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DEVELOPMENT AND VALIDATION OF THE RURAL ACTIVITIES OF DAILY LIVING MANUAL HANDLING SORT

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A thesis submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Doctor of Philosophy

Johannesburg

November 2019

Declaration

I, Jennifer Claire McAdam, declare this research report is my own work. It is being submitted for the degree of Doctor of Philosophy at the University of the Witwatersrand, Johannesburg. It has not been submitted previously for any degree or examination at any other university.



_____

(Signature of candidate)

On this ____29th_____ (day) of _November_____ 2019 _____

in __Johannesburg_____



Once you carry your own water, you will learn the value of every drop.

Dedication

This thesis is dedicated to all those for whom ‘Day Zero’ has been forever – may dignified access to water become a reality for all in our lifetime.

Abstract

Occupational therapists in South Africa provide an essential service to claimants seeking compensation in the medico-legal and insurance industries. Performance in BasicActivities of Daily Living (bADLs) and Instrumental Activities of Daily Living (iADLs) is assessed, as independence in this regard is viewed as a prerequisite of work ability. The household amenities available in less-resourced rural communities differ significantly from those typically available in urban settings. Assessment of rural claimants can be problematic, as existing assessment instruments do not consider the unique manual handling demands of these settings.

The aim of the study was to develop a contextual bADL and iADL assessment instrument to provide South African medico-legal occupational therapists with a means of justifying recommendations to compensation funds suited to the unique needs of rural dwellers. An instrument development design, combined with a descriptive, quantitative research methodology incorporating Rapid Rural Appraisal (RRA) methodologies, was selected to guide the study.

The study was completed in two phases, with the first phase having three stages. Stage I consisted of an electronic survey of medico-legal occupational therapists to indicate their use of bADL and iADL assessment instruments. Data were collected through participatory mapping focus groups with Community Care Workers (CCWs) in Stage II. Data were analysed quantitatively using directed content analysis utilising the ICF and the OTPF III as frameworks for coding to identify domains, and an activity analysis exercise was completed. Stage III consisted of home visits with semi-structured interviews. The equipment used, weights lifted, carried and pushed, time taken and distances walked when performing bADLs and iADLs were measured. Photographic and video data were collected and data were analysed quantitatively

Phase 1 results confirmed the absence of an instrument suitable for assessment of bADLs and iADLs for a rural context. Two Instrumental Activities of Daily Living (iADLs) not previously described in occupational therapy literature, namely water and fuelwood collection, were identified. The forms and manual handling demands of rural bADLs and iADLs were found to differ significantly from those carried out in typical urban Western contexts.

The development of the assessment instrument and the content validity study took place in Phase 2. Data from Phase 1 were used for item identification and development of item descriptors. Content validity was established using inputs from Subject Matter Experts (SMEs). The newly-developed self-report instrument was named the Rural ADL Manual Handling Sort (RAMS) and had three subtests, which corresponded to the manual handling domains. The electronic format enabled generation of reports and results could be triangulated with other aspects of an FCE assessment battery.

Further studies involving field-testing to investigate the remainder of the psychometric properties of the RAMS and its relevance in other fields of practice are anticipated. The study offered insights into the distinct challenges related to completing bADLs and iADLs in a rural, less-resourced context in South Africa. The RAMS includes unique bADL and iADL domains that do not appear in any existing bADL or iADL assessment instrument and will enable medico-legal occupational therapists to provide realistic evidence to compensation funds regarding the manual handling demands of a rural lifestyle.

Key Words: rural, manual handling, occupational therapy, bADL and iADL assessment instrument

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Presentations arising from this study

Three congress presentations arose from this study:

Presentation at the World Federation of Occupational Therapists Congress. Cape Town, 22 May 2018:

Title: 'Water is Life:' The occupational injustice of performing survival tasks in rural South Africa

Authors: Jennifer McAdam, Denise Franzsen and Daleen Casteleijn

Presenter: Jennifer McAdam

Presentation at the 11th Occupational Therapy Africa Regional Group Congress. Kigali, 26 August 2019:

Title: Occupational injustice and water access in rural Africa – Towards inclusion of sustainability in occupational therapy practice and education

Authors: Jennifer McAdam, Denise Franzsen and Daleen Casteleijn

Presenter: Jennifer McAdam

Presentation at the 11th Occupational Therapy Africa Regional Group Congress. Kigali, 28 August 2019:

Title: The development of a South African contextual ADL assessment instrument
Authors: Jennifer McAdam, Denise Franzsen and Daleen Casteleijn

Presenter: Jennifer McAdam

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Authors: Jennifer McAdam, Denise Franzsen and Daleen Casteleijn

Presenter: Jennifer McAdam

Three workshop presentations arose from this study:

July 2017, for Work-Link Vocational Rehabilitation Practice, Johannesburg.

Title: Work-Link ADL Screening Tool – Version for clients from a less-resourced rural context

Author and presenter: Jennifer McAdam

September 2018, at the Chris Hani Baragwanath Hospital - 2018 Occupational Therapy Convention.

Title: The Journey Home: ‘Getting real’ about doing bADL and iADL tasks in a rural context.

Author and presenter: Jennifer McAdam

April 2019, at the Thelle Mogoerane Regional Hospital – Gauteng Provincial Occupational Therapy Forum.

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Operational definitions

Term	Definition
Activity analysis	An analytical analysis intended for the purposes of determining the typically required demands of a task within a given culture; addresses the required body functions, personal factors, and environmental characteristics needed to perform the task successfully. It is used in occupational therapy to design therapeutic activities and identify ways to modify activities for improved performance (Crepeau et al., 2014).
Basic Activities of Daily Living (bADL)	Activities that are orientated towards taking care of one's own body (American Occupational Therapy Association, 2014). Bathing is a bADL domain included in the RAMS: According to the ICF, the code 'd510 Washing oneself' includes bathing, as follows: "Washing and drying one's whole body, or body parts, using water and appropriate cleaning and drying materials or methods, such as bathing, showering, washing hands and feet, face and hair, and drying with a towel" (World Health Organization, 2001). For the purposes of the RAMS, Bathing is defined as the ability to wash one's own, or one's child, or other dependent's body using a plastic basin or a plastic or zink bath.
Community Care Worker	"Refers to any worker, albeit a voluntary worker, who delivers services under the auspices of Home Community-Based Care and Support Programmes both in support of health and social development programmes" (Department of Health, 2009).
Focus groups	Rapid Rural Appraisal (RRA) methodology includes data collection about rural life and resources from groups of rural dwellers. A variety of techniques such as transect walks, participatory mapping, seasonal calendars, time-lines and Venn diagrams are used as semi-structured activities designed to extract information in the context of focus groups (Cavestro, 2003). In this study, the RRA technique used was participatory mapping with groups of

	Community Care Workers. The term *focus groups* thus refers to participatory mapping focus groups throughout the study.
Functional Capacity Evaluation	"FCEs are evaluations designed to measure the capacity to perform activities, and are used to make recommendations for participation in work while considering the person's body functions and structures, environmental factors, personal factors and health status" (Soer et al., 2008).
Instrumental Activities of Daily Living (iADL)	Activities to support daily life within the home and community that often require more complex interactions than self-care used in ADL. (American Occupational Therapy Association, 2014). Four iADLs are included as domains in the RAMS: Collecting fuelwood: According to the ICF, the code 'd6201 - Gathering daily necessities' includes accessing fuelwood, as follows: "Obtaining, without exchange of money, goods and services required for daily living (including instructing and supervising an intermediate to gather daily necessities), such as by harvesting vegetables and fruits and getting water and fuel" (World Health Organization, 2001). For the purposes of the RAMS, Collecting Fuelwood is defined as the ability to access water required for the needs of the household from a source outside of the rural homestead. Collecting water: According to the ICF, the code 'd6201 Gathering daily necessities' includes accessing water, as follows: "Obtaining, without exchange of money, goods and services required for daily living (including instructing and supervising an intermediate to gather daily necessities), such as by harvesting vegetables and fruits and getting water and fuel" (World Health Organization, 2001). For the purposes of the RAMS, Collecting Water is defined as the ability to access water required for survival and hygiene purposes from a communal source outside of the rural homestead.

	Cooking: According to the ICF, the code ‘d630 - Preparing meals’ includes cooking, as follows: “Planning, organising, cooking and serving simple and complex meals for oneself and others, such as by making a menu, selecting edible food and drink, getting together ingredients for preparing meals, cooking with heat and preparing cold foods, and serving the food” (World Health Organization, 2001). For the purposes of the RAMS, Cooking is defined as the ability to cook one’s own or the household’s food on an outdoor fuelwood fire. Doing Laundry: According to the ICF, the code ‘d6400 - Washing and drying clothes and garments,’ defines doing laundry as follows: “Washing clothes and garments by hand and hanging them out to dry in the air” (World Health Organization, 2001). For the purposes of the RAMS, Doing Laundry is defined as the ability to wash one’s own or the household’s clothing by hand, either outdoors in the yard, or next to a nearby communal tap or river.
Manual Handling	The RAMS includes three manual handling domains: Lifting: “Raising or lowering an object from one level to another (includes upward pulling)” (US Department of Labor & United States Employment and Training Administration, 1991). For the purposes of the RAMS, Lifting is defined as the ability to lift household equipment used in bADLs and iADLs in rural contexts. Carrying: “Transporting an object, usually holding it in the hands or arms or on the shoulder” (US Department of Labor & United States Employment and Training Administration, 1991). For the purposes of the RAMS, Carrying is defined as the ability to

	carry household equipment used in bADLs and iADLs in rural contexts over various distances. Pushing: "Exerting force upon an object so that the object moves away from the force (includes slapping, striking, kicking, and treadle action) (US Department of Labor & United States Employment and Training Administration, 1991). For the purposes of the RAMS, Pushing is defined as the ability to push a wheelbarrow loaded with household equipment used in bADLs and iADLs in rural contexts over various distances.
Participatory mapping	"Participatory social mapping is considered as an interactive approach using accessible and free-ranging visual methods in an individual or group interview setting to interrogate qualitative research questions" (Emmel, 2008).
Reconstruction and Development Programme	A South African socio-economic policy framework implemented by the African National Congress government in 1994 aimed at addressing the socio-economic consequences of the Apartheid regime (African National Congress, 1994a).
Rural area	An area typified by villages or settlements with formal and semi-formal dwellings such as houses, huts and rondavels. The area may be under tribal authority and villages often appear as pockets of houses clustered together with large tracts of grassland in between (Laldaparsad, 2011).
Self-report assessment instrument	An assessment instrument that relies on the individual's own report of their symptoms, behaviours, actions, beliefs or attitudes. Respondents read the instrument item questions and select a response themselves, or indicate to the clinician the response they would like to select.
Universal performance skills	Organizing space and objects: Gathers: "Collects together *related* tools and materials into the same workspace and "regathers" tools or materials that have spilled, fallen, or been misplaced"

	Searches / locates: “Looks for and locates tools and materials tools in a logical manner, both within and beyond the immediate environment” Temporal organization of an activity Initiates: “Starts or begins *the next* action without hesitation” Continues: “Performs single actions or steps without interruptions, such that once an action or task step is initiated, the individual continues on without pauses or delays until the action or step is completed” (Fisher & Griswold, 2014). Terminates: “Brings to completion single actions or single steps without inappropriate persistence or premature cessation” (Fisher & Griswold, 2014).

Abbreviations

ALSAR – R2	Assessment of Living Skills and Resources
AMPS	Assessment of Motor and Process Skills
bADL	Basic Activities of Daily Living
CCW	Community Care Worker
CVI	Content Validity Index
DASH & QuickDASH	Disabilities of the Arm, Shoulder & Hand
DOT	Dictionary of Occupational Titles
FABS	Facilitators and Barriers Survey
FCE	Functional Capacity Evaluation
FIM	Functional Independence Measure
HPCSA	Health Professions Council of South Africa
iADL	Instrumental Activities of Daily Living
ICF	International Classification of Functioning, Disability and Health
MBI	Modified Barthel Index
NGO	Non-Governmental Organisation
OSA	Occupational Self-Assessment
OTASA	Occupational Therapy Association of South Africa
OTPF III	Occupational Therapy Practice Framework III
PATS	Pictorial Activity and Task Sort
PC-PART	Personal Care Participation Assessment and Resource Tool
PILE	Progressive Isoinertial Lifting Evaluation
PRO	Patient Self-report Outcome
RAMS	Rural ADL Manual Handling Sort
RDP	Reconstruction and Development Programme
RRA	Rapid Rural Appraisal
SES	Socioeconomic Status
SFS	Spinal Functional Sort
SIS	Stroke Impact Scale
SME	Subject Matter Expert
WFOT	World Federation of Occupational Therapists

WHO	World Health Organization
WHODAS	World Health Organization Disability Assessment Schedule

CHAPTER 1: INTRODUCTION

1.1 Orientation to the study

Occupational therapy intervention focuses on enabling and optimising performance in all occupational areas including Basic Activities of Daily Living (bADLs) and Instrumental Activities of Daily Living (iADLs), which are those tasks that all people engage in to care for themselves, others and their environment as part of their normal daily routines (Fricke, 2010; American Occupational Therapy Association, 2014). Occupational therapy paradigms are primarily based on the concepts of occupational performance and occupational engagement as a means of promoting health and wellbeing (World Federation of Occupational Therapists, 2010). Therefore, understanding the environmental barriers that impact significantly on the potential of individuals and communities to engage in the occupations of their choice and carry out their meaningful occupations within their environment, should direct context-appropriate intervention (Law, 1991).

Many or all of these bADLs and iADLs are affected when an individual becomes disabled and in cases where compensation is to be awarded, occupational therapists complete Functional Capacity Evaluations (FCEs) for medico-legal purposes (Buys & Van Biljon, 2007; Jansen van Vuuren, 2012; Van Biljon, 2013). As part of the FCE, the occupational therapist assesses whether clients have difficulties in terms of physical, psychological and social functioning that affects their ability to carry out their occupations including bADLs, iADLs and work ability (Ciriello & Snook, 1999; Buys & Van Biljon, 2007). The evaluation of their performance of manual handling tasks is an important aspect of work ability. The occupational therapist interprets the assessment findings, and evaluates the results to develop a clear understanding of the consistency of the clients' functioning across assessment categories of occupations. In order for occupational therapists to be able to render appropriate services in rural settings and to advocate for adaptations in the living conditions for optimal independence of their clients, it is essential that assessment of occupational performance is contextualised, with the focus on the client's physical environment, type of settlement and household amenities.

The recommendations that follow focus on the client's physical environment, and the accessibility and resources available in their home and community in order for them to function optimally subsequent to the injuries or condition they have suffered, and include provision of assistive devices, changes to the layout of the client's home, home assistance and possibly reasonable accommodations in the workplace (Buys & Van Biljon, 2007; Van Biljon, 2013; Van Biljon et al., 2016). For these reasons, an understanding of the type of settlement and the household context of clients becomes crucial if the occupational therapist is to make appropriate recommendations so individuals with disabilities can be awarded adequate compensation to optimise their independence in caring for themselves, others and their belongings.

In South Africa, despite significant implementation of economic development policies aimed at reducing inequalities since 1994, the 2011 Census showed that although 77.6% and 53.9% of households in traditional rural areas use electricity for lighting and cooking respectively, only 5.4% have flushing toilets inside the dwellings or on site (Statistics South Africa, 2012). The 2016 Community Survey Statistical Release showed that strides continue to be made regarding water supply, with access to piped drinking water within homestead yards having almost doubled from 16.6% in 1996 to 30% in 2016. Despite this improvement, 15.5% of households still accessed water from outside their yards and 10.1% had no access to piped drinking water (Statistics South Africa, 2016). Thus, many South Africans still have limited access to basic household facilities resulting in individuals living in the rural areas having to use alternate methods to carry out their bADLs and iADLs (Breytenbach, 2016).

The lack of basic resources such as sanitation, electricity and water in rural settings affect participation in other occupations, bADLs, iADLs and care of belongings, others and the home (Naidoo, Van Wyk & Joubert, 2016). Resources such as indoor bathrooms and domestic appliances are often not available in the home environment in order to complete bADLs and iADLs in rural areas in South Africa (Statistics South Africa, 2003). The limited access to basic household amenities of many South Africans, particularly those with mobility difficulties, is thought to make bADLs such as bathing and toileting even more difficult (Breytenbach, 2016). The physical demands of handling equipment to perform activities like washing clothes and bathing are different for people living in less-resourced communities compared to

those living in well-resourced areas. An example of this would be the lifting and carrying of water that has to be fetched from an outdoor and possibly distant tap, versus obtaining water from an indoor pipe system in preparation of doing laundry by hand or using an electric washing machine. As independence in bADLs and iADLs is viewed as a prerequisite for successful return to work, assessment of the higher manual handling capacity required for performance of these occupations in rural contexts rather than just in relation to work is essential (James, 2014; Van Biljon, 2016). These evaluations include occupational forms, performance patterns, habits, routines, methods, environmental context, and challenges regarding execution of bADLs and iADLs, including the household amenities available to the client (Jansen van Vuuren, 2012).

Limited research on the effect of rural environments on bADLs and iADLs has resulted in a lack of valid assessments and consequently, occupational therapists practicing in the rural community context may not have a clear understanding of environmental factors such as the rough terrain and limited infrastructure that impact on their clients' ability to perform these activities (Naidoo, Van Wyk & Joubert, 2017).

According to Van Biljon, there had been notable development of vocational rehabilitation services in the public sector in Gauteng during the two decades prior to the early 1990s (Van Biljon, 2016). However, the challenges regarding staffing and other resources experienced during the initial period after 1994 resulted in these services being lost along with a number of other specialised offerings.The majority of vocational rehabilitation services appear to currently be rendered in the private sector (Buys & Van Biljon, 2007), although verification of practitioner employment sector is unavailable as such information is not recorded by either the Health Professions Council of South Africa (HPCSA) nor the Occupational Therapy Association of South Africa (OTASA). Requests for occupational therapy services by the medico-legal and insurance fraternities have increased markedly in South Africa in recent years (Buys & Van Biljon, 2007; Coetzee et al., 2011; Van Biljon, 2013). The reports that result from the comprehensive FCEs in medico-legal cases are used to assist the courts to quantify and qualify legal matters in personal injury matters, including Road Accident Fund and civil claims. Occupational therapists can be asked to assist the court by being available for consultation or to act as expert witnesses. Similarly, FCEs provide information to insurers regarding claimants'

functioning across occupational performance areas, as well as their potential to return to work. It is essential that occupational therapists rendering FCE services are cognisant of the limitation of amenities in rural less-resourced households as they have an ethical responsibility to ensure their recommendations are comprehensive and appropriate for their clients' contexts (Van Biljon et al., 2014).

The nature of FCEs necessitates a combination of a number of assessments. Often limited time is available for the use of validated tests of performance in bADLs and iADLs, therefore South African occupational therapists working in the medico-legal field make use of non-validated assessment procedures regarding performance of these occupations, such as an interview with the client or their caregiver, or observation of simulated tasks (Van Biljon, 2013). Information regarding difficulties that are identified in these areas is integrated with the results of standardised assessments by exercising clinical judgement to compile lists of client problems. Recommendations are then made regarding provision for intervention, including environmental modifications, home assistance and assistive devices (Buys & Van Biljon, 2007; Jansen van Vuuren, 2012; Slabbert & Edeling, 2012; Van Biljon, 2013).

The accurate evaluation and reporting on manual handling ability needs to be integrated with assessment of performance of bADLs and iADLs, and these findings are an essential part of the occupational therapy assessment reports that form part of the submissions to compensation funds. It is thus viewed as essential that South African occupational therapists make use of an accurate and contextually relevant bADL and iADL assessment instrument, which takes into account the substantial component of manual handling inherent in bADLs and iADLs in the rural less-resourced context.

1.2 Conceptual frameworks

Conceptual frameworks provide a set of lenses to approach the research question and guide a study. They should incorporate relevant theories, findings from previous research, as well as the researcher's own experiences and worldview. The integration of these numerous different but complementary perspectives that capture different aspects of the subject under examination enhance the depth of understanding. The application of conceptual frameworks throughout the research

process needs to demonstrate the researcher's reflections on the research experiences and results (Ravitch & Riggan, 2016).

1.2.1 Researcher's experiential knowledge, beliefs and values

The researcher qualified as an occupational therapist in December 1991, having participated in anti-Apartheid social justice projects as a student at the University of the Witwatersrand. In 1992 when she started her first job in a public sector hospital located in the turbulent East Rand of Johannesburg, pre-democratic South Africa was a society riddled with political violence and inequality, with public sector hospitals still segregated along racial lines in accordance with the statutory Apartheid policies (Coovadia et al., 2009).

Against this background, the researcher was appointed as one of three occupational therapists dedicated to the spinal unit, where being thrown off trains, sustaining gunshot or stab wounds were amongst the most prevalent causes of acute spinal cord injury. In the researcher's six-month tenure at the spinal unit, only one home visit was carried out and that was only after extensive motivations had been submitted by the head of the occupational therapy department to the hospital superintendent. Health services, including occupational therapy were hospital-based as health policy made no provision for primary healthcare (Maillacheruvu & McDuff, 2014). That single home visit was a pivotal moment for the researcher, as she realised the critical importance of understanding the patient's home circumstances to ensure that occupational therapy assessment and intervention was contextually relevant.

The researcher subsequently relocated to the then Orange Free State province, where she worked in a health setting within the gold mining sector. Taking background histories from her patients, the realities of the migrant labour system hit home, with miners relating stories of herding cattle while growing up in deep rural areas. An appreciation of the rural household context that severely disabled miners would return to after their in-patient rehabilitation was reinforced for the researcher.

Fast-forward five years, South Africa's first democratic elections had come and gone, leaving a more stable country full of hope in the new Constitution. The Health Plan of the African National Congress (ANC) was promulgated in 1994, with extensive

primary healthcare services planned as the backbone of the health system (African National Congress, 1994b; Coovadia et al., 2009). The researcher was now the first Assistant Director of Occupational Therapy in Mpumalanga Province and was tasked with developing occupational therapy services across all health districts. Together with colleagues, primary healthcare level occupational therapy services, which included outreach clinics and home visits, were set up. The decade that followed was filled with initiating public sector occupational therapy services in outlying areas and participating in operationalising disability-related government policies on a national level through the National Forum for Occupational Therapy in the Public Sector (The Office of the Deputy President, 1997; Department of National Health, 2000).

The researcher also worked part-time, after hours, from 2004 in a private practice specialising in assessment of medico-legal and insurance claimants. As she resided in an outlying province, most claimants referred for medico-legal Functional Capacity Evaluations (FCEs) lived in rural and less-resourced areas. The researcher realised the available FCE assessment instruments were based on normative data from Western industrial settings and did not take into account the heavy loads routinely handled by rural dwellers as part of their bADLs and iADLs. This view was reinforced when the researcher was subsequently responsible for supervision of occupational therapy students completing their so-called rural public health blocks in Limpopo Province for six years. Community members were frequently observed carrying heavy loads of wood on their heads, as well as carrying or pushing containers of water in wheelbarrows. After numerous informal discussions with colleagues practicing in the vocational rehabilitation field, the researcher was struck by a lack of awareness regarding living circumstances in rural communities; this gap in knowledge could have a negative impact on the accuracy and applicability of recommendations in occupational therapy medico-legal reports.

The researcher's personal and professional alignment with a social justice framework led to the development of the research concept. Her extensive experience of rendering occupational therapy services in home settings in rural contexts resulted in a unique perspective on the performance of bADLs and iADLs and their impact on medico-legal practice. The researcher embarked on her PhD journey to investigate the nature of bADLs and iADLs in a rural context in order to

develop an appropriate bADL and iADL assessment instrument. It was felt such a tool could contribute towards social justice for rural claimants by enhancing the quality of occupational therapy medico-legal evaluations, thus ensuring that compensation optimally addresses their contextual needs.

The critical impact of access to water and electricity on the performance of bADLs and iADLs became apparent as the researcher embarked on data collection in rural villages. After reviewing historical literature and having current exposure to households without access to these resources in rural contexts in South Africa, the researcher confirmed her original premise that limited availability of household amenities impacts significantly on occupational performance in bADLs and iADLs. She realised the high manual handling demands implicit in completing bADLs and iADLs in rural contexts contribute significantly to occupational risk factors such as occupational deprivation and occupational imbalance, and that inappropriate assessment of bADL and iADL performance could result in social injustice due to inadequate compensation for rural dwellers (Durocher, Rappolt & Gibson, 2014; Wrisdale et al., 2017; Whiteford et al., 2018). Further exposure to literature regarding occupational injustice, including occupational apartheid, occupational deprivation and occupational imbalance, led to a new appreciation of the extent of the impact of limited household amenities on occupational engagement in rural communities. The researcher's original paradigm of social justice shifted to one of occupational justice and a strong identification with the World Federation of Occupational Therapists' position on the significance of occupational science to occupational therapy (World Federation of Occupational Therapists, 2012a; Durocher, Gibson & Rappolt, 2014).

1.2.2 Research Frameworks used: Pragmatic and Post-positivist

The pragmatic ontological worldview of the researcher influenced the selection of the research topic and the identification of the research questions. Pragmatism views actions and consequences rather than the adherence to a single particular research approach as paramount, and focuses on utilising research methods that lead to solutions to real-life problems being found. Multiple research procedures and techniques are typically used to achieve the intended consequences, which may arise from social justice or political ideals. This paradigm guided the overall conceptualisation of the study as a means of addressing the perceived dearth of

contextual bADL and iADL assessment instruments appropriate for medico-legal practice (de Vos et al., 2011).

The post-positivist research paradigm is frequently equated with the traditional form of research or the so-called scientific method, which features empirical measurement of phenomena with the aim of determining their causes and the outcomes effected. It also strongly influenced the study and guided the selection of the quantitative research method and the data collection and analysis utilised throughout the study (Cresswell, 2014). The researcher sought to gain a better understanding of the realities faced by rural dwellers and the context in which they conduct their bADLs and iADLs by using multiple methods of data collection. Focus groups, semi-structured interviews and participant observations when visiting community members in their homes all contributed to ensuring the participants' household contexts were adequately reflected.

1.2.3 Theoretical frameworks underpinning the study

Occupational therapy paradigms are primarily based on the concepts of occupational performance and engagement as a means of promoting health and wellbeing (World Federation of Occupational Therapists, 2010). Activities of daily living are viewed as an important category of occupations and an area in which occupational therapists have distinct expertise (World Federation of Occupational Therapists, 2012b). Classifications for activities of daily living include the International Classification of Functioning, Disability and Health (ICF) and the Occupational Therapy Practice Framework III (OTPF III) and these theoretical frameworks underpin this study (World Health Organization, 2001; American Occupational Therapy Association, 2014). In the ICF, activities form the central component of the framework and relate to health, body components, participation as well as personal and environmental factors. The Activity and Participation section of the ICF consists of a list that describes activities by means of a multi-layered coding system, which covers all life areas including self-care, domestic life and work. This classification informed the OTPF III, which was developed to describe these constructs for occupational therapy practice (American Occupational Therapy Association, 2014).

Additionally, work-related practice has been fundamental to the occupational therapy profession since its inception, including the ergonomic considerations of the work

setting (Buys & Van Biljon, 2007; World Federation of Occupational Therapists, 2016). The theoretical basis of ergonomics therefore underpins this study.

1.3 Problem statement

The evaluation of performance in bADLs and iADLs during the FCE and medico-legal assessment process provides the occupational therapist with information regarding the methods, contextual barriers and challenges experienced by the client during the performance of these activities. While there are numerous studies and reports that detail the general living conditions and household amenities in rural communities, there is an absence of literature regarding the physical capacity and manual handling demands of bADLs and iADLs in such contexts (Jagals, 2012; Matsika et al., 2013; American Occupational Therapy Association, 2014; Statistics South Africa, 2016; Wrisdale et al., 2017). At the onset of the study, the researcher had not come across any bADL or iADL assessment instrument which adequately took the context of households in rural less-resourced areas in South Africa into account. The absence of such a validated tool that will stand up to scrutiny in court was thought to make it difficult for occupational therapists to accurately and legitimately evaluate performance of bADLs and iADLs including substantial manual handling demands in less-resourced areas, often causing omissions in medico-legal FCE reports regarding adaptations and compensation. It is therefore important that the type and form of bADLs and iADLs typical of a less-resourced South African context be investigated to enable the development of a contextually relevant bADL and iADL assessment instrument.

1.4 Study questions

The following research questions arose:

1.4.1 To what extent do OTs in medico-legal field consider manual handling demands of bADL and iADL with clients from rural environments?

1.4.2 What should be included in a contextually relevant instrument that assesses the manual handling demands of bADL or iADL in clients living in rural environments?

1.5 Study purpose

The study was conducted to enable occupational therapists to accurately evaluate contextual performance of bADLs and iADLs, which include a substantial component of manual handling. As the intrument items are anticipated to be representative of everyday living in a rural less-resourced area with limited household amenities, the study should enhance access to social justice for occupational therapy clients in the medico-legal and vocational rehabilitation fields in South Africa.

1.6 Study Aims

The study had two aims

Aim 1: To determine whether existing bADL and iADL instruments used by medico-legal occupational therapists are appropriate for assessing manual handling demands of bADLs and iADLs performed in rural communities of South Africa.

Aim 2: To modify an existing bADL and iADL instrument or to develop and validate an instrument for the assessment of bADLs and iADLs that involve a substantial component of manual handling in rural less-resourced areas of South Africa.

1.7 Study Objectives

This study was completed in two phases

1.7.1 Objectives Phase 1

1.7.1.1 **Objective 1:** Determine whether occupational therapists in the South African medico-legal field assess bADLs and iADL as part of their FCEs.

1.7.1.2 **Objective 2:** Identify bADL and iADL assessment instruments most commonly used by occupational therapists in the South African medico-legal field.

1.7.1.3 **Objective 3:** Identify and describe the basic and instrumental activities of daily living that involve a substantial component of manual handling in a rural less-resourced area of South Africa.

1.7.2 Objectives Phase 2

1.7.2.1 **Objective 4:** Develop or modify and instrument for the assessment of bADL and iADL items with substantial components of manual handlling that represent the occupational forms of a rural less-resourced area of South Africa.

1.7.2.2 **Objective 5:** Determine the content validity of the modified or newly developed Rural ADL Manual Handling Sort.

1.8 Study design

The strategy included two phases and quantitative data analysis was utilised throughout. The first phase of the study was a descriptive, sequential, non-experimental research inquiry in three stages, namely an electronic survey, focus groups and home visits. The epistemology of this phase was considered *etic* (outsider perspective), as well as *emic* (insider perspective) as both a survey of outsiders and focus groups and home visits with insiders were conducted (Cresswell, 2014). The data from the Stage I electronic survey of occupational therapists practicing in the medico-legal field provided information regarding the extent to which bADLs and iADLs are assessed as part of FCEs and the methods of assessment of bADLs and iADLs most commonly used in South Africa, thus the *etic* or outsiders' perspective.

The design of the focus groups with Community Care Workers (CCWs) focused on quantitative identification of bADLs and iADLs typically performed in rural less-resourced areas and incorporated Rural Rapid Appraisal (RRA) methodologies to obtain rich information regarding the context and nature of the performance of these bADLs and iADLs (Pretty, 1994; Freudenberger, 1999; Cavestro, 2003; White & Marsh, 2006; Ponto, 2015). In this study, the RRA technique used was participatory mapping with groups of Community Care Workers. The term *focus groups* thus refers to participatory mapping focus groups throughout the study. This data, together with the data collected during home visits to members of communities living in rural less-resourced areas, provided the *emic* or insiders perspective. The data was essential to gain insight into the challenges experienced by rural dwellers when conducting bADLs and iADLs. The selection of the CCWs and community members

assisted in obtaining perspectives that were rooted within the participants' experiences of living within the rural less-resourced context.

The instrument development design (McCoach, Gable & Madura, 2013) was continued in the second phase of the study to fulfil the aim of developing and validating the new instrument for contextual assessment bADLs and iADLs that involve a substantial component of manual handling in rural less-resourced areas of South Africa.

The steps of instrument design were followed in the construction of the newly developed instrument, including the determination of the content validity (Lynn, 1986; Polit & Beck, 2006; Cresswell, 2014). The results obtained from Stages II and III of the first phase where data were collected and analysed using the ICF and OTPF III frameworks were used to develop and finalise the domains and items to be used in the development of the new contextual bADL and iADL assessment instrument.

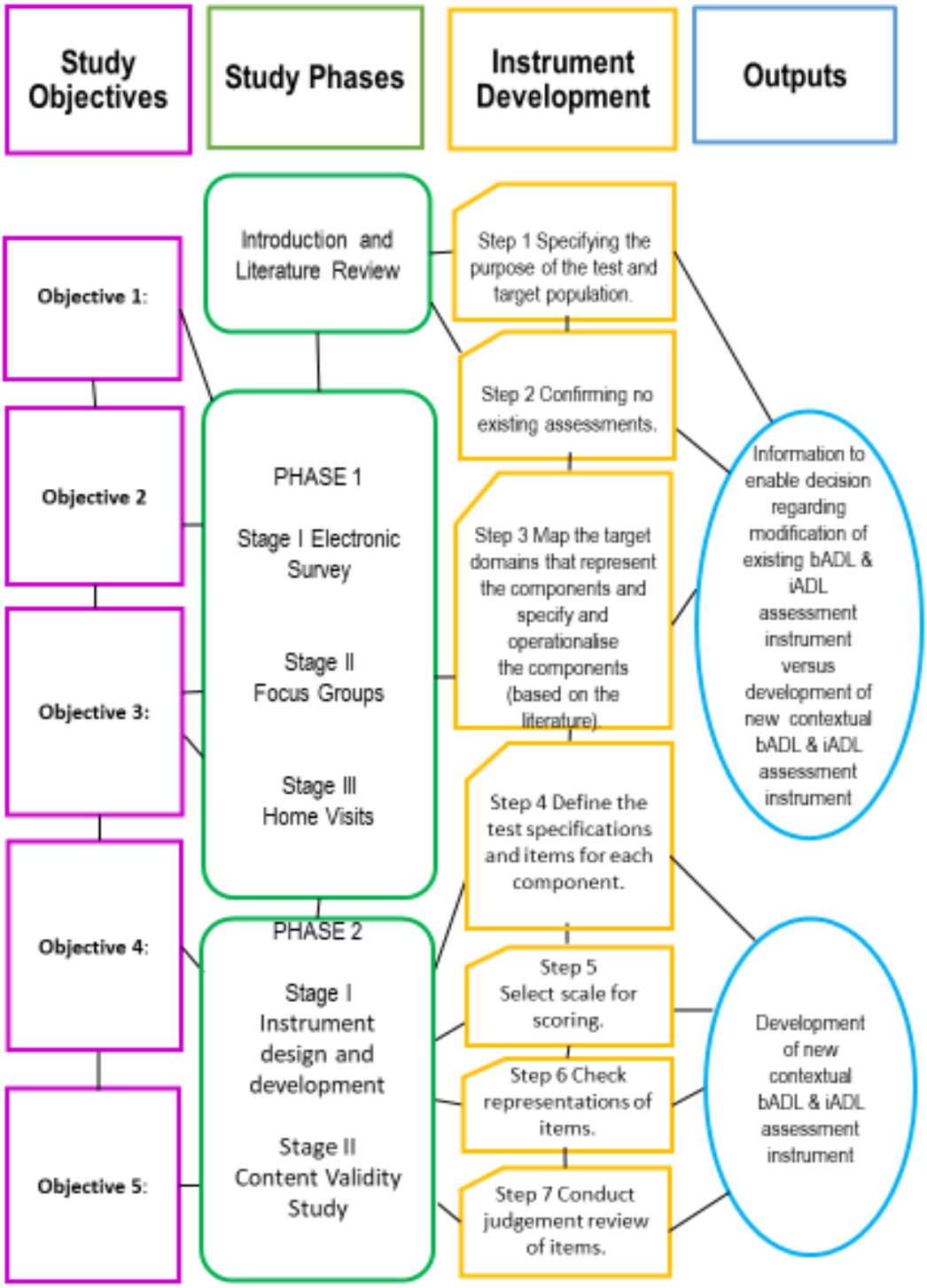


Figure 1.1 Study design flowchart

1.9 Study justification

To date, assessment of manual handling performance has been limited to the work context and the manual handling requirements for independence in bADLs and iADLs typical of rural contexts have not been established.

The development of an assessment instrument for bADLs and iADLs performed in a rural setting can be used by medico-legal occupational therapists to enhance the appropriateness of their recommendations regarding compensation. The assessment instrument will allow for the identification of bADLs and iADLs performed by claimants who reside in or would be returning to rural areas. The comparison of the physical capacity and manual handling demands of these identified bADLs and iADLs, with the clinical findings according to the standardised manual handling evaluation tools, will enable medico-legal occupational therapists to support their recommendations regarding home assistance, home adaptations and assistive devices with evidence.

1.10 Outline of the thesis

This thesis is written in the traditional thesis format for each phase. The structure of the report is the traditional introductory contextualisation chapters, followed by chapters showing the process and results of both phases of the study in a block format, with Phase 1 methodology, results and discussion presented before Phase 2 methodology, results and discussion, ending in a concluding reflection chapter. The thesis is written in the objective academic person.

The thesis is divided into the following chapters:

Chapter 1 Introduction

An orientation to the research gives the background to and the context of the research. An introduction to the relevance of assessment of performance in bADLs and iADLs as part of an occupational therapy FCE for medico-legal purposes in South Africa is presented. The need for an appropriate assessment instrument to evaluate bADL and iADL performance for clients living in a rural less-resourced context where there are substantial physical manual handling demands is argued. The background and rationale of the study are provided and the problem statement,

research questions, aims, objectives, justification of the study and overall research design are presented. The worldview and paradigm of the research are discussed. The researcher's worldview was the reason for embarking on the inquiry and influenced the research framework choices. The significance and contribution of the research is discussed and the layout of the report is provided.

Chapter 2 Review of the literature

This chapter reviews the literature on FCEs conducted by occupational therapists rendering medico-legal services in South Africa, including the assessment of manual handling, bADL and iADL performance. The association between the environmental context and household amenities of the client and the heightened physical demands of manual handling in bADLs and iADLs in rural contexts is explored. The assumptions and gaps regarding environmental context underpinning theoretical Frameworks and models, as well as existing bADL and iADL assessment tools are considered. Theoretical perspectives regarding instrument development and content validity are provided. The chapter addresses Step 1 of the instrument development process as shown in Figure 1.1.

Chapter 3 Methodology Phase 1

This chapter presents the methodology and explains the approach taken for each of the three stages of Phase 1 of the study. It sets out the research design and the setting. The research process is discussed and the internal and external validity of Phase 1 of the research and ethical considerations considered.

Phase 1 of the study was designed to address Steps 1, 2 and 3 of the instrument development process, as shown in Figure 1.1. This phase had three sequential stages, which were designed to establish the need for the modification of an existing bADL and iADL instrument or the development a new bADL and iADL instrument and to provide baseline data for the mapping of the target domains and components in the modified or new contextual bADL and iADL assessment instrument detailed in Phase 2 of the study.

The objectives of Stage I were to determine the extent to which occupational therapists in the medico-legal field in South Africa conduct bADL and iADL assessments as part of FCEs and to identify the bADL and iADL assessment

instruments most commonly used. An electronic survey of 392 occupational therapists working in the medico-legal field of occupational therapy was used to obtain data regarding inclusion of bADL and iADL assessment in FCEs and the bADL and iADL assessment instruments used. The survey was distributed to occupational therapists in the identified study population by means of the membership database of the Occupational Therapy Association of South Africa (OTASA, 2016).

Stages II and III were designed to address objective 3 of the study. Stage II focused on identifying the available household and community amenities, as well as identifying and describing the bADLs and iADLs involving a substantial component of manual handling that are typically carried out in a rural less-resourced area of South Africa. Participatory mapping focus groups to determine the perspectives of Community Care Workers (CCWs) were facilitated by the researcher.

Stage III involved semi-structured interviews conducted during home visits to community members to investigate the bADLs and iADLs comprising a substantial component of manual handling in a rural less-resourced area.

Chapter 4 Results Phase 1

The results were presented separately in this chapter for each stage of Phase 1 of the study; the results of each stage were found to be satisfactory. Information regarding the inclusion of bADL and iADL assessment as part of FCEs and the use of bADL and iADL assessment instruments by South African medico-legal occupational therapists, as well as the type and form of bADLs and iADLs with manual handling demands is provided.

Chapter 5 Discussion Phase 1

This chapter presents a discussion of the findings of Phase 1. The discussion includes the implications of the findings for the identification of the domains and items for the modification of an existing instrument or the development of a new instrument in Phase 2.

Chapter 6 Methodology Phase 2

This chapter presents the methodology and explains the approach taken for Phase 2 of the study, as shown in Figure 1.1. Phase 2 utilised the baseline data for the identification and quantification of domains from Phase 1, regarded as Steps 1, 2 and 3 of instrument development, to develop the new contextual bADL and iADL assessment instrument. The methodology utilised for the development of the new instrument by following Steps 4 and 5 of instrument development is described. Thereafter, Steps 6 and 7 of the instrument development process are addressed and the methodology for the process of exploring content validity of the newly developed instrument is described.

Chapter 7 Results Phase 2

This chapter presents the results of Phase 2 and describes the steps followed to develop the new contextual bADL and iADL assessment instrument. The selection of the scoring system is described and the links between the scores and the manual handling norms from the literature are explained. The results of the content validity study were analysed to confirm the content validity of the newly developed instrument, which was found to be satisfactory but could be improved with revision of some items. The newly developed contextual bADL and iADL assessment instrument was named the Rural ADL Manual Handling Sort (RAMS)

Chapter 8 Discussion Phase 2

This chapter presents a discussion of the process that was followed to identify the RAMS domains and items utilising the data from Phase 1. The content validity study found the format and content of the newly developed instrument to be satisfactory. Changes made to the RAMS after being piloted for content validity are discussed. A discussion of the interpretation of the RAMS scores together with the potential impact of the instrument in the occupational therapy medico-legal field follows.

Chapter 9 Conclusion

This chapter presents a summary of the findings of the study for the two phases in a sequential manner. The strengths and contributions of the study, as well as the limitations and recommendations for further research are included.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The aim of this chapter is to review the literature on assessment of performance in manual handling, bADL and iADL, in the context of medico-legal occupational therapy evaluations, and the impact that limited household amenities of rural dwellers have on the performance of these tasks. The role of occupational therapy in the medico-legal field and the methods and importance of evaluation of performance in manual handling, bADLs and iADLs as part of a medico-legal evaluation are reviewed. The South African context regarding household conditions in rural areas is presented and linked to the manner in which bADLs and iADLs are done in such areas. Lastly, a background to bADL and iADL frameworks and assessment instruments is considered and the gaps regarding their application to a rural less-resourced context are outlined. The chapter concludes by presenting the theoretical frameworks around the instrument development process, with particular focus on the establishment of content validity and self-report assessment instruments.

Literature was sourced from the following databases: PubMed, CINAHL Complete, Science Direct, Sabinet ~~EBSCO Host~~ and SCOPUS. Studies were collected up to June 2019. The following keywords were used: occupational therapy, activities of daily living, ADL instrument, ADL scale, household water access, functional capacity evaluation, manual material handling, lifting, carrying and pushing. Literature lists of relevant articles were also evaluated. Only studies written in English were included.

2.2. Medico-legal occupational therapy services in South Africa

2.2.1 Role of the occupational therapist in Functional Capacity Evaluations

Functional capacity evaluation is the gold standard for measuring work capacity and is relied on by courts, insurers and clinicians both internationally and in South Africa (Hart, Isemhagen & Matheson, 1993; Gibson & Strong, 2003; Buys & Van Biljon, 2007; Joss, 2011; Van Biljon, 2013; Ramano & Buys, 2018). Claimants of compensation are usually assessed by numerous health professionals who then

provide reports, which are submitted to the authority providing compensation, as evidence of the severity of the injuries, as well as the ongoing care requirements of the claimant.

A primary aim of occupational therapy is to enable occupational engagement, including work (James, 2014; World Federation of Occupational Therapists, 2016). Occupational therapy services in the field of vocational rehabilitation have been shown to have a positive impact on patients' ability to return to work (RTW) (Joy, Lowy & Mansoor, 2001; Jousset et al., 2004), but further research is needed to establish exactly which aspects of occupational therapy intervention correlate with RTW (Desiron et al., 2011). Occupational therapists practicing in this field carry out comprehensive FCEs to apprise the Court or the compensation authority as to the impact of the injuries sustained, the extent of the impairments and their implications in terms of the person's functional ability in everyday life activities.

In order to provide this information, occupational therapists perform comprehensive evaluations to establish the claimant's occupational performance and engagement across all spheres of life. One such compensation authority is the Road Accident Fund, which bases the determination of serious injury on the American Medical Association Guide. The use of this guide in South Africa has raised concerns in both the medical and occupational therapy fraternities, as it is not regarded as an accurate measure of disability. In addition, the American Medical Association Guides do not make provision for the impact of environmental or contextual factors on functional outcomes, therefore the Narrative Assessment tool, for the determination of whether or not the claimants' injuries meet the criteria of so-called serious injury, is also used. Commentators have noted that the Narrative Assessment tool provides a more comprehensive description of the non-medical factors that influence functional outcomes after injury. As such, the Narrative Assessment tool is viewed as essential in the South African context, where disparities in incomes have a major impact on issues such as access to healthcare, rehabilitation, housing, transport and skill level (Edeling et al., 2013). The power of the Narrative Report lies in the court being provided with an accurate picture of each claimant's unique circumstances, and occupational therapists have a significant role to play in terms of this in order to optimise the appropriateness and completeness of recommendations for compensation.

South African occupational therapists working in the medico-legal field have increasingly made a significant particular contribution to the Narrative Report to provide quantification of the consequences of the serious injury for each individual's unique circumstances. This is supported by the focus of occupational therapy intervention on enabling and optimising performance in all occupational areas, including bADLs and iADLs, which are those tasks that all people engage in to care for themselves, others and their environment as part of their normal daily routine (Fricke, 2010; American Occupational Therapy Association, 2014). Many or all of these bADLs and iADLs are affected when an individual becomes disabled. In the medico-legal field, Functional Capacity Evaluations (FCEs) and occupational therapy reports emphasise the ability of the claimant to carry out their bADL and iADL tasks and to work or generate income. Recommendations include whether the claimant can return to their job, with or without adjustments, and accommodations at home and in the work-place to do bADLs and iADLs, or whether they need to be placed in an alternative job (Buys & Van Biljon, 2007; Van Biljon, 2013). The occupational therapy reports are thus utilised in the process of determination of compensation, which is based on the degree of disability resulting from the serious injury.

Evaluations of performance of occupational performance in bADLs, iADLs and work, including the manual handling in these occupations, thus form an important part of the medico-legal evaluation process. Such evaluations are triangulated to determine potential for return to work (RTW) and any accommodations, assistive devices and caregiving the claimant may require. The findings of the bADL and iADL evaluation are of particular importance when formulating recommendations regarding the future planning for the claimant, where differentiation is required between curatorship, institutional living, supported living and independent living (James, 2014).

In order to provide assessment results that can withstand rigorous interrogation in court, occupational therapists in the medico-legal field make use of standardised Functional Capacity Evaluation (FCE) tools to evaluate the functional abilities of claimants (Slabbert & Edeling, 2012; Van Biljon, 2013). This battery of standardised assessments includes providing information regarding physical capacity, which involves strength and endurance required to perform the activities the individual completes on a daily basis; this includes walking and manual handling tasks similar to the demands of their job or everyday life activities. Evaluation of the performance

of manual handling tasks allows for recommendations regarding work ability when the claimant's job entails such tasks (U.S. Department of Labor Employment and Training Administration, 1991; Ciriello & Snook, 1999; Buys & Van Biljon, 2007; Van Biljon, 2013).

2.2.2 Manual handling tasks

Historically, manual handling tasks in industrial settings were defined as including lifting, lowering, pushing, pulling and carrying (Ciriello & Snook, 1999; Liberty Mutual Group, 2004). Long-term ergonomic studies were conducted to quantify the spectrum of human ability in these tasks and make the necessary adjustments to the design of workstations for bADLs, iADLs and work activities, to minimise the incidence of injury. These studies involved controlled experiments with factory workers using psychophysical methodology, with manual handling tasks being conducted using varying weights and frequencies, heights of lifts, task duration and sizes of objects being handled (Snook & Ciriello, 1991; Liberty Mutual Group, 2004; Coetzee et al., 2011).

A number of studies have been conducted to ascertain the safe limits for manual handling in industrial settings, as shown in Table 2.1. The best estimate of maximum weights and forces appropriate for the male and female populations in the industrial workforce are shown in the Snook Tables, which were originally published in 1978, then subsequently revised in 1991 (Ciriello & Snook, 1999). The NIOSH equations also provide guidance regarding recommended limits for lifting and were revised in 1991 (Waters et al., 1993). The more recent Liberty Mutual studies provided information regarding the limitations and maximum capabilities for each manual handling task. Guidelines based on the tables were created for industry, to minimise disability resulting from lower back injuries caused by workers doing manual handling tasks as part of their work; these guidelines highlight manual handling tasks in the workplace that need to be ergonomically redesigned. Recommendations followed that manual handling tasks should be designed for the capabilities of 75% of the female population in order to minimise risk of injury to the general work population, and any tasks that only 10% or less of the population are capable of, should be redesigned (Liberty Mutual Group, 2004).

Table 2.1 Summary of studies showing manual handling weights and loads in industrial settings

Study author	Study summary	Time	Manual handling weights and loads						
			Occasional lift (Floor to knuckle)	**Occasional lift (Knuckle to shoulder)**	**Occasional lift (Shoulder to overhead)**	**Carry (two hands)**	**Carry (One hand)**	**Carry (on head)**	**Push**
(Ciriello & Snook, 1999)	A descriptive and analytical research design - analysis on 25,291 manual materials handling (MMH) tasks obtained from 2442 reports. Established proportions of the population who could complete the tasks within their physical capabilities.	-	17-27 kg (M) 12-19 kg (F)	17-26 kg (M) 12-16 kg (F)	13-24 kg (M) 8-14 kg (F)	20 kg (M) *˜ 16 kg (F) *˜	-	-	20 kg (M) * ³ 16 kg (F) * ³
(Shoaf et al., 2010)	Maximum acceptable weights and forces for the industrial population for proportions of this population were calculated, through model development using mathematical models which included a combination of a biomechanical and psychophysical approaches.	-	-	-	-	24 kg (M) 16.3 kg (F) º	-	-	20.0 kg (F) 32.0 kg (M) »
(Waters et al., 1993)	Descriptive study to review the three criteria for the design and evaluation of manual lifting tasks in the 1991 National Institute for Occupational Safety and Health (NIOSH) equation for lifting capacity " recommended weight limits for prevention of lower back pain in workers	-	10 kg	13 kg	6 kg	-	-	-	-

M = Males

F = Females

º = over distance of 4.3 m

˜ = 8.5 m at height 111 cm from floor

* = value that 90 % of the industrial population is capable of

³ = over distance of 61 m

» = over distance of 30.5 m

2.2.3 Evaluation of manual handling

There is abundant literature pertaining to the measurement of maximum human capacity in manual handling tasks in industrial settings, particularly in the Global North. The normative data in the Snook Tables, the Liberty Mutual Guidelines, the Revised NIOSH Equation and the standardised FCE protocols all stipulate the conditions under which manual handling task evaluations be performed, including the dimensions of the objects to be handled and the surfaces of the environment in which the evaluation is to take place. The standard heights from the floor to which objects are lifted or from which they are lowered, as well as the distances over which objects are carried and pushed are stipulated (Snook & Ciriello, 1991; Waters et al., 1993; Ciriello & Snook, 1999; Liberty Mutual Group, 2004). The manual handling capacity of an individual can thus be measured in the clinic and the results interpreted according to these norms. When making use of the Snook Tables, the occupational therapist can compare the individual patient's results to the percentage of the industrial population able to perform the same task as a regular part of their daily work duties. As weights and loads increase, typically fewer workers can handle them, thus those for 90% of the industrial population are lower than those that only 10% of the same population can manage (Ciriello & Snook, 1999).

Comparison of the results on standardised FCE test batteries with the aforementioned normative tables and guidelines continues to be practised widely as part of medico-legal occupational therapy evaluations (Oliveri, 1959; Matheson, Isemhagen & Hart, 2002; Soer et al., 2006; Bieniek & Bethge, 2014). Most commercially available FCE test batteries, such as the Isernhagen Work Systems Functional Capacity Evaluation (IWS FCE Workwell System), Ergo-Kit FCE and ErgoScience, include systematic evaluation of performance of all components of manual handling tasks (Gross, Battie & Cassidy, 2004; Soer et al., 2006; Bieniek & Bethge, 2014).

A number of aspects of FCE instruments need to be considered when selecting the most appropriate for each specific clinical setting and circumstances of the patient. These include safety, reliability, validity, practicality and utility (Hart, Isemhagen & Matheson, 1993). Compliance with safety standards during administration of the FCE can minimise the potential risk for the patient, such as a temporary increase in

symptoms after FCE (Reneman et al., 2006). Each FCE instrument has their own set of supporting research data regarding their overall validity and reliability (Reneman et al., 2006; Streibelt et al., 2009; Ciccolella & Davenport, 2013; Bieniek & Bethge, 2014). Limited concurrent validity between a number of FCE instruments has however been demonstrated and they cannot be used interchangeably (IJmker, Reneman & Gerrits, 2003; Gouttebarge et al., 2004). While reliability and validity in terms of assessment of functional capacity and provision of information required for successful rehabilitation is well established, there is limited correlation between FCE and predictability of RTW and sustained RTW (Hart, Isemhagen & Matheson, 1993; Gross & Battié, 2005; Streibelt et al., 2009). Practicality of the FCE is important, as such assessments can be costly and time-consuming with duration varying between four hours and two days (Gouttebarge et al., 2004). Consideration of the most important and useful aspects for inclusion in the FCE becomes essential. A study regarding the test-retest reliability of the Workwell lifting and carrying subtests concluded that justification of a two-day evaluation for these aspects was not possible given consumer pressure to spend reduced time on FCEs (Reneman et al., 2002).

A number of limitations of FCEs have been reported, including the question of extrapolation of findings from the relatively short FCE assessment period to the ability to sustain work capacity in employment settings. Furthermore, as an FCE is usually administered in a single session, accurate evaluation of patients with conditions that fluctuate, as well as the impact of the FCE in terms of pain and fatigue during the days immediately after completion, are difficult to ascertain (Ciccolella & Davenport, 2013).

