



Social and health determinants of gender differences in disability amongst older adults in South Africa

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Dates:
Received: 15 Feb. 2013
Accepted: 11 July 2013
Published: 09 Sept. 2013

How to cite this article:
Phaswana-Mafuya, N.,
Peltzer, K., Ramlagan, S.,
Chirinda, W. & Kose, Z.,
2013, 'Social and health
determinants of gender
differences in disability
amongst older adults in
South Africa', *Health SA
Gesondheid* 18(1), Art.
#728, 9 pages. <http://dx.doi.org/10.4102/hsag.v18i1.728>

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There has been an unprecedented increase in population ageing resulting in the increase in prevalence of various health conditions, including disability and associated risk factors. This study aimed to investigate the prevalence and predictors of functional status and disability amongst older South Africans. Little is known about disability amongst older South Africans because most previous health research has focused on younger individuals and infectious diseases. We conducted a national population-based cross-sectional study with a sample of 3840 subjects aged 50 years or older in South Africa. Multivariable regression analysis was performed in order to assess the association of social factors, health variables and functional disability. Overall, 37.2% of the respondents had moderate or severe and/or very severe functional disability, this being higher amongst women. The highest disability was found for the mobility, cognition and participation domains. In all domains, except for the self-care domain, women had a higher disability prevalence. Multivariable analysis amongst men revealed that older age, having some or primary education, being from Indian or Asian race, having chronic conditions, physical inactivity and a lower quality of life were associated with functional disability. Amongst women, older age, as well as having chronic conditions and a lower quality of life, were associated with functional disability. This study has implications for health-sector strategic plans aimed at preventing disabilities, ensuring access to curative and rehabilitative care. This study forms an evidence base upon which future policies and health care management systems can be based.

Daar was 'n ongekende toename in bevolkingsveroudering, wat 'n toename in die voorkoms van verskeie gesondheidstoestande tot gevolg gehad het, insluitende gestremdheid en gepaardgaande faktore. Die studie was daarop gemik om die voorkoms en voorspelbaarheid van die funksionele status en gestremdheid onder ouer Suid-Afrikaners te ondersoek. Daar is min bekennis oor gestremdheid onder ouer Suid-Afrikaners omdat vorige gesondheidsnavorsing meestal op jonger individue en oordraagbare siektes ingestel was. Ons het 'n nasionale bevolkings-gebaseerde kruis-seksionele ondersoek uitgevoer op 'n studiemonster van 3840 Suid-Afrikaners, 50-jaar en ouer. Om die verband tussen sosiale faktore, gesondheidsveranderlikes en funksionele gestremdheid te bepaal, is veelvuldig veranderlike regressie-analise uitgevoer. In die algemeen het 37.2% van die respondente matig of ernstige funksionele gestremdheid ervaar wat hoer was onder vroue. Die hoogste vorm van gestremdheid was op die gebiede van beweeglikeheid, waarneming en deelname. Die voorkoms van gestremdheid was op alle gebiede hoër in vroue, behalwe op die gebied van selfsorg. Multi-veranderlike ontledings onder mans het getoon dat funksionele gestremdheid geassosieer word met ouderdom, met 'n mate van primêre onderwys, met die Indiese of Asiatiese bevolkingsgroep, en met diegene wat ly aan kroniese toestande (beroerte, slaapprobleme snags), fisiese onaktiwiteit en 'n laer lewenskwaliteit. Die studie het implikasies vir strategiese planne in die gesondheidssektor wat daarop gemik is om gestremdheid te voorkom en om toegang tot genesende en rehabiliterende sorg te verseker. Hierdie studie verskaf 'n grondslag van bewyse waarop beleid- en gesondheidsorg-bestuurstelsels in die toekoms gebaseer kan word.

Introduction

The world's population is ageing rapidly (United Nations Department of Economics and Social Affairs 2009:iv; United Nations Population Division 2005:1) and estimates show that this unprecedented increase will be evidenced even in developing countries, including South Africa (Gómez-Olivé *et al.* 2010:24), thus making the phenomenon of population ageing more significant. Whilst ageing represents a victory of medical, social and economic advances over disease, the other side of the coin is also true: population ageing has a negative effect on the health, economic and social spheres (National Institute on Aging, National Institutes of Health & US Department of Health and Human Services 2007:3). Health-wise, ageing results in deteriorating health and physical strength, inducing a greater demand for long-term care and



creating demands on an already-overwhelmed healthcare system (Dobriansky, Suzman & Hodes 2007:17; Kowal *et al.* 2010:12; United Nations Population Division 2002:2, 2005:4; World Health Organization [WHO] 2005:3, 2006:63). From an economic perspective, population ageing impacts negatively on economic growth by means of old-age pensions, per capita Medicare expenditures and the like (United Nations Department of Economics and Social Affairs 2009:viii). In the social sphere, population ageing affects the composition and living arrangements of the families who may need to provide care for their aged individuals (Dobriansky *et al.* 2007:17; United Nations Department of Economics and Social Affairs 2009:viii).