The individual's performance in lifting is classified according to the Dictionary of Occupational Titles (DOT) into physical demand categories, namely sedentary, light, medium, heavy and very heavy, based on the intensity of the lifting, carrying and pushing tasks (U.S. Department of Labor Employment and Training Administration, 1991). Physical capacity performance can then be compared to the physical demand requirements of the individual's work-related tasks according to the DOT, as shown in Table 2.2 (U.S. Department of Labor Employment and Training Administration, 1991; Matheson, 2004), and can be extrapolated to the whole work day, demonstrating whether the individual would be able to maintain the task at the

required frequency for the entire work day (Oliveri, 1959). A lifting task performed at a frequency of less than 33% of an eight-hour work day is defined as occasional lifting, one performed for 34% to 66% is defined as frequent, whereas one performed for 67% to 100% of the work day is termed constant lifting (U.S. Department of Labor Employment and Training Administration, 1991; Matheson, 2004). The potential for the claimant to RTW can be quantified, and recommendations regarding mechanisms to optimise productivity within their capabilities and limitations follow (Dempsey & Maynard, 2005; Shoaf et al., 2010).

Table 2.2 Physical Demand Characteristics of Work (U.S. Department of Labor Employment and Training Administration, 1991; Matheson, 2004)

Physical Demand Level	**OCCASIONAL** **0-33% of the workday**	**FREQUENT** **34-66% of the workday**	**CONSTANT** **67-100% of the workday**	**TYPICAL ENERGY REQUIRED**
Sedentary	1-10 lbs (4.5 kgs)	Negligible	Negligible	1.5-2.1 METS
Light	11-20 lbs (9kg)	1-10 lbs (4.5kgs)	Negligible	2.2-3.5 METS
Medium	21-50 lbs (9 to 23kgs)	11-25 lbs (4.5 to 11.4kgs)	1-10 lbs (4.5kgs)	3.6-6.3 METS
Heavy	51-100 lbs (23 to 45kgs)	26-50 lbs (11.4 to 23kgs)	11-20 lbs (4.5 to 9kgs)	6.4-7.5 METS
Very Heavy	Over 100 lbs (over 45kgs)	Over 50 lbs (over 23kgs)	Over 20 lbs (over 9kgs)	Over 7.5 METS

Of all manual handling tasks, two-handed lifting has shown to have the strongest association with lower back injuries and lower back pain in industrial settings. This finding led to the development of assessment instruments, such as the Progressive Isoinertial Lifting Evaluation (PILE) and the Isoinertial Lifting Protocol, to evaluate and measure lifting ability in the clinic, as part of a comprehensive battery of physical capacity testing. If the client's job requires them to lift on an occasional basis (for up to one third of their workday) then the Isoinertial Lifting Protocol is the suitable assessment instrument. If the client's job requires them to lift on a frequent or constant basis (for more than a third or two thirds of their workday respectively) then

the Progressive Isoinertial Lifting Evaluation (PILE) should be conducted after completion of the Isoinertial Lifting Protocol.

The study by Lee (2005) added to the understanding of maximum human isoinertial lifting capability and detailed the order of difficulty in terms of physical demand regarding different types of lifts. So-called *floor to knuckle* lifts, i.e. lifts from the floor to the height of the knuckles when the arms are hung loosely at the side, are the least physically demanding, consequently the heaviest weights can be lifted to this height. Lifts become more physically demanding the higher the object has to be lifted, with difficulty increasing from *knuckle to shoulder* to the most physically demanding *shoulder to overhead* lifts (Ciriello & Snook, 1999; Matheson, Isemhagen & Hart, 2002; Gross, Battie & Cassidy, 2004; Soer et al., 2006; Spavins, 2011; Van Staden, Kemp & Beukes, 2011). The performance in floor to knuckle lifting in particular has been found to be the strongest predictor of RTW (Mayer et al., 1988; Matheson, Isemhagen & Hart, 2002).

There is a paucity of literature regarding the load-carrying of rural dwellers in the developing world (Lloyd et al., 2010). It is of importance to note that the standardised tests used in South Africa for evaluation of manual handling, which are based on the maximum loads and forces for industrial settings described in the literature, exclude head-loading, one-handed lifting and carrying, as well as pushing objects other than loaded trolleys, such as a wheelbarrow (Liberty Mutual Group, 2004). One-handed lifts are regarded as being the most physically demanding and are not recommended from an ergonomic perspective, as the uneven spinal loading is associated with an increased risk of back injury (Liberty Mutual Group, 2004; Lee, 2009).

In the medico-legal context, when compensation is at stake, the occupational therapist has to provide comment on possible symptom magnification. The results of the standardised FCE tests, the interview and clinical observations are triangulated to obtain a comprehensive view of the claimant's functioning and to test for consistency across assessment areas. The comparison of manual handling, bADL and iADL results, for example, can often highlight inconsistencies in the information provided by the claimant. Since independence in bADLs and iADLs is viewed as a precursor for work ability, this occupation needs to be thoroughly evaluated so that the occupational therapist can provide evidence of the claimant's RTW potential.

Accurate evaluation and reporting on difficulties in performance in bADLs and iADLs are therefore an essential part of the occupational therapy assessment reports that form part of the Narrative Assessment tool submissions. The Spinal Functional Sort is a self-report manual handling instrument commonly used in medico-legal evaluations in South Africa, which includes functional bADL and iADL tasks (Matheson & Matheson, 1989; Matheson, Matheson & Grant, 1993). However, the instrument items are reflective of a well-resourced Western setting and there is no such assessment instrument for rural contexts.

Many medical experts that conduct evaluations of claimants seeking compensation, including occupational therapists, tend to have a limited appreciation of the household and community context of rural dwellers. This can arguably contribute to inadequate or inappropriate evaluation, thereby compounding the true impact of the injuries sustained on the individual's quality of life. It is important to ensure the evaluation of bADLs and iADLs in medico-legal evaluations takes cognisance of the claimant's household and community environment context. It follows therefore that there is a need to describe the material handling in household tasks typical of a rural less-resourced South African context.

2.3 Household amenities in rural South Africa

Settlements in South Africa are classified as being in urban areas, traditional areas or farm areas, according to Statistics South Africa (Statistics South Africa, 2003; Housing Development Agency (HDA), 2013). The results of the 2011 Census indicated that 67.7% of the population is found in urban areas, while the remainder lives in rural areas, with 27.1% in traditional areas and 5.3% in farm areas respectively. More than 80% of households found in urban areas have access to basic household amenities, including clean-piped water, electricity, flushing toilets and refuse removal. However, this is not the case in rural areas, where many households still have limited access to these amenities.

2.3.1 Access to water

Access to water is viewed as a human right and as being central to sustainable development, as enshrined in the Sustainable Development Goal (SDG) 6, to 'Ensure availability and sustainable management of water and sanitation for all'

(United Nations, 2015). According to the 'United Nations Report on Global Issues – Water,' 71% of the world population has access to safe water on their own premises but this is not true for the remaining one third of the 2.1 billion people worldwide, most of whom live in rural areas (United Nations, 2018a). The same report states that 4.5 billion people worldwide do not have access to safe sanitation services. Inconsistent access to potable water is thus a global issue affecting many water-scarce countries such as South Africa, and is exacerbated by climate change and population growth (United Nations, 2018b).

Access to water resources has historically been inequitable in South Africa. The riparian apartheid era water policy framework granted water rights only to landowners and as the majority of South Africans were precluded from property ownership, this translated into Black South Africans being denied access to water for domestic and irrigation purposes (Mokgope & Butterworth, 2001; Perret, 2002; Masangu, 2009). The separate development policy meant the majority of the Black population resided in specifically allocated areas known as homelands, where limited basic infrastructure, such as piped water supplies, was developed (Wrisdale et al., 2017). Wrisdale et al. (2017) postulated in their recent study, regarding factors influencing the impact of limited water access that occupational apartheid continues to prevail as a legacy of the historical inequities in water access in rural South Africa. They point out that the limited water infrastructure that still exists in areas that were historically part of the Black Homelands prior to 1994, is as a direct result of different water and sanitation systems being developed along racial lines according to the 'separate development' policy. The resultant inequity in terms of water access perpetuates the exclusion of communities from opportunities to overcome poverty. "Indeed, apartheid created physical, legal and social barriers in its separate development, producing a disabling environment with unequal access to water and sanitation" (Wrisdale et al., 2017) p. 275).

Water policy reform was prioritised subsequent to South Africa's first democratic elections in 1994. The Water Services Act (WSA) No 108 of 1997, the National Water Act (NWA) No 36 of 1998 and the Strategic Framework for Water Services all aimed at addressing the past inequities and recognising the right of all citizens to a basic water supply (Department of Water Affairs and Forestry, 1997, 1998, 2004a). The riparian system of individual rights to water was abolished in this new legislation,

with water resources being viewed as a national asset. The Reconstruction and Development Programme (RDP) made provision for all South Africans to have equitable, sustainable and efficient access to water for their basic needs including drinking, cooking, and personal and household hygiene. This basic water supply was defined as a minimum of 25 litres per capita per day, within a distance of 200m from the household, at a flow rate of 10 litres per second and at a 98% level of reliability of service delivery (Department of Water Affairs and Forestry, 1994).

The new policy framework of 1994 was implemented through numerous government-driven programmes to achieve this RDP standard, including water infrastructure development in the Limpopo Province (Department of Water Affairs and Forestry, 2004b). These strategies significantly improved water access, but many rural communities could not afford to pay for the newly installed water services and reverted to collection of water from free sources such as rivers. The Free Basic Services Policy of 2000 was thus instituted, which made provision for 6 kilolitres of free municipal water per household per month (Department of Water Affairs and Forestry, 2004a).

Despite the implementation of these progressive water policies in South Africa since 1994, the 2011 Census showed only 38% of households had access to piped water inside their dwellings, or on site in rural areas (Statistics South Africa, 2012). By 2014, the Human Rights Commission Report on 'Access to Water and Sanitation in South Africa' reported that this figure had increased to 46.3%. The same report stated that 85% of South African households had stable municipal water supplies in place that met the RDP standard by being closer than 230 m from the dwelling. This is consistent with the 2016 Community Survey Statistical Release, which showed that 15.5% of households were found to still access water from outside their yards and 10.1% of households had no access to piped drinking water (Statistics South Africa, 2016).

The abovementioned Human Rights Commission Report further indicated that in Limpopo Province specifically, only 18.4% of households have access to piped water within their homes, 33.9% have access to piped water within their properties and 20.5% have access to piped water within 230 m of their homes, while 13.2% of households have to walk further than 230 m to access piped water and 14.0% have

no access to piped water at all. Despite the improvements challenges remain, with many South Africans living in rural less-resourced areas still having limited access to water within their homesteads (South African Human Rights Commission, 2014). Furthermore, the impact of not having access to a safe water supply is particularly significant for women and girls, as it most often falls to them to fetch water, at great expense in terms of energy expenditure, time and exposure to attack (World Health Organization and United Nations Children's Fund, 2017; United Nations, 2018b).

Globally the attainment of sustainable water services includes access to sanitation and hygiene over and above basic access to water (Coussens, 2009). The essential link between these concepts is encapsulated in the term WASH, which stands for Water, Sanitation and Hygiene.

2.3.2 Access to sanitation

There are 2.3 billion people globally who lack access to a basic sanitation service. While 39% of the global population have a safe sanitation service, this figure goes down to 28% in Sub-Saharan Africa with rural dwellers being the least likely to have adequate sanitation services. There are significant global efforts to remove inequalities in access to the sanitation component of WASH as enshrined in the SDG Goal 6, with specific objectives detailing worldwide targets to be achieved by 2030 (World Health Organization and United Nations Children's Fund, 2017).

In South Africa, 60% of households have access to sanitation by means of a flush toilet, and 70% have access to sanitation that meets the 'RDP' standard. The situation in rural areas is somewhat different, with only 5.4% of households having flush toilets inside the dwellings or on site. Almost two-thirds of households in the Limpopo Province do not have access to adequate sanitation, with 52.9% having an unventilated pit latrine, 0.6% having a bucket latrine and 7.2% of households having no sanitation service at all (South African Human Rights Commission, 2014).

2.3.3 Access to electricity

The rollout of electricity connections throughout South Africa was accelerated subsequent to the first democratic elections in 1994, when the ruling African National Congress included an agreement with the South African electricity utility, Eskom, for the electrification of 2.5 million households within their 1994 election manifesto. This

strategy also formed part of the government's Reconstruction and Development Programme (RDP) and was reinforced by the 1998 White Paper on Energy Policy, which emphasised the importance of households having access to adequate electricity to meet their needs for cooking, heating, lighting and communication (Department of Minerals and Energy, 1998). The successful implementation of the strategy is supported in reports produced by Stats SA, which showed that while only 35% of households nationally had access to electricity in 1994, 84% had access to electricity by 2011 (Statistics South Africa, 2012). This number rose to almost 90% of households throughout South Africa by 2015, but was found to be significantly lower, at 60.1%, in Limpopo Province (Statistics South Africa, 2018).

The Integrated National Electrification Programme (INEP) was set up in 2002, and the goal of making electricity available to all South Africans was enhanced by the introduction of minimal connection charges for new users. Despite this concession, many new users experienced difficulty with payment for electricity and government introduced the Free Basic Electricity (FBE) policy from 2004, whereby poor households receive 50 kWh of electricity free per month (Howells et al., 2005; Department of Energy, 2014). Many rural households continue to rely on fuelwood as their primary energy source for cooking and heating due to financial constraints despite significant rollout of electrification that has taken place in South Africa within the 23 years of democracy (Shackleton, Gambiza & Jones, 2007; Matsika et al., 2013). Against the backdrop of widespread poverty, households remain dependent on collecting cheap or free fuelwood (Matsika et al., 2013; Twine, Moshe, Netshiluvhu, & Siphungu, 2003). Communities living in rural and traditional areas have historically been the hardest hit regarding access to electrification. Limpopo Province has the highest consumption of fuelwood as the primary source of fuel for domestic use in the country, with over 40% of households relying on fuelwood fires for cooking and heating water (Thom, 2000; Statistics South Africa, 2018).

It follows that the limited household amenities available inside homes in less-resourced rural South African contexts affects the way individuals conduct their bADLs and iADLs. The following section discusses the extent to which theoretical frameworks that underpin occupational therapy practice, as well as the commonly used bADL and iADL assessment instruments, take cognisance of the impact of limited household amenities on the performance of bADLs and iADLs.

2.4 Activities of daily living frameworks, construct and assessment tools

Activities of daily living are the tasks people carry out on a regular basis, as part of their day-to-day routines (Fricke, 2010). A number of frameworks that form the basis of occupational therapy practice provide classifications for bADLs and iADLs. The Occupational Therapy Practice Framework III (OTPF III) (American Occupational Therapy Association, 2014) is one such framework, and as its development was informed by the International Classification of Functioning, Disability and Health (ICF), a discussion of both frameworks follows (World Health Organization, 2001).

2.4.1 Frameworks including activities of daily living

The International Classification of Functioning, Disability and Health (ICF) arose from the previous World Health Organization (WHO) coding system for disability and functioning, known as the International Classification of Disability and Health (ICDH-10). The ICF includes three main sections, namely Body Components, Activity and Participation, and Environmental Factors. It was developed as a comprehensive and well-defined coding system for all aspects of human functioning, which allows for varying degrees of specificity. It is available in numerous languages and was developed by means of pilot studies in various areas of the globe, aimed at reaching consensus regarding the definitions of all functional tasks (World Health Organization, 2001).

The ICF classification, with its focus on biopsychosocial and socioecological approaches, informed the OTPF III which was developed to describe these constructs for occupational therapy practice (American Occupational Therapy Association, 2014). As such, the OTPF III reflects the occupational therapy profession's move in recent years towards an understanding of occupation as the profession's core concern (Turpin & Iwama, 2011). The OTPF III includes both domain and process aspects of occupational therapy, and defines five domain categories within the scope of the profession, namely areas of occupation, client factors, performance skills, performance patterns, and context and environment.

The OTPF III includes terminology and a system for defining and describing bADLs and iADLs, which are viewed as falling within the areas of occupation domain. The

term ADL is used to describe activities related to the care of the individual's body, including bathing/showering, bowel and bladder management, dressing, eating, feeding, functional mobility, personal device care, personal hygiene and grooming, sexual activity and toilet hygiene. The OTPF III also allows the ADL category to be alternatively referred to as Basic ADL (bADL) or Personal ADL (pADL). The framework differentiates between this category and Instrumental ADL (iADL), which are those activities that support daily life within the home or community; these iADLs are viewed as requiring greater complex interactions than bADLs, and as being easier to delegate to another person. The iADL category includes care of others, care of pets, child-rearing, communication management, community mobility, financial management, health management and maintenance, home establishment and management, meal preparation and clean up, religious observance, safety and emergency maintenance, and shopping (American Occupational Therapy Association, 2014).

A further difference between numerous bADL and iADL frameworks and assessment instruments relates to the extent to which the impact of the environmental context in which these occupations take place is considered. Occupational therapy paradigms are primarily based on the concepts of occupational performance and occupational engagement as a means of promoting health and wellbeing (World Federation of Occupational Therapists, 2010). Therefore, understanding the environmental barriers that impact significantly on the potential of individuals and communities to engage in the occupations of their choice and carry out their meaningful occupations within their environment, can inform occupational therapy intervention at an environmental level (Law, 1991). All the major contemporary occupational therapy models and frameworks used in South Africa, and internationally, emphasise the interplay between occupation, environment and the person (Law et al., 1990a; Law, 1991; Law et al., 1996; Kielhofner, 2002); most also take the impact of context and the environment into account. They explore how occupational performance is influenced by the environmental context in which it takes place and describe how the environment in which occupation occurs, places demands on the individual and provides resources, which allow the occupation to be carried out. The environment includes physical and social factors, which can be enabling or constraining in terms

of occupational performance, as illustrated in the Person-Environment-Occupation Model (Law et al., 1996).

Both the ICF and OTPF III frameworks make provision for the environmental context of the performance of occupations including bADLs and iADLs to be considered; the ICF has a system of modifier codes in the Environmental Factors section of the Contextual Factors in Part 2 of the classification system. The modifier codes describe the extent to which an environmental factor acts as a barrier or facilitator to the capacity of the individual to perform the activity or participate in it. Thus, this framework allows for any gap between the individual's potential and actual performance that is caused by the environmental context to be qualified, which in turn becomes a mechanism for identifying adjustments that can be made to the environment to improve the individual's performance. Against the background of the pervasive limited access to water, sanitation and electricity in rural South Africa, the relevant ICF codes for domestic activities and environment presented in Table 2.3 are critiqued.

Table 2.3 The International Classification of Functioning, Disability and Health codes relevant to limited access to water, sanitation and electricity in rural South Africa,

ICF section	ICF domain	ICF code	Code descriptor
Section 1: Activities and Participation	Domestic life	d6201	Gathering daily necessities: Obtaining without exchange of money, goods and services required for daily living (including instructing and supervising an intermediate to gather necessities), such as by harvesting vegetables and fruits and getting water and fuel.
Section 2: Contextual Factors	Environmental Factors	e530	Utilities services, systems and policies: Services, systems and policies for publicly provided utilities, such as water, fuel, electricity, sanitation, public transportation and essential services.

The code and descriptor for gathering daily necessities, d62010, is viewed as an example of inadequate provision of descriptors for less-resourced settings. While mention is made of water and fuel collection, these tasks are grouped together with harvesting vegetables and fruits. The time, distances and physical effort required for water and fuel collection, as well as the global scale of limited domestic water access in less resourced settings described in the literature in sections 2.3.1 and 2.3.3 do not appear to be adequately reflected.

Similarly, the OTPF III includes context and environment as one of its domains, thereby acknowledging the significance of the physical and social environment within which the occupational performance and engagement takes place. Practitioners using this model are encouraged to apply conditional clinical reasoning to anticipate or predict the impact that the environment has on occupational engagement. The application of conditional clinical reasoning allows for numerous forms of reasoning, such as procedural, narrative and interactive, to be drawn upon in order for the therapy service to be flexible and responsive to changing circumstances (Unsworth, 2001; World Health Organization, 2001; American Occupational Therapy Association, 2014). However, the examples provided in the explanation of this aspect of the OTPF III arguably point to an unspoken assumption that the environmental contexts being referred to are typical of Western well-resourced settings. The explanation provided regarding environmental factors mentions natural and built factors, and under the latter, refers to buildings and furniture. A doorway which is not wide enough for a wheelchair is cited as an example, which implies a formally constructed brick structure with indoor plumbing and electrical cables, as opposed to being inclusive of settings where the environmental barriers are on a more basic level, such as a shack in an informal settlement.

2.4.2 Activities of daily living construct

Notwithstanding the classifications of bADLs and iADLs within the ICF and the OTPF III, there is some further variation of definitions of this construct. Some literature uses the term ADL as an umbrella term to describe all activities that people undertake routinely in their every-day lives. These activities are then widely viewed as being further divided into personal care or bADLs, and domestic and community or iADLs

(Fricke, 2010; World Federation of Occupational Therapists, 2012b; James, 2014). Thus, some models, such as the OTPF III, regard the term ADL as only referring to functional mobility and personal care, while others use the term to describe all activities performed in daily life.

There are also differing views regarding the tasks included within the term iADL, with some assessment instruments including leisure and feeding tasks as iADLs, which is contrary to the OTPF III classification. Other models and assessment instruments include hobbies, recreational tasks and volunteer work as being iADLs, whereas in the OTPF III these are placed into a separate area of occupation. To complicate matters further, synonyms for iADLs include independent living skills, extended ADL and advanced ADL, the latter focusing on iADL tasks that are more physically demanding (Turpin & Iwama, 2011). It is therefore important to define the terminology being used to avoid confusion. In this study, bADL and iADL are used as described in the OTPF III.

2.4.3 Assessments of activities of daily living

The literature search using the keywords ‘ADL instruments’ and ‘ADL scales’ revealed numerous English publications from 1986 to June 2019. The database searching identified 270 publications on CINAHL, 376 on SCOPUS and 353 on Sabinet Online. Textual analysis was conducted to identify articles which reported using assessment instruments and scales which had domains or items that overlapped with the bADLs or iADLs as described in the OTPF III for data collection. A total of 56 such instruments were identified, with the frequencies of the ten which were used most oftenbeing presented in Table 2.4.

Many of these studies made use of multiple bADL and iADL instruments and scales and included epidemiological surveys with examination of functional or disability status, outcomes of clinical interventions, as well as validation of new and existing instruments. All of the bADL and iADL assessment instruments identified in the literature search were found to have been developed in countries from the Global North and none included items or domains which accommodated the less-resourced context of household amenities described in section 2.3 above.

Table 2.4 Summary of bADL and iADL Instruments identified in literature search

Name of Instrument (author)	*Number of publications*	*Country of Origin*	*Licensing*	*Format*	*Psychometric Properties*	
					Validity established	*Reliability established*
Katz Activity of Daily Living Index (Katz et al., 1963, 1970)	37	United States of America	Open source	Evaluative	Construct validity (Ciesla et al., 1993) Content validity (Law & Letts, 1989) Convergent validity (Hamrin & Lindmark, 1988) Predictive validity (Brorsson & Asberg, 1984)	Internal consistency (Ciesla et al., 1993) Inter-rater reliability (Brorsson & Asberg, 1984)
Barthel Index (and Modified Barthel Index) (Mahoney & Barthel, 1965; Collin et al., 1988; Oveisgharan et al., 2006; Leung, Chan & Shah, 2007)	15	United States of America	Open source	Evaluative	Concurrent validity (Hsueh et al., 2002) Predictive validity (Hsueh, Lee & Hsieh, 2001) Construct validity (Wilkinson et al., 1997) Convergent validity (Hsueh, Lee & Hsieh, 2001)	Internal consistency (Hsueh et al., 2002) Test-retest reliability (Green, Forster & Young, 2002) Inter-rater reliability (Hsueh, Lee & Hsieh, 2001)
Lawton Instrumental Activities of Daily Living (IADL) Scale (Lawton & Brody, 1969)	12	United States of America	Open source	Evaluative	(Graf, 2006) (Gallo & Paveza, 2006) (Pearson, 2000) Known group validity (Siriwardhana et al., 2018)	Internal consistency (Siriwardhana et al., 2018) Inter-rater reliability (Siriwardhana et al., 2018)
Nottingham Extended ADL (Nouri & Lincoln, 1987)	5	United Kingdom	Open source	Descriptive	Construct validity (Harwood & Ebrahim, 2002)	Internal consistency (Nicholl, Lincoln & Playford, 2002) Test-retest reliability (Green & Young, 2001)
Stroke Impact Scale (Duncan et al., 1999, 2003)	4	United States of America	Open source	Evaluative	Content validity (Duncan et al., 2001) Concurrent validity (Duncan et al., 1999) Predictive validity (Duncan et al., 1999) Construct validity (Duncan et al., 2003) Known groups validity (Duncan et al., 1999) Convergent validity (Jenkinson et al., 2013)	Internal consistency (Duncan et al., 1999) Test-retest reliability (Duncan et al., 1999)
Modified Rankin Scale	4	United Kingdom	Open source	Evaluative	Concurrent validity (Kwon et al., 2003) Predictive validity (Weimar et al., 2002)	Test-retest reliability (Wolfe et al., 1991) Intra-rater reliability (Wolfe et al., 1991)

(Wilson et al., 2005)					Convergent validity (De Haan et al., 1993)	Inter-rater reliability (Wolfe et al., 1991)
Functional Independence Measure (FIM) (Quinsey, Findlay & Willmott, 2005)	4	United States of America	License with purchase & licence renewal required	Evaluative	Face and content validity (Keith et al., 1987) Concurrent validity (Hsueh et al., 2002) Predictive validity (Timbeck & Spaulding, 2003) Construct validity (Linacre et al., 1994) Convergent validity (Zwecker et al., 2002) Known groups (Dodds et al., 1993) Ecological validity (Cooke et al., 2006)	Internal consistency (Dodds et al., 1993; Hsueh et al., 2002) Test-retest reliability (Chau et al., 1994) Intra-rater reliability (Sharrack et al., 1999) Inter-rater reliability (Chau et al., 1994)
Activities of Daily Living Questionnaire (ADLQ) (Oakley, Lai & Sunderland, 1999; Johnson et al., 2004)	4	United States of America	Open source	Descriptive ,	Construct validity (Oakley, Lai & Sunderland, 1999)	Test-retest reliability (Chu & Chung, 2009) Inter-rater reliability (Chu & Chung, 2009)
Canadian Occupational Performance Measure (COPM) (Law et al., 1990b)	3	Canada	License with purchase & licence renewal required for digital version	Evaluative (Outcome measure)	Content validity (Tuntland et al., 2016) Construct validity (Tuntland et al., 2016) Convergent validity (Thyer, Brown & Roe, 2018) Predictive validity (Thyer, Brown & Roe, 2018)	Test-retest reliability (Cup et al., 2003)
Frenchay Activities Index (Holbrook & Skilbeck, 1983)	3	United Kingdom	Open source	Descriptive	Construct Validity (Turnbull et al., 2000)	Test-retest reliability (Green & Young, 2001) Inter-rater reliability (Post & De Witte, 2003)

Of the 56 assessment instruments identified in the literature search, six had been the subject of South African studies. One instrument, namely the Modifed Barthel Index (MBI) had been the subject of a validity study for the South African stroke population (Breytenbach, 2016), while two were developed and validated in South Africa (Loubser, Bruce & Casteleijn, 2013, 2014). A comparison of the domains and items in these six instruments with those in the OTPF III is presented in Table 2.5. The instruments focus on either bADLs or iADLs, with some focusing on both, which was similar to the finding of a systematic review of bADL and iADL scales used with neurological conditions (Lindeboom et al., 2003). Significant overlap in the bADL domains and items included in these instruments was notable, with 88% including equivalents of *bathing / showering, feeding* and *functional mobility,* and 75% including equivalents of *dressing* and *toilet hygiene.* The overlap of iADL domains and items was lower, with 50% of the instruments including *communication management*, *community mobility*, and *home establishment and management respectively*.

The impact of limited household amenities on the performance of bADLs and iADLs is not adequately reflected in the occupational therapy instruments commonly used to measure occupational performance in bADLs and iADLs. Access to adequate water and energy sources are arguably the most important amenities when it comes to performance of bADLs and iADLs. Drinking water is essential for survival, and a water supply impacts on food security as it allows for cultivation of vegetables and being able to keep domestic animals as a food source for domestic requirements. Water is also essential for the performance of personal and household hygiene tasks. An adequate supply of electricity opens up the potential for a household to make use of labour-saving household appliances, which have an impact on the way bADL and iADL tasks are done. For example, the presence of an electrical geyser to heat indoor-piped water for personal hygiene and doing laundry would eliminate the necessity for fuelwood to heat water on a fire. Further scrutiny of the bADL and iADL assessment instruments utilised in the South African studies demonstrated that collection of water and fuelwood were not included in any domains or items. However, a number of the studies did make mention of the limited access to piped water, electricity and sanitation in the literature, study setting or discussion sections

(Nyirenda et al., 2012; Xavier Gómez-Olivé et al., 2014; Payne, Xavier Gómez-Olivé, et al., 2017; Schatz et al., 2018; Harling et al., 2019)

Eight South African studies investigated the clinical outcomes for survivors of stroke. The Barthel Index (BI) was used in all these studies, while the Modified Rankin and the Stroke Impairment Scale (SIS) were each also used once. Of the four studies that utilised the Barthel Index, only one made mention of participant's reports regarding the challenges relating to water collection (Cunningham & Rhoda, 2014). This study was set in the Eastern Cape and included an assessment of the impact of environmental barriers using the Facilitators and Barriers Survey (FABS) of environmental influences on participation (Gray et al., 2008). While it is viewed as a strength of the study that measurement of environmental barriers was included, the FABS was developed in the USA and was not modified for the South African context prior to the study. As the FABS does not have items regarding water and fuelwood collection, these aspects were not included in the data.

Five epidemiological studies aimed at evaluating the associations between functional disability and various social and health status variables were found to have used the WHODAS-2.0 as one the of the data collection instruments, (Nyirenda et al., 2012, 2015; Phaswana-Mafuya et al., 2013; Xavier Gómez-Olivé et al., 2013, 2014; Schatz et al., 2018). The study conducted in the Agincourt area by Schatz et al (2018) makes reference to older persons carrying out strenuous household activities such as collecting water and firewood, and the SES score, which includes access to water, sanitation and electricity, is included as a variable in the study. Gender role disparities in terms of care responsibilities, including 'strenuous activities', are mentioned, and the need for further research regarding the factors linked to disability in the aging population is acknowledged (Schatz et al., 2018).

A number of the clinical outcomes and epidemiological South African studies found that walking and mobility were the bADLs with the highest level of reported impairment (Phaswana-Mafuya et al., 2013; Cunningham & Rhoda, 2014; Payne, Xavier Gómez-Olivé, et al., 2017). Even though water and fuelwood collection are not mentioned, given that walking mobility is a prerequisite for completion of these tasks, presumably this could translate into difficulties with collecting water and fuelwood from sources outside of the homestead. Although some studies included

variable known as Household assets and Socioeconomic circumstances, which included availability of piped water, electricity and sanitation, none of the studies carried out direct comparisons of household amenities and walking or mobility impairment (Nyirenda et al., 2012; Xavier Gómez-Olivé et al., 2014).

Table 2.5 Comparison of OTPF III and bADL and iADL Instruments used in South African studies

Occupational Therapy Practice Framework	Clinical outcomes studies				Epidemiological surveys		Newly developed scales		Frequency (Percentage)
	Barthel Index (and Modified Barthel Index) (Mahoney & Barthel, 1965; Collin et al., 1988; Oveisgharan et al., 2006; Leung, Chan & Shah, 2007)	**Functional Independence Measure (FIM)** (Quinsey, Findlay & Willmott, 2005)	**Modified Rankin Scale** (Wilson et al., 2005)	**Stoke Impact Scale** (Duncan et al., 1999, 2003)	**Katz Index of Independence in Activities of Daily Living** (Katz et al., 1963, 1970)	**WHODAS – 2.0** (World Health Organization, 2010)	**BETA** nursing scale **(bADL)** (Loubser, Bruce & Casteleijn, 2013)	**GAMMA** nursing scale **(iADL)** (Loubser, Bruce & Casteleijn, 2014)	
	Country where originally developed								
	United States of America	United States of America	United Kingdom	United States of America	United States of America	Switzerland	South Africa	**South Africa**	
	South African studies								
	(Mamabolo et al., 2009; Hassan, Visagie & Mji, 2012; Rouillard et al., 2012; Cunningham & Rhoda, 2014; Breytenbach, 2016; Cawood & Visagie, 2016)	(Barrie, Franzsen & Gradidge, 2014; Muller, 2015)	(Cunningham & Rhoda, 2014)	(Cawood & Visagie, 2016)	(Payne, Gómez-Olivé, et al., 2017; Harling et al., 2019)	(Nyirenda et al., 2012, 2015; Phaswana-Mafuya et al., 2013; Xavier Gómez-Olivé et al., 2013, 2014; Arowoiya et al., 2017; Schatz et al., 2018)	(Loubser, Bruce & Casteleijn, 2013)	(Loubser, Bruce & Casteleijn, 2014)	
bADLs									
Bathing, showering	Bathing	Bathing	Bathing	Bathe yourself?	Bathing or showering	Washing your whole body?	Bathing		7 (88)
Dressing	Dressing	Dressing		Dress the	Getting	Getting	Dressing -		6 (75)

		upper limb Dressing lower limb		top half of your body?	dressed	dressed?	Up Dressing-Lower		
Feeding	Feeding	Eating	Eating	Cut your food with a knife and fork?	Eating	Eating?	Eating		7 (88)
Personal hygiene and grooming	Grooming	Self-care: Grooming		Clip your toenails?			Grooming		4 (50)
Toilet hygiene	Toilet use	Toileting	Going to the toilet	Get to the toilet on time?	Using the toilet		Toileting		6 (75)
Bowel and bladder management	Bowels Bladder	Sphincter control: Bladder management Bowel management		Control your bladder (not have an accident)? Control your bowels (not have an accident)?			Bladder Bowel		4 (50)
Personal device care									0
Sexual activity									0
Functional mobility	Transfer	Transfers: Bed, Chair, Wheelchair Toilet Tub, Shower		Move from bed to chair?	Getting in and out of sleeping location (transfers)	Standing up from sitting down?	Transfers Tub, Shower Toilet / Chair	Home or car accessibility	7 (88)
	Mobility	Locomotion: Walk / Wheelchair	Walking	Ability to be mobile: Stay sitting without losing your balance? Stay standing without losing your	Walking across a room (mobility)	Standing for long periods such as 30 minutes? Moving around inside your home?	Mobility: Walk / Wheel chair		7 (88)

				balance? Walk without losing your balance?					
	Stairs	Stairs					Stairs		
iADLs									
Child rearing				Role as a family member Ability to help others					1 (13)
Care of pets									0
Communication management		Communication: Comprehension Expression		Ability to communicate and understand	Communication Comprehension Expression	Understanding and communicating			4 (50)
Community mobility			Traveling close to home	Walk one block? Walk fast? Climb one flight of stairs? Climb several flights of stairs? Get in an out of a car?		Getting out of your home? Walking a long distance such as a kilometre (or equivalent)?		Errands/commuting	4 (50)
Financial management			Balancing a checkbook					Money matters	2 (25)
Health management and maintenance								Self-medication	1 (13)
Home establishment and management			Doing household chores	Do light household tasks / chores? Do heavy household chores?		Taking care of your household responsibilities? Doing most important		Household chores	4 (50)

						household tasks well? Getting all of the household work done that you needed to do? Getting your household work done as quickly as needed?			
Meal preparation and clean-up			Making a simple meal					Meal preparation	2 (25)
Religious observance				Participation in spiritual or religious activities					1 (13)
Safety and emergency maintenance									0
Shopping			Shopping	Go shopping? Carry heavy objects (e.g. bag of groceries)?					2 (25)
Not in bADL or iADL Areas of Occupation in OTPF III									
Performance Skills – Cognitive Skills		Problem solving Memory		Memory and thinking			Cognition Memory Problem Solving		3 (38)
Performance Skills – Emotional Regulation Skills				Mood and emotions		How much have you been emotionally affected by your health condition?		Emotional stability	3 (38)
Performance Skills – Emotional		Social cognition: Social interaction	Maintain ties with friends and	Social activities		**Getting along with people?**	Social Interaction		5 (63)

Regulation Skills / Area of Occupation – Social Participation			family?						
Area of occupation – Work			Do same work as before?	Work		Your day-to-day work/school? Doing your most important work/school tasks well? Getting all the work done that you need to do? Getting your work done as quickly as needed?			3 (38)
Area of Occupation – Leisure			Keep up with hobbies?	Quiet recreation Active recreation		How much of a problem did you have in doing things for yourself for relaxation or pleasure?			3 (38)
Not included				Ability to control your life as you wish					1 (13)
Not included						Staying by yourself for a few days?			1 (13)

It should be noted, however, that the distances measured in the studies were lower than the 200m RDP Water Policy. The Stroke Impact Scale mentions 'walking one block' (Duncan et al., 1999), while the WHODAS-2.0 refers to 'Walking a long distance such as a kilometre (or equivalent)' (World Health Organization, 2010). The two Health and Aging in Africa: A Longitudinal Study of an INDEPTH Community in South Africa (HAALSI) studies made use of self-report and objective measures of mobility. The Katz Index of Independence in Activities of Daily Living has a question about 'walking across a room', which was changed to 'walking a distance of 100m'. The objective measure was a timed walk, with walking speed being measured over two 2.5m distances.

In a further study also carried out in Agincourt, 42% of participants reported experiencing musculoskeletal pain, and the high musculoskeletal pain scores correlated with bad or very bad functional ability according to the WHODAS-2.0. In a different study carried out in KwaZulu-Natal, water collection was reported as the activity for which most assistance was needed, with 93% of those that reported receiving care stating that they needed help with fetching water. The study made recommendations that community support systems need to be put in place to assist older people with strenuous activities like drawing water.

Numerous modified versions of bADL and iADL assessment instruments have been produced for use in different countries. The Barthel Index is widely used and is regarded as the bADL assessment instrument of choice in many settings worldwide, with numerous modified versions being utilised (Leung, Chan & Shah, 2007; Breytenbach, 2016). Where modified versions of the BI assessment instruments have been created for different countries, validity studies have utilised methodologies focused on language translation. In identifying linguistic differences regarding bADL task item descriptors, some authors have also commented on the need for conceptual translation, as a number of differences in the way an bADL task was conducted were uncovered; for example, a number of studies found the term bathing was inappropriate in cultural settings where personal hygiene was achieved by using a damp cloth to wash the body, rather than making use of a tub or a shower. Another study reporting on the Chinese modification of the BI noted that some mobility items were not translatable due to constraints imposed by specific physical environments. The methodologies utilised in these validity studies focus on

language translation, with minimal attempts to change instrument items to accommodate for alternative ways of doing bADLs due to differing household amenities. The implications on the degree of physical demand of conducting the bADL task in these different environments were noted, but the authors only recommended modifications to certain item descriptors and fell short of eliminating irrelevant items or adding new ones (Kucukdeveci et al., 2000; Oveisgharan et al., 2006; Leung, Chan & Shah, 2007; Breytenbach, 2016). Most validity studies associated with the development of the modified versions of the BI identify limited attention paid to differing cultural practices as a limiting factor. Thus, many instrument domains and items are inappropriate for rural settings in South Africa, and some important items and domains appear to have been completely left out of this instrument.

Most modified versions of mainstream bADL and iADL assessment instruments did not adequately address the impact of limited access to household amenities on the way bADLs and iADLs are done, which in turn would call into question the validity and reliability of such instruments in rural populations. However, the differences in the way South Africans living in non-Western contexts carry out bADL tasks was explored in a recent validity study on the applicability of the Modified Barthel Index to the South African stroke population. Two factors leading to bADLs being done differently in these contexts were identified, namely resource and accessibility barriers. Limited access to running water and electricity within households was linked to socio-economic status and led to increased demands in terms of carrying out bADLs such as when emptying a basin of dirty water out after completing personal hygiene, as well as walking over rough terrain to reach outdoor toilet facilities. Given the limitations in access to water, sanitation and electricity described earlier in this chapter, it is not surprising that the functional mobility domain was ranked highest for inclusion in the South African version of the MBI and the addition of an item to reflect obtaining supplies necessary to carry out bADLs was recommended. While the author concluded that the MBI could be appropriate for the South African stroke population, the importance of the MBI not assuming a Western bias in terms of household amenities was emphasised (Breytenbach, 2016).

The bADL and iADL instruments utilised in the South African studies are not only silent on occupations relevant to less-resourced contexts, such as fetching water or

fuelwood, but an examination of the language used in the item descriptors shows they also do not consider the limited household amenities typical of rural less-resourced settings. Table 2.6 presents a comparison of the descriptors for the bathing bADL to illustrate how the phraseology of the domains and items in the instruments appear to be based on the assumption that the homes of the individuals being evaluated have household amenities. A number of the instruments use the terms *bath*, *tub* or *shower*, which all imply the availability of piped water and Western bathroom fixtures.

Table 2.6 Phraseology of Bathing item descriptors

Name of Instrument	*Item*	*Item descriptor*	*Item information*
Barthel Index (and Modified Barthel Index) (Mahoney & Barthel, 1965; Collin et al., 1988; Oveisgharan et al., 2006; Leung, Chan & Shah, 2007)		BATHING	0 = dependent 5 = independent (or in shower)
Functional Independence Measure (FIM) (Quinsey, Findlay & Willmott, 2005)	item 3	bathing	washing, rinsing, and drying oneself in a tub or shower
	item 11	tub or shower transfer	getting into or out of a tub or shower
WHODAS – 2.0	D 3.1	Washing your whole body?	This question refers to washing their entire body in whatever manner is usual for their culture
Stroke Impact Scale	5c	Bathe yourself?	Bathing oneself does not include getting into the tub
The International Classification of Functioning, Disability and Health (ICF) (World Health Organization, 2001)	d510	Washing oneself:	Washing and drying one's whole body, or body parts, using water and appropriate cleaning and drying materials or methods, such as bathing, showering, washing hands and feet, face and hair, and drying with a towel.
	d5100	Washing body parts:	Applying water, soap and other substances to body parts, such as hands, face, feet, hair or nails, in order to clean them.
	d5101	Washing whole body:	Applying water, soap and other substances to the whole body in order to clean oneself, such as taking a bath or shower.
OTPF III		Bathing, showering	Obtaining and using supplies; soaping, rinsing and drying body parts; maintaining bathing position; and transferring to and from bathing positions

The ICF code d510 is the overall code descriptor for washing oneself and makes mention of appropriate materials and methods for doing so, such as bathing,

showering or washing individual body parts. The code d5100 also appears to pertain to washing individual body parts, as opposed to code d5101 which specifies washing of the whole body. While the descriptor for d5100 could be construed as being inclusive of household settings without a bath tub, a shower or piped water, the reference to these amenities in the d510 and d5101 descriptors seems to exclude settings where the whole body would be washed using a mobile receptacle such as a plastic basin in the absence of indoor plumbing.

It is clear that most occupational therapy frameworks that guide the evaluation and treatment of bADL and iADL dysfunction have historically been developed in Western and Global North contexts (Whalley Hammell, 2011). Despite the fact that limited access to water, sanitation and energy are global issues and affect billions of people, the daily task of accessing these essential resources does not appear to be included in commonly used frameworks, and bADL and iADL assessment tools. It is therefore critically important for occupational therapists, practising in the South African medico-legal and insurance industry fields, to be able to accurately evaluate performance in bADLs and iADLs in a range of contexts, including those in less-resourced areas with limited household amenities. While the use of standardised tests by occupational therapists working in this arena is well documented, it is not clear which bADL and iADL assessment instruments are being utilised (Edeling et al., 2013). The paucity of literature regarding bADLs and iADLs in less-resourced settings in South Africa and globally is significant as it highlights a gap in occupational therapy frameworks and assessment instruments that take the increased physical demands of bADL and iADL tasks in the rural context into account (Breytenbach, 2016; Naidoo, Van Wyk & Joubert, 2016, 2017). Consequently, there is a need for the development of a contextual bADL and iADL assessment instrument.

2.5 Assessment instruments

2.5.1 Development of assessment instruments

In health sciences, including occupational therapy, there is a need to measure components of specific constructs including an individual's occupational performance and participation in roles and occupations. The use of assessment instruments guides occupational therapy intervention by providing information about the

individual's abilities as well as the difficulties and environmental barriers, which need to be overcome.

Assessment can take place at numerous points in the occupational therapy process, such as initial assessment prior to onset of intervention and ongoing assessment to monitor progress. It is important for the results of assessments to be accurate so that clinical decision-making can be justified; this is of particular importance in the medico-legal and insurance fields where the occupational therapist has to provide recommendations which can withstand scrutiny by the court or compensation fund (Buys & Van Biljon, 2007; Van Biljon, 2013). The use of non-standardised measures in such settings has a negative impact on the credibility of the profession and may compromise the compensation process. Specific steps therefore need to be followed in assessment instrument development to ensure the purpose of the assessment is fulfilled.

The steps for instrument development differ somewhat according to the views of various authors, but predominantly include identifying the construct to be measured, selecting an appropriate type of measure, establishing the main objective of the assessment, identifying and describing the domains and concomitant items, developing the instrument format and selecting a scoring scale. Consideration should be given to the characteristics of the instrument, taking into account utility, specificity, appropriateness and cost (Glover & Albers, 2007). The items should be validated and reviewed by subject experts to ensure the instrument assesses the constructs it purports to. Reliability and validity can then be evaluated through field-testing on a large sample. The outcomes of the investigation of the psychometric properties are then integrated into a final version of the instrument, after which guidelines for administration, scoring and interpretation of the assessment instrument should be compiled (Laver Fawcett, 2013; McCoach, Gable & Madura, 2013).

2.5.2 Validity and reliability of assessment instruments

The psychometric properties of a measurement instrument include reliability and validity. Validity refers to the degree to which an instrument measures the attributes that its author says it measures, while reliability refers to the extent to which an

assessment instrument provides consistent responses regarding the construct being measured (de Vos et al., 2011; Cresswell, 2014; Bolarinwa, 2015).

There are two broad constructs of validity, namely theoretical and empirical. Face and content validity are considered to fall into the former category, and both are established through exploration of the constructs purported to be measured by a panel of experts. However, criterion-rated and construct validity are regarded as types of empirical validity and involve various methods of field-testing the instrument to establish how it relates to external criteria. Predictive and concurrent validity are viewed as forms of criterion-rated validity, whereas convergence, discriminant, known-group, factorial and hypothesis-testing are defined as categories of construct validity (Bolarinwa, 2015).

The initial exploration of the psychometric properties of an assessment instrument most often involves a content validity study; content validity involves determining whether the instrument content covers the construct to be measured. It has to be built into the instrument when it is conceptualised and when the items are constructed to ensure that meaningful inferences can be made from the results. It is addressed by demonstrating that the instrument items are consistent with and adequately represent the current knowledge base about the construct that the instrument was designed to measure (Lynn, 1986; Polit & Beck, 2006).

Subject Matter Experts (SMEs) are provided with definitions of the constructs and domains under investigation and then asked to judge the relevance and clarity of each item to the overall constructs of the assessment instrument. The SMEs rate each item using a Likert scale and these scores are utilised to calculate the Content Validity Index (CVI). The CVI can be calculated in two ways, namely the so-called Item-CVI (I-CVI) and Scale-CVI (S-CVI). The I-CVI index refers to the individual items in a measure, whereas the S-CVI index refers to the overall measure (Lynn, 1986; Polit & Beck, 2006). Feedback is also ideally obtained from the SMEs regarding aspects such as the wording, structure of items and the appropriateness of the selected scoring scale assist, and ensuring the instrument is clear and succinct (Lynn, 1986; Bolarinwa, 2015).

Evaluation by the SMEs of the selected type of assessment instrument is of importance. Measurement instruments can be developed in numerous different ways

such as observation, interview and self-report formats (Bolarinwa, 2015). In recent years, there has been growing recognition of the value of patient self-report outcome (PRO) measures, including Pictorial Activity and Task Sort (PATS) measures in healthcare and rehabilitation for baseline status, progress and outcomes (Verna et al., 2015).

2.5.3 Characteristics of a pictorial activity and task sort measure

Patient self-report outcome measures are regarded as being safe, cost-effective, efficient and minimally invasive when compared to physical tests. They provide information regarding the work capacity and functional ability of the patient and appear to enhance communication between the clinician and the patient (Verna et al., 2015).

As a variation of PRO measures, PATS instruments consist of pictorial representations of functional activities, with a short text description. The patient is required to report on their perceived ability to perform each activity according to a rating scale. The use of PATS represents a relatively recent innovation in the self-report measure of ability. Occupational therapists conducting medico-legal and FCE evaluations typically utilise a combination of objective and subjective or self-review measures to cross-reference self-perceived abilities with measured abilities (Mayer et al., 2005). Pictorial activity and task sort assessment instruments have been found to be a reliable addition to FCE test batteries and their scores are easily linked to the levels of physical demand described by the Dictionary of Occupational Titles (DOT) (U.S. Department of Labor Employment and Training Administration, 1991). The PATS approach has been found to be time-efficient, in that it allows for the assessment of a relatively large number of items in a short space of time. The combination of the picture and the text is thought to promote faster cognitive processing and lower the ambiguity in measures that use text alone. Measures using only text can also present challenges to patients with reading or language difficulties, while PATS instruments have been found to minimise cross-cultural and language challenges within the clinical assessment context (Verna et al., 2015). The focus of the PATS approach on the assessment of use of tools and equipment during the execution of functional activities resonates strongly with the unique role of

occupational therapy in assessing functional capacity and occupational performance (Matheson, 2004; Verna et al., 2015).

2.6 Summary

Chapter 2 presented the literature review. Current frameworks and assessment instruments do not consider the significant impact limited access to basic household amenities in rural areas has on the way rural dwellers perform bADLs and iADLs. Occupational therapists in the medico-legal field should evaluate performance in manual handling, bADLs and iADLs of rural dwellers with their environmental context in mind. In Chapter 3, the research methods for Phase 1 of the study will be presented.

CHAPTER 3: METHODOLOGY PHASE 1

3.1 Introduction

Phase 1 of the study had three sequential stages, which were designed to address objectives 1, 2 and 3, as well as Steps 1, 2 and 3 of the instrument development process as presented in Figure 1.1 and Figure 3.1. Phase 1 provided baseline data for the identification and quantification of domains and items for the development of the new contextual bADL and iADL assessment instrument in Phase 2 of the study.

Stage I Stage I was to determine the extent to which occupational therapists in the medico-legal field in South Africa conduct bADL and iADL assessments as part of FCEs and to identify the bADL and iADL assessment instruments most commonly used. The researcher conducted an electronic survey of occupational therapists working in this field.

Stage II Stage II focused on identifying the available household and community amenities, as well as identifying and describing the bADLs and iADLs, involving a significant component of manual handling typically carried out in a rural less-resourced area of South Africa. Participatory mapping focus groups to determine the perspectives of Community Care Workers (CCWs) were facilitated by the researcher.

Stage III Stage III involved semi-structured interviews conducted during home visits to investigate the bADLs and iADLs comprising significant components of manual handling in a rural less-resourced area.

The research design, ethical considerations and validity for Phase 1 of the study, as a whole, will be discussed, followed by separate discussions regarding the methodology utilised for each of the three stages.

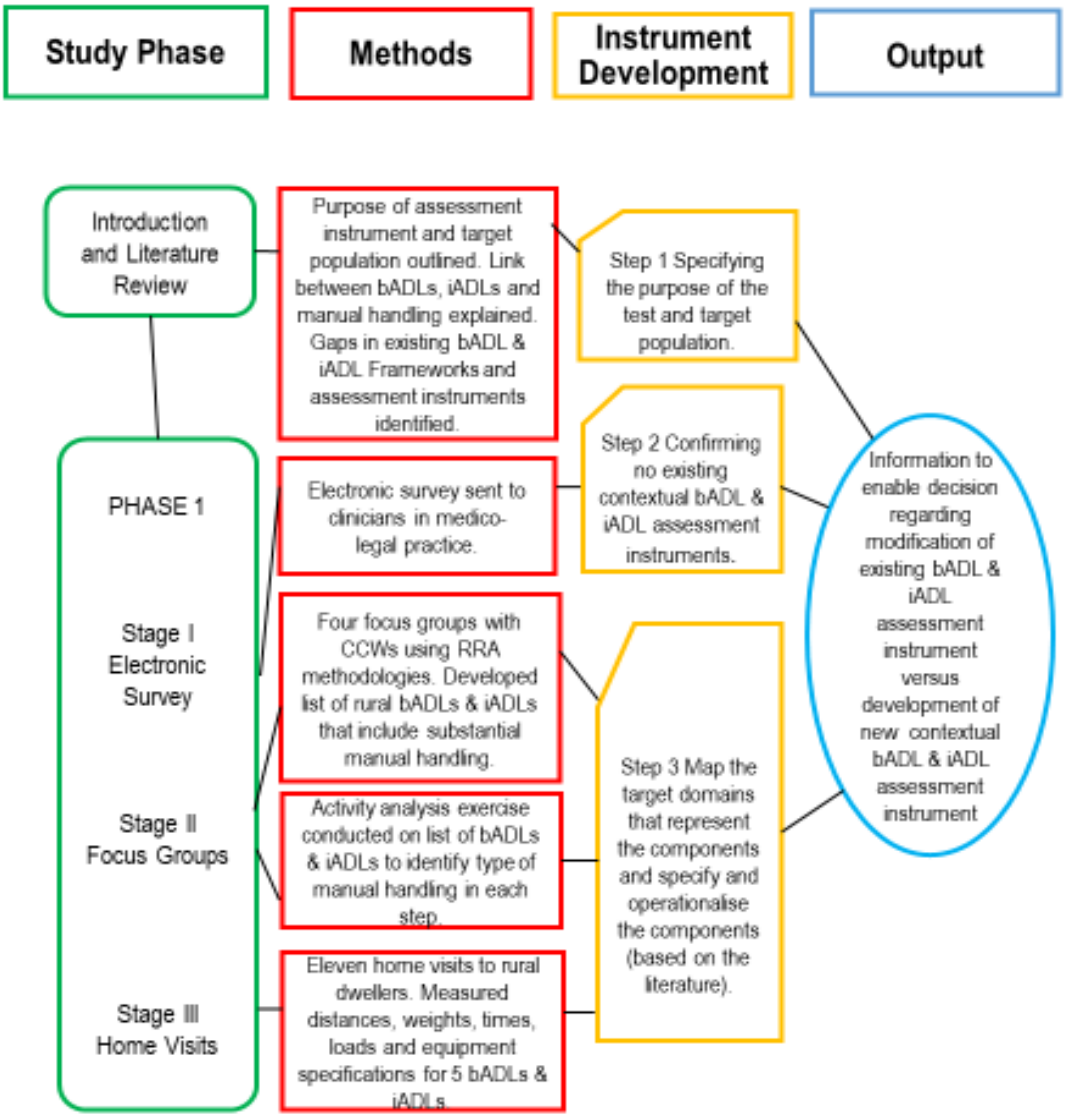


Figure 3.1 Overview of instrument development steps followed in the Introduction, Literature Review and Phase 1 of the study

3.2 Research Design

Phase 1 of the study utilised an overall descriptive, sequential, non-experimental research design incorporating an electronic survey and Rural Rapid Appraisal (RRA) methodologies (Freudenberger, 1999; Cavestro, 2003; Cresswell, 2014). There were three sequential stages, each of which having a descriptive design. Descriptive designs are suitable for quantifying the characteristics of a large group by making inferences from the findings in a sample of the population being studied. The design was suited to the study since no variables were manipulated and data needed to be collected at one point in time.

For **Stage I,** an electronic survey was used as a cost-effective and time-efficient method to collect data from a bigger group of occupational therapists nationally. The benefit of a survey is that it is regarded as reliable and the results may be generalised, particularly when large samples are involved; another advantage is that responses can easily be coded for statistical analysis. The inflexibility of having a finite set of questions posed to respondents without the option of clarifying issues or answering questions can however be a limitation. Another disadvantage is that electronic surveys, such as the one used in this study, are associated with lower response rates, which can call into question whether the data is representative of the population being studied (Privitera, 2016).

For **Stage II**, a Rapid Rural Assessment (RRA) methodology was utilised (Chambers, 1994; Pretty, 1994; Freudenberger, 1999; Cavestro, 2003). A Participatory Rural Appraisal approach which incorporates rural dwellers into all components of the research process with a view to enabling agency in taking action to resolve challenges identified by the community themselves was considered (Cavestro, 2003). Given the aims of the current study regarding whether existing instruments used by medico-legal occupational therapists are appropriate for claimants living in rural contexts and if an existing instrument should be modified or a new contextual instrument should be developed, RRA was selected as the research process and application of the findings remains driven by the researcher. This flexible research approach originated historically from rural agricultural research in the community development context and is underpinned by a commitment to learning about rural conditions, knowledge and environments from rural dwellers

themselves. This philosophy meant that traditional research methods had to be adjusted to local conditions to ensure that communication needs of community members with limited literacy or formal education who were not necessarily familiar with scientific terminology could be accommodated. Techniques such as transect walks, participatory mapping, seasonal calendars, time-lines and Venn diagrams are designed to extract information using visualisation of research questions using symbols familiar to community members (Cavestro, 2003). The RRA research process typically begins with an initial visit to the identified community in the rural setting to make logistical arrangements, followed by data collection visits. Data is systematically gathered in close collaboration with the community within a short period of time. A flexible combination of tools and techniques are designed to facilitate participation, build rapport and provide as complete a picture as possible of the phenomenon being studied. The RRA in this study included participatory mapping focus groups facilitated by the researcher with Community Care Workers (CCWs) who had extensive experience of the household conditions in their rural less-resourced context. The use of this symbolic visual representation of bADL and iADL tasks typical of the rural lifestyle made this research design more appropriate than employing another written survey (Cavestro, 2003). Limitations of focus groups, which include the impact of the skills needed by the facilitator to adequately lead the group, avoid facilitator bias and prevent discussions from being side-tracked or dominated by individuals, can undermine the validity and reliability of the findings. The triangulation of data collected using multiple techniques minimised the potential limitations by ensuring that diverse perspectives were captured, thereby increasing the credibility of the findings.

For **Stage III,** home visits were used to build on the information obtained in the focus groups in Stage II and gain a clear understanding of the context by experiencing the setting first-hand. Observational research design was suited to this phase of the study as it allowed the researcher to observe behaviour about which little is known in the natural context of the participants' homes and to determine the frequency with which it occurs. To improve the validity of the observational research, which is dependent on the skill of the researcher in observing and recognising situational aspects in this study, observations were supported by a semi-structured interview and checklists.

Semi-structured interviews about the household amenities and the methods and frequency of the bADLs and iADLs involving a significant component of manual handling were carried out during home visits (de Vos et al., 2011; Ponto, 2015). Measurements of the distances walked, weights lifted, carried and pushed, and times taken when carrying out the bADLs and iADLs were recorded on a checklist, with the observations and measurements conducted during home visits to allow for detailed questioning of the household circumstances (Chambers, 1994, 2006; Sousa, Driessnack & Mendes, 2007; Emmel, 2008). The outcomes of Phase 1 determined that the procedure for Phase 2 would be the development of a new instrument rather than the modification of existing one.

3.3 Ethical considerations

The study was approved by the Human Research Ethics Committee (Medical) of the University of Witwatersrand, with the Ethics clearance certificate number M150925, as well as the Research Ethics Committee of the Limpopo Department of Health (Appendix 1).

Information sheets regarding the background to the study and the implications of their participation were provided to all respondents and participants. In this way, they were informed that the information they provided would be treated in confidence and that only the researcher, the research assistants and the supervisors would have access to the information. They were also informed that their names and other identifiable information would not be published in the research report and that the completed survey questionnaires and photographic and video material would be stored using codes so that no-one outside the research team would be able to link the names of the respondents and participants. It was made clear to the participants and respondents that they could ask questions about the research project, that their participation was entirely voluntary and that they were free to decline to participate or feel free to withdraw from the study at any point, without any negative consequences. They were also invited to request the results of the study should they be interested to do so.

The information sheets stipulated that the research participants would not gain any remuneration or other direct benefit from participating in the study. The content of the information sheets and the concept of informed consent were translated verbally into

the home language of those participants with limited literacy or English language skills. All respondents and participants signed consent forms once they had read the information sheets.

3.4 Stage I: Exploration of activities of daily living assessment by South African occupational therapists in the medico-legal field

3.4.1 Study population and sample

3.4.1.1 Study population

According to personal email communication received from Mrs Seetha Reddy of the Professional Board for Occupational Therapy, Medical Orthotics and Prosthetics, and Arts Therapy at the HPCSA on 8 February 2016, the HPCSA database of practitioners does not include their employment field or sector (personal communication, Mrs S. Reddy, 8 February 2016). Similarly, according to personal email communication received from Aletta Kietzmann on 11 February 2016, practitioners registered on the database of the Occupational Therapy Association of South Africa indicate their field of practice preferences, but not whether they are employed in the private or public sector(personal communication, Ms A. Kietzmann, 11 February 2016)There is a limitation imposed by the databases available in that none documents the sector or field of practice in which the practitioner is employed. Neither OTASA nor the HPCSA records this information, although OTASA records the field of practice preference. Thus for pragmatic reasons, the practitioners on the OTASA database were selected as the survey population. The population for this stage of Phase 1 was therefore the 392 occupational therapists on the OTASA database who had selected the medico-legal field of practice preference option (OTASA, 2016).

3.4.1.2 Sampling method

Total population sampling was used for this stage of the study. The invitation to participate in the study, with the link to the electronic questionnaire, was sent to OTASA and emailed by them to all occupational therapists in their database who had identified themselves as working in the medico-legal field of practice.

Inclusion criteria

The study population included occupational therapists who met the following criteria:

- Members of OTASA;
- Practicing in the medico-legal field according to their registration information with OTASA ;
- Completed the electronic questionnaire between 1 February 2016 and 21 march 2016.

Exclusion criteria

Exclusion criteria were not used for the electronic survey.

3.4.1.3 Sample size

The sample size, calculated according to Cochrane's formula, was representative of the population with a limit of a 5% error and a 95% confidence level, and was found to be 194 based on a population of 392 therapists (Bartlett, Kotrlik & Higgins, 2001).

3.4.2 Measurement instrument

The electronic questionnaire was developed by the researcher (Appendix 2), taking into account the literature review of bADL and iADL assessment instruments referred to in Chapter 2, as well as the understanding that assessment of performance of bADLs and iADLs usually forms part of comprehensive occupational therapy evaluations conducted for medico-legal purposes (Jansen van Vuuren, 2012; Van Biljon, 2013; Van Biljon et al., 2016).

The questionnaire had nine questions, two of which were dichotomous (Yes/ No) questions (questions 1 and 2) and five were open-ended (questions 4, 6, 7, 8 and 9). Two questions (questions 3 and 5) presented lists of response options from which the respondents needed to select their answers; for example, question 3 asked respondents to select their preferred method of assessing bADL and iADL performance from a list of options. The sequence of the questions was important in some cases, such as question 7, where respondents were asked to provide three reasons for their selection of preferred bADL and iADL instruments provided in their answer to question 6. The survey was converted to an electronic survey using the Research Electronic Data Capture (REDCap) system, which is hosted at the

University of Witwatersrand (Harris et al., 2008). REDCap is a secure, web-based application designed to support data capture for research studies. The system maintains anonymity and researchers cannot access identifying information regarding respondents. Information detailing the background and purpose of the study was attached, including instructions for completion of the survey, the estimated time of 45 minutes that it would take to complete and the provision of informed consent.

Pilot Study

A pilot study was conducted on the electronic survey to establish its suitability for eliciting answers to the research question for Stage I of the study. The draft information sheet and questionnaire were emailed to five medico-legal occupational therapists who were members of OTASA. The occupational therapists were purposively selected based on the following criteria:

- have five or more years of experience working in the medico-legal field of occupational therapy;
- reside and work in South Africa;
- have a post-graduate qualification in vocational rehabilitation.

Space for comments and criticisms was provided and the occupational therapists were requested to consider the clarity and relevance of each question, as well as identify any typographical errors. They were requested to make suggestions regarding the ordering of the questions and the layout of the questionnaire and information sheet as a whole, and were provided with the opportunity to make general comments (de Vos et al., 2011).

The feedback received from the occupational therapists who participated in the pilot study is outlined in Appendix 3. A number of typographical errors were corrected and the information sheet was re-worded to be more user-friendly. The occupational therapists found the questionnaire took approximately 20 minutes to complete, therefore the estimation of the time, as stated on the information sheet, was reduced from 45 minutes to 20 minutes. An option to provide more than one answer was added to question 4, and questions 7 and 9 were restructured to allow the responses to be ranked according to priority.

The final version of the electronic survey after the pilot study included two dichotomous questions (Yes/No), five open-ended and two partially open-ended questions. The open-ended questions allowed for respondents to answer questions in their own words, while the partially open-ended questions provided a selection of restricted options and other options, where respondents could add additional information. The language used in the survey questions was simple and clear, and the length was minimised to optimise the utility of the survey (de Vos et al., 2011).

3.4.3 Research procedure

The pilot of the survey questionnaire was conducted in January 2016. The electronic survey questionnaire, including the information sheet and provision for informed consent, was emailed by OTASA at the beginning of February 2016 to all occupational therapists who met the inclusion criteria (Appendix 2). The response rate was poor therefore follow-up emails were sent to the same occupational therapists after four weeks and then a further two weeks, to serve as reminders. All completed questionnaires received by the researcher by 21 March 2016 were included in the analysis.

Study data were collected and managed using REDCap electronic data capture tools providing 1) an intuitive interface for validated data entry, 2) audit trails for tracking data manipulation and export procedures, 3) automated export procedures for seamless data downloads to common statistical packages and 4) procedures for importing data from external sources.

3.4.4 Data analysis

The responses to the electronic survey questionnaires were analysed using descriptive statistics, and the frequencies and medians were calculated. The open-ended questions were coded by the researcher using quantitative directed content analysis with frequencies (White & Marsh, 2006).

3.5 Stage II: Identification of activities of daily living that involve a significant component of manual handling in a rural less-resourced area

3.5.1 Study Setting

The study was conducted in a rural less-resourced setting in Limpopo Province in South Africa, as the area was well-known to the researcher, who had worked there for six years prior to the commencement of the study. This facilitated the researcher's entry into the community and meant the researcher was aware of the required behaviour and communication style that was appropriate for this community. This is an important component of RRA approach, respect for local people and ability to listen being paramount to ensuring the research is conducted in a way that enhances dignity (Pretty, 1994; Freudenberger, 1999; Ponto, 2015).

The study was conducted in two sub-districts of the Mopani District in Limpopo Province, namely the Greater Tzaneen and the Maruleng sub-districts. These areas are characterised by agricultural and tourism economic activities, interspersed with large tracts of traditional land with rural villages (Greater Tzaneen Municipality, 2017; Maruleng Local Municipality, 2017).

The Greater Tzaneen sub-district, located in the western Mopani District, includes 125 villages and has 26% rural and 2% peri-urban areas. It has a population of approximately 416 146, of which 60% are aged between 15 and 64 years, with 29.6% younger than 15 years. The level of unemployment is high, with 41% of households having no income at all. In households where there is an income, 45% have less than the monthly minimum wage of R1500. There are 122 776 households, of which 45.9% are female headed. Sepedi is the language spoken by 46% of the population. According to the findings of the 2016 Community Survey, 86% of households have access to electricity while 68.8% of the community members have access to safe drinking water (Statistics South Africa, 2018). The implementation of the Free Basic Water Policy is apparent, with 2 273 households in the Greater Tzaneen being beneficiaries (Greater Tzaneen Municipality, 2017).

The Maruleng sub-district is the most southerly of the Mopani District and has 33 rural communities, with a total population of 99 946. Most individuals (64%) are aged

between 15 and 64 years, with 31.7% younger than 15 years. There are 29 007 households, of which 50.5% are female headed. Sepedi is the most commonly spoken language. Fourteen percent of the population is employed, with 15% of households earning less than the monthly minimum wage and 32 871 individuals living off social grants. Piped water is available inside 10.8% of dwellings, while 3.4% of households have a flushing toilet and 95.1% of households have electricity (Maruleng Local Municipality, 2017). According to the findings of the 2016 Community Survey, 77% of community members of the Maruleng District have access to safe drinking water (Statistics South Africa, 2018). The implementation of the Free Basic Water Policy is apparent with 2 405 households in Maruleng being beneficiaries (Maruleng Local Municipality, 2017). The Greater Tzaneen and Maruleng sub-districts have limited services and infrastructure, with many village settlements, thus fit the definition of rural areas used for gathering census information in South Africa (Statistics South Africa, 2004).



Figure 3.2: View of Village A in the Greater Tzaneen Municipality



Figure 3.3: A typical homestead in Village C in the Maruleng Municipality

3.5.2 Study population and sample

3.5.2.1 Study population

The geographical area surrounding the town of Tzaneen in Limpopo Province, South Africa, was selected for convenience as it is well-known to the researcher and is a good representation of a South African rural context. Four villages in the area were selected as they typified rural less-resourced areas, and contact was made via a

local Non-Governmental Organisation (NGO) involved in rendering home-based care services with the community care workers (CCWs).

The CCWs are members of rural communities who were provided with basic skills training to enable them to render appropriate healthcare services at their clients' homes, under the supervision of primary healthcare nurses based at community clinics. Their role emerged from the prioritisation of primary healthcare services and the HIV/AIDS pandemic in South Africa, which placed enormous strain on the public healthcare system. The development of home-based services led to a network of CCWs providing home care, including assistance with personal hygiene and light domestic tasks and support to their clients and their families for which they receive a regular monetary stipend (Van Ginneken, Lewin & Berridge, 2010; Choice Trust, 2018).

The study population for the focus groups was all members of the four CCW groups associated with the NGO Choice Trust in the Greater Tzaneen and Maruleng Municipalities, during the data collection period of the study phase, which was from 1st to 30th April 2016. The four CCW groups comprised 32 CCWs, with two of the groups based in the Maruleng Municipality and two groups based in the Greater Tzaneen Municipality.

The CCW coordinators at the NGO contacted the CCWs in their respective groups and invited them to participate in the study on the pre-arranged dates. Four groups of CCWs agreed to participate in the study focus groups, which were held on consecutive days during the data collection period, with a total of 25 CCWs included in the sample.

3.5.2.2 Sampling method

The Choice Trust CCWs were selected purposively, using convenience sampling, for this study for their expertise in the form of bADLs and iADLs involving a significant component of manual handling typically carried out in an area characterised by rural, less-resourced settlements.

Inclusion criteria

The CCWs who met the following criteria were included in the study:

- The CCWs associated with the Choice Trust to render services in the Maruleng and Greater Tzaneen districts.
- The CCWs who resided in the areas selected for the study and thus had personal and work experience of the less-resourced rural context.

Exclusion criteria

CCWs associated with the Choice Trust who could not attend the focus groups on the pre-arranged dates were excluded from the study.

3.5.2.3 Sample size

The members of the identified four CCW groups were provided with an information sheet regarding the study. Twenty-five CCWs agreed to participate in the study and were included in the sample, after signing the consent form developed by the researcher (Appendix 4). Focus groups should ideally have between 6 and 12 members to allow for optimal participation of all members, while still obtaining a range of responses (Freudenberger, 1999; de Vos et al., 2011).

Four focus groups were facilitated with CCWs to determine their perspectives on performance of bADLs and iADLs that have a significant component of manual handling in their community, according to the protocol developed by the researcher (Appendix 5). The researcher facilitated the focus groups, which each lasted approximately two hours. No further focus groups took place when data saturation had been reached (Fusch & Ness, 2015).

3.5.3 Measurement instruments and data collection tools

The focus groups were video-recorded using a video camera operated by a technician and audio-recorded using the researcher's smartphone.

3.5.3.1 Biographical information sheet

All study participants in the focus groups completed a biographical information sheet (Appendix 6). The biographical information sheet, developed by the researcher, included the years of experience as a CCW, their age, gender, level of education and the household amenities at their own homes. The items regarding the limited amenities available at the CCWs' own homes were included as evidence of their qualification to provide expert information for this study.

3.5.3.2 Focus group guideline

The researcher developed a group protocol, which outlined the way in which each focus group was to be facilitated to ensure the separate focus groups were run as similarly as possible. A question schedule of open-ended prompt questions in the group protocol was drawn up to facilitate the discussions and elicit appropriate responses from the CCWs. The prompt questions were designed to focus the discussions on the bADLs and iADLs that involve manual handling, taking into account the settlement and household amenity types typical of the area referred to in the literature, as well as the researcher's extensive work experience in the area prior to the start of the study. The description of the group protocol is detailed in Appendix 5 and included the use of an adapted RRA technique, namely participatory mapping, whereby a map of a typical homestead was drawn to facilitate in-depth discussion regarding the bADLs and iADLs with a manual handling component (Gona, Hartley & Newton, 2006; Emmel, 2008).

Participatory mapping uses spatial analysis to gather information. Community members are asked to do the mapping activity and the priority is not the quality of the map or cartographic accuracy, but rather with gathering good quality information about the subject being studied. The mapping activity makes people more comfortable with participating, providing the mechanism for questioning beyond a superficial level to draw out the key information. The semi-structured discussion then followed, allowing for interrogation of the mapping activity to draw out more information than can be represented visually (Chambers, 1993, 2006; Emmel, 2008).

The focus groups with CCWs were utilised to identify and describe the type and form of bADLs and iADLs involving a significant component of manual handling typically performed in their context, as well as the household amenities available to them (Functioning and Disability Reference Group, 2010; American Occupational Therapy Association, 2014; Cresswell, 2014). A focus group discussion is a facilitated discussion amongst carefully selected participants, who discuss a topic among themselves with guidance from a facilitator. A focus group is preferable to a survey questionnaire for the exploration of the opinions of a group of individuals who have experience of a certain phenomenon in common and can provide information and insight. Focus groups can bring out rich and detailed information and provide a valuable opportunity to gain insights into behaviours. Several focus groups (usually 3

or 4) on any one topic are usually required to produce valid results (Freudenberger, 1999). A good indication for having reached the goals of this research tool is when the discussion points become repetitive, indicating the point of data saturation has been reached (Fusch & Ness, 2015).

3.5.4 Research Procedure

Once contact was made, the researcher organised and facilitated all the participatory mapping focus groups according to the protocol developed for the study. Focus groups were held in suitable venues in the selected villages, such as in a room at the local clinic or the CCW centre. In line with RRA methodology, the four focus groups took place on consecutive days from the 20th to 24th April 2016 (Freudenberger, 1999). The researcher greeted and welcomed the CCWs to each focus group, explained the background and purpose of the study and reiterated the principles of informed consent. An information sheet and consent form was provided to explain the background and purpose of the study (Appendix 4). The information sheets stipulated the research participants would not gain any remuneration or other direct benefit from participating in the study, however, the researcher deemed it appropriate to compensate the CCWs for transport costs incurred travelling to and from the focus group venues. In collaboration with the management of the Non-Governmental Organisation (NGO) that employed the CCWs, the researcher paid the exact amount for taxi fares to CCWs who travelled by public transport to and from the focus group venues. Furthermore, the researcher provided each group of CCWs with light refreshments at the end of the focus groups.

Written informed consent for participation in the study, as well as for audio recording, was obtained from each of the CCWs prior to the start of each respective focus group. The CCWs were invited to communicate in their home language during the focus groups and a group member was identified to assist with translation if necessary. Demographic data was recorded by the CCW participants on the forms developed by the researcher before the focus groups started (Appendix 6).

Participatory mapping was used first in each focus group as a mechanism to facilitate in-depth discussions (Gona, Hartley & Newton, 2006). The CCWs were asked to collectively draw a map of a typical homestead in their village, detailing the everyday bADLs and iADLs with a significant component of manual handling carried

out by community members, as well as the associated household and community amenities; each group was provided with a blank cardboard poster and various writing materials. As the CCWs drew the map, the researcher compiled a list of the bADLs and iADLs mentioned by the participants. Once the homestead had been mapped, the researcher asked follow-up questions regarding each of the bADLs and iADLs that appeared on the map drawings. The participants were divided into pairs and allocated a selection of the listed bADLs and iADLs until all had been assigned, then asked to discuss in detail how each bADL and iADL was typically done in their context. Each pair of CCWs was then asked to present their discussions to the whole group, with other group members being given the opportunity to add to the information. Once all of the pairs had presented their feedback, the researcher thanked each CCW for their participation and closed the focus groups, inviting the members to enjoy light refreshments.

The RRA methodology formed the basis for data collection in the study. Data was collected during the focus groups and included four maps created by the research participants, as well as the video- and audio-recordings of the participatory mapping focus groups.

3.5.5 Data analysis

The demographic information sheets were analysed by the researcher, using frequencies and medians, to establish the demographic profile of all participants in the focus groups.

The English sections of the recordings of the four participatory mapping focus groups were then transcribed verbatim in their entirety by a research assistant. Thereafter, the Sepedi aspects were transcribed and translated into English by a second research assistant who had expertise in linguistics and Sepedi (Appendix 7). The transcriptions were checked for accuracy by the researcher. The maps were analysed quantitatively to determine the household amenities and the bADLs and iADLs identified in the drawings. The transcribed information was reviewed and a descriptive statistical analysis using the ICF and the OTPF III classifications of activities of daily living was completed (World Health Organization, 2001; Hsieh & Shannon, 2005; White & Marsh, 2006; American Occupational Therapy Association, 2014).

The frequencies of the household amenities, as well as the categories of bADLs and iADLs involving manual handling reported by the CCWs as being typically carried out by members of their communities were identified in each group. The coding of the maps and transcriptions was completed by the researcher and an occupational therapist skilled in content analysis. The two sets of codes were compared for data checking to add rigour to the data analysis process (Appendix 8). Participant checking was done with a CCW to check for the correct interpretation of the gathered information (Freudenberger, 1999). No new data categories or information within data categories were added subsequent to the analysis of the second focus group. As data saturation had thus been reached, data gathering was limited to four focus groups (Fusch & Ness, 2015).

3.6 Stage III: Home visits to investigate activities of daily living comprising a significant component of manual handling in a rural less-resourced area

3.6.1 Study Setting

This aspect of the study was conducted in the same area as Stage II, namely the Greater Tzaneen and Maruleng sub-districts of Mopani District in Limpopo Province in South Africa.

3.6.2 Study population and sample

3.6.2.1 Study population

The same geographical area utilised during Stage II of the study was used for this stage. The community liaison assistants used purposive convenience sampling to identify research participants for home visits in the same four villages within the Greater Tzaneen and the Maruleng Municipalities, according to the inclusion criteria information sheet developed by the researcher (Appendix 9).

3.6.2.2 Sampling method

A sample of community members was recruited using purposive sampling. Six of the CCWs who had participated in the focus groups in Stage II were willing to act as community liaison assistants for this next stage of the study. They recruited community members known to them and who met the selection criteria developed by the researcher (Appendix 9). The participants were recruited by the community

liaison assistants if they agreed to be visited at home by the researcher, in order for the research interview to be carried out, and for the photographic and video material to be collected. Each home visit participant signed the consent form once the research procedure detailed on the information sheet had been explained to them by the community liaison assistant (Appendix 10).

Inclusion criteria

The community liaison assistants were requested to identify community members for inclusion in the study according to the following criteria:

- known to the community liaison assistant;
- residing in one of the four villages included in the study;
- live in less-resourced homesteads typical of the community;
- aged between 18 years and 75 years;
- male or female.

Exclusion criteria

All the participants identified by the community liaison assistants met the inclusion criteria. One participant was unavailable on the scheduled date and was excluded from the study as the researcher was unable to conduct a further field trip.

3.6.2.3 Sample size

The number of variables and the amount of data to be collected were utilised to calculate the sample size for the home visits. To cover all the bADLs and iADLs involving manual handling in the domains of collecting water, collecting fuelwood, doing laundry, doing cooking and bathing, an initial target of 20 home visits, with five home visits being conducted in each of the four villages included in the study, was set. This provided a sample size of four participants per variable or bADL and iADL domain, which was above the minimum set at the lower limit of three suggested by Rummel (1970) for instrument development (Rummel, 1970).

However, no new data was identified after completion of the first nine home visits and it was decided to limit the number of home visits to three per village. One participant was unavailable on the designated date and the home visit was not possible, therefore 11 home visits conducted in total.

3.6.3 Measurement instruments

3.6.3.1. Demographic information sheet

All study participants visited at their homes completed a biographical information sheet (Appendix 11) developed by the researcher. The information sheet included the participants' age, gender and employment or student status, as well as the household and community amenities available to them.

3.6.3.2 Data checklist for home visits

The researcher developed a checklist for the systematic collection of information regarding the five selected bADLs and iADLs, namely collecting water, collecting fuelwood, doing laundry, cooking and bathing (Appendix 12). To complete the checklist these bADLs and iADLs were observed by the researcher and the form, equipment and tools used for these bADL and iADL domains was recorded.

3.6.3.3 Checklist for Distance, equipment dimensions, weight and time measurements

The physical capacity of an individual involves their strength and endurance when performing activities such as walking and manual handling tasks. Numerous authors have defined manual handling tasks as including lifting, lowering, pushing, pulling and carrying. Historically, long-term ergonomic studies were conducted in the industrial context to quantify the spectrum of human ability and the intensity of the lifting, carrying and pushing tasks (Oliveri, 1959; Matheson, Isemhagen & Hart, 2002; Soer et al., 2009; Bieniek & Bethge, 2014). Normative data (Ciriello & Snook, 1999; Liberty Mutual Group, 2004; Snook & Ciriello, 2007) of the distances, weights and forces involved provided information about the limitations and maximum capabilities for industrial populations for each manual handling task.

In order to quantify the manual handling demands of bADLs and iADLs in a rural less-resourced context, specific measurements were taken of distances covered, weights lifted, carried and pushed, as well as the time taken during the execution of each bADL and iADL. This data was necessary to enable the researcher to calculate the manual handling demands of each bADL and iADL. The distance covered in each bADL and iADL was measured using a measuring wheel. All the equipment and tools lifted, carried and pushed were weighed using either a standard bathroom scale or a hanging travel scale, and weighed when empty and when full. This

included, amongst others, cooking and water-heating pots, as well as various plastic and metal containers. A tape measure was used to measure the dimensions of the household equipment and a stop-watch measured the time taken to complete each bADL and iADL. Checklists for these measurements are in Appendix 12.



Figure 3.4 Travel hanging scales used to weigh manually handled loads

3.6.4 Research Procedure

3.6.4.1 Training of community liaison assistants

The community liaison assistants received training by the researcher in data-gathering prior to the commencement of the home visits. The training took approximately one hour and included the following aspects:

- a detailed explanation of the background and purpose of the study;
- the principles of informed consent and how to obtain this from research participants;
- the principles of research ethics as relevant to home visits, including confidentiality and maintenance of the dignity of the participants whilst they carry out the bADLs and iADLs;
- the home visit research procedure, including the semi-structured interview, observation of performance of bADLs and iADLs and the measurements to be taken;
- the use of the measurement tools, namely the measuring wheel, the bathroom scale, the tape measure and the stop watch.

3.6.4.2 Data Collection

The researcher made arrangements for the home visits according to the protocol developed for the study. Home visits took place in two different villages in each sub-district. The researcher met the community liaison assistant in the relevant village and they travelled together to the identified homesteads. The community liaison assistant and the participants were invited to communicate in their home language during the home visits and the community liaison assistant assisted with translation if necessary. The participants were provided with information sheets and consent forms, which detailed the background and purpose of the study (Appendix 10). The content of the information sheets and the concept of informed consent were explained and the participants were asked if they would be willing to participate in a semi-structured interview regarding water collection, followed by having various measurements, photographs and videos taken. This information was translated verbally into the home language of those participants with limited literacy or English language skills. Written informed consent was obtained from each of the participants prior to the start of each home visit. All study participants completed a biographical information sheet that was developed by the researcher (Appendix 11).

The home visit checklist, completed during a semi-structured interview, formed the basis for data collection in the study. The researcher developed an interview format to ensure the home visits were carried out as similarly as possible. The researcher facilitated in-depth discussion using open-ended prompt questions to interrogate the bADLs and iADLs typically carried out in the rural less-resourced community. The household and community facilities available for the water collection were also discussed. Details of the amenities, as well as the bADLs and iADLs, were recorded on the checklist developed by the researcher. The researcher observed and took photographs and videos of each participant carrying out the bADLs and iADLs for the purposes of further analysis. The researcher took measurements of the dimensions of the household equipment and the weights lifted, carried and pushed during the execution of the bADLs and iADLs, as well as the distances walked and times taken by each participant to complete them. The identified homesteads were visited once by the researcher, with each home visit taking approximately five hours to complete.

3.6.5 Data Analysis

The demographic, home visit checklist and measurement data were analysed using descriptive statistics, including frequencies and medians. The data was utilised to quantify the loads pushed in wheelbarrows by taking into consideration the design of a wheelbarrow, which is defined as having a Class 2 lever. The calculation of the total load being pushed requires the use of a formula that includes the weight of the wheelbarrow itself, the weight of the load, the type of surface on which the wheelbarrow is being pushed and the integrity of the wheel (HPWizard.com, 2017).

The images in the photographs and videos were organised per participant and according to the nature of the material recorded. For example, images showing examples of household amenities and equipment used for bADLs and iADLs were labelled as such. Similarly, videos showing the execution of bADLs and iADLs, such as collecting water or doing laundry, were labelled accordingly. These visual records of observations were triangulated with the home visit checklist and measurement data to develop a complete home visit data set.

3.7 Conclusion

This chapter detailed the ethical considerations, research methods, samples, data gathering tools, and procedures, as well as data analysis for each stage of Phase 1. An electronic survey was utilised to investigate the extent to which medico-legal occupational therapists in South Africa conduct bADL and iADL assessments as part of FCEs and the bADL and iADL assessment instruments used. The RRA methodologies employed in Stages II and III were designed to yield the necessary data to proceed in modifying an existing bADL and iADL instrument or developing a new contextual bADL and iADL assessment instrument in Phase 2 of the study. The next chapter presents the results of Phase 1.

CHAPTER 4: RESULTS PHASE 1

4.1 Introduction

The three stages of Phase 1 of the study were designed to address objectives 1, 2 and 3 of the study, as well as Steps 1, 2 and 3 of instrument development. Phase 1, together with the literature review in Chapter 2, aimed to establish the need for modification of an existing bADL and iADL instrument or the development of a new contextual bADL and iADL instrument and to provide baseline data for the identification and quantification of domains and items in the new contextual bADL and iADL assessment instrument detailed in Phase 2 of the study. The results of Stages I, II and III are presented in this chapter.

4.2 Stage I: Identification of activities of daily living assessment instruments used by South African occupational therapists in the medico-legal field

4.2.1 Response rate from electronic survey

Data presented in this section was gathered from electronic survey questionnaires sent to members of OTASA who identified themselves as occupational therapists interested in the medico legal field of practice. The results of the electronic questionnaire, with the exception of the demographic data, represent the information received from the 83 respondents, as shown in Table 4.1 and indicates a response rate of 21%.

Table 4.1 Response rate to survey questionnaire

OTASA members – Medico-Legal field of interest	392
Sample size (using Cochran's formula)	194
Number of completed surveys	83
Response rate	21 %

Not all respondents answered all the questions. The number of respondents who answered each question is indicated in the table on the results for that question.

4.2.2 Demographic information

Demographic information was only obtained from eight of the 83 participants who completed the survey due to the fact the form requesting this information was sent separately from the survey questionnaire and was not completed by the other respondents (Table 4.2).

The sample of respondents who did complete the demographic section were all female, which is line with the 95.9% of females in the OTASA population (OTASA, 2016). The respondents worked in a variety of South African provinces, but mostly in Gauteng Province. The respondents had graduated from four of the eight universities offering occupational therapy training in South Africa and their experience in the medico-legal field varied from 4 years to 17 years, with a median of 5.5 years. All but one had a postgraduate qualification, with the diploma in vocational rehabilitation being held by over 30% of the sample.

Table 4.2 Demographic information of sample of occupational therapists (n= 8)

Variable	Number of responses	Percentage
Gender	Female = 8 Male = 0	100.0
University of undergraduate OT qualification	Wits = 2 UCT = 1 UP = 2 UOVS = 1 Not stated = 2	25.0 12.5 25.0 12.5 25.0
Has postgraduate qualification	Masters OT = 2 Diploma Vocational Rehab (UP) = 3 Diploma Hand Therapy (UP) = 1 Certificate Labour Law = 1	25.0 37.5 12.5 12.5
Province where currently practicing	Gauteng = 3 KwaZulu Natal = 2 Mpumalanga = 1 Western Cape = 1 Eastern Cape = 1	37.5 25.0 12.5 12.5 12.5
Years of experience in medico-legal	4 years = 1 5 years = 2 6 years = 1 12 years = 1 17 years = 1 (Range 4 -17 years)	Median = 5.5 years

4.2.3 Activity of daily living assessments as part of medico-legal evaluation

Almost all occupational therapists in the sample (96.4%) reported they assess performance in bADL and iADL as part of their medico-legal evaluations (Table 4.3).

Table 4.3 Inclusion of activities of daily living assessment in medico-legal occupational therapy evaluations (n= 83)

Question 1: Do bADL and iADL assessment (n= 83)	**Frequency**	**Percentage**
Yes	80	96.4
No	3	3.6
Question 2: Use standardised ADL Assessment Tool (n=80)		**Percentage**
Yes	9	11.3
No	71	88.8
Question 3: Category of Non-Standardised ADL Assessment Tool Used (n=80)		
Structured interview	70	98.6
Questionnaire completed by patient	30	42.3
Simulated ADLs	42	59.2

Of those respondents who included ADL assessment as part of their comprehensive evaluations, most (88.8%) did not make use of standardised ADL tools. Respondents reported making use of a combination of non-standardised ADL assessment tools. Structured interviews (98.6%) were the most frequently used method to assess performance in ADL, followed by simulation of ADLs (59.2 %) and questionnaires (42.3 %) that evaluate their clients' observed abilities in performing ADLs (Table 4.3).

4.2.4 Activities of daily living assessments used

The respondents who reported they made use of standardised ADL assessment tools most frequently used the Functional Independence Measure Instrument (FIM) (30.7%) and the Disabilities of the Arm, Shoulder and Hand (DASH) (15.4%). While a number of respondents reported they made use of more than one standardised

ADL assessment, many of these tools were reportedly used by only one respondent (7.7%). These tools included the Functional Limitations Profile, the Oswestry Low Back Pain Disability Questionnaire, the Assessment of Motor and Process Skills (AMPS), the Functional Assessment Measure (FAM), Katz and Lawton Instrumental Activities of Daily Living Scale, the Lower Extremity Functional Scale (LEFS), the Quick-DASH, the Canadian Occupational Performance Measure (COPM), the World Health Organization Disability Assessment Schedule (WHODAS) 2.0 and the Barthel Index (Table 4.4).

Table 4.4 Standardised assessment tools used to assess performance in activities of daily living (n = 13)

Question 5: Standardised ADL Assessment Tool	Frequency	Percentage
Functional Independence Measure (FIM) Instrument.	4	30.7
Disabilities of the Arm, Shoulder, and Hand [DASH]	2	15.4
Functional Limitations Profile	1	7.7
Oswestry Low Back Pain Disability Questionnaire	1	7.7
Assessment of Motor and Performance Skills (AMPS)	1	7.7
Functional Assessment Measure (FAM)	1	7.7
Katz and Lawton Instrumental Activities of Daily Living Scale	1	7.7
The Lower Extremity Functional Scale (LEFS)	1	7.7
Quick - Disabilities of the Arm, Shoulder, and Hand	1	7.7
The Canadian Occupational Performance Measure (COPM)	1	7.7
World Health Organization. Disability Assessment Schedule 2.0 (WHODAS 2.0)	1	7.7
Barthel Index	1	7.7

4.2.5 ADL screening tools used

A number of respondents reported they preferred to use screening and non-standardised ADL assessments rather than standardised assessments. Of these, four respondents reported they used the Work-Link Screening Tool for the evaluation of performance in ADLs, which is a questionnaire developed by occupational therapists and a student at the Work-Link Occupational Therapy Practice. This practice is based in Johannesburg, Gauteng, and renders occupational therapy

medico-legal and vocational rehabilitation services, including conducting FCEs of employees on behalf of insurance companies. The Work-Link Screening Tool has been consistently utilised in this practise for more than five years and formed part of the recommended Vocational Rehabilitation Assessment procedures for occupational therapists in the public sector, by the Gauteng Vocational Rehabilitation Forum (Van Biljon, 2016). Due to the absence of information regarding the geographical location of the respondents' practices, it was not possible to determine whether the use of the Work-Link Screening Tool was limited to Gauteng Province, where it was developed, or whether it is being utilised further afield.

Others preferred ADL screening or non-standardised assessment tools, which were so-called self-developed questionnaires, checklists, techniques or structured interviews. The Barthel Index and the FIM were reportedly used by three and two respondents, respectively, as screening tools (Table 4.5).

Table 4.5 Screening assessment and non-standardised tools used to assess performance in activities of daily living (n = 6)

Question 6: ADL Screening Tool	Frequency	Percentage
Work-Link Screening tool	4	66.6
Barthel Index	3	50.0
Self-developed questionnaire/checklist/ assessment technique	3	50.0
Functional Independence Measure (FIM) (self-care aspects)	2	33.3
Structured interviews	2	33.3
Simulated activities of daily living	1	16.6
Insurance-driven activities of daily living assessment criteria	1	16.6
Routine Task Inventory	1	16.6
Assessment of Motor and Performance Skills (AMPS)	1	16.6
Occupational Self-Assessment Daily Living Scales	1	16.6

4.2.6 Reasons for preferences for Activities of Daily Living assessments used as part of medico-legal evaluations

Nine respondents provided reasons for their preference in using the assessment tools reported above, and were based on the utility, specificity, appropriateness and

cost of assessments set by the American Educational Research Association, in their standards for screening assessments, as detailed in Table 4.6 (Glover & Albers, 2007).

Table 4.6 Reasons for preferences in activities of daily living assessment tools (n = 9)

Question 7: Reasons for preferences	Raw score	Percentage
Utility		
Easy to use	5	55.6
Relatively quick	1	11.1
Familiar with it	1	11.1
Easily accommodated into practice environment	2	22.2
Accessible	1	11.1
Specificity		
Gives overview of areas of difficulty/function/provides details basic activities of daily living and instrumental activities of daily living	4	44.4
Gives good info	2	22.2
Reveals impact of the injury/disability		
For comparison	1	11.1
Appropriateness		
Appropriate to medico-legal environment	1	11.1
Limiting in South African rural context	1	11.1
Can be used in most cases	1	11.1
Cost		
Free/no permission needed to use it	1	11.1

The highest number of respondents (55.6%) used the assessments because they found them easy to use, while the same number believed the tool provided a good overview of the client's ADL function. Other reasons for use of assessments to evaluate ADL were reported by one or two respondents (Table 4.6).

4.2.7 Appropriateness of activities of daily Living assessments for the South African context

Of the respondents who answered the question, 33.8% were of the opinion that a structured interview was the most appropriate method of assessing ADL performance as part of a comprehensive medico-legal evaluation in the South African context. The use of simulated ADLs was considered to be the second-most appropriate assessment method (23.4%), while obtaining collateral information and completion of questionnaires by the clients themselves were only judged by 14.3% of

respondents to be appropriate assessment options. Less than 7% of the respondents viewed the internationally available standardised ADL assessment tools as being appropriate for the South African setting (Table 4.7).

Table 4.7 Appropriateness of activities of daily living assessment tools for South African context (n = 77)

Question 9: ADL Assessment method	Frequency	Percentage
Structured interview	26	33.8
Simulation of activities of daily living	18	23.4
Collateral information	11	14.3
Questionnaire	11	14.3
Observation	10	13.0
Barthel Index	5	6.5
Home visit	4	5.2
Standard evaluation of physical and psycho-social functioning, and then triangulation of this information with activities of daily living ability	4	5.2
Functional Independence Measure (FIM) Instrument.	3	3.9
Independent Living Scale	2	2.6
Work-Link Activities of Daily Living Screening Tool	1	1.3
The International Classification of Functioning, Disability and Health (ICF)	1	1.3
Functional Assessment Measure (FAM)	1	1.3
The Canadian Occupational Performance Measure (COPM)	1	1.3
Occupational Self-Assessment Daily Living Scales	1	1.3
Assessment of Motor and Performance Skills (AMPS)	1	1.3

4.2.8 Summary of results

The results of Stage I showed that South African occupational therapists practicing in the medico-legal field used standardised ADL assessment instruments minimally and tended to develop their own tools for this purpose, a finding similar to international trends. Of the standardised instruments that were being utilised, the Barthel Index and the FIM were most commonly used. Objective 1 of the study was realised in this stage.

4.3 Phase 1 Stage II: Exploration of basic and instrumental activities of daily living that involve a significant component of manual handling in a rural less-resourced area

4.3.1 Demographics of participants in focus groups

Data presented in this section was gathered during four participatory mapping and focus groups with CCWs.

Table 4.8 Demographics of community care workers (n = 27)

		Group 1 n = 6	Group 2 n = 10	Group 3 n = 6	Group 4 n = 5	Median
		Median (range)				
Age	Years	44 (42-52)	49.5 (35-62)	49 (43-58)	44 (37-48)	48 years
Experience as CCW	Years	15 (13-17)	10 (1-17)	14 (12-14)	13 (9-14)	14 years
	n (percentage)					
Gender	**Female**	6 (100)	10 (100)	6 (100)	4 (80)	26 (96)
	Male				1 (20)	1 (4)
Highest level of Education	**Certificate**	1 (17)				Post-school certificate 1 (4)
	Grade 12	3 (50)	4 (40)	2 (33)	3 (60)	Completed secondary school 12 (44)
	Grade 11	2 (33)	3 (30)	2 (33)	2 (40)	Not Completed secondary school 14 (52)
	Grade 10		2 (20)	2 (33)		
	Grade 3		1 (10)			
Language spoken	**Sepedi**	6 (100)	7 (70)	2 (33)	2 (40)	17 (63)
	Shangaan		3 (30)	4 (66)	3(60)	10 (37)

Between five and seven CCWs were present in each of the four focus groups. The demographic information regarding the CCWs is presented, followed by the identification and classification of the ADLs described by the CCWs in the participatory mapping focus groups.

Most of the CCWs were female (96%), their median age was 48 years and their median number of years of experience as CCWs was 14 years (Table 4.8). Twenty-eight percent of the CCWs had attended but not completed secondary school, while 48% indicated they had completed grade 12, which is the secondary level of education. The remaining 24% of the sample stated they had completed either a certificate or a diploma tertiary education qualification.

4.3.2 Identification of Activities of Daily Living

The areas and objects depicted around the homesteads in the posters, created in the participatory mapping exercises, were identified by group members and then analysed according to the bADLs and iADLs to which they related. Figure 4.1 depicts the poster from one of the groups.

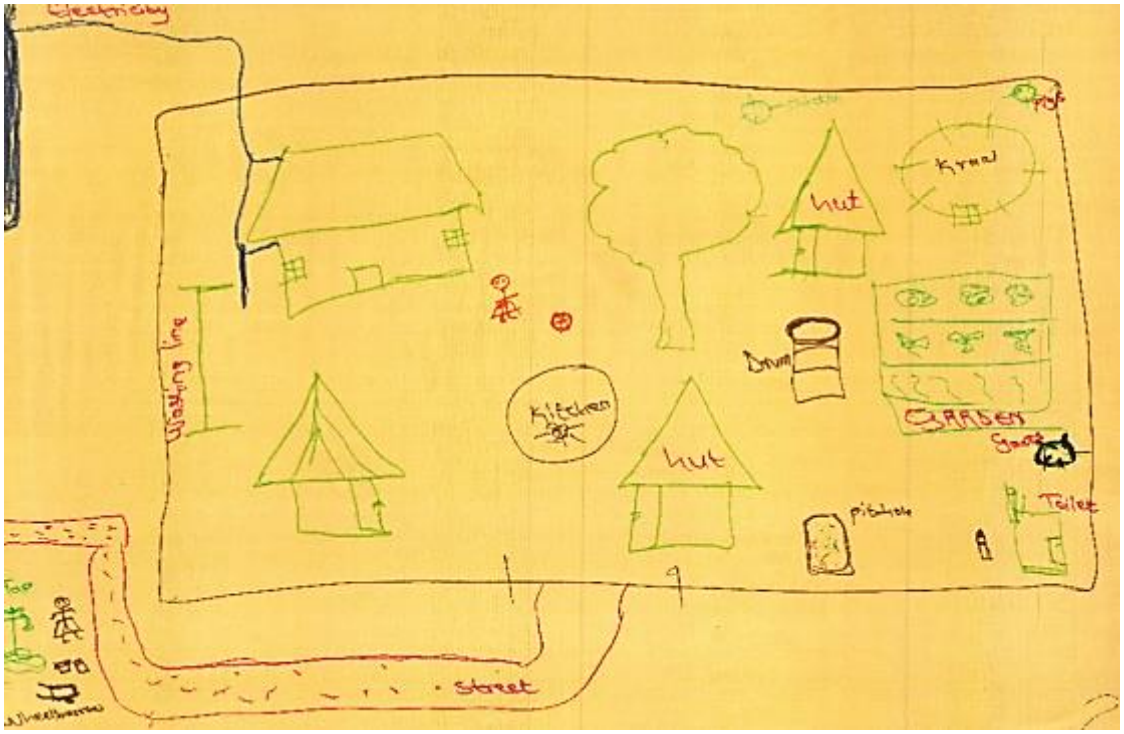


Figure 4.1 Poster map from focus group 3

Table 4.9 presents a summary of the bADLs and iADLs identified from the CCWs' poster maps depicting the homesteads in their communities. Seven other ADLs were identified by between three and one of the groups. None of the indoor ADLs were listed or identified by any group using poster maps, with toileting being the only bADL activity identified. Collecting water and fuelwood were ADLs identified by four and three groups respectively.

When bADLs and iADLs in the homesteads were further identified, using the question guideline drawn up by the researcher, all four groups identified 16 ADLs carried out often by those living in the community.

Table 4.9 Basic and Instrumental Activities of Daily Living identified in the participatory map posters and focus group discussions

	ADL Description	Poster	Discussion
		%	%
1	Collecting water	100	100
2	Cooking on outdoor fire	100	100
3	Using outdoor traditional toilet	100	100
4	Caring for domestic animals/livestock	100	100
5	Having fruit trees	100	100
6	Having a vegetable garden	100	100
7	Using own rubbish pit	100	100
8	Doing laundry	75	100
9	Collecting fuelwood	75	100
10	Cleaning the yard	25	100
11	Slaughtering of domestic animals	25	100
12	Dressing and undressing		100
13	Washing body/bathing		100
14	Cleaning the house		100
15	Eating		100
16	Doing shopping		100
17	Caring for pets, e.g. Dogs, for security	25	50
18	Watching television		75
19	Caring for children		75
21	Hair-care		50
22	Brushing teeth		50
23	Attending monthly financial society/*stokvel* meeting		25
24	Attending religious activity		25
25	Accessing pension at village pay-point		25
27	Cutting nails		25
28	Shaving of face (men)		25

Twelve other ADLs were identified by participants in three and one groups. The indoor and outdoor ADLs identified included bADLs and iADLs. The list developed in the discussion overlapped with the list developed from the poster maps.

4.3.3 Classification of Activities of Daily Living

The bADLs and iADLs being typically performed in the communities were assigned an ICF code, and the listing of the ADL in the OTPF III was confirmed (Table 4.10). The outcome of this process showed that most ADL activities carried out in a rural less-resourced context equated with those specified in the ICF and the OTPF III, with the exception of the iADLs of collecting water and collecting fuelwood, both of which were reported in the maps and the group discussions.

Table 4.10a Classifications of basic Activities of Daily Living

ADLs Identified by CCWs (from Table 4.11)	OTPF III	ICF (Activities and Participation)
Basic Activities of Daily Living		
(13) Washing body	Bathing, showering	d510 Washing oneself
(12) Dressing and undressing	Dressing	d540 Dressing
(15) Eating	Feeding	d550 Eating d560 Drinking
(22) Brushing teeth, (21) Hair-care, (27) Cutting nails, (28) Shaving of face (men)	Personal hygiene and grooming	d520 Caring for body parts
(3) Using outdoor traditional toilet	Toilet hygiene	d530 Toileting

Table 4.10b Classifications of instrumental Activities of Daily Living

ADLs Identified by CCWs (from Table 4.11)	OTPF III	ICF (Activities and Participation)
Instrumental Activities of Daily Living		
(1) Collecting water		
(9) Collecting fuelwood		
(19) Caring for children	Child rearing	d660 Assisting others
(17) Having pets, e.g. Dogs, for security	Care of pets	d660 Assisting others
	Communication management	d360 Using communication devices and techniques
(6) Having a vegetable garden (5) Having fruit trees		
(4) Caring for domestic animals/livestock		
	Community mobility	d460 Moving around in different locations d470 Using transportation
(25) Attending monthly	Financial management	d 860 Basic economic

society/'stokvel' meeting (23) Accessing pension at village pay-point		transactions d865 Complex economic transactions
	Health management and maintenance	d570 looking after one's health
(14) Cleaning the house, (10) Cleaning the yard, (8) Doing laundry, (7) Using own rubbish pit (29) Laying dung floors	Home establishment and management	d610 Acquiring a place to live d640 Doing housework
(2) Cooking on outdoor fire (11) Slaughtering of domestic animals	Meal preparation and clean-up	d630 Preparing meals
(24) Attending religious activity	Religious observance	d930 Religion and spirituality
	Safety and emergency maintenance	
(16) Doing shopping	Shopping	d620 Acquisition of goods and services

4.3.4 Description of the form of Activities of Daily Living

A detailed activity analysis (Pierce, 2001; Crepeau et al., 2014) of the ADLs identified during the focus groups was carried out, and showed that the occupational form or methods were adapted to the contextual lack of resources. Using the activity analysis of doing laundry as an example (Table 4.11), the lack of piped water available in households meant community members needed to collect water from an outside source before beginning to do the laundry. This typically involved pushing empty 25-litre plastic water-containers in a wheelbarrow to the village water source, waiting in the queue before filling the containers, and then pushing the wheelbarrow loaded with between one and four full containers back to the homestead. The quantity of water needed to complete an average load of laundry frequently involved more than one trip to the water source, depending on how many 25-litre water-containers the household member was capable of transporting by wheelbarrow at a time. Fuelwood then had to be collected from the surrounding forest, in order for the water to be heated on a fire. Collection of fuelwood was typically done by the household member walking extensive distances to find an available tree, chopping down the tree and then carrying a load of chopped fuelwood back to the homestead on their head.

Doing the laundry could only commence once the adequate amount of water and fuelwood had been collected. Water and fuelwood collection are thus regarded either as a pre-requisite *searches/locates* step for doing laundry, or as separate iADLs

which need to be completed before doing laundry, as shown in Table 4.11. The dirty laundry items were then washed by hand, using one basin for doing the washing, one for the rinsing and a third for adding fabric softener. The clean items of clothing were then hung on the washing line or the border fence of the yard to dry. The dirty water in the three basins was disposed of by scooping it into a bucket and then pouring it into the outdoor traditional toilet or throwing it out onto the ground in the yard one bucketful at a time.

Table 4.11 Activity Analysis of the steps involved in the instrumental Activity of Daily Living - Laundry

Collecting water and fuelwood as steps done before doing laundry	Collect water to use for laundry	Collecting water and fuelwood as ADL domains
Searches / Locates	1. Gather wheelbarrow and empty 25 litre water-containers	**Gathers**
	2. Walk to water source in nearby street or village	**Initiates**
	3. Place empty water-containers in queue	**Continues**
	4. Fill water-containers	
	5. Place filled water-containers onto wheelbarrow	
	6. Take full water-containers home	
	7. Empty water into storage drum	
	8. Store empty water-containers	**Terminates**
	Collect fuelwood to heat water for laundry	
	1. Gather tools and equipment, e.g. *panga* and rope	**Gathers**
	2. Walk to bush/forest	**Initiates**
	3. Chop down tree	**Continues**
	4. Clean off leaves and small branches	
	5. Bind chopped fuelwood for carrying	
	6. Place bound fuelwood on head	
	7. Carry fuelwood home on head	
	8. Place fuelwood on fuelwood pile	**Terminates**
	Doing laundry	
Gathers	1. Gather items needed for doing laundry, such as the basket of dirty laundry, washing powder, fabric softener, buckets of various sizes, and three large plastic or zinc baths	**Initiates**
	2. Carry items needed to do laundry to laundry area	
Initiates	3. Pour cold water from 25 litre water-container into the three large plastic or zinc baths	
Continues	4. Pour heated water from *tshatshisa* pot into the basin used for washing the dirty laundry	
	5. Wash dirty laundry by hand	**Continues**
	6. Rinse laundry	
	7. Soften laundry	
	8. Carry clean laundry to washing line or fence	
	9. Hang up wet laundry to dry	
Terminates	10. Empty water out of plastic or zinc baths	**Terminates**
	11. Store large plastic or zinc baths, large bucket, small bucket, washing powder and softener	
	12. Take down dry laundry	

The bADL bathing is a further example (Table 4.12). An adequate quantity of water and fuelwood had to be collected in the same way as described for laundry, before bathing could begin. The collection of water and fuelwood could also be regarded as pre-requisite searches/locates steps for bathing, or as separate iADLs that needed to be completed before bathing.