Thus, the epidemiological transition toward an ageing population makes health, disability, economic security and living conditions amongst the elderly policy concerns throughout the world (Cohen & Menken 2006:38). Velkoff and Kowal (2007:3) emphasise the need for a public policy relevant to the older population as their individual needs and social responsibilities change with increased age. In this regard, the United Nations Madrid International Plan of Action on Ageing (United Nations Population Division 2002) and the 2003 African Union Policy Framework and Plan of Action on Ageing (African Union/Help Age International 2003) were developed in order to urge governments to take account of ageing and older populations. The *Older Persons Act* 13 of 2006 of South Africa provides a comprehensive framework for the protection of older peoples' rights in order to ensure that their interests are advanced and their welfare and safety as well as their status are maintained (Republic of South Africa 2006).

Over a billion (about 15%) of the world's population was estimated to be living with some form of disability in 2010 (WHO 2011:261). A survey conducted in 57 countries showed the prevalence of disability amongst women aged 50 years and older to be almost double that of men (40.1% vs. 23.8%) (Hosseinpoor *et al.* 2012:1). The survey further revealed that about 45% of the inequality between men and women was attributed to differences in the distribution of sociodemographic factors. Of this 'explained' inequality, 81% of the contribution came from social determinants such as employment status (49%), education (15%), marital status (12%) and household economic status (4%). The remaining 19% of this inequality was attributed to differences in the distribution of age (10%) and country of residence (10%) (Hosseinpoor *et al.* 2012:4).

In South Africa, Tollman *et al.* (2008:893) reported that amongst the older population, the number of chronic conditions requiring long-term care has increased 2.66-fold during the past 10 years. South Africa is also the country with the highest prevalence of HIV in the world at 10.8% of its population in 2009 being aged 2 years and older (Shisana *et al.* 2009:xvi). One impact of HIV is that it increases the burden on older South Africans, especially women, who have to nurse their sick children, raise their grandchildren and become breadwinners. Debpuur *et al.* (2010:61) showed

that in Ghana, women reported higher levels of disability than men with their respective WHO Disability Assessment Scale (WHODAS-II) means being 30.9 and 26.3; and with an overall national level of disability of 29.1 (0 = no disability; 100 = highest level of disability). In various studies, being female (Debpuur *et al.* 2010:58; Gómez-Olivé *et al.* 2010:31; Mwanyangala *et al.* 2010:40; Razzaque *et al.* 2010:73), increasing age (Debpuur *et al.* 2010:58; Gómez-Olivé *et al.* 2010:31; Mwanyangala *et al.* 2010:39; Razzaque *et al.* 2010), no or less education, single and not working (Gómez-Olivé *et al.* 2010:31), lower economic status (Debpuur *et al.* 2010:59) and lower subjective health status (Debpuur *et al.* 2010:59) have all been found to be associated with functional disability. Another important determinant of functional disability is mental health. About a quarter of the world's disability is attributed to psychiatric disorders (Murray & Lopez 1996:7; Wada *et al.* 2005:272; WHO 2008:9).

This study aims to investigate the social and health determinants of disability amongst older adults in a national probability sample of older South Africans who participated in the Study of Global Ageing and Adults Health (SAGE) Wave 1 in 2008. The research question is: 'what are the social and health determinants of functional disability?' The information generated from this study as well as from planned follow-up SAGE surveys will serve as the basis upon which future policies can be developed.

Research method and design

Sample and procedure

We conducted a national population-based cross-sectional study in South Africa in 2008 with a multi-stage stratified cluster sample of 3840 people aged 50 years or older. The SAGE sample design entails a two-stage probability sample that yields national and subnational estimates to an acceptable precision at provincial level, by locality type (urban and rural) and by population group (including Black, Coloured, Indian or Asian and White). The term Coloured is used in South Africa to denote people of mixed race where descendants of this race of people were couples of European (White) and African (Black African) heritage. The individual response rate amongst those aged 50 years or older was 77%. SAGE was carried out in South Africa in partnership between the WHO, the National Department of Health (NDOH) and the Human Sciences Research Council (HSRC).

Ethical considerations

The study was approved by the HSRC Ethics Committee (Protocol REC 5/13/04/06) and the NDOH (J1/14/45, 2007). Participants provided written informed consent.

Reliability and validity

The questionnaire was interview administered:

The SAGE survey instruments and methods were adapted from those used by the World Health Survey (WHS) and were informed by a review of 16 surveys on ageing (including the



US Health and Retirement Survey (HRS) and the English Longitudinal Study of Ageing (ELSA). The SAGE survey instruments assessed health status and health systems from a household and individual perspective. SAGE also evaluated perceptions of well-being and more objective measures of health, including measured performance tests: 4 m timed walk; spirometry; cognitive battery; near and distance vision; and grip strength; and biomarkers: blood pressure and pulse rate; height and weight; hip and waist circumference; and, blood spot from fingerprick. Standardized SAGE survey instruments were used in all countries consisting of five main parts: (1) household questionnaire; (2) individual questionnaire; (3) proxy questionnaire; (4) verbal autopsy questionnaire (VAQ); and, (5) appendices including showcards. The procedures for including country-specific adaptations to the standardized questionnaire and translations into local languages from English follow those developed by and used for the WHS. (WHO 2013a:1)

Measures

Outcome variable

In this study, the main outcome variable – functional disability – was measured by the 12-item WHO Disability Assessment Schedule, version 2.0 (WHODAS-II) (Üstün *et al.* 2010:1ff.), designed to measure disability from responses to questions on physical functioning in a range of Activities of Daily Living (ADLs) as well as Instrumental Activities of Daily Living (IADLs):

ADLs describe a set of daily self-care activities and usually assess the need for help with personal care activities such as eating, bathing, and dressing. IADLs describe somewhat higher-level functioning considered necessary to live independently. These typically assess the need for help with routine needs such as using transportation, housekeeping, and preparing food. (He *et al.* 2012:18).

The domains include: cognition, mobility, self-care, pain and discomfort, interpersonal activities, sleep and energy and participation. Participants were asked about difficulties in the last 30 days with performing activities of daily living, learning a new task as well as instrumental activities of daily living and participation in community activities. Responses to these questions were scored using a five-point Likert-type response scale: ‘none’, ‘mild’, ‘moderate’, ‘severe’ and ‘extreme/cannot do’. The computed WHODAS-II score ranged from 0 to 48 and was later transformed into a score of 0–100 with 100 being severe or extreme disability (Üstün *et al.* 2010:41–45). WHODAS-II subscales and summary indices were coded using the International Classification of Functioning, Disability and Health (ICF) disability categories (Üstün *et al.* 2001:1ff), namely: No problem (0% – 4%); Mild problem (5% – 24%); Moderate problem (25% – 49%); Severe problem (50% – 95%); Extreme problem (95% – 100%); and then dichotomised into $> 25\% = 1$ and $< 25\% = 0$.

Exposure variables

Depression and nocturnal sleep problems were assessed as mental-health determinants of disability. About a quarter of the world’s disability is attributed to psychiatric disorders (Murray & Lopez 1996; WHO 2008).

In terms of *depression*, symptom-based depression in the past 12 months was assessed based on the World Mental Health Survey version of the Composite International Diagnostic Interview (Kessler & Üstün 2004:104). The diagnosis of depression was based on the International Classification of Diseases, 10th revision (ICD-10), diagnostic criteria for research (DCR) for depressive episodes (WHO 1993) and was derived from an algorithm that took into account respondents reporting symptoms of depression during the past 12 months (Ayuso-Mateos *et al.* 2010:366). The participants reported at least four of 10 depressive symptoms lasting two weeks, most of the day or all of the day. According to the ICD-10–DCR criterion B, at least two of the following three symptoms needed to be present: depressed mood, loss of interest and fatigability. In addition, the participants who responded affirmatively to the question, ‘Have you been taking any medications or other treatment such as attending therapy or counselling sessions for depression during the last 12 months?’, were added to the symptom-based depression group.

Nocturnal sleep problems were assessed with the question, ‘Overall in the last 30 days, how much of a problem did you have with sleeping, such as falling asleep, waking up frequently during the night, or waking up too early in the morning?’ Response options were none, mild, moderate, severe and extreme. Responses were collapsed into two categories, namely: none/mild/moderate and severe/extreme (Stranges *et al.* 2012:1176).