The CCWs described two methods of bathing typically performed in the research setting. The first option involved filling a plastic basin, colloquially known as a *skottel* or *wasbak*, with warm water from the outdoor fireplace and then carrying it into the bedroom. The individual would then conduct the equivalent of a bed-bath, by dipping a facecloth into the water, applying soap and then wiping the various body parts clean. The facecloth would then be dipped into clean water so that any remaining soap could be wiped off the cleaned body parts. The dirty water in the basin was disposed of by carrying it outside for disposal into the outdoor traditional toilet or to be thrown out onto the ground in the yard. The second bathing option involved the use of a large plastic or metal bath, therefore required significantly more water than the first option. The individual would pour cold water into the bath from a 25-litre water-container and add hot water from a so-called *tshatshisa* water pot. The individual would then either sit or stand in the bath and wash themselves using a facecloth and soap. The dirty water was disposed of by scooping it into a bucket and then pouring it into the outdoor traditional toilet or throwing it out onto the ground in the yard, one bucketful at a time.

Table 4.12 Activity Analysis of the steps involved in the basic Activity of Daily Living - Bathing

Collecting water and fuelwood as steps done before Bathing	Collect water to use for bathing	Collecting water and fuelwood as iADL domains
Searches/Locates	1. Gather wheelbarrow and empty 25 litre water-containers	**Gathers**
	2. Walk to water source in nearby street or village	**Initiates**
	3. Place empty water-containers in queue	**Continues**
	4. Fill water-containers	
	5. Place filled water-containers onto wheelbarrow	
	6. Take full water-containers home	
	7. Empty water into storage drum	
	8. Store empty water-containers	**Terminates**
	Collect fuelwood to heat water for bathing	
	1. Gather tools and equipment, e.g. *panga* and rope	**Gathers**
	2. Walk to bush/forest	**Initiates**
	3. Chop down tree	**Continues**
	4. Clean off leaves and small branches	
	5. Bind chopped fuelwood for carrying	
	6. Place bound fuelwood on head	
	7. Carry fuelwood home on head	
	9. Place fuelwood on fuelwood pile	**Terminates**
	Bathing using plastic basin	
Gathers	1. Gather plastic basin/*wasbak*/*skottel*, soap and facecloth	**Gathers**
Initiates	2. Heat water on fire	**Initiates**
	3. Fill basin/ *wasbak*/*skottel* with hot and cold water	
	4. Take basin/*wasbak*/*skottel* to bedroom or bathing area	
Continues	5. Wash face and body	**Continues**
Terminates	6. Take basin/*wasbak*/*kottel* to yard or outside toilet	**Terminates**
	7. Empty basin/*wasbak*/*skottel*	
	8. Store basin/*wasbak*/*skottel*	

4.3.5 Summary of results

The results show that bADLs and iADLs identified as being typically performed in rural less-resourced areas are similar to those reported in literature, with the exception of collecting water and fuelwood. The forms of a bADL and an iADL are described in detail and compared to the forms of these occupations when performed in well-resourced settings. Significant differences in the forms of bADLs and iADLs performed in rural less-resourced contexts were identified including greater physical demands and time implications, particularly when households do not have adequate access to water and electricity. The outcome of Stage II was a list of the bADLs and iADLs that have a significant component of manual handling identified as being typically performed in the study setting. The most common manual handling tasks identified were lifting, carrying and pushing, which became domains for the development of the new contextual bADL and iADL assessment instrument in Phase 2 of the study. This information formed the basis for the development of the home visit record form that was used for data collection in Stage III. Five bADLs and iADLs identified in Stage II were selected for further investigation in Stage III. The following criteria were used to select these five bADLs and iADLs:

- The bADL or iADL was identified by all four focus groups.
- The bADL or iADL was reported by the focus groups as taking place on a daily basis.
- The bADL or iADL was described as involving significant lifting, carrying and pushing of the heaviest weights described during the focus groups.

Using these selection criteria, the five bADLs and iADLs that were selected for further investigation during the home visits were collecting water, collecting fuelwood, laundry, cooking and bathing. These five bADLs and iADLs, typical of the rural context, became domains in the development of the new contextual bADL and iADL assessment instrument in Phase 2 of the study.

The three manual handling and five bADL and iADL domains for the development of the new contextual bADL and iADL assessment instrument were identified in Stage II. Objective 2 of the study was partially realised during this stage and is addressed further in Stage III.

4.4 Phase 1 Stage III: Home visits to investigate Activities of Daily Living comprising a significant component of manual handling domains in a rural less-resourced area

4.4.1 Demographic information

The median age of the participants was 59 years, with the youngest participant being 19 years old and the oldest being 72 years old (Table 4.13).

Table 4.13 Demographic information for home visit participants

Participant age (n=11)		
Median age (range)	**59 years (19-72 years)**	
Gender (n=11)		
Female	10	90.9%
Male	1	9.1%
Geographical area (n=11)		
Village	**Number of participants**	**Percentage**
Village A	3	27.3
Village B	2	18.2
Village C	2	18.2
Village D	4	36.3
Employment Status (n=11)		
Employment category	**Number of participants**	**Percentage**
Full-time employment	0	0
Part-time employment	0	0
Seasonal employment	2	18.2
Unemployed	5	45.5
Social grant	3	27.3
School learner	1	9.0

The participants' homesteads were located in either the Greater Tzaneen or the Maruleng sub-districts of Mopani District in Limpopo Province. Five participants were located in the Greater Tzaneen Municipality, with three living in Village A and 2 living

in Village B respectively, while the remaining six participants resided within Maruleng sub-district, four living in Village C and two in Village D.

The majority of the participants were unemployed (44.4%), with a further 33.3% indicating they received an old-age pension, one participant reporting they worked on a seasonal basis in the agricultural sector, and one was a high school learner.

4.4.2. Household amenities impacting on the basic and instrumental Activities of Daily Living domains

4.4.2.1 Housing type

Table 4.14 indicates all the participants had brick houses (100%). A number of the participants were found to have multiple dwellings on their homesteads, with 37.3% having additional buildings built in the traditional style. Photographs of the houses belonging to participants 1 and 11 show a modern brick house and a homestead with a traditional dwelling on the left and two brick dwellings on the opposite side of the courtyard respectively (Table 4.14).

4.4.2.2 Sanitation

Most of the homesteads that were visited (81.8%) were found to have outdoor toilet facilities (Table 4.14). Of these, 100% were traditional pit latrines, examples of which are shown in Table 4.14. The homestead of participant 11 was found to have no on-site toilet facility, and the household members had to climb through a fence to access their neighbour's outdoor pit latrine. Another homestead was found to have no toilet facilities at all, with the household members using the nearby open field area for toileting purposes.

4.4.2.3 Electricity Supply

All the participants had an electricity supply to their homes, as shown in Table 4.14. A photograph of the electrical connection to the brick dwelling belonging to participant 2 is presented in Table 4.14.

Table 4.14 Household amenities impacting on basic and instrumental Activities of Daily Living domains

Housing (n = 11)				
Housing type	**Number of participants**	**Percentage**	 Participant 11 - Brick house with multiple rooms	 Participant 1 – homestead with traditional and brick dwellings
Brick house	11	100		
Traditional house	3	27.3		
Shack	0	0		
Sanitation				
Toilet location (n = 11)	**Number of participants**	**Percentage**	 Participant 2 – Outdoor toilet	 Participant 9 – Outdoor pit latrine
Indoor toilet	0	0		
Outdoor toilet (in yard)	9	81.8		
No toilet	2	18.2		
Toilet type (n = 9)	**Number of participants**	**Percentage**		
Flushing toilet	0	0		
Pit latrine/ traditional toilet	9	100.0		

Electricity supply (n = 11)		
Presence of electricity supply	**Number of participants**	**Percentage**
Have electricity supply	11	100



Participant 2 – Electricity supply to brick dwelling

Water supply (n = 11)		
Type of water supply	**Number of participants**	**Percentage**
Indoor piped cold water	0	0
Indoor piped hot and cold water	0	0
Water supply (tap) in yard	2 *(no water available)*	18.2
Water supply (tap) in same street	2	18.2
Water supply in village	8	72.7
Water supply from river	1	9.0
Water supply from municipal water trucks	0	0



Participant 8 - tap in the street



Participant 3 – only water supply for the village



Participant 7 – collecting water from the river

Fuelwood supply (n = 11)				
Method of obtaining fuelwood	**Number of participants**	**Percentage**	 Participant 2 – Chopping fuelwood	 Participant 1 Outdoor woodpile
Self-collected, manually	9	81.8		
Self-collected using donkey cart	1	9.1		
Uses delivery service (*bakkie*)	1	9.1		
Cooking facilities (n=11)				
Method of cooking	**Number of participants**	**Percentage**	 Participant 11 – outdoor cooking hut	 Participant 6 – inside the outdoor cooking hut
Uses a fuelwood-fire	11	100.0		
Uses an outdoor cooking-hut	10	91.9		
Uses an outdoor open fire	1	9.1		
Has indoor kitchen with electrical appliances	6	54.5		
Uses indoor kitchen	0	0		

4.4.2.4 Water supply

None of the participants were found to have indoor piped municipal water supplied to their homes, as indicated in Table 4.14. Two of the participants (18.2 %) had a tap within their yards, but reported there had been no water available in the municipal system for many months prior to and including the date of the data collection. All the participants (100%) accessed their water from a communal water source located outside the individual homesteads**.** Two participants (8.2%) collected water from municipal taps in the street near to their homesteads, most (72.7 %) accessed water from the sole supply in their villages, while one participant (9.0%) accessed water from the nearby river. A number of the participants collected rainwater whenever possible, using home-made collection systems or household containers such as plastic basins and buckets, or zinc baths. Photographs of water sources are presented in Table 4.14.

4.4.2.5 Fuel supply

Despite all the participants having connection to the national electricity grid, they (100%) were also found to make use of fuelwood-fires for cooking and heating of water (Table 4.14). All the homesteads visited (100%) were found to have outdoor fuelwood piles, such as the photograph presented in Table 4.14.

4.4.2.6 Cooking facilities

All the participants (100%) were found to make use of fuelwood-fires for cooking, as shown in Table 4.14. These fuelwood-fires were typically located outdoors in the open (9.1%) or within so-called outdoor cooking huts (91.9 %) in the homestead yards. An example of an outdoor cooking hut is shown in Table 4.14. A number of the participants were found to have well-equipped indoor kitchens in addition to their outdoor cooking huts. However, the electrical domestic appliances in the indoor kitchens were not used due to financial constraints which limited the amount of electricity purchased each month.

4.4.3 Household equipment used for basic and instrumental Activities of Daily Living domains

4.4.3.1 Equipment for collecting and storing water

Data and photographs relating to the types of household equipment utilised for water collection and storage are reflected in Table 4.15. All the participants (100 %) were

found to make use of a wheelbarrow to transport the 25-litre plastic water-containers when accessing water. In addition, they all (100%) made use of 25-litre plastic containers for the collection and storage of water, while most (91.9%) were found to use 90-litre plastic or metal drums for the storage of water.

4.4.3.2 Equipment for collecting fuelwood

Table 4.15 presents data and photographs regarding equipment used for collecting fuelwood. All the participants (100%) were found to use a *panga* to chop fuelwood, and 70% made use of rope to tie the chopped fuelwood into a tight bundle suitable to be carried on the head, as well as scarf or piece of fabric as a make-shift cushion to protect their heads when carrying a load of fuelwood (80.0%). Fifty percent of the participants reported they made use of small sticks, which they twisted in the rope to tighten the fuelwood together once the bundle of fuelwood had been securely tied. One participant reported he made use of his donkey-cart to transport fuelwood from the collection point back to his homestead.

4.4.3.3 Equipment for the laundry instrumental Activities of Daily Living domain

All the participants (100 %) were found to make use of two different plastic or zinc baths and basins when doing their laundry by hand, while 45.5% indicated they also made use of a third bath or basin (Table 4.15).

Table 4.15 presents photographs regarding the laundry iADL domain. Three different plastic and zinc containers were typically used for laundry by hand – one for washing the dirty clothes, the second for rinsing the washed clothes and the last for adding fabric softener to the rinsed clean clothes. All the participants (100%) made use of 25-litre plastic water-containers for the provision of water needed to do laundry. A number of participants stored water in plastic or metal drums near to the areas of their yards where they did their laundry. Many of the participants (27.3%) made use of a bucket to empty the dirty water out. One participant reported making use of a ‘scoop’ or small plastic bucket for putting the detergent into the first bath or basin, and for filling the bucket with dirty water when emptying the baths or basins.

Table 4.15 Household equipment used for basic and instrumental Activities of Daily Living domains

Water Collection Domain (n = 11)				
Equipment type	**Number of participants**	**Percentage**	 Participant 3 – 25-litre water-containers in wheelbarrow	 Participant 8 - plastic drums with capacity of approximately 90 litres
Wheelbarrow	11	100.0		
25-litre plastic container	11	100.0		
90 litre storage drum	10	90.9		
Fuelwood Collection Domain (n = 10)				
Equipment type	**Number of participants**	**Percentage**	 Participant - panga used for chopping fuelwood	 Participant - sticks used to tighten the rope securing a bundle of fuelwood
Panga	10	100.0		
Scarf to protect head	8	80.0		
Rope	7	70.0		
Stick and string to tighten bundle	5	50.0		
Donkey cart	1	10.0		
Laundry Domain (n=11)			 Participant 1 – laundry equipment	 Participant 1 – selection of basins and containers used for laundry
Equipment type	**Number of participants**	**Percentage**		
Large zinc/ plastic bath for washing	11	100.0		
Large zinc/ plastic bath for rinsing	11	100.0		
Large zinc/ plastic bath for softening	5	45.5		
25-litre plastic water-container	11	100.0		
Scoop/small bucket	1	9.1		
Bucket	3	27.3		
Cooking Domain (n = 11)				
Equipment type	**Number of participants**	**Percentage**	 Participant 11 – metal fireplace stands on outdoor cooking fire	 Participant 2 – *potjie* pot used to cook 'pap'
Metal tripod grid	10	90.9		
Three-legged *potjie* pot	11	100.0		
Lefehlo/ traditional pap whisk	3	27.3		
Traditional wooden spoon	2	18.2		
Tshatshisa/ pot for heating water over fire	11	100.0		
Circular stainless steel pot	5	45.5		
Bathing Domain (n=11)				
Equipment type	**Number of participants**	**Percentage**	 Participant 3 – plastic basin used for bathing	 Participant 1 – *tshatshisa* pot on fuelwood- fire for heating water
Small plastic basin	7	63.6		
Bucket	4	36.4		
Large zinc or plastic bath	4	36.4		
Tshatshisa (pot) on fire to heat water	11	100.0		

4.4.3.4 Equipment for cooking

Table 4.15 presents data and photographs regarding equipment used when cooking on a fuelwood fire. A tripod metal stand was used by most participants (91.9%) to keep their pots stable on the fireplaces. Despite 54.5% of participants having indoor kitchens with electrical equipment, such as a 4-plate electrical stove and oven and a refrigerator as well as various sizes of pots, pans and various kitchen utensils, these facilities were only used for cooking when funds were available for electricity. Where cooking was done on a fuelwood-fire inside an outdoor kitchen hut, three-legged traditional *potjie* pots were found to be used by all the participants (100%). Round stainless steel pots were also commonly utilised (45.5 %) by the participants. All the participants used a *tshatshisa* pot, which is a specially designed metal pot with a handle and a spout, for heating water used for cooking. Traditional wooden spoons were used by 18.2% of the participants and a traditional wooden *pap* porridge whisk was found to be used by 27.3%.

4.4.3.5 Equipment for bathing

The results and photographs shown in Table 4.15 indicate that 63.6% of the participants used a plastic basin for bathing. The remainder of the participants (36.4 %) made use of *zinc* or plastic baths. The participants all (100.0%) used cold water stored in either the drums or 25-litre plastic water-containers, reported on in section 5.5.3.1, for bathing and added hot water heated in the traditional *tshatshisa* pot on a fuelwood-fire. Those participants who used zinc or plastic baths also used a plastic bucket to empty out the dirty bath water afterwards.

4.4.4 Frequency of basic and instrumental Activities of Daily Living

Table 4.16 shows the frequency of the five bADL and iADL domains. Most of the participants collected water more than twice per day (63.6%), while 9.1% collected water either once or twice per day. In terms of collection of fuelwood, the results shown in Table 4.16 indicate that most participants (36.4 %) collected fuelwood on a daily basis, while 9.1% collected fuelwood every second day and 18.2% collected it twice a week respectively. A further 18.2% collected fuelwood on a weekly basis. The 18.2% of participants found to collect fuelwood every six weeks were the same ones who made use of their own donkey cart or a delivery service, as indicated in Table 4.16.

Table 4.16 Frequencies of performance of basic and Instrumental Activitites of Daily Living domains

Water Collection Domain		
Frequency	**Number of participants**	**Percentage**
More than twice daily	7	63.6
Twice daily	1	9.1
Once daily	1	9.1
Every second day	2	18.2
Fuelwood Collection Domain		
Frequency	**Number of participants**	**Percentage**
Once daily	4	36.4
Every second day	1	9.1
Twice weekly	2	18.2
Once weekly	2	18.2
Every six weeks	2	18.2
Laundry Domain		
Frequency	**Number of participants**	**Percentage**
Once daily	1	9.1
Every second day	1	9.1
Twice weekly	4	36.4
Weekly	5	45.4
Cooking Domain		
Frequency	**Number of participants**	**Percentage**
Twice daily	3	27.3
Once daily	8	72.7
Bathing Domain		
Frequency	**Number of participants**	**Percentage**
Twice daily	9	81.8
Once daily	2	18.2

Most participants were found to cook once daily (72.7 %), while most of them typically bathed twice daily (81.8%). Laundry was the least frequently done iADL, with most participants doing it either weekly (45.4%) or twice weekly (36.4%).

4.4.5 Time taken to complete basic and instrumental Activities of Daily Living

The median total times taken to complete each bADL and iADL domain are shown in Table 4.17. Collection of water was found to take a median time of 38 minutes,

bathing took a median time of 58 minutes to complete, collecting fuelwood and cooking took 2 hours and 9 minutes, and 2 hours and 59 minutes respectively, while laundry was the most time-consuming bADL and iADL, with a median time of 4 hours and 25 minutes.

These times were measured from the start to the completion of each respective bADL and iADL and did not take into account that most of the participants did multiple bADLs and iADLs simultaneously, nor that there were waiting times within certain steps of these occupations. For example, the median total time taken to do laundry included the period during which the dirty clothing was left to soak, while the participant got on with starting to cook a meal. Similarly, the total median time for cooking included stretches of time when the food was left to cook on the fire, without the participant necessarily being actively involved in the task during those times.

Table 4.17 Time taken to complete basic and instrumental Activities of Daily Living domains

bADL / iADL	Median total time (range)
Collecting water	38 mins (6 mins to 1 hour 23 mins)
Collecting fuelwood	2 hours 9 mins (22 mins to 3 hours 5 mins)
Laundry	4 hours 25 minutes (2 hours 15 mins to 6 hours 42 mins)
Bathing	58 minutes (54 minutes to 1 hour 12 minutes)
Cooking	2 hours 59 minutes (1 hour 3 minutes to 5 hours 10 mins)

4.4.6 Distances walked during performance of basic and instrumental Activities of Daily Living domains

4.4.6.1 Distances walked in collecting water and fuelwood domains

The results shown in Table 4.18 indicate that 72.7% of the participants who collected water from the central water source in the village were walking a median distance of 1 256 m per trip when doing so. Those participants (18.2 %) who collected water from a tap in the street near to their homes walked a median distance of 452 m per trip. The participant who collected water from the nearby river walked a distance of 9 676 m per trip.

The results shown in Table 4.18 indicate that the 82 % of the participants who collected fuelwood from the bush area surrounding the village were walking a median distance of 5 120 m per trip when doing so.

Table 4.18 Median distances walked in collecting water and fuelwood domains (n=11)

Water Collection Domain (n = 11)		
Water source	**Median distance walked (range)** (* = sample size too small to perform D'Agostino-Pearson test for Normal distribution)	
Tap in the street (N = 2) (18.2 %)	One way = 226 m * (129.7 m to 321.5 m)	Round trip = 452 m (259.4 m to 643 m)
Tap in the village (N = 8) (72.7 %)	One way = 628 m (175.5 m to 1176.2 m)	Round trip = 1256 m (351 m to 2352.4 m)
River (N = 1) (9.1 %)	One way = 4 838 m *	Round trip = 9 676 m
Fuelwood Collection Domain (n = 9)		
Fuelwood source	**Median distance walked (range)**	
Self-collected from bush/veld (N = 9) (82 %)	One way = 2 560 m (673 m to 8447.5 m)	Round trip = 5 120 m (1345 m to 16 895 m)

4.4.6.2 Distances walked in laundry, cooking and bathing domains

Table 4.19 shows the data and photographs regarding areas within the homesteads where the participants typically carried out the bADLs and iADLs. The results indicate that 100% of the participants did their laundry outdoors in their yards, while most of them (90.9%) bath themselves in their bedrooms. Most of the participants did their cooking on fireplaces in an outdoor cooking hut (72.7%), while 27.3% cooked on an open outdoor fire. Many of the participants (54.5%) were found to also have indoor kitchens, but reported they only made use of these facilities when they had adequate funds for electricity. Given that none of the participants had indoor plumbing, they all disposed of dirty water from bathing and laundry manually, either by throwing it away in their yards (54.5%) or pouring it into their outdoor traditional toilets (45.5%).

Table 4.19 Household area where basic and instrumental Activities of Daily Living domain is typically performed (n = 11)

Laundry Domain			
Area	**Number of participants**	**Percentage**	
Outdoors in yard	11	100	 Participant 2 – laundry equipment and washing line
Cooking Domain			
Area	**Number of participants**	**Percentage**	
Indoor kitchen	6 *	54.5*	 Participant 7 – outdoor cooking hut
Outdoor fireplace	3	27.3	
Outdoor cooking hut	8	72.7	
Bathing Domain			
Area	**Number of participants**	**Percentage**	
Bedroom / indoor sleeping area	10	90.9	 Participant 6 - Preparing to bath in the bedroom
Indoor kitchen	1	9.1	
Disposal of dirty water (laundry and bathing Domains)			
Area	**Number of participants**	**Percentage**	
Dirty water emptied into toilet	5	45.5	 Participant 5 – distance of yard for throwing out of dirty water
Dirty water emptied into garden	6	54.5	

The participants were observed to repeatedly walk between various identifiable points within their yards and homes while laundry, cooking and bathing, in order to access and dispose of the fuelwood and water required to perform the bADLs and iADLs. For example, when bathing, cold water had to be collected from the water storage drum or 25-litre water-container and then poured into the traditional *tshatshisa* pot to be heated on the fuelwood-fire. Thus, the participant had to walk from the water storage area to the fire-place in order to accomplish this step of preparing the hot water for bathing. In the same way, 25-litre plastic water-containers need to be carried from where they are stored to the area where the laundry is done.

The results reflected in Table 4.20 below are the median distances for a single trip between the various identifiable points within the homesteads. Data regarding the number of times each distance was walked throughout the duration of completing the entire bADLs and iADLs was not collected therefore median cumulative distances are not available.

Table 4.20 Average of the median distances walked within homesteads when performing laundry, cooking and bathing basic and instrumental Activities of Daily Living domains

bADL / iADL domain	Description	Median distance walked (range)	
		One way	Round trip
Laundry Domain	Water storage to laundry area	12.1 m (3.5 m to 19.6 m)	24.2 m (7.0 m to 39.2 m)
	Laundry area to wash-line	9.4 m (0 m to 16 m)	18.8 m (0 m to 32 m)
	Average of median values (range)	10.75 m (0 m to 29.3 m)	21.5 m (0 m to 58.6 m)
Cooking Domain	Water storage to cooking area	11.8 m (2 m to 22.3 m)	23.6 m (4 m to 44.6 m)
	Fuelwood-pile to cooking area	15.0 m (2 m to 62 m)	30.0 m (4 m to 124 m)
	Average of median values (range)	13.4 m (2 m to 62 m)	26.8 m (4 m to 124 m)
Bathing Domain	Water storage to bathing area	10.0 m (0 m to 33.3 m)	20.0 m (0 m to 66.6 m)
	Bathing area to toilet	28.0 m (8 m to 48.6 m)	56.0 m (16 m to 97.2 m)
	Fireplace to bathing area	15.0 m (10 m to 31.6 m)	30.0 m (20 m to 63.2 m)
	Average of median values (range)	17.6 m (0 m to 48.6 m)	35.3 m (0 m to 97.2 m)
Average of median distances walked within homesteads when accessing stored water for bADL and iADL domains (range)		**11.3 m (0m to 33.3 m)**	**22.6 m (0 m to 66.6 m)**
Average of median distances walked within homesteads when performing bADL and iADL domains (range)		**16.9 m (0 m to 62 m)**	**33.8 m (0 m to 124 m)**

4.4.6.3 Weights lifted and carried during performance of basic and instrumental Activities of Daily Living domains

The weights of the equipment and materials were standardised to match the dimensions of those observed during the home visits, as presented in Appendix 13. The weights of the items that were lifted and carried during the performance of the five bADL and iADL domains are recorded in Table 4.21.

In order to determine the physical demand level of lifting, the frequency of the lift needs to be considered, as shown in Figure 2.1 in Chapter Two. According to the results presented in Table 4.17 above, the median total times taken to complete Water Collection, Fuelwood Collection and Bathing were all less than 33% of an eight-hour work day. Conversely, the total times taken to complete Doing Laundry and Cooking fell between 34% and 66% of a full work day. Given that the design of the current study did not include the measurement of the number of lifts performed per bADL or iADL domain, it is not possible to determine whether the lifting tasks performed in the Doing Laundry and Cooking domains met the criteria for *Frequent Lifting* (U.S. Department of Labor Employment and Training Administration, 1991; Matheson, 2004)**.** The assumption has been made that all lifting results for the current study will be regarded as *Occasional Lifting*, as shown in Table 4.21

The results presented in Table 4.21 show that the physical demands of the lifting domain fall within the norms developed for industrial settings. The heaviest load lifted from floor to knuckle was two full 25-litre water-containers, with one held in each hand to the sides of the legs, weighing 50.0 kg in total. This lift falls into the very heavy category, according to the DOT, and was found to be performed as part of the water collection, laundry and bathing bADL and iADL domains. The heaviest load lifted from knuckle to shoulder was one full 25-litre water-container, weighing 25.0 kg, when pouring water into a water storage drum or when offloading full water-containers from a delivery vehicle; this lift was found to be performed during the water collection iADL domain. The heaviest load lifted from shoulder to overhead was the 14.3 kg load of wood lifted from the ground onto the head; this lift was performed during the fuelwood collection domain.

Table 4.21 Weights of items lifted and carried during performance of basic and instrumental Activities of Daily Living domains

Household equipment item (Dimensions in Appendix 13)	Weight (kg)	DOT Physical Demand Level (Occasional Lifting)			Median distance carried (range) *	
		Floor to knuckle lift	Knuckle to shoulder lift	Shoulder to overhead lift	Within homestead	Outside of homestead
Collecting water domain						
Wheelbarrow	33.80 kg	Heavy	N/A	N/A	N/A	N/A
1 x 25-litre plastic container	Empty:1.2 kg	Sedentary	N/A	N/A	11.3 m (0 m to 33.3 m)	From household to the tap in the street: 226 m (129.7 m to 321.5 m) From the homestead to the tap in the village: 628 m (175.5 m to 1176.2 m)
	Full of water: 25.0 kg	Heavy	Very heavy	N/A	1.3 m (0 m to 33.3 m)	
2 x 25-litre plastic container	Empty: 2.4 kg	Sedentary	Light	N/A	11.3 m (0 m to 33.3 m)	
	Full of water: 50.0 kg	Very heavy	N/A	N/A	11.3 m (0 m to 33.3 m)	
90 litre storage drum	Empty = 3.68 kg	Sedentary	N/A	N/A	N/A	N/A
Collecting fuelwood domain						
Load of fuelwood	15.8 kg * (11.0 kg to 20.0 kg)	Medium	Heavy	Very heavy	15.0 m (2 m to 62 m)	From forest to homestead: 2 560 m (673 m to 8 447.5 m)
Panga	2.85 kg	Sedentary	N/A	Medium	16.9 m (0 m to 62 m)	Round trip from homestead to forest and back: 5 120 m (1 346 m to 16 895 m)
Scarf to protect head	0.12 kg	Sedentary	N/A	Light	16.9 m (0 m to 62 m)	
Rope	0.01 kg	Sedentary	N/A	Light	16.9 m (0 m to 62 m)	
Laundry domain						
Large plastic bath for washing/rinsing/fabric softening	Empty: 3.42 kg	Light	N/A	N/A	16.9 m (0 m to 62 m)	N/A
Large zinc bath for washing/ rinsing/fabric softening	Empty: 3.94 kg	Light			16.9 m (0 m to 62 m)	
25-litre plastic water-container	Empty: 1.2 kg	Sedentary			12.1 m (3.5 to 19.6 m)	
	Full of water: 25.0 kg	Very heavy			12.1 m (3.5 m to 19.6 m)	

Scoop/small bucket	Empty: 0.02 kg	Light			16.9 m (0 m to 62 m)	
	Full of water: 0.99 kg	Light			16.9 m (0 m to 62 m)	
Large bucket	Empty: 0.8 kg	Light			16.9 m (0 m to 62 m)	
	Full of water: 10.0 kg	Medium			16.9 m (0 m to 62 m)	
	Full of wet laundry: 7.04 kg	Medium			9.4 m (0 m to 16 m)	
Cooking domain						
Three-legged *potjie* pot	Empty: 2.5 kg	Light	N/A	N/A	N/A	N/A
	Full: 8.6 kg	Medium			16.9 m (0 m to 62 m)	
Lefehlo/traditional pap whisk	0.14 kg	Light			N/A	
Traditional wooden spoon	0.09 kg	Light			N/A	
Tshatshisa/pot for heating water over fire	Empty:1.3 kg	Sedentary			N/A	
	Full of water: 14.2 kg	Heavy			N/A	
Bathing domain						
Plastic basin	Empty: 0.12 kg	Sedentary	N/A	N/A	16.9 m (0 m to 62 m)	N/A
	Full of water: 9.5 kg	Medium			16.9 m (0 m to 62 m)	
Large bucket	Empty: 0.8 kg	Sedentary			16.9 m (0 m to 62 m)	
	Full of water: 10.0 kg	Medium			28.0 m (8 m to 48.6 m)	
Large plastic bath	Empty: 3.42kg	Sedentary			16.9 m (0 m to 62 m)	
Large *zinc* bath	Empty: 3.94 kg	Sedentary			16.9 m (0 m to 62 m)	
Tshishisa pot for heating water on fire	Empty: 1.3 kg	Sedentary			N/A	
	Full of water: 14.2 kg	Medium			16.9 m (0 m to 62 m)	
25-litre plastic water-container	Empty: 1.2 kg	Sedentary			10.0 m (0 m to 33,3 m)	
	Full of water: 25.0 kg	Heavy			10.0 m (0 m to 33.3 m)	

The heaviest load carried was two full 25-litre water-containers, with one held in each hand to the sides of the legs, weighing 50.0 kg in total. This carry was found to be performed as part of the water collection, laundry and bathing bADL and iADL domains. The load was carried over relatively shorter distances within the homestead during the laundry and bathing iADL and bADL domains. Participants also opted to carry this load over the shortest distances in the water collection iADL domain that were outside of the homestead, particularly from the water sources in the nearby streets. During the fuelwood collection domain, the median load was significantly lighter (15.8 kg) but was found to be carried on the head over shorter distances within the homesteads and over much greater distances from fuelwood collection points in the surrounding forest areas.

4.4.6.4 Forces pushed during performance of basic and instrumental Activities of Daily Living domains

The initial forces exerted when pushing the loads by wheelbarrow during the performance of the iADLs were calculated as indicated in Table 4.22. The results show that the pushing domain was applicable for most aspects of the iADL domains that required loads to be transported over distances outside of the homesteads.

Table 4.22 Loads pushed in a wheelbarrow in instrumental Activities of Daily Living domains

Load pushed	iADL domain	Initial Force exerted (N)
Empty wheelbarrow	Water collection Fuelwood collection	26.47 kg
Items needed for doing laundry pushed in wheelbarrow	Laundry	38.54 kg
Load of fuelwood pushed in wheelbarrow	Fuelwood collection	44.69 kg
Four empty 25-litre water-containers pushed in wheelbarrow	Water collection	30.39 kg
One full 25-litre water-container pushed in wheelbarrow		46.10 kg
Two full 25-litre water-containers pushed in wheelbarrow		66.21 kg
Three full 25-litre water-containers pushed in wheelbarrow		87.62 kg
Four full 25-litre water-containers pushed in wheelbarrow		106.91 kg

The quantity of water transported by wheelbarrow per trip varied depending on the physical strength of the participant and the physical terrain. The photographic data supported the finding that most participants opted to transport two or three filled 25-litre plastic water-containers in a wheelbarrow at a time when accessing water from the village taps; participants were therefore transporting between 50 and 75 kilograms of water in their wheelbarrows per trip.

4.4.6.5 Person responsible for basic and instrumental Activities of Daily Living domains

The results in Table 4.23 show that collection of water and fuelwood is predominantly carried out by the adult female (54.5%) and elderly female (27.3%) members of the households.

Table 4.23 Household members responsible for basic and instrumental Activities of Daily Living domains (n=11)

Household member	Water Collection Domain	Fuelwood Collection Domain	Laundry Domain	Cooking Domain	Bathing Domain
n (percentage)					
Mother/adult female	5 (45.5)	6 (54.5)	6 (54.5)	7 (63.6)	6 (54.5)
Grandmother/ elderly female	4 (36.4)	3 (27.3)	4 (36.4)	3 (27.3)	4 (36.4)
Father/adult male	1 (9.1)	1 (9.1)	0	0	0
Female Child	1 (9.1)	0	1 (9.1)	1 (9.1)	1 (9.1)
Out-sourced	0	1 (9.1)	0	0	0

In addition to collecting water and fuelwood, 54.5% of the adult females took responsibility for laundry, 63.6% did the cooking and 54.5% prepared baths for the rest of their households. Similarly, 36.4% of the elderly adult females took responsibility for laundry, 27.3% did the cooking and 36.4% prepared baths for the rest of their households in addition to collecting water and fuelwood.

In one household, the 19 year-old school-going daughter was responsible for collecting the water, while her father took responsibility for collecting the fuelwood.

The same young girl also did the laundry, cooking and bath preparation for her family, in addition to being a grade 12 school learner.

4.4.7 Summary of results

The results of Stage III expand on those of Stage II by describing the five bADL and iADL, and the three manual handling domains utilised in the development of the new contextual bADL and iADL assessment instrument in Phase 2 of the study. The household amenities typically available and the equipment used in the five bADLs and iADLs selected as domains (collecting water, collecting fuelwood, doing laundry, cooking and bathing) were described. The distances walked, the time taken and the weights involved when performing the five bADL and iADL domains demonstrated that there is a significant component of manual handling, namely lifting, carrying and pushing, implicit in these tasks for households with limited amenities. This finding supported the selection of lifting, carrying and pushing as manual handling domains in the new contextual bADL and iADL assessment instrument which was developed in Phase 2.

4.5 Conclusion

The results presented in this chapter show that occupational therapists in medico-legal practice routinely assess performance in bADLs and iADLs, but tend to use non-standardised assessment instruments more than standardised instruments. No existing bADL and iADL assessment instrument suitable for evaluation of rural dwellers was found to be utilised by South African occupational therapists. These findings realise objectives 1 and 2, and together with the review of the literature regarding existing bADL and iADL instruments in Chapter 2 confirms the basis for proceeding with the development of a contextual bADL and iADL assessment instrument. The results from Stages II and III address objective 3 of the study and provide the basis for the content (bADL, iADL and manual handling domains) and items of the new contextual bADL and iADL assessment instrument in Phase 2.

CHAPTER 5: DISCUSSION PHASE 1

5.1 Introduction

The discussion for Stage I of Phase 1 focuses on the use of bADL and iADL assessment instruments by South African occupational therapists. Furthermore, the absence of a contextual bADL and iADL assessment instrument being used by these medico-legal occupational therapists is confirmed, which together with the review of the literature justifies proceeding to Phase 2 of the study.

The utilisation of the Stage II findings for the identification of the five bADL and iADL and the three manual handling domains included in the new contextual bADL and iADL assessment instrument, which is developed in Phase 2 of the study, is discussed. The forms of bADLs and iADLs typically carried out in the rural less-resourced study setting is highlighted and two iADLs that have not previously been described in occupational therapy literature and theoretical frameworks are identified. The discussion of Stage III expands on the description of the forms of the bADLs, iADLs and manual handling domains and shows the quantification of the physical demands of the manual handling domains included in the newly developed contextual bADL and iADL instrument. The impact of the significant manual handling demands of bADLs and iADLs in a rural less-resourced context on occupational engagement is described.

5.2 Demographic information

5.2.1 Stage I Medico-legal occupational therapists

The absence of employment sector and current field of practice variables in the existing HPCSA and OTASA practitioner databases resulted in it not being possible to ensure the study population included all medico-legal occupational therapists.

Due to the lack of demographic information received, it was not possible to determine whether the demographics of the sample were reflective of the population of medico-legal occupational therapists belonging to OTASA. However, the limited demographic information did show a similar trend in terms of gender, with 100% being female compared to the 95.9% females in the OTASA population. Similarly,

most respondents in the sample and the population reported practicing in Gauteng Province. The sample of medico-legal occupational therapists also appeared well qualified, with 87.5% of them reporting having post-graduate qualifications, predominantly in the vocational rehabilitation field. The duration of experience is usually included as it is assumed that more experience brings more knowledge regarding instruments used. The sample reported having more work experience than the current average number of years of experience of occupational therapists in the public sector in South Africa.

5.2.2 Stage II Community Care Workers

The data for the study were collected from CCWs who had been care workers in their communities for a number of years and were familiar with the daily activities carried out in the homes of the people they assisted. The vast majority of CCWs who provided input were female, which is in line with the national and international literature regarding provision of care support services (Folbre, 2006; Urdang, 2006; Statistics South Africa, 2013). The CCWs also carried out the bADLs and iADLs described in this study themselves, so they were able to provide details about the methods used (Kehler, 2001). Most of the CCWs had a secondary school level of education, with some also having had basic tertiary training. The CCWs thus had adequate knowledge and experience for participation in the study and the RRA methodology was found to be effective in eliciting their responses optimally. The gender, age range as well as the level of education and number of years' experience of the CCWs were similar to that reported in South Africa in other studies on CCWs (Van Ginneken, Lewin & Berridge, 2010; Austin-Evelyn et al., 2017).

5.2.3 Stage III Home visit participants

The data shown in Table 4.14 demonstrates the unemployed female members of households predominantly take responsibility for the collection of water and fuelwood, as well as doing laundry, cooking and the preparation for bathing. Conversely, the findings indicate that men typically do not do laundry, cooking or bath preparation, but can be responsible for water and fuelwood collection. These findings are supported by literature, with numerous studies and reports confirming that women are predominantly responsible for water collection in rural South Africa (Kehler, 2001; Masangu, 2009; Geere, Hunter & Jagals, 2010; Human Sciences

Research Council, 2011; World Health Organization and United Nations Children's Fund, 2017; United Nations, 2018; World Vision, 2018). Other studies have shown that women are also predominantly responsible for fuelwood collection in rural South Africa (Aggarwal & Romano, 2001; Howells et al., 2005). The existence of a gender gap with regard to performance of domestic bADLs and iADLs was also borne out by the 2010 Time Use Survey, which found that South African women spent a mean of 3 hours and 15 minutes per day on domestic tasks, which is 2.2 times longer than the mean of 1 hour and 28 minutes spent on these tasks by their male counterparts. The same survey also showed that women are more likely to collect water, regardless of the distance of the water source from the homestead. As far as fuelwood collection goes, women were found to be more likely to be responsible for it when the source of fuelwood was further than 100m from the homestead, whereas men more commonly collected fuelwood from distances closer than 100m (Statistics South Africa, 2013).

These findings raise the issue of whether existing theoretical frameworks and bADL and iADL assessment tools used by occupational therapists talk to gender roles within these occupations. There is arguably a need for the newly developed contextual bADL and iADL assessment instrument to make allowance for variations in gender roles according to each patient's unique circumstances, thus ensuring that conclusions drawn from the individual's score are accurate.

5.3 Factors affecting data collection and interpretation

The development of the survey instrument was not adequately rigorous – while the draft questionnaire was piloted, a REDCap version was not used for the pilot. The design flaws in the survey instrument, such as the demographic questions mistakenly being left out, were thus not comprehensively addressed, which negatively affected the quality of data collection. The results for Stage I thus need to be interpreted with caution.

The response rate for the electronic survey in Stage I was low (21%) as there were only 83 as opposed to the required 194 respondents. The results of the survey thus need to be interpreted with caution. The selection of open-ended and multiple response option questions allowed respondents to add additional information under the *other* option.

Although the CCW participants had expertise in the bADLS and iADLS typically completed by community members, certain accommodations were needed in order for data collection in the group discussions to be effective. The CCWs were encouraged to speak in their home languages when necessary during the participatory mapping exercises focus groups. However, the use of different languages during group discussions and the need for translation affected the flow of the discussions. Nevertheless, the use of the participatory mapping technique seems justified as it cut across potential language barriers and served as a concrete mechanism for facilitating discussions.

5.4 Assessment of Activities of Daily Living as part of medico-legal evaluations

When asked about the inclusion of bADL and iADL assessment in medico-legal occupational therapy evaluations, 96% (80) of the respondents reportedly assessed the performance in bADLs and iADLs. The majority did not provide an opinion regarding the use of a bADL and iADL assessment as part of a comprehensive medico-legal evaluation. The high percentage who reported they include a bADL and iADL assessment can be interpreted as an indication of the high value placed on these assessments as part of a comprehensive medico-legal evaluation. A possible reason for this finding is that adequate performance in bADLs and iADLs is regarded as a precursor to the ability to function in the work environment (Buys & Van Biljon, 2007). Furthermore, in the South African economic climate, where a high unemployment rate prevails, employees who have sustained an injury or have developed a chronic health condition are often at risk of losing their jobs. Such individuals then remain at home, with bADLs and iADLs becoming their main occupations. Their performance in bADLs and iADLs therefore needs to be considered by medico-legal occupational therapists in order for appropriate recommendations to be made.

The finding that 88.8% of respondents do not use standardised bADL and iADL assessment instruments is supported by findings of numerous studies conducted internationally, which showed that occupational therapists delivering services to adults use standardised assessment instruments to a limited extent (Walker et al., 2000; Blenkiron, 2005; Stapleton & McBrearty, 2009). Furthermore, there was a

similarity in terms of the Barthel Index and the FIM being the most commonly utilised standardised instruments in South Africa, albeit to a lesser extent. In the current study, the Barthel Index (6.5%) and the FIM (3.9%) were the most commonly used standardised instruments, while in a recent Irish study the FIM (28%) and the Barthel Index (27%) were utilised the most (Stapleton & McBrearty, 2009).

The studies also report that many occupational therapists use assessment tools that they have developed themselves, which is supported by the current study's finding that over 40% of the study sample used their own practice-specific questionnaires to assess performance in bADLs and iADLs. The reasons cited in the international literature for the limited use of standardised assessment instruments were similar to the findings of this current study. South African medico-legal occupational therapists identified the costly licensure requirements of numerous standardised assessment instruments as a barrier to usage, which was supported by other international studies. Similar reasons given for preferring non-standardised assessments included they are regarded as less time-consuming, easier to use and more relevant to diverse settings than standardised assessment instruments (Blenkiron, 2005; Stapleton & McBrearty, 2009).

While such customised patient questionnaires no doubt assist occupational therapists to obtain relevant information regarding the contextual challenges their clients experience in the performance of their bADLs and iADLs, the absence of a standardised method for evaluation may make it difficult for them to justify their clinical findings and subsequent intervention recommendations to courts of law (Unsworth, 2011). The routine use of standardised functional assessments in disciplines such as allied health is low and use of 'in-house' non-standardised assessments more common which is undesirable for evidence based practice. Reasons for limited use of standardised assessments include a lack of time and resources (including financial), and limited knowledge of the most suitable tool to use (Bowman, 2006) [The Work-Link Screening Tool (Van Biljon et al., 2014) was the only informally developed questionnaire specifically reported on by the sample. The finding that numerous occupational therapists preferred self-developed bADL and iADL screening or non-standardised assessment tools can be interpreted as there are additional non-standardised tools that South African occupational therapists have developed for themselves, in response to the paucity of bADL and iADL assessment

tools deemed appropriate for their contexts. There is no evidence that the impact of a rural less-resourced context on bADLs and iADLs has been considered in these informally developed instruments, with the result that a significant proportion of bADL and iADL assessments conducted may be inadequate or inaccurate. Objective 1 of the study was realised in Stage I and the findings supported the contention of the researcher that there is a need for a South African contextual bADL and iADL assessment instrument to be developed.

5.5 Activities of Daily Living in a rural less-resourced context

5.5.1 Development of list of rural basic and instrumental Activities of Daily Living

The results presented in Table 4.11 illustrate there was a moderate level of similarity between the four participatory maps and focus group transcriptions in terms of the identified bADL and iADL activities. All but one of the bADLs and iADLs identified in the maps were mentioned in the discussions, but a number of additional iADLs were further identified during the discussions. The bADL and iADL activities were then assigned an ICF code and the listing of the activity in the OTPF III was confirmed (Table 4.11). The outcome of this process showed that most bADL and iADL activities carried out in a rural less-resourced context equated with those specified in the ICF and the OTPF III, with the exception of the collecting water and collecting fuelwood. The findings of Stage II show that many rural households are, out of necessity, faced with having to collect water and fuelwood on a daily basis. All four focus groups and maps showed that water and fuelwood collection from sources outside of the homesteads takes place on a daily basis. This finding is consistent with recent studies on accessing domestic water and fuelwood in rural villages in South Africa (Mokgope & Butterworth, 2001; Malubane, 2005; Masangu, 2009; Geere, Hunter & Jagals, 2010; Jagals, 2012; Matsika et al., 2013; Wrisdale et al., 2017). As such, the collection of water and fuelwood constitute significant occupations within a rural less-resourced context, which is important for the practice of occupational therapy in South Africa.

5.5.2 Form of basic and instrumental Activities of Daily Living in a rural less-resourced context

The data collected during the home visits supported the findings of the focus groups with the CCWs, that the forms of numerous bADLs and iADLs are unique within a rural, less-resourced context. Occupational therapists make use of activity analysis to describe the various aspects of occupations, such as the performance skills involved, the required equipment and materials, and the physical, psychological and environmental demands (Pierce, 2001; Crepeau et al., 2014). Performance skills are the discrete units of occupational performance, which when linked together form a task as a whole. Universal performance skills are viewed as being observable in the performance of any daily life task and include motor, process and social interaction performance skills (American Occupational Therapy Association, 2014; Fisher & Griswold, 2014).

While all the activities, with the exception of collecting water and collecting fuelwood, could be aligned with categories in the ICF and the OTPF III, the methods used to carry out the activities differed from that typically described in occupational therapy literature. The absence of indoor plumbing and limited access to electricity means the way bathing, cooking and laundry are done in a rural less-resourced context differs markedly from urban settings. Instead of using a built-in bath or shower, an electric stove and a washing machine, water and fuelwood first need to be collected before these bADLs and iADLs can be tackled.

Availability of adequate sources of water and energy are a pre-requisite to the completion of a number of bADLs and iADLs, such as hot water for bathing, washing dishes or doing laundry. Water first has to be collected from the available source, such as a tap in the adjacent street or the communal village tank. Fuelwood then has to be collected so that the water can be heated on an outdoor fireplace in the yard; this involves the household member walking into unpopulated areas adjacent to their village to chop down a tree and then carry the wood back to their homestead. The fuelwood is used to build a fire to heat the water in a customised pot called a *tshatshisa*. Using an occupational performance perspective, collection of water and fuelwood from outside the homestead could be viewed in two ways, as shown in Table 4.11 and Table 4.12. If regarded as a pre-requisite step for bADL and iADL

domains that require water and energy, then the universal process skills descriptor *searches/locates* would suffice. Alternatively, water and fuelwood collection can be regarded as iADLs in their own right, with the *gathers*, *initiates*, *continues* and *terminates* being universal process skills implicit within them. The findings of this study support the second option. Water and fuelwood collection from outside the homestead involves both significant time and physical demands. The collection of water and fuelwood is typically done at a separate time and in a different area to where the bADLs and iADLs requiring these resources are carried out. Furthermore, they can easily be delegated to another person, which is characteristic of an iADL (World Federation of Occupational Therapists, 2012b; James, 2014).

Once water has been collected from outside the homestead, it is stored in large drums or 25-litre water-containers within the homestead. Similarly, fuelwood that is collected from the surrounding forest is stored in a woodpile in the yard. Utilising an occupational performance perspective, these steps could be regarded as a *gathers* universal process skill. Before water-dependant bADLs and iADLs, such as bathing, doing laundry and cooking can be done, stored water needs to be accessed from the storage site and carried to the relevant area within the homestead. For example, when bathing, cold water is carried from where it is stored outdoors to the fireplace to be heated. It is then poured into a plastic basin, which is then carried from the outdoor fireplace to the bedroom so that privacy can be ensured while bathing. In the same way, collecting a few pieces of fuelwood from the woodpile to use for the fire in order to heat water for doing laundry, cooking or bathing can be regarded as the *gathers* universal process skill.

The *initiates* and *continues* process skills differ between a rural less-resourced context and a house with electricity and indoor piped hot and cold water; a plastic or *zink* basin filled with water is used for bathing as opposed to a bath or shower that is connected directly to the municipal water and sanitation system, laundry is washed by hand rather than by using an electrical appliance and cooking is done on an outdoor fire as opposed to an electrical stove.

Disposal of dirty water after completion of the bADL or iADL cannot be achieved by merely removing a plug for water flow into the drain system, it has to be carried either to the outdoor toilet for disposal, or to an area of the yard where it can be

thrown onto the ground. The universal process skill *terminates* is viewed as a suitable descriptor for this step.

5.5.3 Identification of instrumental Activities of Daily Living not previously described

The additional iADLs identified in this study, namely water and fuelwood collection, do not appear in the commonly used bADL and iADL assessment tools presented in Table 2.3 in Chapter 2, nor in the OTPF III. While the ICF includes a code for collecting daily necessities, this single code does not adequately convey the amount of daily time and effort required, nor the global prevalence of household circumstances that necessitate carrying out these two critical survival iADLs (World Health Organization, 2001). This highlights the concern that these occupations have historically not been included in the traditional bADL and iADL theory base nor bADL and iADL assessment tools, which arguably reflects an inadvertent yet pervasive bias locally and internationally, towards Western and well-resourced contexts.

This inherent bias in the ICF and the OTPF III, amongst others, towards well-resourced developed settings needs to be rectified to ensure that occupational therapists globally gain insight into the daily occupations performed by millions world-wide. This gap in occupational therapy frameworks, models and assessment tools indicates that consideration needs to be given to revising them to ensure all contexts are accommodated. The recognition of collection of water and fuelwood as iADLs will contribute to the transformation of the paradigms underpinning the profession by challenging the existing unspoken assumptions regarding household amenities. This may necessitate revision of existing bADL and iADL assessment tools or the development of bADL and iADL assessment tools that are relevant to less-resourced contexts.

The results of this stage of the study, together with other studies regarding access to water and fuelwood in similar contexts, point to the fact that the type and form of bADLs and iADLs is related to the household amenities that are available (Aggarwal & Romano, 2001; Shackleton, Gambiza & Jones, 2007; Geere, Hunter & Jagals, 2010).

5.6 Household amenities in a rural less-resourced context

The findings identified a significant manual handling burden, because of bADL and iADL performance, for rural dwellers who do not have indoor sanitation, plumbing or piped water in their homes. The participants had to rely on multiple daily trips collection of their household water requirements from communal water sources within their villages on an ongoing basis for all survival and hygiene purposes. The equipment typically used to do the bADLs and iADLs in these rural less-resourced settings provides a further indication of the difficulties faced by community members when performing them. When collecting water from sources outside and within their homesteads, all participants either carried water in 25-litre containers over the shorter distances, or used a wheelbarrow to push the containers. While it is feasible for a 25 kg weight to be carried in each hand over a relatively short distance, such as from a tap inside the yard or even from the street tap to the homestead, this requires a great deal of strength and physical endurance and would presumably not be possible for many people; carrying 25 kg by hand would also not be possible over longer distances. These high manual handling demands explain why most participants made use of wheelbarrows to transport filled water containers rather than carry them, as the fulcrum design of a wheelbarrow facilitates pushing of such heavy weights less strenuously than carrying an identical weight.

Provision of sanitation services in the study setting also differed markedly from those in urban environments and had an impact on the amount of manual handling done during bADLs and iADLs. As there were no drains to dispose of dirty water from laundry and bathing, it was typically disposed of in the outdoor pit latrines, or was thrown directly onto the ground in the yards. Participants therefore typically carried buckets or basins of dirty water from the area where the bADL and iADL was performed to the outdoor toilet or an open yard area for disposal.

The South African Government has rolled out electrification to vast areas of South Africa since the country's first democratic elections in 1994. The findings of this study illustrate how financial capacity to pay for electricity remains a challenge. Despite all the households in the sample having a connection to the National Electricity Grid, none of them used electrical appliances for cooking or heating water, citing financial constraints as the reason. The participants were all found to cook food and heat

water on outdoor fuelwood-fires, and thus had an ongoing need to collect fuelwood from unpopulated areas surrounding their villages. These findings supported the selection of lifting, carrying and pushing as manual handling domains in the newly developed instrument.

5.7 Manual handling demands of the five basic and instrumental Activities of Daily Living domains

5.7.1 Distances walked during performance of the basic and instrumental Activities of Daily Living domains

The study findings illustrated that household members living in the rural, less-resourced communities walk extensive distances from their homesteads to access water and fuelwood on a daily basis. The South African Constitution (The South African Government, 1996) states that access to potable water is a basic human right. The National Water Act goes further, stipulating the so-called RDP standard regarding the maximum distance that households should be from a source of potable water, indicating that all South Africans should have access to 50 litres of potable water per person per day within 230 m from their homes. When considering the finding of this study that the median distance of a one-way trip was 226 m, being the direct distance from the households in the study to the street taps they were utilising, the RDP standard is only slightly exceeded. Another study conducted in a different part of Limpopo Province indicated the mean distance that water was carried on the head was 360 m (Geere, Hunter & Jagals, 2010). The results of the current study showed that the majority of households did not have street taps available to them and were accessing water from much further afield, walking a median distance of 1 256 m, which far exceeds the RDP standard. This finding is significant as it provides insight into the walking ability required to access water each day, which is essential for survival. This latter finding is supported by a study carried out in the Mopani District, which showed that women walk distances of up to 4 kilometres to collect water for domestic use (Malubane, 2005).