Blood pressure (systolic and diastolic) was measured three times on the right arm or wrist of the seated respondent using an automated recording device (OMRON R6 Wrist Blood Pressure Monitor, HEM-6000-E, Omron Healthcare Europe, B.V., Hoofddorp and The Netherlands). Out of three measurements, the average of the last two readings was used, as suggested by the WHO (2013b). In accordance with the Seventh Report of the Joint National Committee of Prevention, Detection, Evaluation and Treatment of High Blood Pressure, individuals with systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg and/or who reported the current use of antihypertensive medication, were considered to be suffering from high blood pressure (Chobanian *et al.* 2003:2562).

Tobacco use. Lifetime tobacco use was assessed with the question ‘Have you ever smoked tobacco or used smokeless tobacco?’ Lifetime tobacco users were asked ‘Do you currently use (smoke, sniff or chew) any tobacco products such as cigarettes, cigars, pipes, chewing tobacco or snuff?’ The response options were ‘Yes, daily’, ‘Yes, but not daily’ and ‘No, not at all’. These questions are based on the WHO Guidelines for Controlling and Monitoring the Tobacco Epidemic (WHO 1998).

Alcohol use. Lifetime alcohol use was assessed with the question ‘Have you ever consumed a drink that contains alcohol (such as beer, wine, spirits, etc.)?’ Response options



were 'Yes' or 'No, never'. Lifetime alcohol users were asked about current (past month) alcohol use and current alcohol users were asked 'During the past seven days, how many drinks of any alcoholic beverage did you have each day?'

Height and weight were measured. Body mass index (BMI) was used as an indicator of obesity. BMI was calculated as weight in kg divided by height in metre squared. Obesity was defined as $\geq 30 \text{ kg/m}^2$.

Physical activity was measured using the General Physical Activity Questionnaire (GPAQ). The instrument gathered information on physical activity in three domains (activity at work, travel to and from places and recreational activities), as well as time spent sitting down. The questionnaire also assessed vigorous and moderate activities performed at work and recreational activities. Information on the number of days in a week spent on different activities and time spent in a typical day for each activity was also recorded (WHO 2009). For physical activity, in addition to the total minutes of activity, the activity volume was also computed by weighing each type of activity by its energy requirement in metabolic equivalents (METs). The number of days and total physical activity MET minutes per week were used to classify respondents into three categories of low, moderate and high levels of physical activity. Physical inactivity was defined as those who had low levels of physical activity, whilst moderate and high levels of physical activity were collapsed in further analysis (WHO 2009).

Quality of life, a social determinant of disability, was also assessed by means of WHO Quality of Life (WHOQOL) instruments which ranges from 0 to 100 and was evaluated by responses to questions on overall life satisfaction and specific aspects of life. The WHOQOL instruments are a set of international, cross-culturally comparable tools used to assess quality of life and provide a measure of the evaluative component of wellbeing (WHO 1997). They also used two questions in each of the following four broad domains: physical, psychological, social and environmental. Results from the eight items were summarised to get an overall WHOQOL score, which was then transformed to a 0–100 scale, with lower scores indicating a better quality of life. Besides overall satisfaction, SAGE also asked whether an older person was satisfied with a wide range of life aspects such as health, oneself, ability to perform activities of daily living, personal relationships and conditions of living space.

Economic or wealth status. Wealth levels were generated through a multi-step process, whereby asset ownership was converted to an asset ladder, Bayesian post-estimation method was used to generate raw continuous income estimates and these were then transformed into quintiles (Ferguson *et al.* 2003:747).

Chronic conditions. Other chronic conditions such as stroke, angina, diabetes, arthritis, chronic lung disease, depression, hypertension, cataracts, injuries and oral health problems were assessed by self-report.