Extensive distances were also walked for collection of fuelwood, with loads either carried on the head or pushed in wheelbarrows. The median distance of a one-way trip, that is from the fuelwood source back to the participant's home, was 2 560 m.

The routine methods of doing laundry, cooking and bathing in the rural less-resourced context involved walking distances within the homestead yards, as shown in Table 4.20. For example, doing bathing involved walking a median distance of 10 m per one-way trip from the water storage area to the laundry area, carrying or pushing a 25-litre water container. Once the bathing had been completed, the dirty water then had to be disposed of into the outdoor toilet or an empty area of the yard. This disposal involved numerous trips of a median distance of 28.0 m carrying a bucket of dirty water.

5.7.2 Lifting, carrying and pushing in the basic and instrumental Activities of Daily Living domains

The semi-structured interview, photographic and video data supported the finding that most participants opted to transport two or three 25-litre plastic water-containers in a wheelbarrow at a time when accessing water from the village taps. Thus, participants were pushing between 50 and 75 kilograms of water in their wheelbarrows per trip. The quantity of water transported depends on the physical strength of the community member. This is presumably the reason why most participants who accessed water from either the village taps or the nearby river made use of wheelbarrows to transport filled water containers rather than carrying them, as the fulcrum design of a wheelbarrow makes pushing such heavy weights less strenuous than carrying an identical weight. The loads carried and pushed over the long distances outside of homesteads during water collection described in this study, as shown in Tables 4.18, 4.21 and 4.22, exceed the maximum safe loads and forces for carrying and pushing described in the FCE literature (Liberty Mutual Group, 2004). For example, the assessment of carrying ability in a clinic setting involves the individual carrying a maximum weight of 16 kg for females or 20 kg for males, with both hands at a height of 111cm from the floor over a distance of 8.5 m. Similarly, evaluation of pushing ability in a clinic setting has the individual pushing a trolley with a maximum initial force of 16 kg for females and 20 kg for males over a smooth surface (Snook & Ciriello, 1991).

Furthermore, one-handed lifts, such as when carrying a 25-litre water container in one hand, are regarded as being the most physically demanding and are not recommended from an ergonomic perspective, as the uneven spinal loading is

associated with an increased risk of back injury (Liberty Mutual Group, 2004; Lee, 2009). In industrial settings, individuals required to manoeuvre such heavy and asymmetrical loads are regarded as being at high risk for work-related injury and ergonomic adjustments to reduce the loads would be implemented. The heavy loads being lifted, carried and pushed by water and fuelwood collectors reported in this current study place them at risk of developing physical symptoms and fatigue, which in turn may have a negative impact on their capacity to engage in other occupations, resulting in occupational injustice (Human Sciences Research Council, 2011).

The findings of this study about the manner in which water is collected are largely consistent with the findings of a study on the health consequences of water carrying in rural Limpopo (Geere, Hunter & Jagals, 2010). The authors showed that as an alternative to using a wheelbarrow, individuals carried heavy water containers on their heads, which exerted a physical load that raised their risk of developing musculo-skeletal disorders and sustaining injury. The heightened risk in rural dwellers of developing musculo-skeletal pain associated with collecting water is supported by numerous studies carried out elsewhere in the world (Hoy et al., 2003; Ghandhi, 2016). Carrying water on the head is a common method throughout less-resourced parts of Africa and is well-documented in literature (Bryceson & Howe, 1993). The findings of a study conducted in Ghana and Nigeria showed that heavy physical demands are placed on women and children in terms of collecting water and fuelwood. These tasks are achieved by means of head-loading over distances of up to 10 kilometres per trip (Porter et al., 2013). An Indian study found that shoulder and waist modes of carrying water were riskier from an injury perspective than head loading and should be stopped to reduce risk of injury. It was concluded that carrying water places extreme physical loads on the bodies of rural dwellers. These loads exceed the capacity for adaptation or repair, leading to fatigue, accumulation of fatigue damage or early degenerative changes to bone or soft tissues (Sharma & Singh, 2012). Further investigation of the reasons why this method is not used in the setting of this current study may be warranted.

The same is true of fuelwood. The finding of the current study that fuelwood is mostly carried by women on their heads, is consistent with practices in other parts of South Africa, as well as the African continent as a whole (Porter et al., 2013). From an ergonomic perspective, head-loading is not a recognised method of manual handling

and as such, is not evaluated within clinical settings (Snook & Ciriello, 1991; Liberty Mutual Group, 2004; Shoaf et al., 2010).

5.7.3 Time taken during basic and instrumental Activities of Daily Living

The CCWs emphasised the significant amount of time that is taken in gathering these resources, often on a daily basis, influencing involvement in other activities. Similarly, the *Survey of Time Use* of 2010 reports that time spent on housework is significantly greater in households where water and fuel is sourced from outside of the homestead (Statistics South Africa, 2013). The time taken to collect water and fuelwood and the adapted form required to complete the activities meant that bADLs and iADLS filled most of the waking hours of individuals in the community.

The findings show that most participants made multiple daily trips to collect water and one daily trip to collect fuelwood. In respect of water collection, numerous other South African studies and reports supported the finding of multiple daily water collection trips (Geere, Hunter & Jagals, 2010; Statistics South Africa, 2013), but one study conducted in the Mopani District found that community members mostly collected water only once daily (Masangu, 2009). Numerous authors have reported that water collectors spend extensive time waiting for their turn at communal water sources (Malubane, 2005; Human Sciences Research Council, 2011; Wrisdale et al., 2017). Similar long waiting times at communal water points were reported by both the CCWs and the participants, and were observed and photographed by the research team. However, the measurements of the times taken for water collection were negatively impacted by the presence of the research team members, as they and the participants were invited to fill their water containers immediately upon reaching the communal water points, which resulted in an accurate measurement of the typical waiting times not being taken.

The findings of this current study that most participants had to make multiple trips to collect water each day, could be a function of limited water storage facilities and the physical capacity to transport only a certain amount of water per trip when it is being carried or pushed in a wheelbarrow. Collected water was typically stored in large plastic drums with a capacity of 90 litres. The facility to store water in drums as opposed to the 25-litre containers themselves enables the participants to re-use the

containers for further trips to collect water to accumulate an adequate water supply for the needs of the household.

It is of value to calculate the practical time implications of the water collection findings. There are numerous international standards regarding the minimum daily water requirement, ranging between 25 and 75 litres per person per day (United Nations, 2018b,a). The South African RDP standard for a basic water supply is 25 litres per person per day (Department of Water Affairs and Forestry, 1994), and the average household size in Limpopo Province of 3.6 people (Statistics South Africa, 2016) translates into each household needing to collect at least 90 litres per day. Transporting two 25-litre water containers at a time by wheelbarrow would require 1.8 trips per day, with a total time of 68 minutes per day. This is similar to the mean time of 75 minutes per day spent on water collection from sites further than one kilometre from homesteads, as reported in the 2010 Time Use Survey (Statistics South Africa, 2013). It is also similar to the finding of another study conducted in the Mopani District, which reported a mean of 76 minutes for daily water collection (Malubane, 2005). Alternatively, pushing three water containers at a time in a wheelbarrow would require 1.2 trips per day, with a total total time of 46 minutes per day. The results of this current study differ from the findings of a study in Senegal, which reported that women and girls spend up to 7 hours per day collecting water (Benefice & Cames, 1999). Similarly, a study on water collection in rural India found that individuals spent up to 6 hours per day on water collection (Sharma & Singh, 2012).

In addition to collecting water, a single member of the household is usually responsible for numerous other demanding bADLs and iADLs, resulting in a cumulative impact. The study findings showed that participants also spend a median time of 2 hours and 9 minutes collecting fuelwood each day, a finding almost identical to the finding of the 2010 Time Use Study, which found that fuelwood collection from distances greater the 100m from the homesteads took a mean time of 135 minutes per day (Statistics South Africa, 2013).

The collected water and fuelwood was utilised to carry out other daily bADLs and iADLs. Of these, doing laundry appeared to take the longest, with a median time of 4 hours and 25 minutes, cooking was found to take a median time of 2 hours and 59

minutes, while bathing took a median time of 58 minutes. The cumulative time for the performance of all five was found to be 11 hours and 15 minutes. This calculation may not however be an accurate reflection of a typical day, as participants were observed to typically do laundry, cooking and bath preparation simultaneously, alternating between the various steps of each one. Thus, one could argue that a more accurate reflection of the time taken to complete laundry, cooking and bath preparation is the longest time of the three, namely the 4 hours and 25 minutes taken to do laundry. In addition, as it was found that water collection was typically done more than once per day, it may be more accurate to include two or three times the median time taken to collect water once.

This alternative method of calculating a cumulative time for completion of all five bADLs and iADLs results in a finding of 8 hours and 23 minutes. This is more than double those of the 2010 Time Use Study, which reported that the mean daily time for housework, including the collection of water and fuelwood, was 225 minutes for women aged 18 to 45 years and 215 minutes for women older than 46 years (Statistics South Africa, 2013). While the methodology of this current study proved inadequate in terms of an accurate measurement of the times taken to complete the five bADLs and iADLs in the rural, less-resourced context, the preliminary findings point to significantly increased time implications when compared to completing the same bADLs and iADLs within an urban, well-resourced context.

The cumulative physical and time demands of all five of the bADLs and iADLs identified in this study are significant. Due to the extensive time needed for completion of bADLs and iADLs in rural communities, individuals, particularly women, are often excluded from participation in other occupations; this limits their access to employment and educational opportunities that could otherwise potentially contribute towards poverty alleviation. The limited provision of household amenities, particularly piped water and an adequate electricity supply, contributes to occupational injustice in rural communities.

5.7.4 Implications for assessment of Activities of Daily Living as part of Medico-Legal evaluations

The reality that the essential resources of water and fuelwood have to be manually collected from outside the home and manually transported to the home on an

ongoing basis, places a high physical strength and endurance demand on the household members responsible for doing these bADLs and iADLs. The forms of other bADLs and iADLs that require water and energy also differ in rural low-resourced contexts. Engagement in these bADLs and iADLs on an ongoing basis exposes rural dwellers to significant occupational risk factors, including musculo-skeletal injury and occupational imbalance and deprivation. The physical demands of the bADLs and iADLs undertaken in this context have bearing on their cumulative daily physical loads and thus their occupational performance in employment settings. This finding is supported by a study conducted in Senegal, which showed that the cumulative physical load of conducting multiple bADLs and iADLs in a rural context, including collecting water, places the MET level in the heavy load category (Benefice & Cames, 1999). While the impact of these excessive physical demands poses health risks for any rural dwellers, it is particularly significant for those who have sustained injury, illness or disability. Such individuals may no longer be able to perform bADLs and iADLs necessary for survival, personal hygiene and care of home in an environment without adequate access to water and electricity. It is therefore feasible that an injury or illness may result in a greater degree of disability or participation restriction for an individual living in a rural context compared to an individual having the identical condition in a well-resourced setting.

Existing bADL and iADL assessment instruments utilised by South African occupational therapists are not relevant to a rural less-resourced context. To date, occupational therapists providing medico-legal services to individuals who live in rural less-resourced contexts have had no means of measuring these clients' occupational performance in bADLs and iADLs, yet the accurate assessment of the individual's ability to perform bADLs and iADLs typical of a rural context is essential for the occupational therapist's recommendations for compensation to be realistic. An adequate supply of water and electricity is essential for people to be able to engage in meaningful and productive occupations, including bADLs and iADLs. The energy and effort required to complete bADLs and iADLs in rural less-resourced contexts also affects the individuals' endurance for involvement in other occupational performance areas. The water and fuelwood collection occupations present significant physical demands and time implications, particularly for women, placing them at additional risk of occupational marginalisation and exclusion from economic

and educational opportunities. In a recent study regarding water collection, also conducted in Limpopo Province, the authors emphasised that access to only the bare minimum of daily water requirements impacts negatively on participation in many occupations, including self-care, domestic tasks and the ability to maintain a standard of hygiene and dress appropriate to a formal employment setting (Wrisdale et al., 2017). Medico-legal occupational therapists need to take cognisance of the forms and types of bADLs and iADLs typical of rural settings in order for their recommendations regarding patients' work ability to be accurate. For example, a patient presenting for a medico-legal FCE may be found capable of returning to their previous job as a domestic worker, which has a medium physical demand level according to the DOT (U.S. Department of Labor Employment and Training Administration, 1991), however, if the patient resides in a rural less-resourced context, they may be collecting water and fuelwood for their own family before work each day. The cumulative physical demand level of their bADLs, iADLs and their job would arguably meet the criteria for the heavy level according to the DOT. Accurate assessment of contextual bADLs and iADLs of rural claimants by medico-legal occupational therapists can therefore be regarded as a mechanism of enhancing access to occupational rights and minimising occupational deprivation and injustice (Durocher, Rappolt & Gibson, 2014; Whiteford et al., 2018).

5.8 Occupational injustice

A key component of apartheid in South Africa was separate development, and this policy included different water and sanitation systems being developed according to race. "Indeed, apartheid created physical, legal and social barriers in its separate development, producing a disabling environment with unequal access to water and sanitation" (Wrisdale et al., 2017:p275)**.** The findings of this current study demonstrate that residual occupational apartheid prevails in rural Limpopo Province, where individuals are excluded from occupational engagement because of historical environmental factors affecting water access. The system of available household amenities that prevails in this type of rural area continues to exclude communities from opportunities to overcome poverty and fulfil their rights as enshrined in the South African Constitution.

Women are mostly responsible for water collection and typically do multiple daily trips to collect water over and above doing numerous other bADLs and iADLs requiring water, such as cooking, bathing, doing laundry and caring for domestic livestock. Women and girls collect water at great expense in terms of energy expenditure, time and exposure to attack (World Health Organization and United Nations Children's Fund, 2017; United Nations, 2018a). The time taken and physical effort expended to gather basic resources needed for survival in a rural less-resourced context far exceeds that required in well-resourced households.

The household members responsible for collecting water and fuelwood, as well as doing other daily household iADLs, have little time available to engage in other meaningful occupations. Occupational imbalance results as individuals are in effect caught in a double bind. Engagement in survival iADLs, such as collecting daily water and fuelwood requirements, limits occupational choice as it supersedes the option to engage in a balanced range of occupations.

Where an individual is employed, by the time they get to their workplace, having collected water and fuelwood in the early mornings, they may in effect already have completed the equivalent of work requiring significant physical strength and endurance. The cumulative effect of collecting water and fuelwood at home over and above their normal work duties may negatively influence their performance at work, placing them at further risk of occupational injury or negative performance appraisal and therefore a lack of promotional opportunities.

These findings are significant for the practice of occupational therapy in South Africa. The performance of bADLs and iADLs in a rural context should therefore be viewed from an occupational injustice perspective to ensure that occupational therapy assessment and intervention is contextually relevant. Current inequities in access to water have perpetuated occupational apartheid and have resulted in occupational injustice, including limited occupational choice and occupational imbalance for rural communities.

5.9 Conclusion

The implications of many South African medico-legal occupational therapists routinely including assessment of bADL and iADL performance as part of FCEs

whilst not utilising an assessment instrument which is adequately appropriate for rural less-resourced contexts are discussed. The bADLs and iADLs identified in Phase 1 of the study demonstrated differences in the types and forms of bADLs and iADLs that can be attributed to the type of household amenities available. These differences result in them being physically demanding and time-consuming. The finding that collection of water and fuelwood constitutes significant occupations in a rural less-resourced context is important for the practice of occupational therapy in South Africa, and internationally.

The findings of Phase 1 fulfil objectives 1,2 and 3 of the study and provide data justifying the selection of the three manual handling and the five bADL and iADL domains used in the development of the new contextual bADL and iADL assessment instrument in Phase 2 of the study that follows.

CHAPTER 6: METHODOLOGY PHASE 2

6.1 Introduction

The overall aim of Phase 2 was to develop an instrument for the assessment of bADL and iADL items with substantial components of manual handlling that represent the occupational forms of a rural less-resourced area of South Africa. The content validity of the newly developed contextual bADL and iADL assessment instrument was also established. Steps 4 to 7 of the instrument development research design as shown in Figure 1.1, utilising the baseline data detailed in Phase 1 of the study, were implemented to develop the new contextual bADL and iADL assessment instrument for medico-legal occupational therapists in South Africa. This chapter outlines the methodological process that was applied during the implementation of the second phase of the study.

Phase 2 had two stages:

Stage I Stage I was to develop the new contextual bADL and iADL assessment instrument. The researcher combined the steps of instrument design from Glover and Albers (2007), McCoach, Gable and Madura (2013) and Laver Fawcett (2013).

Stage II Stage II was a pilot study to determine the content validity of the newly developed contextual bADL and iADL assessment instrument.

6.2 Overview of research design for Phase 2

The new instrument was designed to assess performance of bADLs and iADLs with a substantial component of manual handling typical of a rural context based on steps 4 to 7 of instrument development (Figure 6.1). These steps were followed to identify the domains from the manual handling, bADL and iADL constructs identified in Phase 1 of the study in Steps 1 to 3 of the instrument development process. The manual handling, bADL and iADL domains were integrated with the criteria for the development of assessment instruments (Glover & Albers, 2007) to form the basis for the development of items for the new contextual bADL and iADL instrument.

An overview of Phase 2 of the study is presented in Figure 6.1, with the methods used for each stage, the steps of instrument development and the associated outputs.

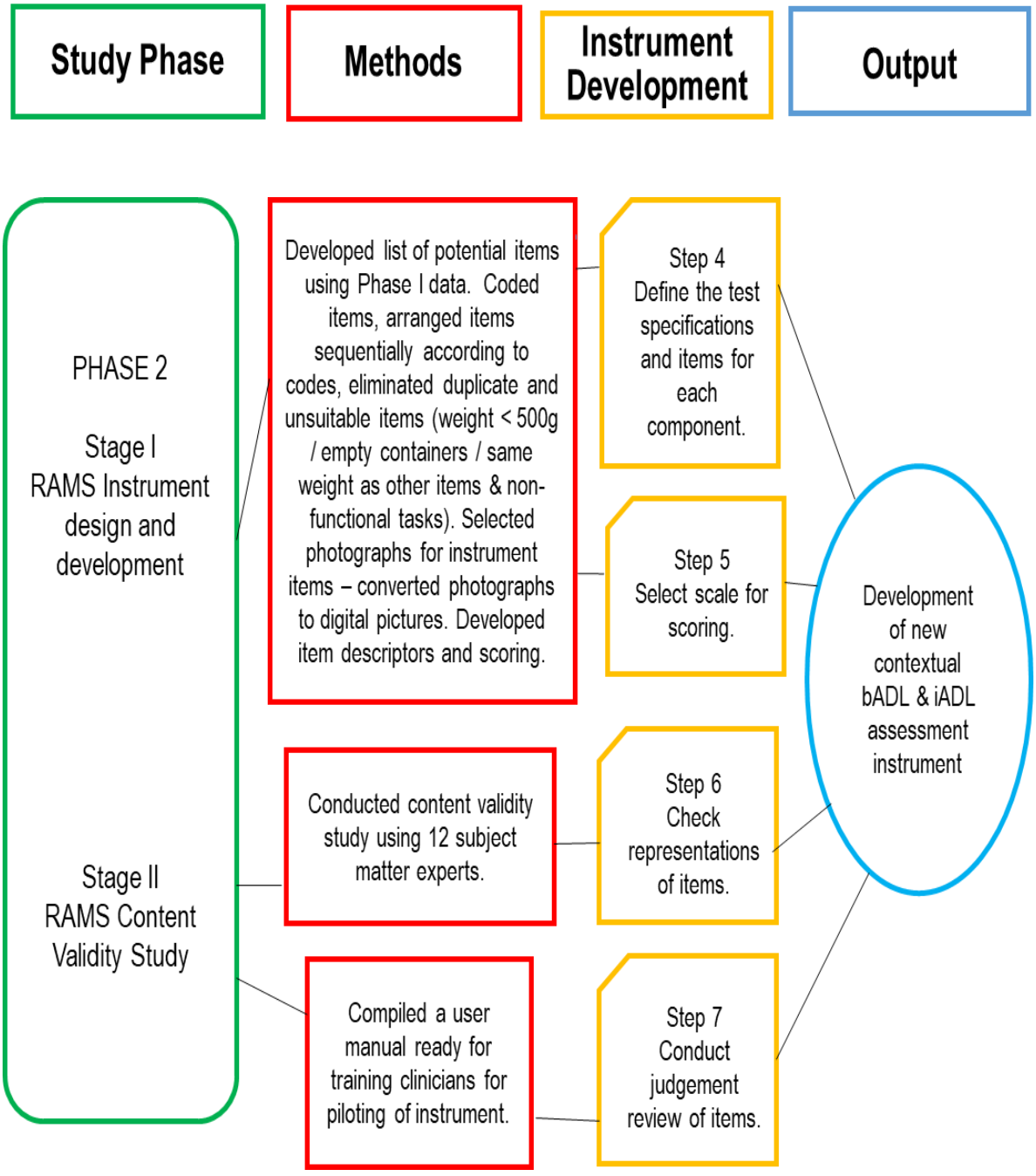


Figure 6.1 Steps followed in the development of the Rural ADL Manual Handling Sort in Phase 2 of the study

Once the bADL, iADL and manual handling domains materialised from Phase 1, the instrument was developed and named the Rural ADL Manual Handling Sort (RAMS). This name depicted the main objectives of the assessment instrument, as the term manual handling is familiar amongst occupational therapists in medico-legal settings. The instrument name depicted the theoretical frameworks of ergonomics in terms of manual handling domains, as well as bADL and iADL domains, which were central to the development of the RAMS.

For the RAMS to be appropriate and useful for occupational therapists working in the medico-legal field, it needs to measure the contextual bADL and iADL domains routinely carried out by the individual accurately and reliably. It was envisaged the assessment would be administered by an occupational therapist to one individual at a time.

6.3 Phase 2 Stage I: Development of the Rural ADL Manual Handling Sort

Steps 1 and 2 of instrument design was completed in Phase 1 of the study, where the assessment purpose was specified and the absence of other assessments was confirmed. Although the domains for the assessment were conceptualised in Phase 1 of the study, they are confirmed below in Step 4 of instrument design (Fig 6.1).

6.3.1 Research procedure

6.3.1.1 Step 4 Defining the test specifications and items for each domain

The researcher utilised the results of Phase 1 of the study to develop the RAMS in Phase 2 of the study. Data collection in Phase 1 targeted the bADL, iADL and manual handling constructs according to the theoretical perspectives of manual handling, the ICF and the OTPF III (Snook & Ciriello, 1991; World Health Organization, 2001; American Occupational Therapy Association, 2014). The researcher defined the instrument domains and items by analysing the data available after the focus groups and home visits in Phase 1 of the study. Three constructs were included in the RAMS assessment instrument, namely bADL, iADL and manual handling. The bADLs and iADLs identified in Phase 1 of the study which included a substantial component of manual handling, formed the bADL and iADL domains for the RAMS (Table 6.1)

Table 6.1 Domains for Activities of Daily Living

bADL and iADL Domains	Collecting Water
	Collecting Wood
	Doing Laundry
	Cooking
	Bathing

The forms of the five bADLs and iADLs identified in Phase 1 of the study were described during the activity analysis exercise (Appendix 14) (Pierce, 2001; Crepeau et al., 2014). Each step comprising the bADL and iADL domains, as well as the required equipment and materials, were identified. Each step of the bADL and iADL domains was then analysed in terms of the three manual handling domains, according to the definitions indicated in Table 6.2.

Table 6.2 Definitions of manual handling domains utilised for activity analysis exercise (U.S. Department of Labor, 1991)

Manual handling domain	Description
Lifting	"Raising or lowering an object from one level to another (includes upward pulling)" (pg 12-1)
Carrying	"Transporting an object, usually holding it in the hands or arms or on the shoulder" (pg 12-1)
Pushing	"Exerting force upon an object so that the object moves away from the force (includes slapping, striking, kicking, and treadle action" (pg 12-1)

The Lifting domain was further divided into different components categorised into the three types of lifts, namely floor to knuckle, knuckle to shoulder and shoulder to overhead (U.S. Department of Labor, 1991). For the purposes of the RAMS, all lifts are regarded as occasional, based on the data collected during the home visits in Phase 1 of the study (U.S. Department of Labor Employment and Training Administration, 1991; Matheson, 2004).

The following procedure was utilised to refine and select the final instrument items after completion of the activity analysis exercise:

- Coding of all bADL and iADL domain steps having a manual handling component (lifting, carrying and pushing)
- Grouping sets of steps having the same codes
- Selection of items:
    - Elimination of duplicates
    - Elimination of steps with weights similar to those in other steps
    - Elimination of non-functional steps
    - Elimination of items involving low weights

The relevant categories of manual handling domains, namely Lifting, Carrying and Pushing, as well as the five selected bADL and iADL domains, namely Collecting Water, Collecting Wood, Doing Laundry, Cooking and Bathing, were selected as the domains for the newly developed RAMS.

The steps that emerged during the activity analysis of the bADL and iADL domains that had a substantial component of lifting, carrying or pushing were developed into a list of potential instrument items. Each unique step was coded according to the applicable Lifting, Carrying and Pushing manual handling domains (Appendix 15).

The actions required to store and retrieve items on the floor were regarded as floor to knuckle lifts, as most household items were observed to be stored on the floor, either indoors or outdoors. The terms used for the lift actions were the same regardless of the direction of the lift, e.g. a floor to knuckle lift includes a lifting action upwards from the floor and downwards towards the floor (U.S. Department of Labor, 1991).

The lift, carry and push components in each step of the bADL and iADL domains were described and colour coded to allow for easy identification of manual handling domain categories pertinent to each respective step. Each step that represented a unique lift, carry or push component was assigned a code to enable preparation of potential RAMS items. Each action was assigned a code for lifting (Arabic numbers), carrying (Roman numbers) or pushing (letters). An example from Appendix 14 of the activity analysis and the assignment of manual handling codes with one of the iADL domains is shown in Table 6.3. The *lifting an empty container (floor to knuckle)* was assigned a code of 1, *lifting wheelbarrow handles (floor to knuckle)* a code of 2, and *lifting a full container (floor to knuckle)* was assigned a code of 3. The carrying code i

was assigned to the action *carry one empty 25-litre water-container*, while the pushing code A was assigned to the action *push wheelbarrow with empty water containers*.

Table 6.3 Example of activity analysis of instrumental Activities of Daily Living domain - Collecting water from tap in village or street

Steps:	Manual Handling Step Description:	Manual Handling Code
1. Gather wheelbarrow and empty 25 litre water containers	Lift empty water container/s into wheelbarrow (floor to knuckle)	1
2. Walk to water source	Lift handles of wheelbarrow loaded with empty containers (floor to knuckle) Push wheelbarrow with empty water container/s	2 A
3. Place water containers in queue	Lift empty water container from wheelbarrow to floor (floor to knuckle)	1
4. Fill water containers	Lift empty water container into place under tap or pipe (floor to knuckle)	1
5. Lift water containers onto wheelbarrow	Lift 1 full 25 litre water container onto wheelbarrow (floor to knuckle)	3
6. Take full water containers home	Lift handles of wheelbarrow loaded with full water containers (floor to knuckle) Push wheelbarrow with 1 full water containers Push wheelbarrow with 2 full water containers Push wheelbarrow with 3 full water containers Push wheelbarrow with 4 full water containers	4 B C D E
7. Empty water into storage drum	Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder) Tip water into drum	5 5
8. Store empty water containers	Lift 1 empty 25-litre water container Carry 1 empty 25-litre water container	1 i

The coding of the lifting, carrying and pushing actions proceeded until all unique actions had been assigned a code. Table 6.4 shows a summary of the coding.

Table 6.4 Summary of activity analysis coding

Manual handling domain	Coding summary
Lifting	1 – 36
Carrying	i – xvii
Pushing	A – G

The unique steps of each bADL and iADL domain that included manual handling categories identified during the activity analysis exercise were transposed into a table, with separate sections for Lifting, Carrying and Pushing domains.

Table 6.5 Example of list of sequential lifting domain steps

Manual Handling Step Description	Manual Handling Code
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift handles of wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift empty water container from wheelbarrow to floor (floor to knuckle)	1
Lift empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1 filled 25 litre water container onto wheelbarrow (floor to knuckle)	3
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
Lift empty water container (floor to knuckle)	1
Lift empty water container (floor to knuckle)	1
Lift empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1filled 25 litre water container (floor to knuckle)	3
Lift 2 filled 25 litre water containers (floor to knuckle)	6
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle, knuckle to shoulder and shoulder to overhead)	5
Tip water into drum (floor to knuckle, knuckle to shoulder and shoulder to overhead)	5
Lift empty water container (floor to knuckle)	1
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift empty water container from wheelbarrow to river bank (floor to knuckle)	1
Lift empty small plastic bucket (floor to knuckle)	7
Scoop water into 25-litre water container using small bucket (floor to knuckle)	8
Lift 1 filled 25 litre water container onto wheelbarrow (floor to knuckle)	3
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4
Lift full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
Tip water into drum	5
Lift empty water container (floor to knuckle)	1
Lift full 25-litre water container from bakkie (floor to knuckle and knuckle to shoulder)	5
Lift full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
Tip water into drum	5
Lift empty water container (floor to knuckle)	1

The steps in each section were first listed in sequential order according to the activity analysis to develop items of the RAMS (see Appendix 14). An example pertaining to the Lifting domain is shown in Table 6.5.

6.3.1.2 Grouping sets of steps having the same codes

Once the lifting, carrying and pushing steps of all bADL and iADL domains had been listed in the sequence in which they occurred when executing the respective bADL and iADL tasks, they were arranged in numerical order according to their assigned codes (Appendix 16). An example of this for the Lifting domain is shown in Table 6.6.

Table 6.6. Example of Lifting domain steps listed in numerical order

Manual Handling Step Description	Manual Handling Code
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift 1 empty water container from wheelbarrow to floor (floor to knuckle)	1
Lift 1 empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1 empty water container (floor to knuckle)	1
Lift 1 empty water container (floor to knuckle)	1
Lift 1 empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1 empty water container (floor to knuckle)	1
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift 1 empty water container from wheelbarrow to river bank (floor to knuckle)	1
Lift empty water container (floor to knuckle)	1
Lift empty water container (floor to knuckle)	1
Lift wheelbarrow handles (floor to knuckle)	2
Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lower 1 full 25 litre water container onto the ground (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container Lift 1 full 25 litre water container	3 3
Lift 1 full 25 litre water container	3
Lift 1 full 25 litre water container (floor to knuckle)	3

This activity analysis data was then used to select items for the RAMS by eliminating steps, which were duplicates, involved weights of less than 500 g, were non-functional actions or were of a similar weight to those in other items.

6.3.1.3 Selection of items

Suitable potential instrument items were selected according to the procedure that follows, resulting in a final list of items (Table 7.2) for inclusion in the draft version of the RAMS, which was utilised in Stage II of Phase 2 for the content validity study.

6.3.1.3.1 Elimination of duplicates

Once the list of identified lifting, carrying and pushing activities had been coded and arranged in numerical order according to the assigned codes, it was seen that a number of codes were duplicated within and between the bADL and iADL domains. Most duplicated items were eliminated (Appendix 17) so that only one item with any given code remained in the list. In the example from the Lifting domain presented in Table 6.7, there were originally two instances of code 4 and one was deleted; similarly, for the five instances of code 6, four were eliminated.

Three instances of duplication were not eliminated in order to make provision for establishment of inter-item reliability during field-testing subsequent to completion of the current study. The category of lift and the frequency of the lift in the activity analysis were considered when selecting duplicate items for retention. Two items with *floor to knuckle* lifts were selected, as this type of lift is regarded as the best predictor of return to work in individuals with lower back injury (Mayer et al., 1988; Matheson, Isemhagen & Hart, 2002).

The manual handling code with the highest frequency in the activity analysis was code 3 (*floor to knuckle* lifting of a full 25-litre water container), which was thus selected for retention as a duplicate item. An example of this is shown in Table 6.7, where of the eight instances of manual handling steps with code 5, six and not seven were deleted.

Two manual handling code 3 items (*floor to knuckle* lift of a full 25-litre water container) and two manual handling code 12 items (*floor to knuckle* lift of a load of wood) were retained. Similarly, two instances of a *knuckle to shoulder* lift of a full 25-litre water container were retained, namely pouring water from a 25-litre water

container into a storage drum and offloading a full 25-litre water container from a *bakkie* to the ground.

Table 6.7 Example of elimination of duplicates in lifting domain steps

Manual Handling Step Description	Manual Handling Code
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4
~~Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)~~	~~4~~
Lift full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
~~Lift full 25 litre container to rest on lip of drum (floor to knuckle, knuckle to shoulder and shoulder to overhead)~~	~~5~~
~~Tip water into drum~~	~~5~~
~~Lift full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)~~	~~5~~
~~Tip water into drum~~	~~5~~
~~Lift full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)~~	~~5~~
~~Tip water into drum~~	~~5~~
Lift full 25-litre water container from bakkie (floor to knuckle and knuckle to shoulder)	5
Lift 2 full 25-litre water containers (floor to knuckle)	6
~~Lift 2 full 25-litre water containers (floor to knuckle)~~	~~6~~
~~Lift 2 full 25-litre water containers (floor to knuckle)~~	~~6~~
~~Lift 2 full 25-litre water containers (floor to knuckle)~~	~~6~~
~~Lift 2 full 25-litre water containers (floor to knuckle)~~	~~6~~

Once the duplicates of steps had been eliminated, a preliminary list of items for the draft RAMS was completed (Appendix 18). An example of the preliminary list for the Lifting domain is shown in Table 6.8.

Table 6.8 Preliminary list of items for lifting

Manual Handling Step Description	Manual Handling Step Code
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift wheelbarrow handles (floor to knuckle)	2
Lift 1 25 litre water container into wheelbarrow (floor to knuckle)	3
Lift 25 litre water container to pour cold water into 'tshatshisa' pot (floor to knuckle)	3
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4
Lift full 25 litre water container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
Lift full 25 litre water container from *bakkie* (floor to knuckle and knuckle to shoulder)	5
Lift 2 25-litre water containers (floor to knuckle)	6
Lift empty small plastic bucket (floor to knuckle)	7
Scoop dirty water out of plastic or zinc bath with small bucket (floor to knuckle)	8
Lift panga (floor to knuckle)	9
Lift and swing panga (floor to knuckle, knuckle to shoulder and shoulder to overhead)	10
Lift bound wood from floor to top of head (floor to knuckle, knuckle to shoulder and shoulder to overhead)	11
Lift bound wood from floor onto wheelbarrow (floor to knuckle)	12
Lift bound wood from wheelbarrow onto woodpile (floor to knuckle)	12
Lift handles of loaded wheelbarrow (floor to knuckle)	13
Lift wood from Bakkie (floor to knuckle and knuckle to shoulder)	14
Lift items for doing washing i.e. washing powder, softener (floor to knuckle)	15
Lift large plastic or zinc bath (floor to knuckle)	16

6.3.1.3.2 Elimination of steps which involve weights similar to other items

The preliminary list of RAMS items in Table 6.8 was reviewed to eliminate items where similar weights are involved in discrete steps. Items that were coded as discrete steps in the activity analysis of the bADL or iADL task, but which involved similar weights to other discrete steps in the same or in a different bADL or iADL task, were eliminated (Appendix 19). An example of the application of the criteria

used to eliminate items that involved the same weight is shown in Table 6.9. Lifting code 15 was eliminated, as the weight of a full bottle of fabric softener is similar to the weight of wood lifted from a woodpile into a wheelbarrow (Lifting code 12).

Table 6.9 Example of application of criteria used to eliminate unsuitable items

Manual Handling Step Description	Manual Handling Code	Reason for elimination
Lifting step description	**Lifting code**	
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1	
Lift wheelbarrow handles (floor to knuckle)	2	Lifting only of wheelbarrow handles is not a functional stand-alone step. Deferred to Push code A.
Lift 1 25 litre water container onto wheelbarrow (floor to knuckle)	3	
Lift 25 litre water container to pour cold water into 'tshatshisa' pot (floor to knuckle)	3	
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4	Lifting only of wheelbarrow handles is not a functional stand-alone step. Deferred to Push code B.
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5	
Lift full 25 litre water container from bakkie (floor to knuckle and knuckle to shoulder)	5	
Lift 2 full 25-litre water containers (floor to knuckle)	6	Lifting 2 full water-containers is not a functional stand-alone step. Deferred to Carry code iii.
Lift empty small plastic bucket (floor to knuckle)	7	Empty equipment weighing < 500g.
Scoop water with small bucket (floor to knuckle)	8	
Lift panga (floor to knuckle)	9	Lifting a panga is not a functional stand-alone step. Deferred to Carry code iv.
Lift and swing panga (floor to knuckle, knuckle to shoulder and shoulder to overhead)	10	
Lift bound wood from floor to top of head (floor to knuckle, knuckle to shoulder and shoulder to overhead)	11	Lifting wood onto the head is not a functional stand-alone step. Deferred to Carry code v.
Lift bound wood from floor onto wheelbarrow (floor to knuckle)	12	
Lift bound wood from wheelbarrow onto woodpile (floor to knuckle)	12	
Lift handles of wheelbarrow loaded with wood (floor to knuckle)	13	Lifting only of wheelbarrow handles is not a functional stand-alone step. Deferred to Push code F.
Lift wood from Bakkie (floor to knuckle and knuckle to shoulder)	14	
Lift items for doing washing i.e. washing powder, softener (floor to knuckle)	15	Weights similar to other Lift items.

6.3.1.3.3 Elimination of non-functional steps

Some lifting activities were momentary and were not functional stand-alone steps, rather leading into carrying and pushing tasks. For example, lifting a bundle of fuelwood onto the head is quickly completed and leads to carrying the fuelwood over a distance, such as from the collection site back to the homestead. The ability to perform the carrying task is dependent on having first lifted the load of fuelwood onto the head. The lifting aspect of this task is not considered a functional activity as it is never carried out in its own right without leading to carrying a load of fuelwood. The Lifting code 11 was thus deferred to Carrying code v. Table 6.9 shows numerous examples of Lifting items that were similarly deferred to the relevant items in the Carrying and Pushing domains.

6.3.1.3.4 Elimination of steps involving low weights

Commonly used instruments to assess performance of lifting, such as the Iso-Inertial Lifting Protocol and the PILE, use increasingly heavy weights presented sequentially to the patient. The lightest weight presented in the Iso-Inertial Lifting Protocol is 2.5 kg for females and 5 kg for males while in the PILE, the lightest weights presented are 3.6kg and 5.85kg respectively. Some steps identified in the activity analysis involved light equipment. Steps involving empty equipment weighing less than 500 g were eliminated, for example Lifting code 7 as shown in Table 6.9.

6.3.1.4 Sequencing of Instrument Items

The items for all domains were sequenced in ascending order according to the increasing physical demand level identified in Phase 1 of the study, as presented in Table 4.25 in Chapter 4.

The items in the Lifting domain were sequenced according to three criteria:

- the DOT category (sedentary, light, medium, heavy or very heavy) (U.S. Department of Labor Employment and Training Administration, 1991; Matheson, 2004);
- the type of lift being performed (*floor to knuckle*, *knuckle to shoulder* or *shoulder to overhead*) (Ciriello & Snook, 1999; Matheson, Isemhagen & Hart, 2002; Gross, Battie & Cassidy, 2004; Lee, 2005; Soer et al., 2006);
- the weight of the equipment handled in the item task.

The Lifting domain items were first sequenced according to ascending DOT categories. Items falling into the sedentary category came first and items falling into the very heavy category came last. Items within the same DOT category were further sequenced according to the type of lift, with the less physically demanding floor to knuckle lifts placed first and the more physically demanding shoulder to overhead lifts placed last. Items within the same DOT lift category were further sequenced according to the weight of the equipment being handled, with the lightest items placed first and the heaviest items placed last.

The Carrying domain items were sequenced according to the weight of the equipment being handled, with the lightest items placed first and the heaviest items placed last. The Pushing domain items were sequenced according to the initial force being pushed, with the lower force items placed first and the items with the greatest forces placed last.

6.3.1.5 Draft Rural ADL Manual Handling Sort

6.3.1.5.1 Format of draft instrument

The methodology on the development of the RAMS is presented in the following sections, using examples of the completed RAMS for ease of understanding. The draft RAMS was developed in an electronic format but can be made available in hard-copy format. It has three subtests, which correspond to the Lifting, Carrying and Pushing manual handling domains. Each selected item was placed into the relevant domains. The descriptors for each item were generated and assigned a score. The items in each domain were numerically ranked according to increasing physical demand to establish the sequence of the instrument items. All items included the weight of the equipment being handled, and the items in the carrying and pushing subtests included options of distances over which the bADL or iADL was performed.

Two versions of the draft RAMS were developed, namely photograph and drawing versions, so that end users could visually identify the activities if they could not read the descriptions. Photographs of each instrument item were selected from the home visit photographic data or simulations created by the researcher. These photographs were used to develop a photographic version of the RAMS (Appendix 20). A drawing version of each selected photograph was created electronically by a research assistant (Appendix 21). Appropriate wording was developed for each item, which

posed the question *Can you?* in relation to the action being performed in the photograph. A section for demographic data of respondents was included in the instrument.

An example of one item from the photograph version of the instrument is shown in Figure 6.2.



Figure 6.2 Example of transforming the photograph version of an instrument item into a drawing version

6.3.1.5.2 Presentation of items

Each item comprised a text question in relation to performance of the manual handling task shown in the associated drawing; for example, the wording and a drawing for the item presented in Figure 6.3 was *Can you push a wheelbarrow loaded with 4 full 25-litre water-containers? (106.9 kg).*

This wording was included with the appropriate photograph or drawing so that the patient could indicate whether he or she could perform the activity. Questions were included in English and Sepedi. It is envisaged that versions in other official South African languages will be developed in the future.

PUSH



3.7. Can you push a wheelbarrow loaded with 4 full 25-litre water-containers? (106.9 kg)

O kgona go tšhofa kerebane ye e rwelego dikupu tše nne (4) tša di-25 litre tše di tletšego ka meetse? (106.9 kg)

Option/Kgetho:	***Distance/Bokgole:***
From the tap in the street back to your home/ Go tloga pomping ya strateng wa boela ka gae	From 31m to 220 m/ Go tloga 31m go fihla 230 m
From the tap in the village back to your home/ Go tloga pomping ya legaeng wa boela ka gae	From 221 m to 750 m / Go tloga 201m go fihla 650m
From the river back to your home/ Go tloga nokeng wa boela ka gae	From 751 m to 5 km/ Go tloga 651m go fihla 5km

Figure 6.3 Item for pushing a wheelbarrow loaded with 4 full 25-litre water containers.

6.3.1.5.3 Inclusion of a demographic and household amenities section

A section for demographic data of patients was included in the draft instrument. The name, date of birth, address and medical diagnosis are important for clinical record

keeping and are anticipated to be meaningful variables for future studies involving the database of completed electronic RAMS evaluations.

A list of household amenity options follows, which allows for the patient to indicate which water, energy and sanitation services they have at their home and to select the cooking, laundry and bathing facilities they use (Table 6.10). The household amenities sections serve two purposes: firstly, if a patient selects options typical of a well-resourced setting, such as having indoor-piped water heated by an electric geyser, then it is unlikely the RAMS will be a suitable assessment instrument for them. Secondly, the patient's responses in the household amenities section can be triangulated with the results of the RAMS thereby serving as a means of evaluating the consistency of the information provided by the patient.

Table 6.10 Household amenities section

A. <u>Household amenities/Didirišwa tša ka gae.</u> **Please tick the household amenities you have in your home. You may select more than one option. Kgetha didirišwa tše o nago le tšona ka gae. O ka kgetha go feta gatee.**		
	Amenity / Sedirišwa	√
	***Water supply* / Go fiwa meets**	
i.	Piped municipal water inside your house/Meetse a phaephe ka ntlong, a go tšwa ga mmasepala — meetse a go fihla ka ntlong ka diphaephe tša go agelelwa le ntlo.	
ii.	Tap in the yard/Pompi ka tšarateng	
iii.	Tap in the street/Pompi strateng sa geno	
iv.	Tap in the village/area/extension: Pompi legaeng/tikologong/karolong ya geno	
v.	Water obtained from river/Meetse a go tšwa nokeng	
vi.	Water obtained from municipal water-truck/Meetse a go tšwa loring ya meetse ya mmasepala	
vii.	Rainwater collected in *Jojo* tank Meetse a pula a go kgelelwa ka thankeng ya *Jojo*.	
	***Power/fuel supply* Go fiwa mohlagase/ mollo**	
viii.	Electricity supply from national grid/Mohlagase wa go tšwa go mmušo	
ix.	Electricity supply from solar panel/Mohlagase wa *solar panel* (seipone sa letšatši/enetši ya letšatši)	

6.3.1.6 Step 5 Selection of scale for scoring

A Likert rating scale with different response options was used for each question in order to determine the participant's status with regard to performance of bADL, iADL and manual handling domains. The response categories for the sections were unable to do, has difficulty, able to do with no difficulty, and N/A – not done or not

applicable. A 3-point ordinal scale was selected to represent these categories, as shown in Table 6.11.

Table 6.11 Scale utilised in Rural ADL Manual Handling Sort

Description	***Score***
Unable to do	1
Has difficulty	2
Able to do	3
N/A - Not done/not applicable	N/A

6.3.1.6.1 Recording the patient responses

An individual patient's responses are recorded on the four sheets of the RAMS excel version, which covers the amenities checklist and the 30 items related to manual handling. Once all of the responses have been recorded, the remainder of the RAMS' sheets will automatically be populated and the manual handling responses automatically matched to items in the bADL and iADL domains.

Table 6.12 Excel scoring sheet for Subtest 1 – Lifting Tasks

	ITEM	**1 Unable to do**	**2 Has difficulty**	**3 Able to do**	**N/A Not applicable / Not done**
1.1	Can you scoop water with a bucket?				
1.2	Can you lift an empty 25-litre water-container from the ground onto a wheelbarrow?				
1.3	Can you stack wood onto a woodpile?				
1.4	Can you load wood from the ground onto a wheelbarrow?				
1.5	Can you lift an empty bath used for doing washing?				
1.6	Can you lift an empty *potjie* pot from the ground?				
1.7	Can you lift a basket of washing onto a wheelbarrow?				
1.8	Can you empty a bucket of water?				
1.9	Can you offload wood from a vehicle onto the ground?				
1.10	Can you chop down a tree using an axe or a panga?				
1.11	Can you lift a *potjie* pot full of pap from the ground?				
1.12	Can you lift a full pot of water from the ground onto the fire stand?				
1.13	Can you lift a full 25-litre water-container from the ground onto a wheelbarrow?				
1.14	Can you pour water from a 25-litre water-container into a pot?				
1.15	Can you pour water from a 25-litre water-container into a storage drum?				
1.16	Can you offload a full 25-litre water-container from a vehicle onto the ground?				
Median Score					

To generate a score, the item that best fits the patient's performance is selected and a score between 1 and 3 for each item is allocated in the relevant column of the RAMS Excel sheet, such as the example presented in Table 6.12.

The raw scores for each item and total scores in the manual handling, bADL and iADL domains will automatically be generated. The total score is automatically calculated for each manual handling domain by summing the raw scores of all the items and converting the result to a percentage, as shown in Figure 6.4.

1		Section 1 - Lifting		Score	
2	1.1	Can you scoop water with a bucket?	Small bucket water	1	1
3	1.2	Can you lift an empty 25-litre water-container from the ground onto a wheelbarrow?	Empty 25-L	2	2
4	1.3	Can you stack wood onto a woodpile?	Stack wood	3	3
5	1.4	Can you load wood from the ground onto a wheelbarrow?	Wood onto w/barrow	3	3
6	1.5	Can you lift an empty bath used for doing washing?	Empty bath	3	3
7	1.6	Can you lift an empty potjie pot from the ground?	Empty potjie	3	3
8	1.7	Can you lift a basket of washing onto a wheelbarrow?	Laundry basket w/barrow	3	3
9	1.8	Can you empty a bucket of water?	Large bucket water	1	1
10	1.9	Can you offload wood from a vehicle onto the ground?	Wood off vehicle	2	2
11	1.1	Can you chop down a tree using an axe or a panga?	Chop tree	2	2
12	1.11	Can you lift a potjie pot full of pap from the ground?	Full potjie	2	2
13	1.12	Can you lift a full tshashisa pot of water from the ground onto the fire stand?	Full water pot	1	1
14	1.13	Can you lift a full 25-litre water-container from the ground onto a wheelbarrow?	25-L onto w/barrow	2	2
15	1.14	Can you pour water from a 25-litre water-container into a tshashisa pot?	25-L into water pot	2	2
16	1.15	Can you pour water from a 25-litre water-container into a storage drum?	25-L into drum	2	2
17	1.16	Can you offload a full 25-litre water-container from a vehicle onto the ground?	25-L off vehicle	2	2
18			Total score:	34	
19			Percent	70.83	
20					
21				Abilities	
22			N/A	0	
23			Unable	18.75	
24			Some Difficulty	50	
25			Able	31.25	
26					
27					
28					

Figure 6.4 Example of patient responses recorded on Lifting domain spreadsheet

6.3.1.6.2 Presentation of the scores

A summary of the patient's scores across all eight domains will be instantly available in text format on the summary sheet.

The RAMS produces five different score categories:

1. Raw scores for each of the eight domains in numeric and graphic formats.

2. Total Scores for each of the eight domains.
3. The physical demand level for the maximum **occasional lifting** capability of the patient.
4. The maximum weight and distance the patient is able to **carry**.
5. The maximum initial force the patient is able to **push.**

The results can also be graphically represented and added to the therapist's medico-legal report. A graph showing a summary of the eight domains can be generated, or alternatively, each domain with its constituent items can be presented as separate graphs.

6.3.1.7 Interpretation of scores

The five types of scores should be interpreted as follows:

6.3.1.7.1 Raw scores

Responses for the Lifting, Carrying and Pushing domains are recorded on sheets two to four according to the 3-point Likert scale. These raw scores are automatically generated on sheets five to nine so that raw scores are available for each of the eight domains. The domain raw scores are reported in numeric and graphic form. The graphic representation provides a visual profile for easy comparison of items within each domain. The therapist can tell at a glance which items in the domain the patient performs best, and those with which they have the most difficulty. This allows for identification of specific aspects within each domain that the patient may require assistance. The therapists can also tell which items the patient does not perform (N/A responses), which can provide information regarding their roles and available household amenities.

An example of a graph showing the Collecting Water domain raw scores is shown in Figure 6.5. This patient was able to manage all lifting tasks related to water collection and was able to carry a large bucket and a full 25-litre water-container within their yard. However, the patient was unable to do any carrying tasks related to water collection that involve distances outside their yard and was unable to do any tasks that involved transporting water containers by wheelbarrow.

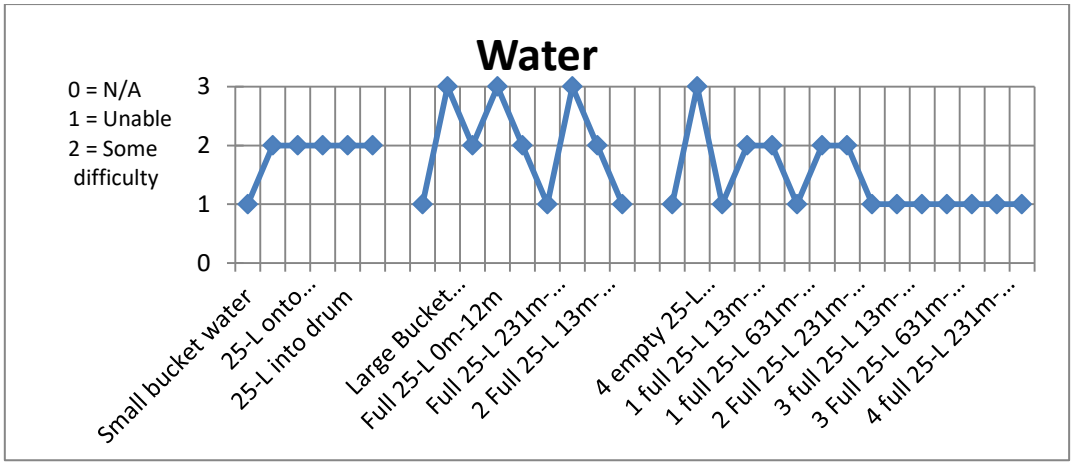


Figure 6.5 Graph generated for raw scores for the Water Collection domain

6.3.1.7.2 The Total Scores

The raw scores for each domain are summed and converted to a percentage to obtain the total score; as percentages, the total scores can be compared to one another. A graph of the total scores from the eight domains is automatically generated on sheet 10, which allows for easy comparison of the patient's performance across all eight domains.

An example of a graph showing the total scores is shown in Figure 6.6. The total scores can be interpreted as indicating the highest and lowest levels of independent functioning across the manual handling, bADL and iADL domains. The patient has the most difficulty with collecting water and performs the best with cooking.

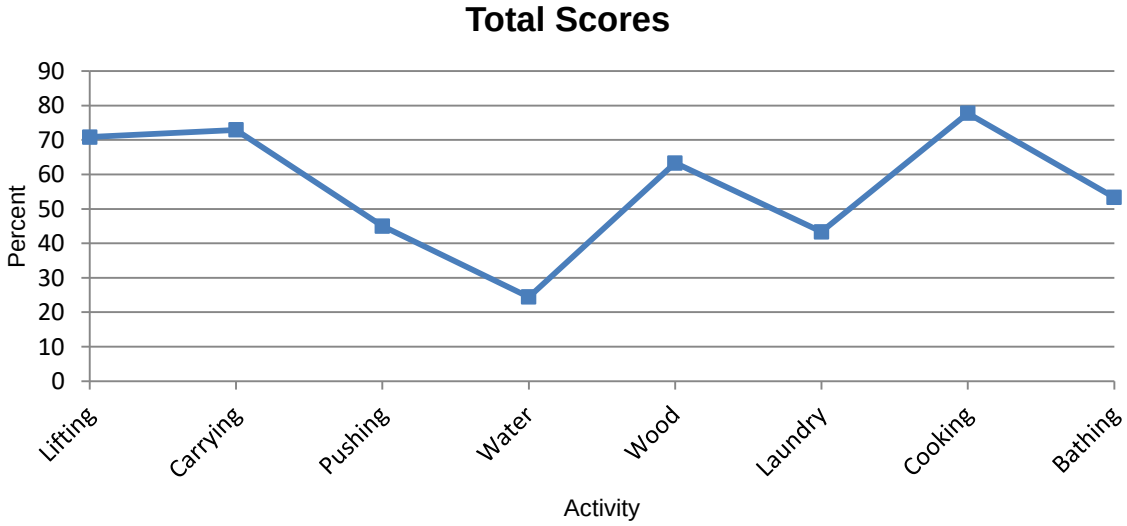


Figure 6.6 Graph representing total scores

6.3.1.7.3 Physical demand level for the maximum Occasional Lifting capability of the patient

The maximum physical demand level for Occasional Lifting capability of the patient can be obtained by using the raw scores to identify the Lifting domain item, where the patient has the highest level of independence for the most demanding task. For example, in the graph shown in Figure 6.7 below, the patient scored 3 for item 1.7, 2 for item 1.8 and 1 for all remaining items in the Lifting subtest. The highest weight lifted independently by the patient was 7.0 kg and the patient indicated they could lift 7.5 kg, but with difficulty. The patient can thus be placed on the Light level of physical demand for Occasional Lifting according to the Dictionary of Occupational Titles (DOT).

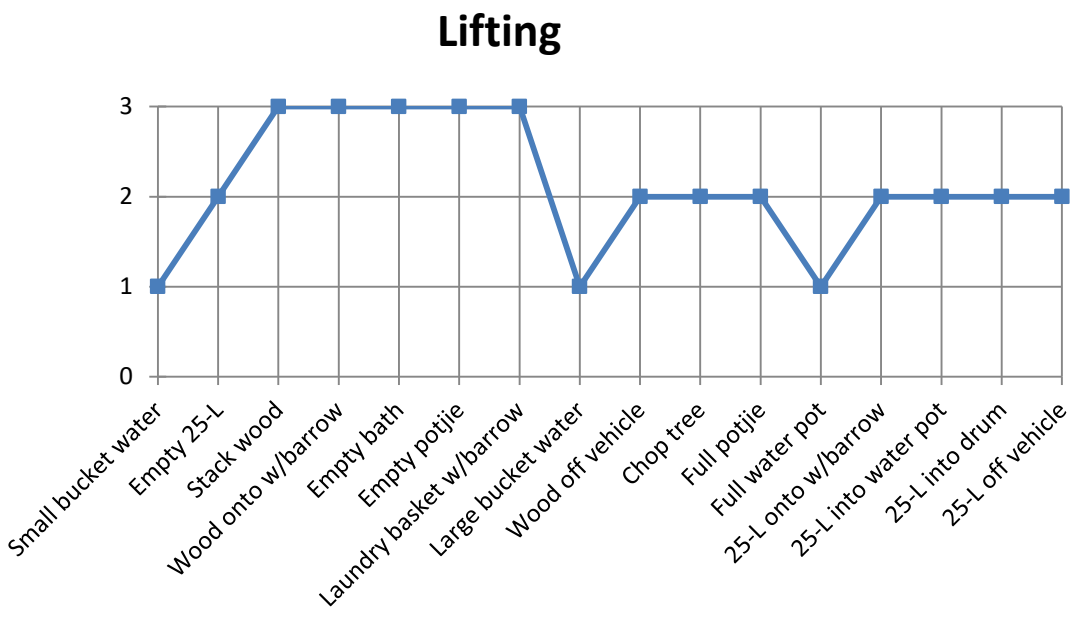


Figure 6.7 Graph representing the raw scores for the Lifting domain showing the physical demand level for the maximum Occasional Lifting capability

6.3.1.7.4 The maximum weight and distance that the patient is able to carry

The maximum weight and distance that the patient is able to carry can be established by using the raw scores to identify the item where the patient has the

highest level of independence in carrying the greatest weight over the longest distance. This score can be obtained by identifying the Carrying subtest item, where the patient has the highest level of independence for the most demanding carrying task. For example, in the graph shown in Figure 6.8, the patient scored 3 for item 2.5, 2 for item 2.6 and 1 for item 2.7. The highest weight carried by the patient was 25.0 kg and the patient indicated they could carry this weight over a distance of 750 m when taking a full 25-litre water-container from the communal village water source back to their home.

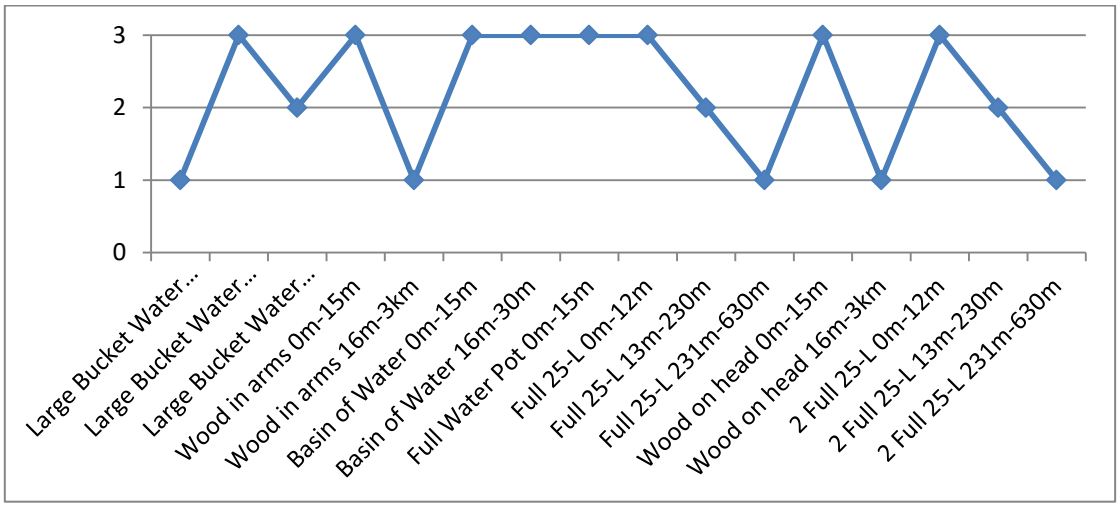


Figure 6.8 Graph representing raw scores for the Carrying domain and the maximum weight and distance that the patient is able to carry

6.3.1.7.5 The maximum initial force that the patient is able to push

The maximum initial force the patient was able to push can be established by using the raw scores to identify the item where the patient has the highest level of independence in pushing the greatest weight over the longest distance. These scores can be obtained by identifying the item where the patient had the highest level of independence for the most demanding pushing task. For example, in the graph shown in Figure 6.9 below, the patient scored 3 for item 3.4, 3 for the first item in 3.5, 2 for the second item in 3.5 and 1 for the remainder of the items. The highest initial force pushed by the patient was 66.2 kg and the patient indicated they could carry this weight over a distance of 220 m when pushing a wheelbarrow loaded with two full 25-litre water-containers from the communal street water source back to their home.

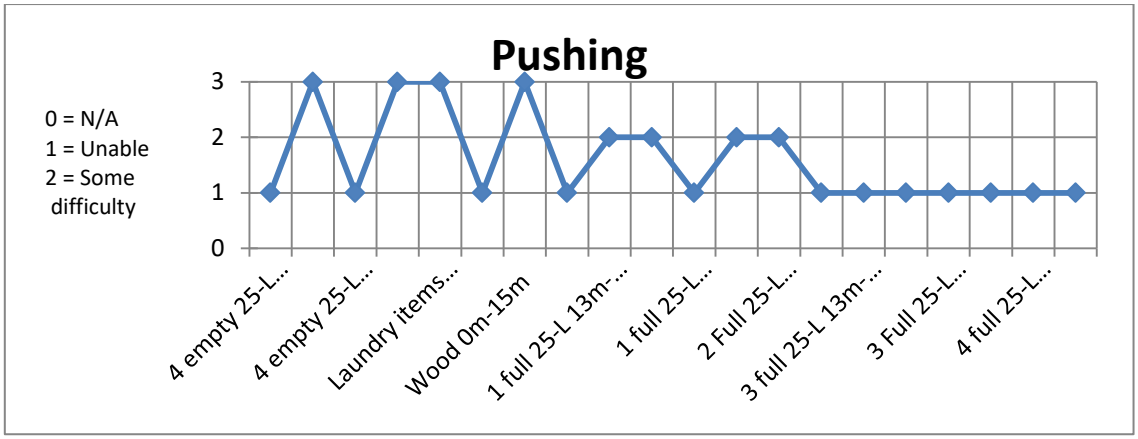


Figure 6.9 Graph showing the raw scores for the Pushing domain and the maximum initial force that the patient is able to push

6.3.2 Concluding Stage I of Phase 2

Graphs and a text format summary of the patient's performance across all eight domains will be instantly available for easy transfer into the occupational therapy medico-legal report. The visual presentation of the patient's RAMS scores in graphs is a useful way to present evidence of the patient's performance of bADLs and iADLs. The items for the three manual handling domains in the RAMs are each represented by numerous items from the five bADL and iADL domains. The procedure for a scoring system was described. The methodology for the content validity study is described in the next section.

6.4 Phase 2 Stage II Content validity study of the Rural ADL Manual Handling Sort (Steps 6 and 7)

The aim for this stage of the study was to evaluate the content validity of the RAMS assessment instrument. Steps 6 and 7 of the instrument design were completed in this stage.

6.4.1 Research design

A quantitative, descriptive research design was used to establish the content validity of the RAMS. Since content validity is a theoretical type of validity, as opposed to an empirical type, the design needs to be descriptive. This means a panel of experts called subject matter experts (SMEs) will judge if the domains and items for the RAMS adequately represent the constructs of manual handling, bADL and iADL. They need to judge the appropriateness of the domains for the context, which in this

case is a rural less-resourced setting. The quantitative aspect of the research design is necessary as the SMEs will use a content validity index scale to indicate the level of representation of the domains (Lynn, 1986; Yaghmale, 2003; Bolarinwa, 2015).

6.4.2. Selection of Subject Matter Experts

6.4.2.1 Sampling method

Purposive stratified sampling was used for this stage of the study. Prospective SMEs were sent an information sheet regarding the study and the purpose of their involvement, as well as logistical information regarding the anticipated time commitment (Appendix 22).

Inclusion criteria

Inclusion criteria were set for SMEs according to professional experience and expertise in the fields of medico-legal and community practice. The SMEs were selected according to the following inclusion criteria:

- six occupational therapists with expertise in the field of Primary Healthcare and community occupational therapy service delivery in the Limpopo Province;
- six occupational therapists who had 10 or more years' experience in vocational rehabilitation conducting medico-legal evaluations.

Exclusion criteria

Exclusion criteria were not used for the content validity study.

6.4.2.2 Sample size

The recommended number of SMEs required to calculate the content validity index (CVI) varies between three and ten, with numerous authors recommending five SMEs (Lynn, 1986; Yaghmale, 2003; Polit & Beck, 2006; Polit, Beck & Owen, 2007). Twelve SMEs were approached to participate in the content validity study in order to have equal representation between community and medico-legal experts.

6.4.3 Measurement instruments

6.4.3.1 Demographic information sheet

A biographical information sheet, developed by the researcher, included aspects such as gender, age, qualifications and years of experience (Appendix 23).

6.4.3.2 Content Validity Record Form

The content validity record form (Appendix 24) was developed by the researcher to enable the SMEs to rate the relevance and clarity of each RAMS item, and to provide their opinion regarding the extent to which the items clearly and unambiguously represented the construct being measured (Lynn, 1986; Polit & Beck, 2006).

Section A of the content validity record form made provision for the SMEs to rate the validity and clarity of each of the items in the RAMS on a 4-point ordinal scale, as follows:

Table 6.12 Content Validity Rating Scale

i.	Relevance	ii.	Clarity	Classification
1	Not relevant	1	Not clear	**Irrelevant/Unclear**
2	Somewhat relevant	2	Item needs some revision	
3	Quite relevant	3	Clear but needs minor revision	**Relevant/Clear**
4	Very relevant	4	Very clear	

The 4-point Likert scale was converted into a dichotomous scale, where items that were given a rating of 1 and 2 were regarded as irrelevant or unclear. Items that received ratings of 3 or 4 were regarded as relevant or clear, and were retained in the RAMS.

Section B of the content validity record form included closed and Yes/No questions to elicit the SMEs' opinions regarding item composition and inclusion.

Table 6.13 Questions included in section B of the content validity study

Question number:	Question:
1	Should duplicate items be included in the instrument?
2	Should items that relate to empty containers be included, versus only including the items where the containers are full or have the maximum weight for the respective bADL or iADL task component?
3	Should there be separate lift, carry and push items for the different steps of the same bADL or iADL task, or only items that reflect the step with the greatest physical demand?
4	Should items pertaining to each individual piece of equipment or material used for the bADL or iADL tasks be included?
5	Please indicate whether you prefer the photograph or drawing version of the instrument.
6	Should the Household Amenities tick-off form be included at the beginning of this instrument?
7	Please could you suggest a name for the newly developed instrument.

6.4.4 Research procedure

Ten SMEs were included in the first round of the content validity study. This allowed for two additional SMEs to be available for a second round should extensive revisions be necessary after the first round (Lynn, 1986; Polit & Beck, 2006). The purpose of the study, what was expected from the SMEs and the implications of their participation were explained in an email communication. The SMEs then attended a presentation by the researcher regarding the background of the study, the constructs under consideration, the findings of Phase 1, the procedure followed for the development of the RAMS and the process for determining content validity (Lynn, 1986; Polit & Beck, 2006).

A hard copy of the content validity record form (Appendix 24), a photograph version of the RAMS (Appendix 20) and a drawing version of the RAMS (Appendix 21) was provided for each SME. The SMEs were asked to evaluate both versions of the RAMS instrument and the individual items critically and to make comments on the record form provided by the researcher. Ten SMEs completed the content validity record forms in the first round and submitted them to the researcher for statistical analysis. Once the revisions had been made to the RAMS, two SMEs completed the content validity record form in the second round and statistical analysis was completed by the researcher.

6.4.5 Data Analysis

The data were entered into an Excel spreadsheet for analysis. Descriptive statistics were used to analyse the data of the SME's demographic factors to establish the profile of the SMEs.

The calculation of the Content Validity Index (CVI) is a recognised method of establishing the content validity of an assessment instrument. The CVI can be calculated in two ways, namely the so-called Item-CVI (I-CVI) and Scale-CVI (S-CVI). Polit and Beck (2006) urged researchers to report on both I-CVI and S-CVI (Polit and Beck, 2006).

The I-CVI index refers to the individual items in a measure. The I-CVI for each instrument item is calculated by dividing the number of experts giving that item a rating of 3 or 4, by the total number of experts. According to Polit and Beck (2006), the index should be 0.78 or higher when six, or more, expert raters are utilised.

The S-CVI index refers to the overall measure. Polit and Beck (2006) recommended the S-CVI scores should be 0.80 or higher. The S-CVI can be calculated in two ways. The average of the S-CVI (S-CVI/Ave) is the same as the mean I-CVI. The Universal Agreement Scale-level Content Validity Index is more stringent, and is calculated by dividing the number of items where the experts gave a score of relevant, by the total number of items (Lynn, 1986; Polit & Beck, 2006). The I-CVI and the S-CVI of the RAMS were calculated.

The responses to the closed questions, to elicit the SMEs' opinions regarding the RAMS, were analysed using descriptive statistics and the frequencies and percentages were calculated. The responses to the closed questions were coded by the researcher using quantitative directed content analysis with frequencies (White & Marsh, 2006).

6.4.6 Guidelines for using the instrument

Changes suggested by the SMEs were documented and incorporated into the manual. The name of the assessment was also confirmed by the SMEs. For step 7 of the instrument development, a user manual (Appendix 25) was compiled to guide occupational therapists in the use of the RAMS as part of the standard FCE

assessment battery, and included a background of the origin and development of the RAMS. The psychometric properties of assessment instruments were explained and the extent to which these properties had been investigated for the RAMS was presented. Definitions of the constructs and domains in the RAMS were presented followed by an explanation of the procedure for administering and scoring the RAMS.

6.5 Conclusion

Chapter 6 presented the methodology for Phase 2 of the study, including the purpose and aim, the research design and research process. The methodology used for the development of the RAMS, including construct definition and analysis of the data from Phase 1 according to manual handling demands for each bADL and iADL domain, was presented. The content validity study procedure was described. The development of the RAMS and the results of the content validity study are presented in Chapter 7.

CHAPTER 7: RESULTS PHASE 2

7.1 Introduction

This chapter presents the results of the instrument development phase of the study, as described in Chapter 6. This current chapter therefore describes the development of domains and items of the RAMS during implementation of steps 4 to 7 and the content validity study.

7.2 Phase 2 Stage I: Development of the Rural ADL Manual Handling Sort

7.2.1 Step 4: Define the items for each domain and the test specifications

The analysis of manual handling according to the bADL and iADL domains was described in the research procedure and allowed for identification of potential instrument items. These items were developed according to the activity analysis of the manual handling components of the bADL and iADL tasks typical of a rural less-resourced context during Phase 1 of the study (Pierce, 2001; Crepeau et al., 2014). This classification of rural bADL and iADL tasks according to manual handling categories had not taken place previously and therefore developed specifically for the current study. The wording of the item descriptors was developed directly from the observations of manual handling components of bADL and iADL tasks in Phase 1 of the study.

The items for the RAMS were confirmed through a systematic process involving elimination of duplicate codes, items having equivalent weights to other items, items involving non-functional tasks and items that involved empty low-weight equipment. Similar to other PATS instruments, three pairs of items with the same codes were retained to allow for evaluation of inter-item reliability (Matheson, 2004).

The results of the item selection procedure are presented in Table 7.1.

Table 7.1 Items selected for draft RAMS

Manual Handling Step Description	Manual Handling Code	Frequency	Item elimination			Final draft items
			Equivalent weight to other item	Empty equipment / < 500g	Deferred to carry or push	
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1	11				X
Lift wheelbarrow handles (floor to knuckle)	2	3			X	
Lift 1 full 25 litre water container into wheelbarrow (floor to knuckle)	3	23				X
Lift 25 litre water container to pour cold water into *tshatshisa* pot (floor to knuckle)	3	1				X
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4	2			X	
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5	7				X
Lift full 25 litre water container from *bakkie* (floor to knuckle and knuckle to shoulder)	5	1				X
Lift 2 full 25-litre water containers (floor to knuckle)	6	5			X	
Lift empty small plastic bucket (floor to knuckle)	7	18		X		
Scoop dirty water out of plastic or *zink* bath with small bucket (floor to knuckle)	8	9				X
Lift panga (floor to knuckle)	9	6			X	
Lift and swing *panga* (floor to knuckle, knuckle to shoulder and shoulder to overhead)	10	2				X
Lift bound wood from floor to top of head (floor to knuckle, knuckle to shoulder and shoulder to overhead)	11	2			X	
Lift bound wood from floor onto wheelbarrow (floor to knuckle)	12	2				X
Lift bound wood from wheelbarrow onto woodpile (floor to knuckle)	12	1				X
Lift handles of wheelbarrow loaded with wood (floor to knuckle)	13	1			X	
Lift wood from *bakkie* (floor to knuckle and knuckle to shoulder)	14	3				X

Lift items for doing washing, i.e. washing powder, softener (floor to knuckle)	15	7			X	
Lift large plastic or zink bath (floor to knuckle)	16	10				X
Lift empty large bucket (floor to knuckle)	17	11		X		
Lift basket of dirty washing onto wheelbarrow (floor to knuckle)	18	3				X
Lower dirty laundry into the first plastic or bath	19	10		X		
Lift container of softener (floor to knuckle)	20	4	X			
Lift large bucket full of wet clean laundry (floor to knuckle).	21	4	X			
Lift laundry items from bucket one-at-a-time and peg laundry items to washing line or fence to dry (floor to knuckle and knuckle to shoulder).	22	4		X		
Lift full plastic bucket of dirty water to empty it out (floor to knuckle)	23	9				X
Lift handles of wheelbarrow loaded with items for doing laundry (floor to knuckle)	24	4			X	
Lift empty laundry basket onto wheelbarrow (floor to knuckle)	25	1		X		
Lift empty basin/*wasbak*/*skottel* (floor to knuckle)	26	3		X		
Lift soap and facecloth (floor to knuckle)	27	8		X		
Lift full *tshatshisa* off ground onto fire grid (floor to knuckle)	28	5				X
Lift full basin/*wasbak*/*skottel* (floor to knuckle and knuckle to shoulder)	29	5			X	
Lift facecloth to wash face and body areas (floor to knuckle, knuckle to shoulder and shoulder to overhead)	30	2		X		
Lift empty *potjie* pot (floor to knuckle)	31	3				X
Lift utensils (floor to knuckle)	32	6		X		
Lift empty cup to scoop required amount of mielie meal (floor to knuckle)	33	4		X		
Lift cup of mielie meal (floor to knuckle)	34	5		X		
Lift full *potjie* pot off fire grid (floor to knuckle)	35	2				X
Totals	**38**	**207**	**2**	**11**	**9**	**16**
Carry Step descriptions	**Carry Codes**	**Frequency**	**Equivalent weight to other item**	**Empty equipment**	**Deferred to lift**	
Carry 1 empty water container	I	5			X	
Carry 1 full 25 litre water container	Ii	6				X

Carry 2 full 25-litre water containers	Iii	5				X
Carry *panga*	Iv	2				X
Carry bound wood on head	V	1				X
Carry wood load in arms from *bakkie* to yard	Vi	1				X
Carry items for doing washing, i.e. washing powder, softener to laundry area	Vii	2			X	
Carry empty large plastic or *zink* bath to laundry area	Viii	4			X	
Carry small bucket to laundry area	Ix	2		X		
Carry large bucket to laundry area	X	4		X		
Carry large bucket full of wet clean laundry to washing line.	Xi	3			X	
Carry full plastic bucket to yard or outside toilet	Xii	2				X
Carry empty plastic basin/*wasbak/ skottel*	Xiii	2		X		
Carry soap and facecloth	Xiv	4		X		
Carry full basin/*wasbak*/*skottel* to bedroom or bathing area	Xv	2				X
Carry full *tshatshisa* to bedroom or bathing area	Xvi	1				X
Totals	**16**	**46**	**0**	**4**	**4**	**8**
Push Step description	**Push codes**	**Frequency**	**Equivalent weight to other item**	**Empty equipment < 500g**	**Deferred to carry**	
Push wheelbarrow with empty water containers	A	3				X
Push wheelbarrow with 1 full water container	B	2				X
Push wheelbarrow with 2 full water containers	C	2				X
Push wheelbarrow with 3 full water containers	D	2				X
Push wheelbarrow with 4 full water containers	E	2				X
Push bound wood on wheelbarrow	F	1				X
Push wheelbarrow with items needed to do laundry to river	G	2				X
Totals	**7**	**14**	**0**	**0**	**0**	**7**

There were 267 manual handling steps identified in the activity analysis of the five bADL and iADL domains (Table 6.1). The elimination of duplicate codes left 59 items across the Lifting, Carrying and Pushing domains (Table 6.2), which formed the pool of potential instrument items. Of these, there were initially 35 items in the Lifting domain, and through the process of item selection, 18 lifting items were eliminated and 16 remained in the draft version of the RAMS. The Carrying domain initially had 16 items, of which eight were eliminated, leaving eight items in the draft RAMS. No items were eliminated from the Pushing domain, which had seven items in the draft RAMS.

The items and descriptors of the Lifting domain represented all five bADL and iADL domains and included the different levels of physical demand according to the DOT, as well as the three types of lifting. The items for the Carrying domain represented four bADL and iADL domains, with the Cooking domain having no carrying tasks. The Carrying domain descriptors represented a range of weights being carried over four categories of distances, namely within rural dwellers' yards, from the immediate vicinity of the homesteads, within villages and beyond villages. The items for the Pushing domain represented three iADL domains, as the Cooking and Bathing domains did not include the use of a wheelbarrow to transport equipment. The Pushing domain descriptors represented a range of weights being pushed over the same four categories of distances as the Carrying domain

7.2.2 Items for Draft Rural ADL Manual Handling Sort

The final list of items for the draft RAMS is shown in Table 7.2.

Table 7.2 Final list of items for the draft RAMS

Manual Handling Step Description	Manual Handling Code	RAMS item number
Lifting step description	**Lifting code**	**Lifting Sub-test**
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1	1.1
Lift full 25 litre water container onto wheelbarrow (floor to knuckle)	3	1.2
Lift full 25 litre water container to pour cold water into *tshatshisa* pot (floor to knuckle)	3	1.3
Lift full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5	1.4
Lift full 25 litre water container from *bakkie* (floor to knuckle and knuckle to shoulder)	5	1.5
Scoop water with small bucket (floor to knuckle)	8	1.6
Lift and swing panga (floor to knuckle, knuckle to shoulder and shoulder to overhead)	10	1.7
Lift bound wood from floor onto wheelbarrow (floor to knuckle)	12	1.8
Lift bound wood from wheelbarrow onto woodpile (floor to knuckle)	12	1.9
Lift wood from *bakkie* (floor to knuckle and knuckle to shoulder)	14	1.10
Lift large plastic or *zink* bath (floor to knuckle)	16	1.11
Lift a basket of washing onto a wheelbarrow (floor to knuckle)	18	1.14
Lift full large plastic bucket of dirty water to empty it (floor to knuckle)	23	1.12
Lift full *tshatshisa* pot from ground onto fire grid (floor to knuckle)	28	1.13
Lift empty *potjie* pot (floor to knuckle)	31	1.15
Lift full *potjie* pot off fire grid (floor to knuckle)	36	1.16
Carry Step description	**Carry Code**	**Carrying Sub-test**
Carry 1 filled 25 litre water container	ii	2.1
Carry 2 filled 25-litre water containers	iii	2.2
Carry *panga*	iv	
Carry bound wood on head	v	2.3
Carry wood load in arms from *bakkie* to yard	vi	2.4
Carry full plastic bucket of water to yard or outside toilet	xii	2.5
Carry full basin/*wasbak*/*skottel* to bedroom or bathing area	xvi	2.6
Carry full *tshatshisa* to bedroom or bathing area	xvii	2.7
Push Step description	**Push code**	**Pushing Sub-test**
Push wheelbarrow with empty water containers	A	3.1
Push wheelbarrow with 1 full water container	B	3.2
Push wheelbarrow with 2 full water containers	C	3.3
Push wheelbarrow with 3 full water containers	D	3.4
Push wheelbarrow with 4 full water containers	E	3.5
Push bound wood on wheelbarrow	F	3.6
Push wheelbarrow with items needed to do laundry to river	G	3.7

The draft RAMS instrument was developed by placing each selected item into the respective manual handling domains, namely Lifting, Carrying and Pushing.

Table 7.3 Manual handling constructs, domains and items of the draft instrument

Constructs	Domains	Items
Manual Handling	Domain 1 – Lifting	16 items
	Domain 2 – Carrying	8 items
	Domain 3 – Pushing	7 items
		31 items

7.2.3 Sequencing of instrument items

The results of sequencing the 16 items in the Lifting domain, according to increasing physical demand, are represented in Table 7.4. The results show that the RAMS instrument has occasional lifting items across all five physical demand categories of the DOT, with the most items being in the *light* category and two items each in the *heavy* and *very heavy* categories respectively. There was only one item placed in the *medium* category.

The results of sequencing the items in the Carrying and Pushing domains are presented in Table 7.5. The items were also sequenced in order of increasing physical demand, taking into account the distances over which the items were carried and pushed. The results show the RAMS Carrying items have a range of weights comparable to the Snook Tables. Of the seven Carrying items, only one item involved a weight that exceeded the maximum Snook Table value for females. Conversely, the distances in the Carrying item descriptors all exceeded the maximum distance for carrying described in the Snook Tables (Snook & Ciriello, 1991). The range of physical demand in the Pushing domain items is limited, with almost all items involving initial pushing forces and distances that exceed the values described in the Snook Tables. The options for all seven items, which reflect the distance when the task is performed within a yard, fall within the pushing distance measured when utilising the Snook Tables. With reference to the finding of Phase 1 of the study, the median distance from street taps to participants' homesteads was 226 m (Table 4.22), all other Pushing item options involved distances that exceeded the maximum pushing distance in the Snook Tables. The initial pushing forces for all items exceed the maximum value for females according to the Snook Tables, while

the initial pushing forces of the first two items (items 3.1 and 3.2) do not exceed the maximum value for males.

Table 7.4 Sequencing of Lifting domain items

Item	Instrument descriptor	Lift category	bADL / iADL domain	Weight (kg)	Physical Demand Level (DOT) (Occasional Lifting)
1.1	Can you scoop water with a bucket?	Floor to knuckle	Water collection Laundry Bathing	0.9 kg	Sedentary
1.2	Can you lift an empty 25-litre water-container from the ground onto a wheelbarrow?	Floor to knuckle	Water collection Laundry	1.2 kg	Sedentary
1.3	Can you stack wood onto a woodpile?	Floor to knuckle	Fuelwood collection	2.3 kg	Sedentary
1.4	Can you load wood from the ground onto a wheelbarrow?	Floor to knuckle	Fuelwood collection	2.3 kg	Sedentary
1.5	Can you lift an empty bath used for doing washing?	Floor to knuckle	Laundry Bathing	3.4 kg	Sedentary
1,6	Can you lift an empty *potjie* pot from the ground?	Floor to knuckle	Cooking	6.5 kg	Light
1.7	Can you lift a basket of washing onto a wheelbarrow?	Floor to knuckle	Laundry	7.0 kg	Light
1.8	Can you empty a bucket of water?	Floor to knuckle	Water collection Laundry Bathing	7.5 kg	Light
1.9	Can you offload wood from a vehicle onto the ground?	Knuckle to Shoulder	Fuelwood collection	2.3 kg	Light
1.10	Can you chop down a tree using an axe or a *panga*?	Shoulder to overhead	Fuelwood collection	2.9 kg	Light
1.11	Can you lift a *potjie* pot full of pap from the ground?	Floor to knuckle	Cooking	8.6 kg	Light
1.12	Can you lift a full *tshatshisa* pot of water from the ground onto the fire stand?	Floor to knuckle	Laundry Cooking Bathing	14.2 kg	Medium
1.13	Can you lift a full 25-litre water-container from the ground onto a wheelbarrow?	Floor to knuckle	Water collection	25.0 kg	Heavy
1.14	Can you pour water from a 25-litre water-container into a pot?	Floor to knuckle	Laundry Cooking Bathing	25.0kg	Heavy
1.15	Can you pour water from a 25-litre water-container into a storage drum?	Knuckle to shoulder	Water collection	25.0 kg	Very Heavy
1.16	Can you offload a full 25-litre water-container from a vehicle onto the ground?	Knuckle to shoulder	Water collection	25.0 kg	Very Heavy

Table 7.5 Sequencing of Carrying and Pushing domain items

Item number	Instrument descriptor	bADL / iADL domain	Weight (kg)	Distance carried	Comparison with **Snook Tables** (Snook & Ciriello, 1991)
Carrying Domain					
2.1	Can you carry a bucket of water?	Water collection Laundry Bathing	7.5 kg	Within yard (up to 12 m)	Distance exceeded Weight not exceeded
				From tap in street back to home (13 m to 230 m)	Distance exceeded Weight not exceeded
				From tap in village back to home (231 m to 630 m)	Distance exceeded Weight not exceeded
2.2	Can you carry a basin of water for bathing?	Bathing	9.5 kg	From fireplace to bedroom (up to 15 m)	Distance not exceeded Weight not exceeded
				To empty in yard or outdoor toilet (up to 30 m)	Distance exceeded Weight not exceeded
2.3	Can you carry a pot full of water?	Bathing	14.2 kg	From fireplace to bedroom (up to 15 m)	Distance not exceeded Weight not exceeded
2.4	Can you carry a load of wood?	Fuelwood collection	15.8 kg	Within yard (up to 15 m)	Distance exceeded Weight not exceeded
				From forest back to home (16 m to 2.6 km)	Distance exceeded Weight not exceeded
2.5	Can you carry a load of wood on your head?	Fuelwood collection	15.8 kg	Within yard (up to 20 m)	Distance exceeded Weight not exceeded
				From forest back to home (21 m to 2.6 km)	Distance exceeded Weight not exceeded
2.6	Can you carry one full 25-litre water-container?	Water collection Laundry Cooking Bathing	25.0 kg	Within yard (up to 12 m)	Distance exceeded Weight not exceeded
				From tap in street back to home (13 m to 230 m)	Distance exceeded Weight not exceeded
				From tap in village back to home (231 m to 630 m)	Distance exceeded Weight not exceeded
2.7	Can you carry two full 25-litre water-containers?	Water collection Laundry Bathing	50.0 kg	Within yard (up to 12 m)	Distance exceeded Weight for females exceeded
				From tap in street back to home (13 m to 230 m)	Distance exceeded Weight for females exceeded
				From tap in village back to home (231 m to 630 m)	Distance exceeded Weight for females exceeded
Pushing Domain					
3.1	Can you push a wheelbarrow loaded with 4 empty 25-litre water-containers?	Water collection	30.4 kg	Within yard (up to 12 m)	Distance not exceeded Weight for females exceeded
				From home to tap in the street (13 m to 230m)	From > 61m, distance exceeded Weight for females exceeded
				From home to tap in the village (231 m to 630 m)	Distance exceeded Weight for females exceeded
				From home to the river (631 m to 5 km)	Distance exceeded Weight for females exceeded

Item number	Instrument descriptor	bADL / iADL domain	Weight (kg)	Distance carried	Comparison with **Snook Tables** (Snook & Ciriello, 1991)
3.2	Can you push a wheelbarrow loaded with all the things needed to do washing?	Laundry	39.2 kg	Within yard (up to 17 m)	Distance not exceeded Weight for females exceeded
				From tap in street to home (18 m to 230 m)	From >61m, distance exceeded Weight for females exceeded
				From tap in village to home (231 m to 630m)	Distance exceeded Weight for females exceeded
				From the river to home (631 to 5 km)	Distance exceeded Weight for females exceeded
3.3	Can you push a wheelbarrow loaded with wood?	Fuelwood collection	42.7 kg	Within yard (up to 17 m)	Distance not exceeded Weight for males and females exceeded
				From forest to home (17 m to 3 km)	From >61m, distance exceeded Weight for males and females exceeded
3.4	Can you push a wheelbarrow loaded with 1 full 25-litre water-container?	Water collection	46.1 kg	Within yard (up to 12 m)	Distance not exceeded Weight for males and females exceeded
				From tap in street back to home (13 m to 230 m)	From > 61m, distance exceeded Weight for males and females exceeded
				From tap in village back to home (231 m to 630 m)	Distance exceeded Weight for males and females exceeded
				From river back to home (631 m to 5 km)	Distance exceeded Weight for males and females exceeded
3.5	Can you push a wheelbarrow loaded with 2 full 25-litre water-containers?	Water collection	66.2 kg	Within yard (up to 12 m)	Distance not exceeded Weight for males and females exceeded
				From tap in street back to home (13 m to 230 m)	From > 61m, distance exceeded Weight for males and females exceeded
				From tap in village back to home (231 m to 630 m)	Distance exceeded Weight for males and females exceeded
				From river back to home (631 m to 5 km)	Distance exceeded Weight for males and females exceeded

Item number	Instrument descriptor	bADL / iADL domain	Weight (kg)	Distance carried	Comparison with Snook Tables (Snook & Ciriello, 1991)
3.6	Can you push a wheelbarrow loaded with 3 full 25-litre water-containers?	Water collection	86.7 kg	Within yard (up to 12 m)	Distance not exceeded Weight for males and females exceeded
				From tap in street back to home (13 m to 230 m)	From >61m, distance exceeded Weight for males and females exceeded
				From tap in village back to home (231 m to 630 m)	Distance exceeded Weight for males and females exceeded
				From river back to home (631 m to 5 km)	Distance exceeded Weight for males and females exceeded
3.7	Can you push a wheelbarrow loaded with 4 full 25-litre water-containers?	Water collection	106.9 kg	Within yard (up to 12 m)	Distance not exceeded Weight for males and females exceeded
				From tap in street back to home (13 m to 230 m)	From > 61m distance exceeded Weight for males and females exceeded
				From tap in village back to home (231 m to 630 m)	Distance exceeded Weight for males and females exceeded
				From river back to home (631 m to 5 km)	Distance exceeded Weights for males and females exceeded

7.2.4 Evaluating performance in the bADL and iADL domains

Although the RAMS consists of the 30 items related to manual handling described above, and these items are what the patient will complete, when scoring the RAMS the same 30 items are also scored in relevant bADL and iADL domains.

Table 7.6 Activity of Daily Living Domains in the Draft Instrument

bADL / iADL Domains	Domain 4 – Collecting Water	14 items
	Domain 5 – Collecting Wood	7 items
	Domain 6 – Doing Laundry	8 items
	Domain 7 – Cooking	6 items
	Domain 8 – Bathing	9 items
		44 items

Based on the analysis and coding presented in Chapter 6, scores are generated for the same manual handling items listed under the five bADL and iADL domains,

namely Collecting Water, Collecting Fuelwood, Doing Laundry, Cooking and Bathing. The number of items in each domain, as indicated in Table 7.6, allows for evaluation of each bADL and iADL domain, which can then also be reported on.

There were more items in the bADL and iADL domains as some items were applicable to more than one domain. One carrying item depicts an individual collecting water in a bucket from the communal tap in the street and then carrying it back to their homestead to be used for numerous bADLs and iADLs. Therefore the *Carrying a bucket of water* item would be reflected in both the Carrying and Collecting Water domains. Carrying water in a bucket within the yard is also necessary when disposing of the dirty water after bathing in a *zink* or plastic bath and after doing laundry. Thus, the same item would also appear in the Doing Laundry and the Bathing domains.

7.2.5 Step 5 Scale for scoring of the Rural ADL Manual Handling Sort

The scale for scoring the RAMS has the same three descriptors for each item across the eight domains. A score of 1 for all items is listed as having the descriptor *unable to do*, a score of 2 with the descriptor *has difficulty doing* and a score of 3 has the descriptor *able to do*.

An example of the scoring descriptors for a Lifting item (item 1.2) follows:

- Able to lift a full 25-litre water container from the ground onto the wheelbarrow
- Has difficulty lifting a full 25-litre water container from the ground onto a wheelbarrow
- Unable to lift a full 25-litre water container from the ground onto a wheelbarrow

The order of the score descriptors results in higher scores reflecting better performance of manual handling tasks. Items with a raw score of 3 reflect the patient's self-report of better performance than on items with a raw score of 2 or 1. Similarly higher Total Scores for domains indicate better performance than for those domains with lower Total Scores.

7.2.6 Concluding Stage I of Phase 2

The items for the three manual handling domains in the RAMs are each represented by numerous items from the five bADL and iADL domains. The scoring system was developed, and the scoring method and interpretation of the scores was described. The draft version of the RAMS was utilised in Stage II of Phase 2 for the content validity study. The section that follows describes the results of the content validity study of the newly developed RAMS.

7.3 Phase 2 Stage II: Content validity of the Rural ADL Manual Handling Sort

7.3.1 Demographic information

The demographic information regarding the SMEs used for this component of the study is shown in Table 7.7. All twelve SMEs who were approached agreed to participate in the study. An equal number of SMEs worked in the medico-legal field and in the community. All the medico-legal SMEs were female and worked in Gauteng Province, and their experience varied from 4 years to 17 years, with a mean of 8.2 years. All but one of the SMEs who worked in the community in the Mpumalanga or Limpopo Provinces were female (83.4%). Their experience in the community field varied from 4 years to 25 years, with a mean of just over 10 years.

Table 7.7 Demographic Information of subject matter experts (n= 12)

		Medico-Legal n = 6	**Community n = 6**	**Median**
		Median (range)		
Years of experience	**Years**	21.6 (13-30)	10.3 (5- 25)	16 years
		n (percentage)		
Gender	**Female**	6 (100%)	5 (83.4%)	11 (91.6%)
	Male	0	1 (16.6)	1 (8.4%)
Province where currently practicing	**Gauteng**	5 (83.3 %)	0	17 (63%)
	Limpopo	1 (16.6 %)	3 (50.0 %)	10 (37%)
	Mpumalanga	0	3 (50.0 %)	

The SMEs who worked in medico-legal practice had graduated from four of the eight universities offering occupational therapy training in South Africa. All but one had a post-graduate qualification, with the Diploma in vocational rehabilitation and a Master's degree in occupational therapy being the most commonly held by over 30% of the sample respectively (Table 7.8).

Table 7.8 Education demographics of subject matter experts (n= 12)

		Medico-Legal n = 6	Community n = 6	Total
Has postgraduate qualification	**Masters OT**	2 (33.3 %)	1 (16.6 %)	
	Diploma Vocational Rehab (UP)	2 (33.3 %)	0	
	Diploma Hand Therapy (UP)	1 (16.6 %)	2 (33.3 %	
	Sensory Integration Certification	1 (16.6 %)	1 (16.6 %)	
	Neuro-Developmental Therapy certification	1 (16.6 %)	0	
	PhD	1 (16.6 %	1 (16.6 %)	
	Master's in Public Health	1 (16.6 %)	1 (16.6 %)	
	None	1 (16.6 %)	0	
University of undergraduate OT qualification	**Wits**	1 (16.6%)	4 (66.6%)	5 (41.6%)
	UP	1 (16.6%)		1 (8.3 %)
	US	1 (16.6%)		1 (8.3 %)
	UFS	2 (33.3%)	1 (16.6%)	3 (25.0 %)
	UCT	1 (16.6%)	1 (16.6 %)	2 (16.6 %)

The community subject matter experts graduated from three of the eight universities offering occupational therapy training. All the community SMEs had a post-graduate qualification.

7.3.2 Results of CVI calculations

The results of the CVI calculations supported good content validity of the newly developed RAMS instrument. Ten SMEs participated in the first round of the content validation, five of which were medico-legal and five were community experts respectively. The item and scale content validity indices were calculated, in accordance with the recommendations made by Lynn (1986) and presented in Table

7.9 (Lynn, 1986). The I-CVI for all three of the manual handling domains was above the 0.80 cut-off point, at 0.95, 0.93 and 0.92 respectively, while the mean I-CVI was also high at 0.93. The Scale-level content validity index–average method (S-CVI/Ave) score for relevance was 0.93, which falls above the 0.80 cut-off level. The Scale-level content validity index–universal agreement method (S-CVI/UA) score was 0.56, which fell significantly below the 0.8 cut-off level and indicated the need for extensive item revision.

Table 7.9 Content validity on the relevance and clarity of the items of the Rural ADL Manual Handling Sort

	Domain	Item-level content validity index (I-CVI)		Scale-level content validity index – average method (S-CVI/Ave)		Scale-level content validity index – universal agreement method (S-CVI/UA)	
		Round 1 (n=10)	Round 2 (n=2)	Round 1 (n=10)	Round 2 (n=2)	Round 1 (n=10)	Round 2 (n=2)
Relevance	Lifting	1	0.97	**0.99**	**0.99**	**0.96**	**0.96**
	Carrying	1	1				
	Pushing	0.99	1				
	Mean I-CVI	**0.99**	**0.99**				
Clarity	Lifting	0.89	1	**0.86**	**1**	**0.16**	**1**
	Carrying	0.86	1				
	Pushing	0.84	1				
	Mean I-CVI	**0.86**	**1**				
Overall (Relevance + Clarity)		0.95	0.99	**0.93**	**0.99**	**0.56**	**0.98**

The I-CVI scores for clarity were generally lower than for relevance. The weakest indices in terms of clarity were reported for items 2, 13 and 15, with scores of 0.7, 0.7 and 0.6 respectively. Despite these low scores, the researcher opted to reject only item 2 from the draft instrument. A number of the SMEs were of the opinion that the pictorial representation of the item did not reflect the way a *panga* would usually be carried therefore the item was rejected on this basis.

Once the experts' suggestions had been implemented, a second round of content validation was conducted with the remaining two SMEs. The I-CVI for all three manual handling domains was above the 0.80 cut-off point, at 0.97, 1 and 0.99 respectively, while the mean I-CVI was also high at 0.99. The Scale-level content

validity index–average method (S-CVI/Ave) score for relevance was 0.99, which falls above the 0.80 cut-off level (Table 7.9).

The Scale-level content validity index–universal agreement method (S-CVI/UA) score was 0.98, which also falls above the 0.8 cut-off level and indicated the item revisions had improved the content validity of the RAMS. S-CVI was judged as good in this study. The researcher incorporated the recommended changes regarding the other items of the draft RAMS, which were then retained in the final version on the basis that their clarity had been improved.

7.3.3 Revisions to the instrument based on the feedback from the subject matter experts

7.3.3.1 Revisions based on content validity

The feedback from the SMEs regarding the instrument items was summarised for the purposes of analysis and implementation (Appendix 26). Many of the suggestions regarding clarity were incorporated, as summarised in Table 7.10.

Nineteen suggestions regarding changes to the wording of the item text were made by SMEs. For example, SMEs suggested replacing the word *bakkie* with the word *vehicle* in item 8. The suggestion was accepted as the word *vehicle* is more generic. All the suggestions regarding wording were incorporated into the final version of the instrument. Similarly, four suggestions were made by SMEs regarding mismatches between the item text and drawings, and were incorporated into the final version.

Six comments were made regarding the need for the wording of the item text to better describe the origin and end-point of the action being portrayed. For example, for item 5, the text *Can you load wood onto a wheelbarrow?* was changed to *Can you load wood from the ground onto a wheelbarrow?* In this way, the text clearly described a floor to knuckle lift.

Table 7.10 Subject matter experts' comments regarding items

Issue raised by SMEs:	Number of comments :	Actions taken:
Demonstration of manual handling effort in drawings and photographs	11	Deferred to future ongoing validity studies
Wording changes	19	All suggestions were implemented
Mismatch between words and drawings/photographs	4	All suggestions were implemented
Inclusion of distance into the carrying and pushing items	11	Distance options added to each carry and push item
Inclusion of weights into all items	8	Weights added to all items
Confusion regarding lift categories	1	Kept instrument the same. Explanation of lift categories and ranking of lift items included in the instrument manual
Clarity of drawings and photographs	15	Drawings revised to improve clarity
Contextual correctness of items	6	Deferred to future ongoing validity studies
Suggested additional items	2	Deferred to future ongoing validity studies
Ergonomic considerations	6	Wording changed to better explain the ergonomic aspects of each item
Application of instrument for patients with impairment or disability	1	Deferred to future ongoing validity studies

The SMEs also suggested the inclusion of the weights lifted and carried, the forces pushed and the distances over which the loads were carried and pushed into each item, to enable patients to gauge their performance more accurately. The researcher included this information onto each item in the final version of the instrument. Fifteen suggestions were made by SMEs regarding improving the clarity of the drawings. The research assistant electronically altered the images and the suggestions were incorporated into the final version of the instrument.

A number of the suggestions made by the SMEs were not implemented by the researcher. Eleven comments, which concerned the extent to which the item

drawings reflected the physical effort involved in executing the item action, were made by only two of the SMEs and did not appear to be of general concern. In light of the time and cost constraints of the current study, and the potential implications of replacing many of the item drawings, it was decided to defer this issue to the clinical trial stage, which will be carried out after completion of this current study.

Six comments were made by SMEs relating to the contextual correctness of the actions depicted in the instrument items. For example, for item 19, an expert questioned whether the 25-litre water container would be carried on the head if the individual preferred not to use a wheelbarrow. Similarly, one of the SMEs suggested the addition of an item regarding carrying water on the head, as this is a well-documented practice in many rural areas of South Africa, as discussed in Chapter 2 (Geere, Hunter & Jagals, 2010; Wrisdale et al., 2017). One expert was not clear on the category of lift depicted in the item. The researcher included text defining the lift category into all of the lift items and an explanation of the lift categories in the user manual (Appendix 25).

Another expert posed a question regarding the ability of Persons with Disabilities to carry out the bADL and iADL domains depicted in the instrument items. The researcher incorporated this issue into the explanation in the user manual of the sample used to develop the instrument.

7.3.3.2 Revisions based on opinions of subject matter experts

The researcher also included a number of questions in section B of the content validity record form (Appendix 27), to ascertain the SMEs' opinions on broader aspects of the development of the instrument and to add rigour to the decisions that the researcher had taken during the instrument development phase, as discussed in sections 7.2.2.4, 7.2.2.5 and 7.2.2.6. The results are depicted in Figure 7.8.

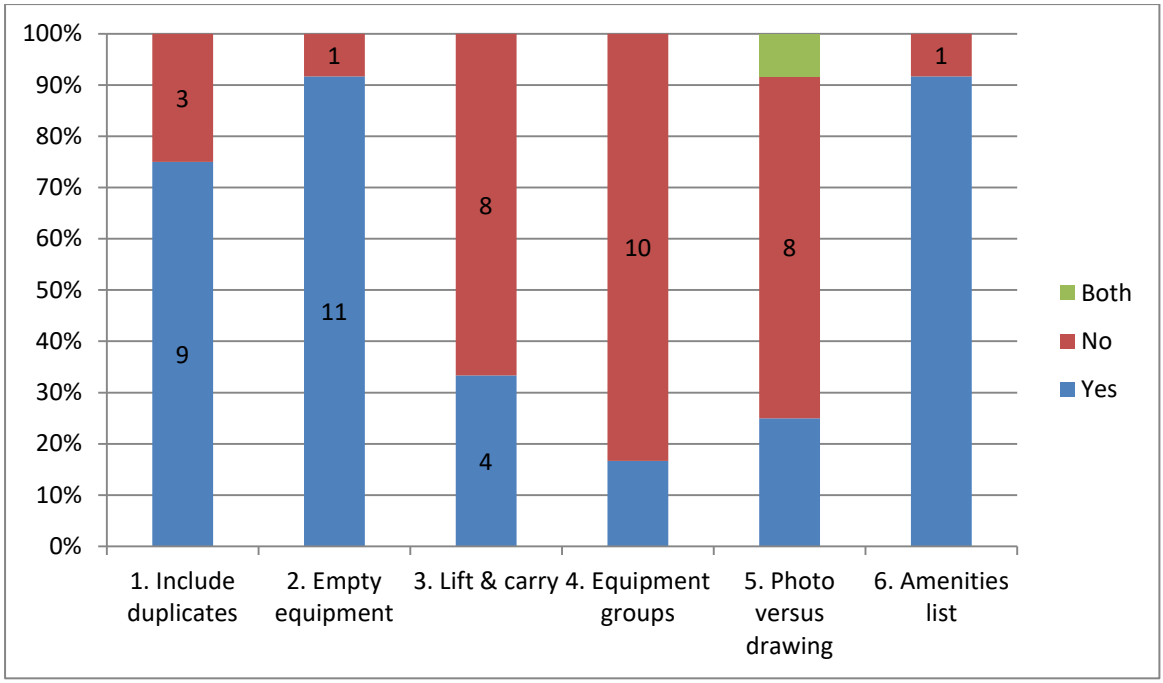


Figure 7.8 Results of Questions

Figure 7.8 shows the results of the questions in the content validity record form, which were presented in Table 6.8 in Chapter 6. In terms of question 1: inclusion of duplicate items in the instrument was supported by 75% of the SMEs. This result affirmed the researcher's decision to include the following duplicate instrument items in the Lifting sub-test (Table 7.2), namely:

- Items 1.3 and 1.4, which both pertain to floor to knuckle lifts of fuelwood, weighing on average 2.2kg;
- Items 1.13 and 1.14, which both pertain to floor to knuckle lifts of 25-litre water-containers, weighing 25kg;
- Items 1.15 and 1.16, which both pertain to knuckle to shoulder lifts of 25-litre water-containers, weighing 25kg.

The results for question 2: inclusion of instrument items that pertained to the manual handling of empty containers indicated that 92% of the SMEs recommended the inclusion. The researcher thus did not eliminate the following instrument lifting or pushing items from the final version:

- Item 1.1, which pertains to the lifting of an empty 25-litre water-container from the floor into a wheelbarrow;
- Item 1.5, which pertains to lifting an empty bath for doing laundry;
- Item 1.8, which pertains to lifting an empty *potjie* pot from the ground;
- Item 3.2, which pertains to pushing four empty 25-litre water-containers in a wheelbarrow.

The results for question 3: the inclusion of instrument items that illustrated the element of an bADL and iADL domain involving the greatest physical demand showed that 67% of the SMEs supported the inclusion.

The results for question 4: the instrument only include items comprising the sum of the weights, as opposed to a separate item for each individual weight, when the bADL and iADL domain depicted indicated that 83% of the SMEs recommended this. The instrument item reflected the practice in reality that multiple pieces of equipment and materials were handled together. Thus, instrument item 3.1 pertains to 'all of the things needed to do washing of clothes,' as opposed to having separate instrument items for pushing a basket of clothing, laundry detergent and laundry basins separately.

Question 5 asked the SMEs to indicate their preference between the photograph and drawing versions of the draft instrument. While most of the SMEs (67%) opted for the drawing version, 25% preferred the photograph version and one expert (8%) felt that both versions were effective, having different advantages and disadvantages. The researcher opted to use the drawings in the final version of the instrument.

In response to question 6, 92% of the SMEs supported the inclusion of the Household Amenities Checklist in the instrument. Reasons cited included that the checklist would provide clinicians with individualised, clear and comprehensive information regarding the particular combination of household amenities of each patient, which would enable the clinician to predict the form of the bADL and iADL domains in the patients' context.

The researcher utilised the suggestions made by the SMEs in question 7 to name the newly developed instrument the RAMS.

All the recommendations of the SMEs were incorporated into the final version of the RAMs (Appendix 28), which was deemed ready for field testing at the conclusion of the current study.

7.3.4 Guidelines for using the instrument

The user manual includes information on the administration, scoring and interpretation of the RAMS (Appendix 25).

7.3.4.1 The Rural ADL Manual Handling Sort administration procedure

The administration instructions to be given to the patient or caregiver completing the RAMS were presented. The occupational therapist will do the FCE assessment of medico-legal patients in the usual way, utilising an interview, standardised assessments and clinical observations (Buys & Van Biljon, 2007; Van Biljon, 2013). The RAMS should be completed as part of the battery of assessments carried out during the FCE.

The RAMS is untimed and individually administered by the occupational therapist. The instrument item plates must be shown consecutively at a comfortable pace, and the patient should select an answer for all instrument items. Generally, the time required for a patient to complete the RAMS will be approximately 20 minutes.

The purpose and format of the verbal instructions for administration of the RAMS are presented. Personal information including the patient's name, age and gender, date of assessment, name of the occupational therapist and the diagnosis are filled in on the scoring sheet.

Verbal instructions must preferably be given to the patient in a language they can understand. The instructions may be repeated during each subtest administration if needed. Once it is clear the instructions are understood, the administration of all items can proceed.

The RAMS can be completed in one of two ways:

- The patient completes RAMS independently using a hard copy of the scoring sheet. The therapist subsequently enters the patient's scores into the electronic score sheets.

- The occupational therapist completes the RAMS by entering the patient's responses directly into the electronic scoring sheets (available on the CD).

7.3.5 Conclusion

The RAMS was found to have good content validity. The participation of the SMEs in the CVI process enhanced the development of the instrument. Both the medico-legal and community practice SMEs confirmed the selection of the manual handling domains of Lifting, Carrying and Pushing as the domains for the instrument. Furthermore, they rated the items within each domain as highly relevant and supported the authenticity of the instrument in terms of the South African rural, less-resourced context. The SMEs involved in the CVI process provided extensive input into the clarity of the instrument items, and their feedback was incorporated into the current version of the RAMS. The administration guidelines for the RAMs were presented.

CHAPTER 8: DISCUSSION PHASE 2

8.1 Introduction

This discussion pertains to steps 4 to 7 of instrument development in Phase 2 of the study. These steps included the development of the items, scoring and interpretation of scoring of the RAMS. A discussion of the content validity study of the RAMS is also presented.

8.2 Define the items for each domain and the test specifications

The domains for the RAMS were clearly defined and described in Phase 1 in order to develop the items for the self-report assessment. The target domains considered the individual, the rural environment and bADL and iADL task characteristics which include manual handling, so that items in RAMS represent appropriate environment-based tasks. Gender and age were considered for these activities which were linked to the primary occupations of adult individuals living in a rural less-resourced area of South African in terms of their bADLs and iADLs in the home and community (Matheson, 2004).

8.2.1 Item identification

The emphasis on occupational performance as the premise for item identification ensured that the newly developed instrument was clearly within the field of occupational therapy (World Federation of Occupational Therapists, 2010; American Occupational Therapy Association, 2014).The selection of the subjective description of the bADL and iADL domains by the CCWs as well as the objective observation of occupational performance by the researcher during the home visits as the basis for the activity analysis proved most effective. This methodology ensured the item identification which followed was based on the contextual reality of the five selected bADL and iADL domains. For example, according to the literature, water is typically carried on the head in many rural settings (Geere, Hunter & Jagals, 2010; Jagals, 2012; Wrisdale et al., 2017). The findings of Phase 1 of this current study, however, showed that this is not always the case and that wheelbarrows are used extensively to transport water.

Initially all the observed occupational performance components and steps of the bADL, iADL and manual handling domains were included as potential instrument items and coded using activity analysis according to occasional lifting, carrying and pushing. Inclusion of all of the potential items would have had a negative impact on the utility of the RAMS and the elimination of most duplicate tasks made sure it was a comprehensive assessment that could be administered in a reasonable time. The criteria utilised to select the final items ensured that all the bADL, iADL and manual handling domains were included and the instrument was specific to the population of a rural less-resourced area. Three pairs of items with the same manual handling codes were included to allow for inter-item reliability. This provides a check on the clients' responses as different responses on the paired items highlight possible malingering behaviour (Matheson, 2004). Such a mechanism to check for possible malingering behaviour is of particular importance when compensation is an outcome of the assessment.

8.2.2 Test specification (Instrument format)

The selection of the PATS format for the instrument was influenced by a number of factors. The PATS format has been validated in previous research and was found to be a good fit for the target population (Mayer et al., 2005; Verna et al., 2015). Instruments with the PATS format are used as part of a functional capacity evaluation (FCE) to cross-reference perceived abilities and are often used as a substitute for performance testing which may be difficult for the activities identified for the RAMS out of the clients' context (Matheson, 2004). As in the RAMS, the PATS format allows for a description of a large number of bADL and iADL tasks and thus a set of items are presented to obtain detailed information about the client's ability to perform in each domain. This assessment approach is compatible with the expressed needs of the occupational therapists practicing in the medico-legal and FCE fields who participated in the electronic survey in Phase 1 of the current study. It is easy to administer and score in addition to the drawings being accessible across language and cultural barriers (Matheson, 2004).

According to Matheson item difficulty in PATS assessments must be matched to the population of test users so that there are sufficient items at the extremes of the likely range of responses. This was achieved by observing the performance of bADLs and

iADLs in the field and coding all the steps with different manual handling physical demands seen in the five bADLs and iADL domains included in the RAMS. The use of pictorial instrument items with a small amount of text will minimise the potential negative influence of limited levels of literacy of clients undergoing medico-legal or FCE occupational therapy evaluations. The translation of the text into the first language of the clients is anticipated to enhance the utility of the instrument for the South African population.

A decision was made to use drawings only in the instrument as a study by Haynes (2003) found that using black and white photographs compared to colour photographs affected the scores in a PATS assessment significantly (Matheson & Haynes, 2003). The use of black and white drawings adds clarity as background detail and shading is removed as opposed to colour photographs and will optimise the cost-effectiveness of reproduction of the hard-copy version of the instrument. The development of the electronic version of the instrument, where the client will be shown the items on the screen of the occupational therapist's device, further enhances the cost-effectiveness of the RAMS.

Since performance in manual handling is routinely evaluated by occupational therapists as part of medico-legal evaluations, particularly if it is a required component of the client's job description, it is essential in developing an assessment instrument that items are graded according to the challenge they present to determine the level at which the client is functioning (Snook & Ciriello, 1991; Liberty Mutual Group, 2004; Matheson et al., 2008; Soer et al., 2009; Shoaf et al., 2010). The scoring of the Lifting domain of the RAMS was based on the Dictionary of Occupational Titles (DOT) (U.S. Department of Labor Employment and Training Administration, 1991). According to the DOT, each physical demand level has a range of weights lifted in the occasional, frequent and constant categories, as well as a range of MET values. In addition, the DOT makes provision for the different categories of lifting tasks, namely floor to knuckle, knuckle to shoulder and shoulder to overhead lifts. The physical demand categories of the DOT, namely sedentary, light, medium, heavy and very heavy demand, were embedded in developing the rating scale. All of the levels indicated in the DOT were accounted for in the instrument.

Only the more challenging items achieved are scored to assess the client's ability in lifting, carrying and pushing tasks. The findings are compared to the DOT and the Snook Tables to establish the extent to which the client's assessment findings equate to the physical demand level of their job (Snook & Ciriello, 1991; Matheson, Isemhagen & Hart, 2002; Liberty Mutual Group, 2004). Lifting items on the RAMS were sequenced in ascending order according to the DOT level of physical demand and the Snook Tables formed the basis for comparison of the amount of weight lifted, carried or pushed as well as the distance over which materials were carried or pushed (Snook & Ciriello, 1991; U.S. Department of Labor Employment and Training Administration, 1991).

The inclusion in the Phase 1 methodology of measurement of weights, distances and forces for contextual manual handling tasks made comparison of RAMS items with the Snook Tables possible (Tables 7.12 and 7.13) (Snook & Ciriello, 1991). The Lifting and Carrying domains that are assessed in a clinic setting are defined as having an item in front of the trunk using both hands, whereas the resources and equipment in the rural less-resourced context was more typically lifted and carried on the head or shoulders (fuelwood) or in one hand to the side of the body (water containers). Furthermore, while calculations of the loads being pushed in wheelbarrows were scientifically done (HPWizard.com, 2017), the terrains over which the wheelbarrows were typically pushed were rough, making comparison with performance on pushing a trolley over a smooth surface in a clinic setting difficult. Despite these limitations, the selected RAMS items provide an initial comparison of the norms for an industrial population with the physical demands of routine bADL, iADL and manual handling domains in a rural less resourced context.

The results presented in Table 7.4 show that the Lifting domain demands of the Water Collection domain were the greatest, with one Lifting item falling into the heavy and two items falling into the very heavy categories of the DOT (U.S. Department of Labor Employment and Training Administration, 1991). All items for Bathing, Laundry and Cooking bADL and iADL domains fell into the sedentary, light and medium categories, except those items that involved lifting a 25-litre water-container to access the water needed for the bADL and iADL domains. These findings are clinically significant for medico-legal occupational therapists as provision of accommodations regarding accessing water from sources outside of the home, as

well as water storage facilities that are as near as possible to the areas where Laundry, Cooking and Bathing are done, could enable optimal client independence. The presence of only one item representing the medium category could be viewed as a limitation in assessment of range of physical demand in occasional lifting in the RAMS. Further studies regarding the manual handling demands of bADLs and iADLs in rural less-resourced contexts could provide additional items to ensure a more comprehensive assessment of performance across all DOT categories.

The results presented in Table 7.12 demonstrate that the distance recommended for Carrying according to the Snook Tables (Snook & Ciriello, 1991), is exceeded for all RAMS carrying domain items. However, the shorter distances (median carrying domain distance = 16.5 m) within the homesteads are relatively similar to the 8.3 m utilised in the Snook Tables, as compared to the median carrying domain distances for collecting water and fuelwood from community sources. The results for the Pushing domain presented in Table 7.12 indicate that the distance norm of 61 m in the Snook Tables is exceeded for all items (Snook & Ciriello, 1991). Thus, all aspects of the bADLs and iADL domains that involve accessing resources or performing iADLs outside of the homestead exceed the norms for pushing in industrial settings. Furthermore, all initial forces in the pushing domain exceed the Snook Table norms for females, while those in the water and fuelwood collection iADL domains are exceeded for both females and males (Snook & Ciriello, 1991). Thus, medico-legal occupational therapists' recommendations regarding accommodations should include provision of household assistance to collect water and fuelwood.

While a number of the Lifting, Carrying and Pushing domain load results of the current study fall within the Snook Table norms, it is important to note that many loads handled in the rural less-resourced context exceed the norms in the Snook Table for females (Snook & Ciriello, 1991). This is a significant finding given that it is most frequently women who perform the bADL and iADL domains in rural less-resourced contexts. The graded values for the weights and distances in the final RAMS provides items in the order of physical demand and allows the occupational therapist to compare the clients reported ability to other standardised measures of manual handling.

The RAMS has been designed for the occupational therapist to enter the scores directly into an electronic score sheet, after which a number of automatic calculations will provide clinical information for inclusion in the report and triangulation with other assessment results. The electronic format allows the assessment to be administered in a standard way, with timesaving automatic generation of results that can assist with report-writing and the capturing of statistics which can lead to database development for further study. The client's perception of the maximum weight they can lift, carry and push, as well as the typical distances over which the loads are carried and pushed during the execution of bADL and iADL domains will be available in a quick and easy format. Graphs of the client's perceived performance across the three manual handling and the five bADL and iADL domains are automatically generated, which will allow the occupational therapist to identify clearly the amount of assistance the client would require for optimal independence. Recommendations for occupational therapy intervention, including provision of home assistance, environmental adaptions or prescription of assistive devices can then follow.

8.3 Scoring of the Rural ADL Manual Handling Sort

The scoring of the manual handling domains using a 3-point ordinal scale for the RAMS is similar to other PATS instruments including the RISC Tool Sort, WEST Tool Sort, Spinal Function Sort and Hand Sort, which are rated *able*, *restricted* and *unable* (Matheson & Matheson, 1989; Mayer et al., 2005; Matheson et al., 2008). For some of these assessments a category of *don't know* was reflected in the RAMS as *Not Applicable* (N/A) (Matheson, 2004). This category was intended for when the client did not routinely carry out the task in question. The number of response options in a Likert scale is an important consideration as an optimum number of response categories promotes discrimination between the rated items (de Vos et al., 2011). A 5-point scale such as the one utilised in another PATS instrument, the M-TAP, was considered for the RAMS (Matheson, 2004), however the 3-point scale was deemed more appropriate since questions on the RAMS are quantifiable and based on the bADL and iADL tasks typical of a rural less-resourced context. It was also deemed acceptable for the anticipated target population of rural dwellers in terms of their level of formal education.

The manual handling components of the bADL and iADL tasks are graded according to weight, initial pushing force and distance with increasing physical demands. This matched the scoring strategies used in other PATS which fulfils the assumption that each item measures a different level of ability and therefore makes a separate contribution to the total score (Matheson et al., 2008). Thus, even though the scores in the RAMS are ordinal they provide an assessment of ability in terms of increased manual handling demands and when summed to give a total, as with other PATS assessments, lower scores indicate less ability than higher scores.

8.4 Comparison with other instruments

The results of the RAMS can be triangulated with other standardised assessment results. Graphs and a text format summary of the patient's performance across all eight domains are instantly available for easy transfer into the occupational therapy medico-legal report. This information can thus be used to justify the findings and recommendations regarding the patient's level of occupational performance in work and contextual bADL and iADL tasks.

The median scores for each manual handling domain in the RAMS can be compared to identify which manual handling domains are most challenging for the patient. The therapist can establish the level of physical demand in occasional lifting in bADL and iADL tasks and compare to other instruments such as the Isoinertial Lifting Protocol, the PILE or the Carry and Push Protocols (Mayer, 1988; Soer et al., 2006). In this way, the occupational therapist can utilise the results regarding performance of contextually relevant bADLs and iADLs to predict the manual handling capabilities of the patient in their work or home setting. Similarly, the patient's results on the commonly used standardised manual handling instruments could provide an indication of which bADL and iADL domains they would have difficulty with in the rural context. Furthermore, the scores for each item in the respective manual handling domains are visually presented in the graphs, allowing for easy identification of the most challenging aspects.

The Isoinertial Lifting Protocol is utilised to evaluate occasional lifting, that is lifting that takes place in the work place for less than one third of the 8-hour work day, whilst the PILE applies to the evaluation of frequent lifting that occurs for more than one third of the normal work day (Mayer, 1988; Soer et al., 2006). This finding shows

the loads handled by rural dwellers when performing bADL and iADLs frequently exceed the usual safe limits for manual handling in industrial settings. As multiple such physically demanding bADL and iADLs are performed each day over and above work duties, the outcome is a significant cumulative load. The cumulative lifting demands of an employed rural claimant should therefore be interpreted as being characteristic of frequent lifting. This calls into question the applicability of the Isoinertial Lifting Protocol for employed rural claimants in the South African context and points to the need to interpret a rural patient's result on this test with caution (Mayer et al., 1988; Soer et al., 2006).

In terms of interpretation of the RAMS, the water and fuelwood collection items of the Carrying and Pushing domains were found to exceed the norms of manual handling domains typically evaluated in a clinic setting (Ciriello & Snook, 1999; Soer et al., 2006). The maximum weight carried over the longest distance according to the RAMS score can be compared to the patient's performance on the standardised carrying assessment completed in the clinic over a distance of 8.5 metres (Ciriello & Snook, 1999). Similarly the maximum weight pushed over the longest distance according to the RAMS score can be compared to the patient's performance on the standardised pushing assessment completed in the clinic, where various weights can be pushed in a trolley carried over a distance of 61 metres.

Furthermore, the scores for each item in the respective bADL and iADL domains are visually presented in the graphs, allowing for easy identification of the most challenging aspects. For example, for a patient with a lower limb injury resulting in difficulty walking over long distances, the comparison of the median bADL and iADL domain scores could show the patient experiences the most difficulty with water and fuelwood collection from community sources outside of the homestead. This finding would then be compared to the scores for all items in the Bathing, Laundry and Cooking bADL and iADL domains that relate to accessing water and fuelwood over shorter distances from where they are stored within the homestead.

8.5 Content Validity

The fourth objective of the study was to determine the content validity of the RAMS, as the clarity of the rating scale and whether each item is relevant needs to be determined. The experts involved in the first round of the content validity process

provided extensive input into the clarity of the instrument items which was incorporated into the first version of the newly developed instrument. The I-CVI for clarity of items and the overall S-CVI (Lynn, 1986; Polit & Beck, 2006; Polit, Beck & Owen, 2007) improved in the second round of the validation by the SMEs. The participation of the experts in the content validity process enhanced the development of the instrument. Both the medico-legal and community practice experts confirmed the selection of the bADL, iADL and manual handling domains for the instrument. Furthermore, they rated the items within each domain as highly relevant and supported the authenticity of the instrument in terms of the South African rural less-resourced context.

The lower I-CVI and S-CVI scores for clarity in the first round were reflective of the numerous comments by the SMEs regarding the formatting and wording of the draft RAMS. All the SMEs suggestions regarding wording of the RAMS text were implemented, along with improved descriptions of the lift heights and the addition of information depicting the weights and distances for each item. A number of issues that were unclear to the SMEs, such as the classification of lifts and the rationale used for sequencing the RAMS items were addressed in the User Booklet. The researcher took the decision not to add any items based on the opinions of the SMEs in the current study, such as adding an item regarding carrying water on the head. While this method of carrying water is well-documented within the literature, it was not observed during the Phase 1 data collection. It is anticipated that further research during the field testing after completion of the current study will guide the possible addition of items.

The positive response of the SMEs who participated in the content validity process demonstrated that the RAMS would be well accepted by the occupational therapy practitioners. The prevalence of South Africans living in households with limited amenities and the impact that climate change is already having on water and fuelwood security, may result in the instrument proving to have utility across more diverse occupational therapy populations than initially envisaged. The technical adequacy of the first version of the RAMS instrument will improve once it is piloted and the remainder of the psychometric properties have been explored.

8.6 Conclusion

Standardised bADL and iADL assessment instruments are currently being used to a very limited extent by medico-legal occupational therapists in South Africa. Furthermore, the bADL and iADL assessment instruments being utilised are not optimally appropriate for claimants from rural less-resourced contexts. The RAMS is anticipated to impact significantly on the ability of South African occupational therapists in the medico-legal field to evaluate their rural clients' occupational performance of bADLs and iADLs, and provide contextually relevant intervention. Recommendations in medico-legal and FCE occupational therapy reports will be contextually accurate and relevant, thus optimising impaired or disabled clients' access to social justice when claiming compensation.

The process of development of the RAMS was rigorous and consistent with guidelines for instrument development. The selected PATS format was appropriate and the content validity study yielded positive results. The development of the RAMS and evaluation of its content validity in Phase 2 fulfil objectives 3 and 4 of the study. The overall evaluation and conclusion of the study follows in Chapter 9.

CHAPTER 9: CONCLUSION

9.1 Introduction

The aims of the study were to determine whether existing bADL and iADL instruments used by medico-legal occupational therapists are appropriate for assessing bADLs and iADLs that involve a substantial component of manual handling performed in rural less-resourced communities of South Africa, and if not, then to modify an existing bADL and iADL instrument or to develop and validate a new instrument for the contextual assessment of bADLs and iADLs in these clinical settings. This chapter presents a critical evaluation of the study including the findings, strengths, limitations and recommendations for further research. The contribution of the study and the newly developed Rural ADL Manual Handling Sort to occupational therapy practice in the medico-legal field in South Africa are discussed.

9.2 Main findings of the study

South African occupational therapists currently conduct comprehensive FCEs for medico-legal purposes. Occupational therapists base their professional opinions regarding recommendations for compensation on theoretical frameworks and bADL and iADL assessment instruments that were developed in Western, well-resourced countries (World Health Organization, 2001; Turpin & Iwama, 2011; American Occupational Therapy Association, 2014; James, 2014). They often lack knowledge about the impact that limited household amenities have on appropriate accommodations, assistive devices and caregiving requirements for rural dwellers. This shortcoming illustrates the need for assessment of bADL and iADL performance that takes into account contextual factors for rural dwellers in medico-legal settings. No bADL or iADL assessment instrument that considers the type and methods of performance of bADLs and iADLs typical of rural less-resourced contexts could be found by the researcher.

The current study developed and evaluated a contextual pictorial sort instrument, the RAMS, to assess the bADLs and iADL tasks with the significant manual handling demands typical of a rural less-resourced context for occupational therapists in the

medico-legal field. This was based on a need identified by the researcher for evidence to substantiate recommendations made in medico-legal reports about claimants who live in rural areas. The RAMS instrument is therefore intended for use by any occupational therapist conducting an FCE for medico-legal purposes of a claimant who resides in a rural less-resourced context and allows for appropriate recommendations for compensation to be made.

The study was completed in two phases:

Phase 1 of the study had three stages and involved data collection from medico-legal occupational therapy clinicians, CCWs and individuals living in a rural context.

Stage I: The results of this stage showed that most occupational therapists conducting FCEs for medico-legal purposes in South Africa include the assessment of bADLs and iADLs into their comprehensive assessment batteries. The findings demonstrated a similar pattern to elsewhere in the world in that occupational therapists use standardised bADL and iADL assessment instruments to a limited extent and tend to utilise informal assessment methods they have devised themselves. The FIM and the BI were the most commonly used formal assessment instruments by respondents, which is a finding supported in other studies internationally (Stapleton & McBrearty, 2009). Those respondents who reported using formal assessment instruments expressed concern, however, regarding their application to the South African context.

Stage II: This stage was designed to address the second aim of the study, namely to investigate the bADL and iADL tasks typically performed in a rural community. The study was conducted in the Limpopo Province of South Africa employing a quantitative approach, combined with aspects of Rapid Rural Assessment (RRA) methodology (Freudenberger, 1999; Chambers, 2006). Data collected using participatory mapping focus groups with CCWs were analysed using quantitative directed content analysis with the ICF and the OTPF III as frameworks for coding (White & Marsh, 2006). This was effective and resulted in the attainment of the objective of identifying bADL and iADL tasks involving significant manual handling typical of a rural setting.

The results showed that while most of the bADL and iADL tasks identified in this stage of the study are reflected in the ICF and the OTPF III, collection of water and fuelwood are not. In addition, the forms of many rural bADL and iADL tasks differ significantly from those carried out in a typical urban Western context due to limited access to adequate water and electricity. The iADL tasks of collecting water and fuelwood were identified as separate from other bADL and iADL tasks and formed part of the five bADL and iADL domains and three manual handling domains that were identified for the development of the RAMS in Phase 2.

Stage III: The findings from this stage of the study confirmed that rural dwellers in Limpopo Province performed significant manual handling tasks with high physical demands on a daily basis when manually collecting water and fuelwood from community sources. All the study participants fetched water from taps in the adjacent streets, village water tanks or nearby rivers on a daily basis. They were also found to collect fuelwood from open areas adjacent to their villages on a daily basis and to use different methods to urban well-resourced dwellers for doing laundry, cooking and bathing due to limited access to water and electricity. The extended time and effort required for these tasks significantly exceeds safe limits in a typical employment context, and arguably constitutes an ongoing social and occupational injustice. This finding points to rural dwellers being at significant risk for the development of musculo-skeletal pain and injury, as well as occupational deprivation due to having little time to carry out occupations beyond those needed for survival. The importance of these two aspects needs to be emphasised and considered in the assessment of bADLs and iADLs of individuals for medico-legal purposes.

Phase 2 had two stages consisting of the development of the RAMS followed by a content validity study.

Stage I: The instrument development process was systematically implemented resulting in a PATS self-report measure for occupational therapists in medico-legal settings. The domains and items that were identified during Phase 1 were utilised to develop a pool of possible RAMS items. A systematic item selection process followed and numerous items were eliminated, leaving 30 items in the final draft of the newly developed instrument. The items in each of the three manual handling domains were sequenced according to increasing physical demand. Each item of the

RAMS comprises a black and white drawing with a text question asking whether the individual can perform the contextual manual handling task. The scoring scale was selected and a hard copy and electronic version of the RAMS were developed.

Stage II: The content validity of the RAMS was established in this stage of the study, based on the inputs regarding relevance and clarity from twelve SMEs in two rounds. Ten SMEs rated clarity and relevance of each item in round one, as well as providing their opinions and suggestions. The resulting item and scale content validity indices showed that extensive item revision was necessary and the inputs from the SMEs in round one were incorporated into a revised version of the RAMS. The conclusion from the second round of the content validity study was that the RAMS domains and items did measure performance of contextual bADL and iADL tasks that involved significant lifting, carrying and pushing. It was concluded that the RAMS had satisfactory content validity and was suitable for the target group and the setting.

9.3 Strengths of the study

The researcher embedded herself in the research setting for six years prior to the start of the study while supervising occupational therapy students, including home visits in rural villages as well as interacting with CCWs. She simultaneously practiced for eight years in the medico-legal field conducting FCE evaluations of claimants, including many living in rural less-resourced areas. Building on this perspective of the rural lifestyle, the need for a context-relevant tool was identified which culminated in the development of the RAMS for the target population.

The rigorous process based on the steps of instrument development that was used to develop the RAMS and to examine the initial psychometric properties of the newly developed instrument is a further strength of the study (McCoach, Gable & Madura, 2013). The study design incorporated a number of methods to ensure the RAMS measured components related to performance of contextual bADLs and iADLs with significant manual handling demands.

The participation of the CCWs and the home visit participants enabled the development of a bADL and iADL assessment instrument which was relevant for the medico-legal clinical setting and addressed the needs of claimants from rural areas. Data were gathered in two stages of Phase 1 from an adequate sample of CCWs

and rural home visit participants. These two stages effectively applied real world pragmatic methodology to thoroughly investigate bADLs and iADLs in the rural context. (Pretty, 1994; Cresswell, 2014) The RRA methodology harnessed the capacity of the CCWs to impart their intimate knowledge of bADLs and iADLs with high manual handling demands in their situation to the researcher. The participatory mapping technique created a comfortable space which enhanced participation in the focus groups (Freudenberger, 1999). This directed the selection of domains and items to include in the RAMS instrument and the ecological validity of the RAMS instrument developed in Phase 2. The development of a method for identification and activity analysis of further context-related occupational performance activities in less-resourced areas will enable the expansion of the RAMS.

There is ample literature pertaining to environmental, health and development perspectives on limited access to water and energy resources, but a strength and unique contribution of the current study was the use of activity analysis to examine bADLs and iADLs in a rural less-resourced context. Activity analysis is a core component of occupational therapy practice and is essential to the reasoning process that practitioners use to plan and implement care. The integration of a number of approaches to inform the instrument development process made the study even more robust. The ICF and OTPF III frameworks were used together with manual handling theory to frame the activity analysis of the bADL and iADL skills in a rural context. The researcher utilised a systematic approach to item selection in Phase 2 of the study, integrating data from the Phase 1 focus groups and home visits with information from available literature regarding bADLs, iADLs, manual handling and activity analysis theory. The identification of contextual bADL and iADL tasks that included a significant component of manual handling followed in order to develop the instrument domains and items, as well as to develop and phrase the descriptors. Analytical mistakes regarding the results of the focus groups were minimised by member-checking with a clinician and an experienced CCW.

The study produced initial normative data for performance of bADLs and iADLs by rural dwellers, which had not previously been reported. The current study showed the importance of assessing the performance of bADLs, iADLs and manual handling for individuals living in rural contexts. The results of Phase 2 of the current study indicated the RAMS was found to have satisfactory content validity for the three most

commonly assessed manual handling domains in FCEs. The newly developed instrument allows for comparison of manual handling demands of bADL and iADL tasks in a rural less-resourced context to the DOT and other manual handling normative data. Additionally, the manual handling demands of these tasks were quantified and could be compared to existing assessment instruments conducted in clinical settings. This finding could be used to improve the accuracy and contextual relevance of FCE assessments conducted by occupational therapists for medico-legal and insurance purposes in order to guide appropriate compensation for rural dwellers.

Using a measuring wheel for measurement of distances walked during performance of bADLs and iADLs was felt to have been the most appropriate method in the study setting. The use of GPS technology to measure distances has been utilised in other studies (Geere, Hunter & Jagals, 2010), however in this current study GPS technology might not have accounted for actual distances walked on routes such as footpaths as opposed to direct 'as the crow flies' measurements. In addition the unreliable internet connectivity in the study area justified the use of the low-tech measuring equipment.

9.4 Limitations of the study

The current study has only included an initial study of the psychometric characteristics of the RAMS. The newly developed instrument still needs to be piloted on a sample of medico-legal evaluations of rural claimants to establish its reliability, validity and utility. Construct validity as well as the convergent and divergent validity against reference tests for bADLs, iADLs and manual handling still need to be explored.

Using only English language articles may have biased the results as articles from the Global South may have been excluded from the literature search in Chapter 2. The omission of cognitive interviewing and the inadequate piloting of the survey instrument in Stage I of Phase 1 negatively affected data collection. Errors in the survey instrument were not identified and corrected prior to it being emailed to the study population, resulting in limited collection of demographic data. The results of the survey in terms of the generalisability throughout South Africa is limited.

Furthermore, the absence of employment sector and field of practice variables in the available HPCSA database imposed a limitation on the population selection. The OTASA database does not reflect all registered occupational therapists, but rather members of the OTASA professional association, and thus bias was introduced into the survey population. It was a further shortcoming that the demographic section of the survey instrument did not include a question regarding employment sector. The results of the electronic survey should thus be interpreted with caution.

The geographical area of the data gathering in Phase 1 of the study was too small for the findings to be generalised to the entire population residing in rural less-resourced areas of South Africa; the generalisation of results on the RAMS instrument for individuals living in other rural less-resourced contexts is therefore limited. Additional studies based on the RAMS in other rural communities could accommodate this limitation and confirm whether the bADLs and iADL tasks identified in the current study are typical of other rural and less-resourced urban South African contexts.

The exclusion of the remainder of the bADLs and iADLs that have significant physical capacity and manual handling demands identified in Phase 1 is regarded as a limitation of the current study. The measurement of performance of bADL and iADL tasks with significant physical capacity and manual handling demands in rural contexts would be more comprehensive if all the bADLs and iADLs were included. The domains and items of the first version of the RAMS are appropriate for medico-legal settings but further data collection will enable quantification of the manual handling demands of the additional bADLs and iADLs.

A history of musculo-skeletal problems or previous injuries may have affected the manual handling capacity of the home visit participants in Phase 1. The possible role of these variables requires further investigation and not recording the absence of these factors is a limitation of the current study.

The researcher conducted all the focus groups in Phase 1 and the quantitative content analysis of the transcriptions which underpinned the identification and description of bADLs and iADL tasks with significant manual handling demands. Furthermore, some minor differences in the execution of the group protocol from

group to group were identified by the peer evaluator who also analysed the data in the verbatim transcriptions. These factors could have introduced bias in the subsequent activity analysis and affected the selection of the items as well as the development of the item descriptors.

9.5 Recommendations

The envisaged implementation of the recommendations is outlined in the knowledge translation strategy in Appendix 29.

9.5.1 Recommendations for further research

Additional aspects of the psychometric properties of the RAMS need to be investigated. It is anticipated that further adjustments will be made to the instrument and the training manual following further validation and reliability studies. Exploration of the remaining psychometric properties during the field-testing, subsequent to completion of the current study, including the construct validity, convergent and divergent validity, internal consistency, sensitivity, clinical utility and intra- and inter-rater reliability, will result in further refinements of the instrument. The degree of discrimination achieved by the RAMS rating scale will be evaluated using Rasch analysis to confirm the grading and levels of difficulty. Increasing the number of response options may need to be considered should the current scale be found to be inadequately discriminative.

It may also be of value to explore the test-retest reliability of the instrument, as it is anticipated that occupational therapists providing reports for the defence and opposing counsel in medico-legal matters would need to utilise the instrument. Should the instrument prove to be applicable for diverse clinical settings, it would be of value to explore whether it could be used to demonstrate clinical change or improvement over sequential re-assessments (Lynn, 1986; Polit and Beck, 2006; Glover and Albers, 2007). Although minimal text is utilised in the RAMS, it could be relevant to develop versions of the RAMS in additional South African languages, as English and Sepedi are not spoken throughout the country.

In addition, further studies regarding the remainder of the bADLs and iADLs identified in Phase 1 need to be completed and the resulting domains and items added to the RAMS, as necessary. Once this process has been completed further

research regarding the application of the RAMS in other settings where individuals have similar challenges with bADLs and iADLs due to limited household amenities should follow.

The content validity results indicated that all domains and items appeared to contribute to the two constructs, namely manual handling, bADLs and iADLs in a rural context; however additional iADL tasks identified in the focus groups warrant further investigation, including slaughtering of domestic livestock for food and traditional requirements, washing dishes and cleaning the house. The first two of these additional iADLs involve significant lifting and carrying respectively, while the last two require lifting and carrying as well as heating of water on a fuelwood fire. The quantification of manual handling demands of other identified iADLs typical of a rural lifestyle could result in additional domains and items as well as additional items in the current domains in the RAMS.

Numerous studies have been conducted on physiological demands such as blood pressure, pulse rate, oxygen consumption and MET value of bADL and iADL tasks in Western well-resourced settings, however, there is a gap in the literature regarding the physiological demands of bADL and iADL tasks that have significant manual handling typical of rural and less-resourced contexts. The current study did not aim to investigate the physiological aspects of the identified rural bADL and iADL tasks and so the purpose was fulfilled. It would be of value for these aspects to be investigated in future studies incorporating the RAMS.

The effectiveness of compensation awarded to rural claimants should be investigated in further studies to identify common environmental barriers and their impact on performance of bADLs and iADLs. Such studies should include examination of the extent to which Persons with Disabilities have been given ~~to~~ access to Free Basic water and electricity in accordance with Government policy.

9.5.2 Recommendations for occupational therapy education

Further research is indicated to review bADL and iADL frameworks and assessment instruments taught in undergraduate occupational therapy programmes in South Africa. There is a need to lobby for decolonisation of undergraduate occupational therapy curricula to ensure that South African graduates are equipped to provide

contextually relevant intervention (Naidoo, Van Wyk & Joubert, 2016). The potential role of the Education Committee of OTASA should be considered as a way of taking the findings forward into undergraduate education programmes.

9.5.3 Recommendations for occupational therapy practice

There is an extensive body of South African and international literature regarding the provision of household amenities in rural areas. These studies have been completed from environmental, environmental health, civil engineering, socio-political, public health and human rights perspectives. Some recent occupational science studies highlighted an occupational justice perspective on limited household amenities in rural South African contexts. Unfortunately, there is very limited literature within occupational therapy about the impact of limited access to water and energy on occupational performance and occupational engagement in bADLs and iADLs.

The results of this current study point to the possibility that the type and form of bADL and iADL domains in a rural less-resourced context are largely dependent on the available household amenities, for example, in a Western, well-resourced context, most if not all households have a supply of piped municipal water. In addition, such households typically have built-in geysers for heating of water, and thus communities with these types of amenities have easy access to hot and cold water on tap in their kitchens and bathrooms. In contrast, in communities such as the ones where the study was carried out, most community members have to collect water from outside their homes, either from taps in their yards or from a water point located within their village or a nearby area.

The dissemination of the findings emanating from this current study is recommended in order to influence occupational therapy practice. These tasks have historically not been included in the occupational therapy frameworks and practice models which is arguably another manifestation of the pervasive bias towards Western and well-resourced contexts (Whalley Hammell, 2011). The inclusion of these newly identified iADLs in occupational therapy frameworks would contribute towards contextually relevant occupational therapy practice. To this effect it is recommended that collecting water and fuelwood be defined within the OTPF III framework as iADLs - they are both tasks that can be delegated to a third party and as such better meet the criteria for being viewed as iADLs as opposed to bADLs. Furthermore, the

significant time and manual handling demands implicit in water and fuel collection support the argument that they should be iADLs in their own right as opposed to being prerequisite requirements of other bADLs and iADLs.

Occupational therapy practice would also be influenced by contributing to the current process of ICF revision that the World Health Organization has embarked on. The 2001 version of the ICF acknowledges the need for further research into the rural context and its particular impact on the coding for environmental factors. Despite the limited geographical area in which the current study was conducted, there is copious literature that points to the global scale of limited access to water and energy. Furthermore the need for improved access to these essential resources, together with sanitation, is enshrined in the United Nations SDGs. The researcher recommends submission of a proposal for a code revision to the ICF online platform; the ICF does have a code for obtaining household necessities that includes water and fuel. The findings of this current study could therefore justify a proposal for collecting water and fuelwood to be allocated individual codes in order for these iADLs to be appropriately recognised. In addition, a proposal for changing the descriptor of the ICF environmental code that speaks to the impact of utilities policies to better encapsulate the rural context would be beneficial.

The evaluation of performance in bADLs and iADLs during the assessment process provides the occupational therapist with information regarding the methods, contextual barriers and challenges experienced by the claimant during the performance of these activities. To date, as no bADL or iADL assessment instrument takes the context of households in rural, less-resourced areas in South Africa into account, it is difficult for occupational therapists to evaluate performance accurately and legitimately. In Western well-resourced contexts, the cumulative load of the claimant's bADL and iADL responsibilities as well as the demands of their job are taken into account by the occupational therapist. As an example, it is sometimes advisable to make adjustments in the home setting in order to minimise the demands of bADLs and iADLs on the claimant, so that their endurance at work can be optimised. In rural settings where households have limited access to amenities, this becomes far more significant. Not taking the physical demands of these tasks into account can skew the FCE results. Furthermore, the burden of care of PWDs in a rural context takes on a different dimension when the demands of collecting

resources needed for survival are considered. The absence of a validated tool that will stand up to scrutiny in court may cause omissions in FCE reports regarding adaptations and compensation for bADLs and iADLs that require extensive manual handling. The study findings and the implementation of the resultant RAMS instrument potentially have significant implications for occupational therapy practice in the medico-legal and other fields of practice in South Africa.

9.5.4 Continual professional development in contextual assessment of basic and instrumental Activities of Daily Living

Generations of South African occupational therapists have been trained using curricula which are founded on dominant theoretical frameworks and models developed in English-speaking Western, well-resourced countries (Whalley Hammell, 2011; Guajardo, Kronenberg & Ramugondo, 2015). In terms of learning objectives relating to bADLs and iADLs, students and practitioners alike have struggled to apply this theoretical knowledge to local less-resourced and rural contexts, a dichotomy which has regularly contributed to a lack of clarity regarding the role of the occupational therapist in various populations, including medico-legal practice (Naidoo, Van Wyk & Joubert, 2017). Awareness regarding the impact of limited access to household amenities, including water and energy, on bADLs and iADLs can be raised through continuing professional development (CPD) workshops and courses. Similarly the findings of the current study can inform more inclusive South African undergraduate occupational therapy curricula and support the drive to address theoretical imperialism and coloniality (Whalley Hammell, 2011; Ramugondo, 2015).

Currently there is no other contextual bADL or iADL instrument available for use in medico-legal or other settings in South Africa. The RAMS could thus become an essential measuring instrument in linking manual handling demands with bADL and iADL task performance in rural less resourced settings. Workshops for training in the use of the RAMS by medico-legal occupational therapists could be provided. Workshops regarding the importance of contextual bADL and iADL assessment would increase awareness of and skill in assessing the manual handling demands of a rural lifestyle in South Africa. Such training would equip clinicians to ensure these factors are appropriately considered when making recommendations regarding rural claimants. Clinicians trained in the use of the RAMS could participate in further

studies regarding the psychometric properties of the newly developed instrument. This involvement could contribute to the collection of further data regarding bADLs and iADLs typically performed in rural settings while meeting practitioners' statutory CPD requirements. The findings of this further research could contribute significantly to raising the profile of occupational therapy in the South African medico-legal arena.

9.6 Reflections on the study

The development of an assessment instrument is a complex process and the RAMS is still in its infancy. A number of additional studies will be required in order to finalise the instrument development process and possible revisions will result in further improvements; the researcher looks forward to pursuing the research and implementing the recommendations made in this study. The researcher believes that the RAMS will contribute substantially to the medico-legal field of occupational therapy in South Africa and have an impact on improving quality of life of rural claimants.

While the PhD journey has been challenging on a personal and professional level, it has rekindled and reinforced the researcher's belief in occupation as the central tenet of occupational therapy. The opportunity for exposure to occupational science and the World Federation of Occupational Therapy's drive to align with global priorities such as SDGs has been inspiring. Through submergence in the data collection, analysis and interpretation processes, the researcher shifted from the social justice paradigm to embracing an occupational justice perspective. The generous giving of time and valuable inputs by the SMEs during the content validity study was positive and affirming for the researcher, particularly as the basis for the study and the rationale used for the development of the instrument were supported.

9.7 Concluding remarks

The study findings demonstrated differences in the types and forms of bADLs and iADLs that can be attributed to the type of household amenities available in rural less-resourced contexts. Many bADL and iADL tasks require water as a prerequisite for their completion, resulting in them being particularly physically demanding and time-consuming. Where there is limited access to water and electricity, community members are required to collect all water and fuelwood needed for survival and

hygiene purposes; this often results in them traversing extensive distances bearing heavy loads of water and wood over difficult terrain, usually more than once a day (Jagals, 2012).

The finding that collection of water and fuelwood constitute significant occupations in a rural less-resourced context is important for the practice of occupational therapy in South Africa and internationally. The description of the two newly identified iADL tasks highlights a gap in occupational therapy frameworks and bADL and iADL assessment tools. Further research into the factors affecting the type and form of bADLs and iADLs in less-resourced rural contexts to inform revision of practice frameworks such as the ICF and the OTPF III was recommended. The study findings highlighted the impact of resource scarcity in a rural context on performance of bADLs and iADLs, which justified the development of a valid cost-effective contextually relevant South African bADL and iADL assessment instrument. It is anticipated that the use of the RAMS in medico-legal practice will enable South African occupational therapists and those further afield to advocate for appropriate bADL and iADL accommodations for claimants who live in rural less-resourced contexts.

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R14/49 Mrs Jennifer Claire McAdam

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M150925

NAME: (Principal Investigator)	Mrs Jennifer Claire McAdam
DEPARTMENT:	Occupational Therapy Letaba Hospital and Sekororo Hospital, Tzaneen Limpopo Province
PROJECT TITLE:	Validation of an Instrument to Assess Activities of Daily Living with Lifting Requirements in a South African Context
DATE CONSIDERED:	02/10/2015
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Prof D. Casteleijn
APPROVED BY:	Professor P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	25/11/2015

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Secretary in Room 10004, 10th floor, Senate House, University.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**.

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF HEALTH

Enquiries: Latif Shamila

Ref:4/2/2

Mc Adam JC
Human Research Ethics Committee

Greetings,

RE: Validation of an instrument to assess activities of daily living with lifting requirements in a South African Context

The above matter refers.

1. Permission to conduct the above mentioned study is hereby granted.
2. Kindly be informed that:-
    - Research must be loaded on the NHRD site (http://nhrd.hst.org.za) by the researcher.
    - Further arrangement should be made with the targeted institutions, after consultation with the District Executive Manager.
    - In the course of your study there should be no action that disrupts the services.
    - After completion of the study, it is mandatory that the findings should be submitted to the Department to serve as a resource.
    - The researcher should be prepared to assist in the interpretation and implementation of the study recommendation where possible.
    - The above approval is valid for a 3 year period.
    - If the proposal has been amended, a new approval should be sought from the Department of Health.
    - Kindly note, that the Department can withdraw the approval at any time.

Your cooperation will be highly appreciated.

Head of Department

18/02/2016.
Date

18 College Street, Polokwane, 0700, Private Bag x9302, POLOLKWANE, 0700
Tel: (015) 293 6000, Fax: (015) 293 6211/20 Website: http/www.limpopo.gov.za

Electronic survey

onfidential

ADL Assessment Tools used as part of medico-legal and functional capacity evaluations by South African Occupational Therapists

Good day,

My name is Jennie McAdam and I am a PhD student at the University of the Witwatersrand, Department of Occupational Therapy. I would like to provide you with some information about a research project that I am undertaking and to invite you to participate.

This study will be conducted in Limpopo, South Africa according to the ethical guidelines and principles of the University of the Witwatersrand and Limpopo Province Department of Health Ethics Committees. The outcome of the research will be the development of a valid 'Activities of Daily Living' assessment instrument that takes into account the less-resourced South African context, for use by occupational therapists working in the medico-legal and insurance industry fields.

The first phase of the study has two objectives. The first objective is a survey questionnaire to occupational therapists practicing in the medico-legal and insurance industry fields, to identify commonly used Activities of Daily Living assessment instruments. The second involves discussion groups with members of less-resourced communities, which will enable the collection of qualitative data to explore their perceptions of basic and instrumental Activities of Daily Living in less-resourced areas.

The second phase of the study has three objectives, namely the development of a contextual Activities of Daily Living assessment instrument, followed by its testing and validation. The study aims to develop this instrument to support occupational therapists in making accurate and contextually relevant recommendations in their medico-legal and/or insurance industry reports. It is anticipated the study will be completed by December 2017.

I would like to invite you to participate in the phase 1 survey as a medico-legal and/or insurance industry practitioner. Your participation will require you to complete the attached survey questionnaire and to submit your responses electronically. This will require approximately 15-20 minutes of your time. For the purposes of this survey, please use the following definition of Activities of Daily Living (ADL): 'an umbrella term used in rehabilitation, that relates to self-care, comprising those activities that people undertake routinely in their every-day lives. These activities can be sub-divided into personal care or basic ADLs, and domestic and community, or instrumental ADLs' (Occupational Therapy Practise Framework, American Occupational Therapy Association, 2008).

As a participant in the research you can expect that all the information you provide will be treated in confidence. To this end, the following procedures will be adhered to in this project:

(i) No one outside the research team comprising myself and two supervisors will have access to the information you provide.

(ii) Your name and other identifiable information will not be published in the report.

(iii) Completed survey questionnaires will be stored using codes, so no one outside the research team will be able to link the information provided to the names of the respondents.

There will be no remuneration for participation in the study.

Please feel free to ask any questions about any part of this project that you do not fully understand. It is important that you are satisfied that you clearly understand what this research entails and how you would be involved. Also, your participation is entirely voluntary and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part. Results of the study will be made available on request.

If you would like to participate please complete the attached electronic questionnaire. Your completion of the electronic questionnaire will be regarded as your having given informed consent to participate in this study.

If you have any queries, more information may be obtained from me at 083 229 4238 or crjmcadam@mweb.co.za . If you have any ethical concerns please contact the chairperson of the Wits Human Research Ethics Committee, Prof P Cleaton-Jones on 011 7171234 or at zanele.ndlovu@wits.ac.za

Thank you in advance for your participation.

Jennie McAdam

1	Do you do an assessment of activities of daily living (ADL) as part of your medico-legal and/or functional capacity evaluations?	◯ Yes ◯ No
8	Please discuss your opinion regarding the use of an ADL assessment as part of a medico-legal and/or functional capacity OT evaluation?	_____
2	Do you used a standardised ADL assessment instrument as part of your medico-legal and/or functional capacity evaluations?	◯ Yes ◯ No
3	Please indicate the method you use to assess performance in ADL as part of a medico-legal and/or functional capacity evaluation. You may select more than one option. (Please note definitions for the purposes of this question: 'Structured interview' refers to asking the client a set list of questions about their ADLs; 'Simulated ADL tasks' refers to observing the client carrying out an ADL task in the clinic that is similar to what they would do at their home.)	☐ structured interview ☐ questionnaire completed by patient ☐ simulated ADL task/s ☐ other
4	Please provide details regarding the method you use to assess performance in ADLs as part of a medico-legal and/or functional capacity OT evaluation.	_____
5	Please indicate which standardised ADL instrument/s you use as part of medico-legal and/or functional capacity evaluations. You may select more than one option.	☐ Functional Independence Measure (FIM) ☐ Assessment of Motor and Process Skills (AMPS) ☐ Canadian Occupational Performance Measure (COPM) ☐ Assessment of Living Skills and Resources (ALSAR) ☐ Australian Therapy Outcome Measures (AusTOMs) ☐ Personal Care Participation and Resource Tool (PC-PART) ☐ Other
6	Please list the ADL assessment instrument/s that you use, in order of preference i.e. Instrument 1 is the most preferred or used instrument, Instrument 2 is the second most preferred or used instrument, etc.	_____
7	Please provide three reasons for choosing to use the ADL assessment instrument/s selected in the previous question.	_____

9	Please list (in order of appropriateness) the ADL assessment instruments or methods for medico-legal and/or functional capacity OT evaluations that are in your opinion most appropriate in the South African context?	_____

Appendix 3

Summary of feedback on pilot questionnaire

Question number	*Reviewer number*	*Feedback*
1. Are the questions clear, in terms of grammar etc? Please provide details regarding your comments.	1	They are well structured and clearly put. I was a little confused with the questionnaire as it felt that the question was very long and packed with a lot of information. I needed to read it a few times to make sure that I had understood it clearly.
	2	• For question 7, perhaps add in at the end the words "selected above" • Question 8 is not so clear. You talk about inclusion but what about those who exclude an assessment? Perhaps take the word inclusion out and just word it: "Please discuss your opinion regarding the use of an ADL assessment as part of a medico-legal and/or functional capacity OT evaluation?. Also, you talk about an opinion. Is that on purpose? Are you looking for a very open ended response? If so the word is great. If you want to know specifically why they use/not use an ADL assessment then that is what I would ask. Eg:" Why have you chosen to include/not include an ADL assessment as part of a medico-legal and/or functional capacity OT evaluation?" • Question 9 asks the participant to list and order that list. In my experience with research if you don't create the structure for a prioritized list they may not answer the question correctly. Perhaps put in numbered lines. Same for question 6. Question 3 may have some jargon that requires explanation in brackets so we all answering correctly (eg. Structured interview and simulated ADL tasks) – what are those. My idea of that may differ from others.
	3	No problem found
	4	Clear. Should one add in question 9 ...'to your experience or opinion..'
	5	
Action taken	• **For question 7, added the words "selected above"** • **Question 8 – changed wording to: "Please discuss your opinion regarding the use of an ADL assessment as part of a medico-legal and/or functional capacity OT evaluation?**	

[1]

[1] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 3 in the complete appendices on CD.

Appendix 4

Discussion group information document and consent form

COMMUNITY CARE-WORKER DISCUSSION GROUP MEMBER

Validation of an instrument to assess activities of daily living with lifting requirements in a South African context.

Good day

I, Jennifer Claire McAdam, am doing research on how activities of daily living are usually done in South African communities. Research is just the process to learn the answer to a question, and I would like to invite you to take part in this research study.

In this study I want to learn how daily activities that involve lifting are done in Nkowankowa and Sekororo, as well as how much weight members of the Nkowankowa and Sekororo communities can lift. This research study is being done to get a better understanding of how the facilities available at a person's home, as well as the area in which they live, can affect how they do daily tasks, such as washing their bodies, going to the toilet, washing their clothes, cleaning their homes, and going shopping. These tasks can be more difficult to do if a home does not have facilities such as electricity and water supply, particularly for people who have had severe injury or illness.

I am inviting you to take part in a discussion group about how you do these activities in your environment. I will meet you, together with the other group members, on a day that is convenient for you, and will require approximately four hours of your time to complete the research discussion. You will be asked to discuss how you and other members of your community do your daily activities. I am also asking permission to video the discussion group.

Because you will be sharing information with the other members of the discussion group, absolute confidentiality cannot be guaranteed. The video data will only be viewed by me the researcher and no one else. The videos will be stored for six years in a secure locked location as required by the regulations of the Health Professions Council of South Africa, and then destroyed.

There are no foreseen risks of being involved in the study. You will not benefit from your participation, but it is expected that future occupational therapy patients will benefit from the results of the study.

Your participation in this study is **voluntary**, and your refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled. You may discontinue your participation in the research study at any time without consequence. Your participation in the research study will not result in any costs to you.

Your participation in the study may be stopped if the researcher's access to the area that you live in becomes limited due to safety issues. The results will be available on request.

For further information, please contact the researcher as follows:

Jennifer McAdam
Tel: 083 229 4238
Email: crjmcadam@mweb.co.za

For reporting of any complaints or problems, please contact the Research Ethics Committee administrator and chair as follows:

Prof P Cleaton-Jones

Address: Medical School, Parktown, Phillip Tobias Building, 2nd Floor, Cnr York Road and Princess of Wales Terrace

Office hours: Mon-Fri 08h00-17h00

Tel: 011-717-1234/1252/ 2700 or Room SH1005, 10th Floor Senate House

Emails: zanele.ndlovu@wits.ac.za or lebo.moeng@wits.ac.za

Sincerely

Jennifer McAdam
Occupational Therapist

CONSENT FORM TO PARTICIPATE IN THE DISCUSSION GROUP

COMMUNITY CARE-WORKER DISCUSSION GROUP MEMBER

I, …… hereby give my consent to be videoed during the discussion group about activities of daily living in the research study '**Validation of an instrument to assess activities of daily living with lifting requirements in a South African context'** being conducted by Jennifer Claire McAdam.

I understand that I can withdraw from the study at any time, and that there is no compensation for participating in the study.

I understand that I can request information regarding the discussion group and the results of the study.

Signed at ..... on ..... .

Research Participant: .....

Signed at ..... on .....

Witness .....

Appendix 5

Discussion Group Protocol

Video recording The video camera will be turned on.	
Introduction and welcome: Good morning to you all. Thankyou for being prepared to take part in this research – it is much appreciated! Can we please start by doing some introductions? I realise that you all know each other, but I don't know any of you.....let me start with me: My name is Jennie McAdam and I am an occupational therapist. I am doing research about the daily activities usually done by people living in this part of Limpopo Province, through the University of Witwatersrand. Would it be fine for us to go around the circle, and for you each to tell me your names and how long you have been working as a community care-worker? Thankyou. I would appreciate it if we could also all wear a sticker with our names written on it, to help me to remember each of your names.....thanks.	***Prompt questions:*** • Is there anything else that you would like to know about me? • Would you like me to explain more about the research that I am doing? • Please could you each write your name onto a sticker?
Consent forms: Have any of you been involved in research before? If so, you will know about the process of giving consent to participate in research.... The consent form explains the topic of the research project, as well as what will be expected of you during this discussion	

group. Please remember that because you all already knew each other before this research discussion group, it will not be possible to keep the input that you give in the discussion today, confidential from each other. However, each of us as members of this discussion group today is not going to talk about the information given in the group, to other people in the community. The consent form also asks your permission for this group discussion to be video-recorded. The person who is here with us today to video the discussion group will not be taking part in our discussion, but will make sure that it is all videoed. They have also signed consent to not discuss the information from our group with anyone else. Also, I will make sure that all of the information that I get from you all today, will be stored in a safe place. Nobody except me and my research supervisors will be able to see the information, and your identities will remain confidential. Please take some time to read the form – you are welcome to ask me any questions about it, if something is not clear..... It is important that you all feel comfortable about participating in this research, and the research consent forms. Your participation in the research is completely voluntary.	• Would anyone like me to explain this in more detail? • Would anyone like to ask a question about this? • Would anyone like me to explain this again? • Would anyone like to ask a question about this? • Is there anything else about the consent form that you would like me to explain?

2

[2] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 5 in the complete appendices on CD.

Appendix 6

Discussion Group Member Biographical Information

1. General Information

Name:	**Date of birth:**	**Day**	**Month**	**Year**
Address :				
Date of discussion group:				

2. Work information:

Please indicate the date when you started to work as a Community Care Worker?

Date:	**Day**	**Month**	**Year**

3. Education:

Please indicate what is your highest level of education? ……..

4. Household amenities:

Select the type of housing and the amenities (tick all that are relevant) available at your home:

	Amenity categories	**Additional Comments**	
3.1	Brick house		
3.2	Traditional house		
3.3	Shack		
3.4	Has electricity		
3.5	No Electricity supply		
3.6	Water supply inside house		
3.7	Water supply in yard		
3.8	Water supply in same street		
3.9	Water supply in same village / suburb		
3.10	Toilet inside house		
3.11	Toilet in yard		
3.12	Flushing toilet		
3.13	Traditional toilet		

Signed at …… on ……

Discussion group participant: ……

Appendix 7

Example of transcription of discussion group

DISCUSSION GROUP : COMMUNITY CARE WORKERS 12 – 17 APRIL 2016 DAY 1				
English		**Sepedi**	**Translated Sepedi**	**Code number:**
	More members arrive and are welcomed.	**Thobela...** **Setulo sese.**	**Hello...** **Here's a chair for you.**	
JENNIE	Freda, I don't know if you want to quickly do a summary of what I have been saying, especially for the two that have come now. I'm Jenny. Hi Mary. Welcome. Did you have o come from far? Did you have to come from Tickyline? How far is that from here?			
FREDA		**Le di kwile mose?**	**You heard it all, right?**	
JENNIE	You know, all the years that I was staying here in Tzaneen driving along the Lydenburg road and seeing the signs for Tickyline and I always think….where is this Tickyline? so I've never actually been there but I am familiar with the name. What is Tickyline? what does it mean??			
ALL	Where things are bad things and good things are happening ……			
JENNIE	Now you're teaching me something. I've always wondered.			

3

[3] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 7 in the complete appendices on CD.

Appendix 8

Phase 1 Data – Peer Data-Checking for Discussion Groups

		Researcher				*Research assistant*			
		Discussion group number:				*Discussion group number:*			
Number	*ADL Task*	*1*	*2*	*3*	*4*	*1*	*2*	*3*	*4*
1	**Washing body**	√	√	√	√	√	√	√	√
2	**Dressing and Undressing**	√	√	√	√	√	√	√	√
3	**Using toilet**	√	√	√	√	√	√	√	√
4	**Hair-care**	√	√	√	√	√	√	√	√
5	**Shaving of face (men)**	√	√	√		√	√	√	√
6	**Brushing teeth**	√	√	√	√	√	√	√	√
7	**Eating**	√	√	√	√	√	√	√	√
8	**Collecting water**	√	√	√	√	√	√	√	√
9	**Collecting wood**	√	√	√	√	√	√	√	√
10	**Laundry / washing clothes**	√	√	√	√	√	√	√	√
11	**Cooking**	√	√	√	√	√	√	√	√
12	**Slaughtering of domestic animals**			√	√		√	√	√
13	**Cleaning the house**	√	√	√	√	√	√	√	√
14	**Cleaning the yard**	√	√	√	√	√	√	√	√
15	**Gardening**	√	√	√	√	√	√	√	√
16	**Care of domestic animals / livestock**	√	√	√	√	√	√	√	√
17	**Rubbish disposal**	√	√	√	√	√		√	√
18	**Shopping**	√	√	√	√	√	√	√	√
19	**Watching television**				√	√	√		√
20	**Care of children**			√		√	√	√	
21	**Monthly society / 'stokvel' meeting**			√			√	√	√
22	**Religious activity**				√		√	√	√
23	**Accessing pension**	√	√			√	√		√
24	**Working in communal garden**	√	√						
25	**Cutting nails**	√	√			√	√	√	√
26	**Play**						√	√	

Appendix 9

Guidelines for choosing community members for the home visits

1. Village 1

- Please choose 4 community members that live in Village 1, who live in less-resourced households;
- Make two appointments per day – so we spend two days in Village 1, doing two home visits per day;
- The two community members for each day must be in the categories in the table below, for example:
    - Day One:
        - One female who is 20 years old and one male who is 55 years old, **OR**
        - One female who is 42 years old and one female you is 30 years old
    - Day Two:
        - One male who is 28 years old and one male who is 45 years old, **OR**
        - One female who is 21 years old and one female you is 30 years old
- There is space in the table below to write their names, if you like!

	18 – 39 years		**18 – 39 years**
Male 1		**Female 1**	
Male 2		**Female 2**	
	40 - 60 years		**40 - 60 years**
Male 1		**Female 1**	
Male 2		**Female 2**	

2. ***Village 2***

- Please choose 4 community members that live in Village 2, who live in less-resourced households;
- Make two appointments per day – so we spend two days in Village 2, doing two home visits per day;
- The two community members for each day must be in the categories in the table below, for example:
    - Day One:
        - One female who is 40 years old and one male who is 25 years old, **OR**
        - One male who is 47 years old and one female you is 39 years old
    - Day Two:
        - One male who is 22 years old and one male who is 60 years old, **OR**
        - One male who is 19 years old and one female you is 49 years old

4

[4] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 7 in the complete appendices on CD.

Appendix 10

Home visit information sheet and consent form

INFORMATION DOCUMENT

Home Visit Client

Validation of an instrument to assess activities of daily living with lifting requirements in a South African context.

Good day

I, Jennifer Claire McAdam, am doing research on the how activities of daily living are usually done in your community. Research is just the process to learn the answer to a question, and I would like to invite you to take part in this research project.

In this project I want to learn how you do daily activities that involve lifting, as well as how much weight you can lift. This project is being done to get a better understanding of how what you have available in your home, as well as the area in which you live, can affect how you do everyday tasks, such as washing your body, going to the toilet, washing your clothes, cleaning your house, and going shopping. These tasks can be more difficult to do if you don't have electricity and water and if you have had an injury or an illness.

The project involves me asking questions about how you do these activities in your environment. I will visit you once at your home on a day that is convenient for you, and will need approximately three hours of your time. You will also be asked to perform some of your daily activities, as well as do a test to see how much weight you can lift. The distance that you move and the amount of energy you use to perform some of your activities of daily living will be measured. As part of this measure I would like to assess your blood pressure and pulse rate.

I am also asking permission to video the interview and the activities you carry out. At no time will you be asked to undress while carrying out the activities.

There are no anticipated risks of being involved in the study. You will not be expected to lift things or perform activities that you do not normally do. You will not benefit from taking part in the project, but future occupational therapy patients will benefit from the results of the project.

Your participation in this project is **voluntary**, and you will not lose anything if you choose to not participate. You are welcome to stop participating in the research project at any time without any consequence. Your participation in the research project will not cost you anything.

Every effort will be made to keep your personal information confidential. The Research Ethics Committee of the University of Witwatersrand may want to look at the research records. The video will only be viewed by me and will be stored for six years in a secure locked location as required by the regulations of the Health Professions Council of South Africa, and then destroyed.

Your participation in the project may be stopped if my access to the area that you live in becomes limited due to safety issues.

You are welcome to ask for more information about the research project at any time and feedback will be available if you ask for it. If the results of the research are published, your community may be named.

For further information, please contact the researcher as follows:

Jennifer McAdam
Tel: 083 229 4238
Email: crjmcadam@mweb.co.za

For reporting of any complaints or problems, please contact the Research Ethics Committee administrator and chair as follows:

Prof P Cleaton-Jones

Address: Medical School, Parktown, Phillip Tobias Building, 2nd Floor, Cnr York Road and Princess of Wales Terrace

Office hours: Mon-Fri 08h00-17h00

Tel: 011-717-1234/1252/ 2700 or Room SH1005, 10th Floor Senate House

Emails: zanele.ndlovu@wits.ac.za or lebo.moeng@wits.ac.za

Sincerely

Jennifer McAdam
Occupational Therapist

CONSENT FORM TO VIDEO INTERVIEW, LIFTING AND ACTIVITIES OF DAILY LIVING ASSESSMENT

HOME VISIT CLIENT

I, …… hereby give my consent to be videoed during the interview and assessment of lifting and activities of daily living in the research project '**Validation of an instrument to assess activities of daily living with lifting requirements in a South African context'** being conducted by Jennifer Claire McAdam.

I understand that I can withdraw from the project at any time, and that there is no compensation for participating in the project.

I understand that I can ask for information about the procedures done during the home visit and the results of the project.

Signed at ..... on ..... .

Research Participant: .....

Signed at ..... on .....

Witness .....

Appendix 11

Home visit biographical Information Sheet

1. General Information

Name:	**Date of birth:**	**Day**	**Month**	**Year**
Address :	**Evaluator:**			
	Research assistant:			
Date of injury:				
Diagnosis (if any):				
Date of home visit:				

2. Employment Status:

Select which category of employment the participant falls into:

	Category of Employment:	**Additional Comments:**	
2.1	Employed full-time		
2.2	Employed part-time		
2.3	Employed seasonally		
2.4	Unemployed		
2.5	Other		

5. Household amenities:

Select the type of housing and the amenities (tick all that are relevant) available at the participant's home:

	Amenity categories	**Additional Comments**	
3.1	Brick house		
3.2	Traditional house		
3.3	Shack		
3.4	Has electricity		
3.5	No electricity supply		
3.6	Water supply inside house		
3.7	Water supply in yard		
3.8	Water supply in same street		
3.9	Water supply in same village / suburb		
3.10	Toilet inside house		
3.11	Toilet in yard		
3.12	Flushing toilet		
3.13	Traditional toilet / pit latrine		

Appendix 12

Home Visit Data Checklist

Qu. Nr.	Question:			
	Respondent	***V1***		***1-2***
2	**Research assistant**	***V2***		***3-4***
3	**Date of birth (dd/mm/yy)**	**V3**		**5-10**
4	**Date of home visit (dd/mm/yy)**	**V4**		**11-16**
5	**Male / Female**	***V5***		***17-18***
6	**Area**	**V6**		**19-22**
7	**Employment status:** **1 Employed full-time** **2 Employed part-time** **3 Employed seasonally** **4 Unemployed** **5 Social grant (type)** **6 Other**	**V7**		**23-29**

5

[5] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 12 in the complete appendices on the CD.

Weights of ADL Equipment and Materials

1. Collecting Water							
1.1.		1 x empty 25 litre plastic water container	= 1.2 kg	1.2.		Empty 90 litre plastic storage drum	= 3.68 kg
1.3.		Empty wheelbarrow	=	1.4		1 x full 25 litre plastic water container	= 25.0 kg
2. Collecting Wood							
2.1.		1 x panga	= 2.85 kg	2.2.		1 x scarf	= 120 g

Appendix 14

Activity Analysis

Activity Analysis – Key

Items in yellow	Lifting
Items in blue	Floor to knuckle lifting lifts
Items in purple	Knuckle to shoulder lifts
Items in red	Shoulder to overhead lifts
Items in red	Carrying
Items in magenta	Pushing
Items in green	Sections of tasks inserted into related tasks

Activity Analysis: Collecting Water

Method 1: Collecting own water from tap in village or street

Steps:	Analysis:	Manual Handling Code
9. Gather wheelbarrow and empty 25 litre water containers	Lift 1 empty water container/s into wheelbarrow (floor to knuckle)	1
10. Walk to water source	Lift handles of wheelbarrow loaded with empty containers (floor to knuckle) Push wheelbarrow with empty water container/s	2 A
11. Place water containers in queue	Lift empty water container from wheelbarrow to floor (floor to knuckle)	1
12. Fill water containers	Lift empty water container into place under tap or pipe (floor to knuckle)	1
13. Lift water containers onto wheelbarrow	Lift 1 full 25 litre water container onto wheelbarrow (floor to knuckle)	3
14. Take full water containers home	Lift handles of wheelbarrow loaded with full water containers (floor to knuckle) Push wheelbarrow with 1 full water containers Push wheelbarrow with 2 full water containers Push wheelbarrow with 3 full water containers Push wheelbarrow with 4 full water containers	4 B C D E
15. Empty water into storage drum	Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder) Tip water into drum	5 5

[6]

Appendix 15

Manual handling steps in the activity analysis sequence

Manual Handling Step Description	Manual Handling Code
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift handles of wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift empty water container from wheelbarrow to floor (floor to knuckle)	1
Lift empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1 filled 25 litre water container onto wheelbarrow (floor to knuckle)	3
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
Lift empty water container (floor to knuckle)	1
Lift empty water container (floor to knuckle)	1
Lift empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1filled 25 litre water container (floor to knuckle)	3
Lift 2 filled 25 litre water containers (floor to knuckle)	6
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle, knuckle to shoulder and shoulder to overhead)	5
Tip water into drum (floor to knuckle, knuckle to shoulder and shoulder to overhead)	5
Lift empty water container (floor to knuckle)	1
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift empty water container from wheelbarrow to river bank (floor to knuckle)	1
Lift empty small plastic bucket (floor to knuckle)	7
Scoop water into 25-litre water container using small bucket (floor to knuckle)	8
Lift 1 filled 25 litre water container onto wheelbarrow (floor to knuckle)	3
Lift empty small plastic bucket (floor to knuckle)	7
Scoop water into 25-litre water container using small bucket (floor to knuckle)	8
Lift 1 filled 25 litre water container onto wheelbarrow (floor to knuckle)	3
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4
Lift full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
Tip water into drum	5

[7]

[6] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 13 in the complete appendices on the CD.

Appendix 16

List of manual handling steps in numerical order according to codes

Manual Handling Step Description	Manual Handling Code
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift 1 empty water container from wheelbarrow to floor (floor to knuckle)	1
Lift 1 empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1 empty water container (floor to knuckle)	1
Lift 1 empty water container (floor to knuckle)	1
Lift 1 empty water containers into place under tap or pipe (floor to knuckle)	1
Lift 1 empty water container (floor to knuckle)	1
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift 1 empty water container from wheelbarrow to river bank (floor to knuckle)	1
Lift empty water container (floor to knuckle)	1
Lift empty water container (floor to knuckle)	1
Lift wheelbarrow handles (floor to knuckle)	2
Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)	2
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lower 1 full 25 litre water container onto the ground (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container Lift 1 full 25 litre water container	3 3
Lift 1 full 25 litre water container	3
Lift 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container (floor to knuckle) Lower 1 full 25 litre water container (floor to knuckle) Lift 1 full 25 litre water container (floor to knuckle) Lower 1 full 25-litre water container onto the ground (floor to knuckle)	3 3 3 3
Lower 1 full 25 litre water container (floor to knuckle)	3
Lift 1 full 25 litre water container onto wheelbarrow (floor to knuckle)	3
Lift 1 full 25 litre water container onto wheelbarrow (floor to knuckle)	3
Lift 1full 25 litre water container (floor to knuckle)	3

[8]

[7] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 14 in the complete appendices on the CD.

[8] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 15 in the complete appendices on the CD.

Appendix 17

List of manual handling steps with duplicates eliminated

Manual Handling Step Description	Manual Handling Code
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
~~Lift 1 empty water container from wheelbarrow to floor (floor to knuckle)~~	~~1~~
~~Lift 1 empty water containers into place under tap or pipe (floor to knuckle)~~	~~1~~
~~Lift 1 empty water container (floor to knuckle)~~	~~1~~
~~Lift 1 empty water container (floor to knuckle)~~	~~1~~
~~Lift 1 empty water containers into place under tap or pipe (floor to knuckle)~~	~~1~~
~~Lift 1 empty water container (floor to knuckle)~~	~~1~~
~~Lift 1 empty water container into wheelbarrow (floor to knuckle)~~	~~1~~
~~Lift 1 empty water container from wheelbarrow to river bank (floor to knuckle)~~	~~1~~
~~Lift empty water container (floor to knuckle)~~	~~1~~
~~Lift empty water container (floor to knuckle)~~	~~1~~
Lift wheelbarrow handles (floor to knuckle)	2
~~Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)~~	~~2~~
~~Lift wheelbarrow handles wheelbarrow loaded with empty containers (floor to knuckle)~~	~~2~~
Lift 1 full 25 litre water container (floor to knuckle)	3
~~Lift 1 full 25 litre water container (floor to knuckle)~~	~~3~~
~~Lift 1 full 25 litre water container (floor to knuckle)~~	~~3~~
~~Lower 1 full 25 litre water container onto the ground (floor to knuckle)~~	~~3~~
~~Lift 1 full 25 litre water container (floor to knuckle)~~	~~3~~
~~Lift 1 full 25 litre water container (floor to knuckle)~~	~~3~~
~~Lift 1 full 25 litre water container~~ ~~Lift 1 full 25 litre water container~~	~~3~~ ~~3~~
~~Lift 1 full 25 litre water container~~	~~3~~

9

[9] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 16 in the complete appendices on the CD.

Appendix 18

Preliminary list of manual handling items

Manual Handling Step Description	Manual Handling Code
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1
Lift wheelbarrow handles (floor to knuckle)	2
Lift 1 25 litre water container into wheelbarrow (floor to knuckle)	3
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5
Lift 2 full 25-litre water containers (floor to knuckle)	6
Lift empty small plastic bucket (floor to knuckle)	7
Scoop dirty water out of plastic or zinc bath with small bucket (floor to knuckle)	8
Lift panga (floor to knuckle)	9
Lift and swing panga (floor to knuckle, knuckle to shoulder and shoulder to overhead)	10
Lift bound wood from floor to top of head (floor to knuckle, knuckle to shoulder and shoulder to overhead)	11
Lift bound wood from floor onto wheelbarrow (floor to knuckle)	12
Lift handles of wheelbarrow loaded with wood (floor to knuckle)	13
Lift wood from Bakkie (floor to knuckle and knuckle to shoulder)	14
Lift items for doing washing i.e. washing powder, softener (floor to knuckle)	15
Lift large plastic or zinc bath (floor to knuckle)	16
Lift empty large bucket (floor to knuckle)	17
Lift basket of dirty washing (floor to knuckle)	18
Place dirty laundry into the first plastic or zinc bath	19
Lift container of softener (floor to knuckle)	20
Lift large bucket full of wet clean laundry (floor to knuckle).	21
Lift laundry items from bucket one-at-a-time and peg laundry items to washing line or fence to dry. (floor to knuckle and knuckle to shoulder).	22
Lift full plastic bucket of dirty water (floor to knuckle)	23
Lift handles of wheelbarrow loaded with items for doing laundry (floor to knuckle)	24
Lift empty laundry basket onto wheelbarrow (floor to knuckle)	25
Lift empty basin / 'wasbak'/'skottel' (floor to knuckle)	26

10

[10] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 17 in the complete appendices on the CD.

Appendix 19

Elimination of non-rural and non-functional manual handling steps

Manual Handling Step Description	Manual Handling Code	Reason for elimination
Lift 1 empty water container into wheelbarrow (floor to knuckle)	1	
Lift wheelbarrow handles (floor to knuckle)	2	Lifting only of wheelbarrow handles is not a functional stand-alone step. Deferred to Push code A.
Lift 1 25 litre water container onto wheelbarrow (floor to knuckle)	3	
Lift handles of wheelbarrow loaded with full water containers (floor to knuckle)	4	Lifting only of wheelbarrow handles is not a functional stand-alone step. Deferred to Push code B.
Lift 1 full 25 litre container to rest on lip of drum (floor to knuckle and knuckle to shoulder)	5	
Lift 2 full 25-litre water containers (floor to knuckle)	6	Lifting 2 full water-containers is not a functional stand-alone step. Deferred to Carry code iii.
Lift empty small plastic bucket (floor to knuckle)	7	Empty equipment weighing < 500g.
Scoop water with small bucket (floor to knuckle)	8	
Lift panga (floor to knuckle)	9	Lifting a panga is not a functional stand-alone step. Deferred to Carry code iv.
Lift and swing panga (floor to knuckle, knuckle to shoulder and shoulder to overhead)	10	
Lift bound wood from floor to top of head (floor to knuckle, knuckle to shoulder and shoulder to overhead)	11	Lifting wood onto the head is not a functional stand-alone step. Deferred to Carry code v.
Lift bound wood from floor onto wheelbarrow (floor to knuckle)	12	
Lift handles of wheelbarrow loaded with wood (floor to knuckle)	13	Lifting only of wheelbarrow handles is not a functional stand-alone step. Deferred to Push code F.
Lift wood from Bakkie (floor to knuckle and knuckle to shoulder)	14	
Lift items for doing washing i.e. washing powder, softener (floor to knuckle)	15	Not unique to rural, less-resourced context.
Lift large plastic or zinc bath (floor to knuckle)	16	

[11]

[11] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 18 in the complete appendices on the CD.

Photograph Version of Draft RAMS Instrument



1. Can you lift an empty 25 litre water container onto a wheelbarrow?

[12]

[12] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 21 in the complete appendices on the CD.

Picture version of Draft RAMS Instrument



1. Can you lift an empty 25 litre water container onto a wheelbarrow?

13

[13] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 21 in the complete appendices on the CD.

Appendix 22

Invitation to Subject Matter Experts

Dear

I would like to invite you to assist me by participating in the process of evaluating the Contextual ADL Assessment Instrument that I have developed as part of my PhD research project. Should you agree to participate in this process, I would need you to attend a session at the Wits OT Department. The session would include a presentation on the following:

- background and findings of my study
- the method used to develop the Contextual ADL Instrument
- a process to determine the content validity of the Contextual ADL Assessment Instrument.

The presentation will then be followed by a slot for conducting the content validity evaluation exercise. It is anticipated that the entire session would last approximately four hours, and there may be a need for follow-up via email afterwards. The proposed date of the session is Monday 2 October, from 8-12 am. I realise that you are very busy, so should you be willing to assist me with this process, I would like to enquire whether this proposed date would be suitable for you?

If this date is not possible for you, would you be so kind as to let me know which dates and times would be possible for you, preferably between the 26 September and the 6 October...alternatively, if it's not possible for you to attend the session on the 2/10, I would be prepared to meet with you separately, when it's convenient for you....

Looking forward to your response as soon as possible..

Kind regards

Jennie

Appendix 23

CVI Expert Demographic Information Form

Dear

Thank you for being willing to participate in the process of evaluating the content validity of the instrument that I have developed as part of my PhD – your time and expertise are highly appreciated! Please could you complete the following questionnaire to enable me to establish the biographical and demographic characteristics of the panel of experts involved in this process:

Question Number:	Question:	Response:
1	Name:	
2	Year qualified as an OT:	
3	University where OT qualification obtained:	
4	Additional / Post-graduate OT-related qualifications and year/s obtained:	
5	Province where you reside and work as an OT:	
6	Field of OT practice i.e. community / public health OR medico-legal / FCEs:	
7	Number of years of practice in the OT field identified in question 6:	
8	Would you like to receive the results of the research study?	

Please forward your completed questionnaire to Jennie McAdam at crjmcadam@mweb.co.za.

Sincerely

Jennie

Appendix 24

Content Validity Record Form

A. Please evaluate the Content Validity i.e. the extent to which the instrument items measure the domain of 'Manual Handling Tasks in a Rural, Less-Resourced Context', by rating the relevance and clarity of each of the instrument items using the following scales:

i. Relevance

1	**Not relevant**
2	**Somewhat relevant**
3	**Quite relevant**
4	**Very relevant**

ii. Clarity

5	**Not clear**
6	**Item needs some revision**
7	**Clear but needs minor revision**
8	**Very clear**

	Instrument Item:	***Rating Score:***	***Additional Comments:***
2.	Can you lift an empty 25 litre water container onto a wheelbarrow?	i.	
		ii.	
3.	Can you carry a panga or axe?	i.	
		ii.	

		i.	
4.	Can you stack wood onto a woodpile?	i.	
		ii.	
5.	Can you scoop water with a small bucket?	i.	
		ii.	

Rural ADL Manual Handling Sort

User Booklet

Jennie McAdam, 2018

1. Background to the Rural ADL Manual Handling Sort

The Rural ADL Manual Handling Sort (RAMS) is a measure for South African occupational therapists in medico-legal practice. It is intended to be used by occupational therapists that may need a valid measure of the performance of ADL tasks that have significant manual handling demands in adult patients that reside in rural less-resourced contexts. It was developed by Jennie McAdam as part of a PhD study which included extensive investigation of ADL tasks typically performed in a rural setting in Limpopo Province. The focus of the Rural ADL Manual Handling Sort is the manual handling of household objects during the performance of ADLs in real world rural settings.

2. Target Audience

The Rural ADL Manual Handling Sort was developed for occupational therapists practicing in the medico-legal field. Occupational therapists are eligible to receive training and to implement the Rural ADL Manual Handling Sort after the training.

Further research to test further aspects of the psychometric properties and the relevance of the Rural ADL Manual Handling Sort in other fields of practice is anticipated. The Rural ADL Manual Handling Sort has not been used in other disciplines like physiotherapy or psychology and is not developed for other healthcare professionals.

3. Development of the Rural Manual Handling Sort

To devise a measure of performance of ADLs that have a significant component of manual handling, it was first necessary to define the domains that constitute the ADL and Manual Handling constructs, as follows:

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Appendix 26

Summary of Feedback from Content Validity Experts

[14] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 25 in the complete appendices on the CD.

Issue raised by experts:	*Decision taken:*	*Instrument items affected:*
• **Pictures / photos need to show actual effort i.e. need to look less staged** o Items 1, 2, 11, 15, 19, 21, 24, 27, 28, 31, 32		
• **Word changes** o Hyphenating – ’25-litre water-container’ o Item 2 ▪ ‘what you use to cut or chop’ ▪ ‘safety’ ▪ In your hand’ o Item 4 ▪ Remove ‘with a small bucket’ o Item 6 ▪ Remove ‘zinc or plastic’ o Item 7 ▪ Remove ‘dirty water’ o Item 8 ▪ Replace ‘bakkie’ with ‘vehicle’ o Item 10 ▪ Replace ‘size 2’ with the actual weight o Item 11 ▪ Replace ‘dirty’ with ‘dry’ o Item 14 ▪ Replace ‘laundry’ with ‘washing’ or ‘clothes’ o Item 17 ▪ Change ‘grid’ to ‘stand’ ▪ Change ‘lifting’ to ’placing’ ▪ Replace ‘Tshashisa’ with a generic term o Item 20 ▪ Add words ‘without spilling’ o Item 21 ▪ Add ‘carried by hand’ or ‘carried on head’ o Item 24 ▪ Change ‘bakkie’ to ‘vehicle’ ▪ Together with item 8 – use either ‘unload’ or ‘offload’		

[15]

[15] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 26 in the complete appendices on the CD.

Content Validity Record Form – Questions

B. Please answer the following questions related to the overall principles used in the development and item- selection for this instrument, providing reasons for your opinions:

Question number:	***Question:***	***Response:***
1	Should duplicate items be included in the instrument? For example, lifting a full 25 litre water container onto a wheelbarrow is the same as lifting a full 25 litre water container to pour water into a plastic bath (both 'floor to knuckle lifts of the same weight).	
2	Should items that relate to empty containers be included, versus only including the items where the containers are full or have the maximum weight for the respective ADL task component?	

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[16] The example presented is a section of the full document in order to limit the length of the dissertation document. Refer to the full document in Appendix 27 in the complete appendices on the CD.

Final Rural ADL Manual Handling Sort

RURAL ADL MANUAL HANDLING SORT

An ADL evaluation instrument for clients who live in rural less-resourced areas

Sedirišwa sa tekanyo, sa badirelwa bao ba dulago mafelong a go hlaela dinyakwa.

Name: **Leina:**		**Date of birth :** **Letšatši la Matswalo:** **Age:** **Mengwaga:**	
Address: **Aterese:**		**Diagnosis:** **Bothata:**	

B. <u>Household amenities / Didirišwa tša ka gae.</u> **Please tick the household amenities that you have in your home. You may select more than one option.** **Kgetha didirišwa tše o nago le tšona ka gae. O ka kgetha go feta gatee.**		
	Amenity / Sedirišwa	**√**
	***Water supply* / Go fiwa meetse**	
x.	Piped municipal water inside your house/ Meetse a phaephe ka ntlong, a go tšwa ga mmasepala — meetse a go fihla ka ntlong ka diphaephe tša go agelelwa le ntlo.	
xi.	Tap in the yard / Pompi ka tšarateng	
xii.	Tap in the street / Pompi strateng sa geno	
xiii.	Tap in the village / area / extension : Pompi legaeng/ tikologong/ karolong ya geno	
xiv.	Water obtained from river / Meetse a go tšwa nokeng	
xv.	Water obtained from municipal water-truck / Meetse a go tšwa loring ya meetse ya mmasepala	
xvi.	Rainwater collected in 'Jojo' tank / Meetse a pula a go kgelelwa ka thankeng ya 'Jojo.'	
	Power / fuel supply **Go fiwa mohlagase/ mollo**	
xvii.	Electricity supply from national grid / Mohlagase wa go tšwa go mmušo	
xviii.	Electricity supply from solar panel / Mohlagase wa *solar panel* (seipone sa letšatši/enetši ya letšatši)	
xix.	Water heated by geyser / Meetse a go tutetšwa ka kizara	
xx.	Water heated in electric kettle / Meetse a go bedišwa ka ketlela ya mohlagase	
xxi.	Water heated in pot on fire / Meetse a go bedišwa ka pitšeng mollong	
xxii.	Cooking done on wood fire on the ground/ Go apeiwa mollong wa dikgonye wa go gotšwa fase	
xxiii.	Cooking done on primus stove / Go apeiwa godimo ga prema (*primus stove*)	
xxiv.	Cooking done on '2-plate' electric stove / Go apeiwa godimo ga *2-plate* ya mohlagase	
xxv.	Cooking done on '4-plate' electric stove / Go apeiwa godimo ga setofu sa mohlagase sa dipoleiti tše nne (4)	
xxvi.	Cooking done on coal stove / Go apeiwa godimo ga setofu sa malahla	
	***Toilet facilities /*Dintlwana**	
xxvii.	Indoor flushing toilet / Thoilethe ya ka ntlong, ya go folasha	
xxviii.	Indoor traditional toilet / Thoilethe ya ka ntlong, ya setho (ya go se folashe)	
xxix.	Outdoor flushing toilet / Thoilethe ya ka ntle, ya go folasha	
xxx.	Outdoor traditional toilet / Thoilethe ya ka ntle, ya setho (ya go se folashe)	
xxxi.	Bucket or similar in room during night / Pakete goba sedirišwa sa go swana le pakete, sa go šomišwa ka ka moreng bošego	
	***Bathroom facilities /* Go hlapa**	
i.	Bath with piped municipal water / Bhafu ya meetse a phaephe a go tšwa ga mmasepala	
ii.	Shower with piped municipal water / Shawara ya meetse a phaephe a go tšwa ga mmasepala)	
iii.	Plastic basin / Sekotlelo sa polastiki	
iv.	Plastic or zinc bath / Bhafu ya polastiki goba ya lesenke	
	***Laundry facilities /* Go hlatswa washini**	
i.	Clothing washed using electrical automatic washing machine/ Diaparo di hlatswiwa ka motšhene wa mohlagase wa go itshepetša (*automatic*)	
ii.	Clothing washed using electrical top-loader washing machine/ Diaparo di hlatswiwa ka motšhene wa go bulwa ka godimo ge washini e tsentšhwa (*top-loader*)	
iii.	Clothes washed by hand in containers in the yard/ Diaparo di hlatswiwa ka matsogo ka gare ga dikotlelo ka tšarateng	
iv.	Clothes washed by hand in containers at the tap in the street/ Diaparo di hlatswiwa ka matsogo ka gare ga dikotlelo pomping ya strata sa geno	
v.	Clothes washed by hand in containers at the tap in the village / area / extension/ Diaparo di hlatswiwa ka matsogo ka gare ga dikotlelo pomping ya legaeng/ tikologong/ karolong ya geno	
vi.	Clothes washed by hand in containers at the river/ Diaparo di hlatswiwa ka matsogo ka gare ga dikotlelo nokeng	

SECTION B

Subtest 1 – LIFTING TASKS

KAROLO B

Karolo 1 – Mešomo ya go kuka

Read the description of each task and ask yourself: "Can I ....?"

Bala tlhaloso ya mošomo wo mongwe le wo monwge mme o ipotšiše gore: "Na ke kgona...?

FLOOR-TO-KNUCKLE LIFT



1.1 Can you scoop water with a bucket? (0.9kg)

O kgona go kga eets ka pakete? (0.9kg)

FLOOR-TO-KNUCKLE LIFT



1.2 Can you lift an empty 25-litre water-container from the ground onto a wheelbarrow? (1.2kg)

O kgona go rwala sekupu se setee sa *25* litre sa go hloka selo ka gare, wa se lokela ka gare ga kerebane? (1.2kg)

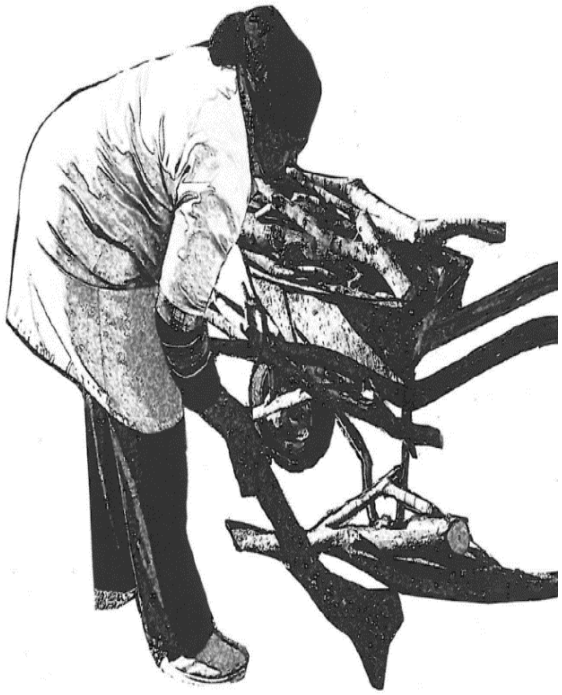
FLOOR-TO- KNUCKLE LIFT



1.3 Can you stack wood onto a woodpile? (2.3kg)

O kgona go tšea dikgonye wa hlophaganya mokgobo goba wa bopa ngata? (2.3kg)

FLOOR-TO-KNUCKLE LIFT



1.4 Can you load wood from the ground onto a wheelbarrow? (2.3kg)

O kgona go tšea dikgonye di lefase wa di laiaiša ka kerebaneng? (2.3kg)

FLOOR-TO-KNUCKLE LIFT



1.5 Can you lift an empty bath used for doing washing? (3.4kg)

O kgona go kuka bhafu ya go hlatswa washini ge e se na selo ka gare? (3.4kg)

FLOOR-TO-KNUCKLE LIFT



1.6 **Can you lift an empty potjie pot from the ground? (6.5kg)**

O kgona go kukela godimo pitša (ya maotwana) ye e dutšego fase e se na selo ka gare? (6.5kg)

FLOOR-TO-KNUCKLE LIFT



1.7 Can you lift a basket of washing from the ground onto a wheelbarrow? (7.0kg)

O kgona go kukela manki wa washini ka kerebaneng? (7.0kg)

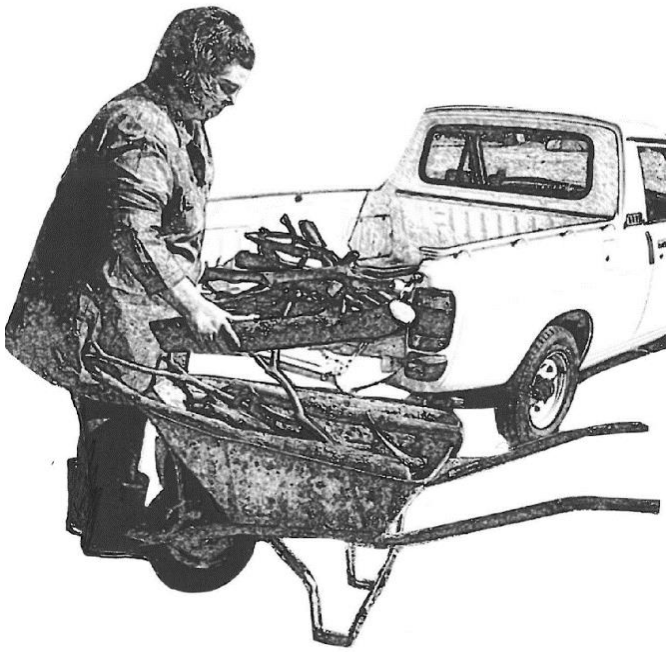
FLOOR-TO-KNUCKLE LIFT



1.8 1.8 Can you empty a bucket of water? (7.5kg)

O kgona go tšholla pakete ya eets? (7.5kg)

KNUCKLE-TO-SHOULDER LIFT



1.9 1.9 Can you offload wood from a vehicle onto a wheelbarrow? (2.3kg)

O kgona go laolla/fološa dikgonye di le ka sefatanageng (ka morago) wa di laiša ka kerebaneng? (2.3kg)

SHOULDER-TO-OVERHEAD LIFT



1.10 **Can you chop down a tree using an axe or a panga? (2.9kg)**

O kgona go remake mohlare ka selepe goa ka peila? (2.9kg)

FLOOR-TO-KNUCKLE LIFT



1.11 **Can you lift a potjie pot full of pap from the ground? (8.6kg)**

O kgona go kukela godimo pitša (ya maotwana) ye e dutšego fase e tletše ka bogobe? (8.6kg)

FLOOR-TO-KNUCKLE LIFT



1.12 **Can you lift a full pot (tshashisa) of water from the ground onto the fire stand? (14.2kg)**

O kgona go kukela godimo tshashisa/tšhatšhakluma ye e tletšego ka eets wa e bea mollong/sebešong? (14.2kg)

FLOOR-TO-KNUCKLE LIFT



1.13 **Can you lift a full 25-litre water-container from the ground onto a wheelbarrow? (25.0kg)**

O kgona go kukela godimo sekupu se setee sa go tlala sa 25 litre wa se laiša ka kerebaneng? (25.0kg)

FLOOR-TO-KNUCKLE LIFT



1.14 **Can you pour water from a 25-litre water-container into a pot (tshashisa)? (25.0kg)**

O kgona go tšhela meetse a sekupu sa 25 litre ka gare ga ‘tshisisa’/tšhatšhakluma? (25.0kg)

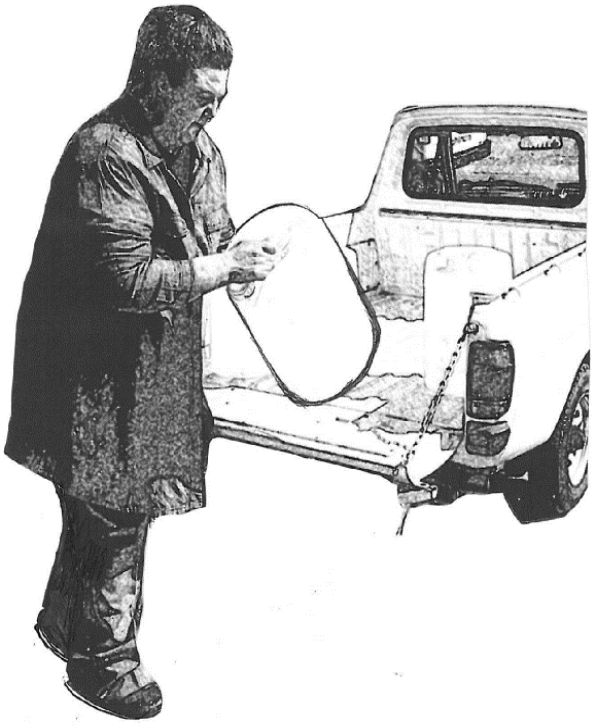
KNUCKLE-TO-SHOULDER LIFT



1.15 **Can you pour water from a 25-litre water-container into a storage drum? (25.0kg)**

O kgona go tšhollela eets a sekupu sa 25 litre ka gare ga teromo ye kgolo ya eets? (25.0kg)

KNUCKLE-TO-SHOULDER LIFT



1.16 **Can you offload a full 25-litre water-container from a vehicle onto the ground? (25.0kg)**

O kgona go fološa sekupu sa 25 litre se se tletšego meetse ka morago ga koloi wa se bea fase? (25.0kg)

Section 2 – carrying tasks

Karolo 2- mešomo ya go rwala

Read the description of each task and ask yourself: “Can I ....?”

Bala tlhaloso ya mošomo wo mongwe le wo monwge mme o ipotšiše gore: “Na ke kgona...?

CARRY



2.1. Can you carry a bucket of water? (7.5kg)

O kgona go rwala pakete ya meetse? (7.5kg)

Option / Kgetho	Distance / Bokgole:	☑
Within your yard / Ka tšarateng ya gago	Up to 12m / Go fihla 30m	
From the tap in the street back to your home / Go tloga pomping ya strateng sa geno wa boela ka gae	From 13m to 230m / Go tloga 31m go fihla 230m	
From the tap in the village back to your home / Go tloga pomping ya legaeng wa boela ka gae.	From 231 m to 650 m / Go tloga 231m go fihla 630m	

CARRY



2.2. **Can you carry a load of wood? (15.8kg)**

O kgona go rwala ngata ya dikgonye? (15.8kg)

Option / Kgetho	Distance / Bokgole:	☑
Within your yard / Ka tšarateng ya gago	Up to 15m / Go fihla 15m	
To the forest or bush and back to your house / Go fihla lesoding goba sethokgweng wa ba wa boela ka gae	From 16m to 3km / Go tloga 16m go fihla 3km	

CARRY



2.3. **Can you carry a basin of water for bathing? (9.5kg)**

O kgona go rwala sekotlelo goa bhafu ya meets a go hlpana? (9.5kg)

Option / Kgetho:	Distance / Bokgole:	☑
From the fireplace to the bedroom / Go tloga mollong go fihla ka kamoreng	Up to 15m / Go fihla 15m	
To empty in the yard or outdoor toilet / Go ya go tšholla meetse ao ka tšarateng goba ka thoiletheng ya ka ntle	From 16m to 30m / Go tloga 16m go fihla 30m	

CARRY



2.4. **Can you carry a pot (tshashisa) full of water? (14.2kg)**

O kgona go rwala tshashisa/tšhatšhakluma ye e tletšego meetse? (14.2kg)

Option / Kgetho:	Distance / Bokgole:	☑
From the fireplace to the bedroom / Go tloga mollong go ya ka kamoreng	Up to 15m / Go fihla 15m	

CARRY



2.5. **Can you carry one full 25-litre water-container? (25.0kg)**

O kgona go rwala sekupu se setee sa sa 25 litre sa go tlala meetse ka gare? (25.0kg)

Option / Kgetho:	Distance / Bokgole:	☑
Within your yard / Ka tšarateng ya gago	Up to 12m / Go fihla 12m	
From the tap in the street back to your home / Go tloga pomping ya strateng sa geno wa boela ka gae	From 13m to 230m / Go tloga 13m go fihla 230m	
From the tap in the village back to your home / Go tloga pomping ya legaeng wa boela ka gae.	From 231m to 630m / Go tloga 231m go fihla 630m	

CARRY



2.6. Can you carry a load of wood on your head? (14.3kg)

O kgona go rwala ngata ya dikgonye hlogong? (14.3kg)

Option / Kgetho:	Distance / Bokgole:	☑
Within your yard / Ka tšarateng ya gago	Up to 15m / Go fihla 15m	
Back to your house from the forest or bush / Go boela ka gae o etšwa lesoding goba sethokgweng?	From 16m to 3km / Go tloga 16m go fihla 3km	

CARRY



2.7. Can you carry two full 25-litre water-containers? (50.0kg)

O kgona go rwala dikupu tše pedi tša meetse a 25 litre tša go tlala? (50.0kg)

Option / Kgetho:	Distance / Bokgole:	☑
Within your yard / Ka tšarateng ya gago	Up to 12m / Go fihla 12m	
From the tap in the street back to your home / Go tloga pomping ya strateng sa geno wa boela ka gae	From 13m to 230m / Go tloga 13m go fihla 230m	
From the tap in the village back to your home / Go tloga pomping ya legaeng wa boela ka gae.	From 231m to 750m / Go tloga 231m go fihla 750m	

SECTION 3 – PUSHING TASKS
KAROLO 3 – MEšOMOYA GO TšHOFA

Read the description of each task and ask yourself: "Can I ....?"
Bala tlhaloso ya mošomo wo mongwe le wo monwge mme o ipotšiše gore: "Na ke kgona...?

PUSH



3.1 Can you push a wheelbarrow loaded with 4 empty 25-litre water-containers? (30.4kg)

O kgona go tšhofa kerebane ye e rwelego dikupu tše nne (4) tša di-25 litre tša go hloka selo ka gare? (30.4kg)

Option / Kgetho:	***Distance / Bokgole:***	☑
From your home to the tap in the street / Go tloga ka gae wa fihla pomping ya strateng	From 13m to 230m / Go tloga 13m go fihla 230m	
From your home to the tap in the village / Go tloga ka gae wa fihla pomping ya legaeng	From 231m to 630m / Go tloga 231m go fihla 630m	
From your home to the river / Go tloga ka gae wa fihla nokeng	From 631m to 5km / Go tloga 631m go fihla 5km	

PUSH



3.2. Can you push a wheelbarrow loaded with all the things needed to do washing? (39.2kg)

O kgona go tšhofa kerebane ya go tlala ka dilo tšohle tše di hlokegago ge go dirwa washini?
(39.2kg)

Option / Kgetho:	Distance / Bokgole:	☑
To the tap in the street and back to your home / Go fihla pomping ya strateng sa geno wa ba wa boela ka gae	From 12m to 230m / Go tloga 12m go fihla 230m	
To the tap in the village and back to your home / Go fihla pomping ya legaeng wa ba wa boela ka gae.	From 231m to 630m / Go tloga 231m go fihla 630m	
To the river and back to your home / Go fihla nokeng wa ba wa boela ka gae	From 631m to 5km / Go tloga 631m go fihla 5km	

PUSH



3.3. Can you push a wheelbarrow loaded with wood? (42.7kg)

O kgona go tšhofa kerebane ye e rwelego dikgonye? (42.7kg)

Option / Kgetho:	Distance / Bokgole:	☑
Within your yard / Ka tšarateng ya gago	Up to 15m / Go fihla 15m	
Back to your house from the forest or bush / Go boela ka gae o etšwa lesoding goba sethokgweng	From 16m to 3km / Go tloga 16m go fihla 3km	

PUSH



3.4. Can you push a wheelbarrow loaded with 1 full 25-litre water-container? (46.1kg)

O kgona go tšhofa kerebane ye e rwelego sekupu se setee (1) sa go tlala ka meetse?
(46.1kg)

Option / Kgetho	***Distance / Bokgole:***	☑
From the tap in the street back to your home / Go tloga pomping ya strateng wa boela ka gae	From 13m to 230m / Go tloga 13m go fihla 230m	
From the tap in the village back to your home / Go tloga pomping ya legaeng wa boela ka gae	From 231m to 630m / Go tloga 231m go fihla 630m	
From the river back to your home / Go tloga nokeng wa boela ka gae	From 631m to 5km / Go tloga 631m go fihla 5km	

PUSH



3.5. Can you push a wheelbarrow loaded with 2 full 25-litre water-containers? (66.2kg)

O kgona go tšhofa kerebane ye e rwelego dikupu tše pedi (2) tša di-25 litre tše di tletšego ka meetse? (66.2kg)

Option / Kgetho:	Distance / Bokgole:	☑
From the tap in the street back to your home / Go tloga pomping ya strateng wa boela ka gae	From 13m to 230m / Go tloga 13m go fihla 230m	
From the tap in the village back to your home / Go tloga pomping ya legaeng wa boela ka gae	From 231m to 630m / Go tloga 231m go fihla 630m	
From the river back to your home / Go tloga nokeng wa boela ka gae	From 631m to 5km / Go tloga 631m go fihla 5km	

PUSH



3.6. Can you push a wheelbarrow loaded with 3 full 25-litre water-containers? (87.6kg)

O kgona go tšhofa kerebane ye e rwelego dikupu tše tharo (3) tša di-25 litre tše di tletšego ka meetse? (87.6kg)

Option / Kgetho:	Distance / Bokgole:	☑
From the tap in the street back to your home / Go tloga pomping ya strateng wa boela ka gae	From 13m to 230m / Go tloga 13m go fihla 230m	
From the tap in the village back to your home / Go tloga pomping ya legaeng wa boela ka gae	From 231m to 630m / Go tloga 231m go fihla 630m	
From the river back to your home / Go tloga nokeng wa boela ka gae	From 631m to 5km / Go tloga 631m go fihla 5km	

PUSH



3.7. Can you push a wheelbarrow loaded with 4 full 25-litre water-containers? (106.9kg)

O kgona go tšhofa kerebane ye e rwelego dikupu tše nne (4) tša di-25 litre tše di tletšego ka meetse? (106.9kg)

Option / Kgetho:	Distance / Bokgole:	☑
From the tap in the street back to your home / Go tloga pomping ya strateng wa boela ka gae	From 13m to 230m / Go tloga 13m go fihla 230m	
From the tap in the village back to your home / Go tloga pomping ya legaeng wa boela ka gae	From 231m to 630m / Go tloga 231m go fihla 630m	
From the river back to your home / Go tloga nokeng wa boela ka gae	From 631m to 5km / Go tloga 631m go fihla 5km	

Rural ADL Manual Handling Sort Score Sheet

Name:	Date of assessment:
Age / D.O.B.:	Gender:

Choose the number (from the box on the right) that best shows the way you do your daily tasks **Kgetha nomoro (go tšwa lepokising ka mo lehlakoreng la go ja) go laetša gore mešomo ya ka matšatši o e kgona go fihla kae**	1. Unable to do - Complete difficulty / Boima bjo bo feleletšego - Ga ke kgone go dira se	2. Some difficulty / Boima bjo bo lekanetšego	3. Able - No difficulty / Ga go boima	N/A. Not done / not applicable GGA Ga go angwe (ga ke amane le se)

Subtest 1 – Lifting Tasks

	ITEM	1	2	3	N/A
1.1	Can you scoop water with a bucket?				
1.2	Can you lift an empty 25-litre water-container from the ground onto a wheelbarrow?				
1.3	Can you stack wood onto a woodpile?				
1.4	Can you load wood from the ground onto a wheelbarrow?				
1.5	Can you lift an empty bath used for doing washing?				
1.6	Can you lift an empty potjie pot from the ground?				
1.7	Can you lift a basket of washing onto a wheelbarrow?				
1.8	Can you empty a bucket of water?				
1.9	Can you offload wood from a vehicle onto the ground?				
1.10	Can you chop down a tree using an axe or a panga?				
1.11	Can you lift a potjie pot full of pap from the ground?				
1.12	Can you lift a full pot of water from the ground onto the fire stand?				
1.13	Can you lift a full 25-litre water-container from the ground onto a wheelbarrow?				
1.14	Can you pour water from a 25-litre water-container into a pot?				
1.15	Can you pour water from a 25-litre water-container into a storage drum?				
1.16	Can you offload a full 25-litre water-container from a vehicle onto the ground?				

Subtest 2 – Carrying Tasks

ITEM		DISTANCE CARRIED	1	2	3	N/A
2.1	Can you carry a bucket of water?	· Within yard (up to 12 m)				
		· From tap in street back to home (13 m to 230 m)				
		· From tap in village back to home (231 m to 630 m)				
2.2	Can you carry a load of wood?	· Within yard (up to 15 m)				
		· From forest back to home (16 m to 3 km)				
2.3	Can you carry a basin of water for bathing?	· From fireplace to bedroom (up to 15 m)				
		· To empty in yard or outdoor toilet (16 m to 30 m)				
2.4	Can you carry a pot full of water?	· From fireplace to bedroom (up to 15 m)				
2.5	Can you carry one full 25-litre water-container?	· Within yard (up to 12 m)				
		· From tap in street back to home (13 m to 230 m)				
		· From tap in village back to home (231 m to 630 m)				
2.6	Can you carry a load of wood on your head?	· Within yard (up to 15 m)				
		· From forest back to home (16 m to 3 km)				
2.7	Can you carry two full 25-litre water-containers?	· Within yard (up to 12 m)				
		· From tap in street back to home (13 m to 230 m)				
		· From tap in village back to home (231 m to 630 m)				

Subtest 3 – Pushing Tasks

ITEM		DISTANCE PUSHED	1	2	3	N/A
3.1	Can you push a wheelbarrow loaded with 4 empty 25-litre water-containers?	· From home to tap in the street (13 m to 230m)				
		· From home to tap in the village (231 m to 630 m)				
		· From home to the river (631 m to 5 km)				
3.2	Can you push a wheelbarrow loaded with all the things needed to do washing?	· From tap in street to home (11 m to 230 m)				
		· From tap in village to home (231 m to 630 m)				
		· From the river to home (631 m to 5 km)				
3.3	Can you push a wheelbarrow loaded with wood?	· Within yard (up to 15 m)				
		· From forest to home (16 m to 3 km)				
3.4	Can you push a wheelbarrow loaded with 1 full 25-litre water-container?	· From tap in street back to home (13 m to 230 m)				
		· From tap in village back to home (231 m to 630 m)				
		· From river back to home (631 m to 5 km)				
3.5	Can you push a wheelbarrow loaded with 2 full 25-litre water-containers?	· From tap in street back to home (13 m to 230 m)				
		· From tap in village back to home (231 m to 630 m)				
		· From river back to home (631 m to 5 km)				
3.6	Can you push a wheelbarrow loaded with 3 full 25-litre water-containers?	· From tap in street back to home (13 m to 230 m)				
		· From tap in village back to home (231 m to 630 m)				
		· From river back to home (631 m to 5 km)				
3.7	Can you push a wheelbarrow loaded with 4 full 25-litre water-containers?	· From tap in street back to home (13 m to 230 m)				
		· From tap in village back to home (231 m to 630 m)				
		· From river back to home (631 m to 5 km)				

Appendix 29

Knowledge translation strategy

	Recommendation	**Implementation strategy**	**Action**
1	Disseminate information to medico-legal practitioners regarding reasonable accommodations and assistive devices and technology that is appropriate for rural contexts	Articles in Focus	Jennie McAdam October 2019
2	Contribute to Wits OT undergraduate curriculum development	SAFRI Fellowship 2019 research project - development of e-learning resources for public health module. Incorporating findings regarding impact of limited household amenities on type and form of bADLs and iADLs, into curriculum review regarding teaching how to do PRAs, as well as rural examples regarding universal access	Jennie McAdam 2019 / 2020
3	Raise awareness regarding ICF's inadequate coding regarding water and fuelwood collection	Submit proposal on ICF update platform	Jennie McAdam Proposal submitted February 2019 – awaiting feedback
4	Training of medico-legal practitioners	Present workshops on use of the RAMS and the basis for its development	Jennie McAdam First workshop scheduled for November 2019
5	Raising awareness with practitioners and academic community	Presentations at local and international conferences	Two abstracts accepted for OTARG 2019 First article

		Publications in peer reviewed journals	published May 2019 in Journal of Occupational Science
6	Further development of the RAMS	Completion of studies of remainder of psychometric properties Development of online version and database for field trials	Jennie McAdam From 2020, as part of post-doctoral studies
7	Contribute towards undergraduate curriculum development at all South African occupational therapy programmes	Send a summary of the study with recommendations regarding inclusion in curricula to the Education Committee of OTASA	January 2020