Data analysis

The data were entered using CSPro and analysed using STATA Version 10 (Stata Corp, College Station, Texas, USA). Data were weighted using post-stratified individual probability weights based on the selection probability at each stage of selection. Individual weights were post-stratified by province, sex and age-groups according to the 2009 Medium Mid-Year population estimates from Statistics South Africa (2009). Weights were not normalised. Associations between the key outcome of functional disability ($\geq 25\%$, indicating moderate/severe/very severe) and social and health variables were evaluated, calculating odds ratios (OR) for men and women separately. Unconditional multivariable logistic regression was used for the evaluation of the impact of explanatory variables for the outcome of functional disability (binary dependent variable). Predictor variables, which have been found to be associated with functional disability in previous studies (Debpuur *et al.* 2010; Gómez-Olivé *et al.* 2010; Hosseinpoor *et al.* 2012; Murray & Lopez 1996; Mwanyangala *et al.* 2010; Razzaque *et al.* 2010; Wada *et al.* 2005; WHO 2008), were put into the regression models. All variables that were significant statistically at the $p < 0.05$ level in bivariate analyses were included in the multivariable models. The models were adjusted for sociodemographic variables and separate models were run for men and women. In the analysis, weighted percentages are reported. Both the reported 95% confidence intervals and the p -value are adjusted for the multi-stage stratified cluster sample design of the study.

Results

Descriptive results

The total sample included 3840 South Africans, aged 50 years or older – 44.1% men and 55.9% women. The most prevalent population group was African Black (74%); almost half (49.9%) were between 50 and 59 years old. The educational level of most participants (71.6%) was lower than secondary-school education and almost two-thirds (64.9%) lived in an urban area. Almost half (46.7%) of the older adults were obese, 77.3% had hypertension and 9.2% had diabetes. In addition, 4.0% had had a stroke, 5.2% angina, 4.9% asthma, 4% depression, 24.7% arthritis and 8.9% a nocturnal sleep problem. More than half (60.5%) engaged in low physical activity, 20.4% were daily tobacco users and a small proportion (3.7%) were hazardous or harmful alcohol users. With a possible total score of 100, functional disability scored a mean of 21 (low) and quality of life scored a mean of 47 (also low). Overall, 37.2% had moderate/severe or very severe functional disability, 32.6% amongst men and 40.9% amongst women (see Table 1).

On analysis of the different domains of functional disability, the highest disability was found for the domain of mobility, followed by cognition and participation. In all domains women had higher disability prevalence than men except for one, namely, self-care (see Table 2).

**TABLE 1:** Sample characteristics and prevalence of disability amongst older South Africans by gender.

Variables	Disability (moderate, severe or extreme)				Total sample	
	Male		Female		N	%
	n	%	n	%		
Age						
50–59	163	23.1	271	35.2	1695	49.9
60–69	161	33.9	251	41.1	1233	30.6
70–79	117	51.6	210	49.8	661	14.0
80 and over	54	72.3	90	63.9	251	5.5
Population group						
African Black	255	36.0	503	43.7	2053	74.0
White	20	17.4	32	23.6	269	9.3
Coloured	68	30.1	133	32.5	655	12.8
Indian or Asian	56	51.6	73	47.5	307	3.8
Marital status						
Single	45	36.4	123	38.3	512	14.3
Married	363	31.3	240	35.2	2007	55.9
Separated/Divorced	22	25.8	46	37.8	230	5.9
Widow	61	46.2	394	48.5	1020	23.9
Educational level						
No schooling	202	29.9	202	45.2	854	25.2
Less than primary	111	40.1	166	46.0	803	24.0
Primary	110	46.9	127	40.1	779	22.4
Secondary	72	20.9	94	30.4	923	28.3
Wealth						
Low	208	38.6	327	45.9	1482	40.6
Medium	81	29.7	191	42.2	731	18.2
High	204	28.4	300	34.4	1608	41.2
Geolocality						
Rural	185	38.0	265	41.4	1276	35.1
Urban	309	29.7	556	40.6	2561	64.9
Chronic conditions						
High blood pressure	373	33.7	660	43.3	2842	77.3
Stroke	38	76.0	46	67.2	139	4.0
Angina	33	47.3	87	66.8	219	5.2
Diabetes	57	44.7	121	54.0	360	9.2
Obesity (BMI ≥ 30)	142	35.8	319	46.4	1539	46.7
Arthritis	142	62.0	319	61.1	851	24.7
Asthma	35	62.7	49	58.1	165	4.9
Depression	32	64.4	63	67.5	160	4.0
Sleep problem (nocturnal)	60	67.5	123	83.8	249	7.4
Health habits						
Daily tobacco use	136	33.6	153	38.7	810	20.4
Alcohol use (10 drinks or more a week)	42	35.0	18	42.6	158	3.7
Physical inactivity	386	43.4	632	47.3	2455	60.5
Quality of Life (QoL)						
Low	228	67.8	375	67.1	956	28.5
Medium	175	29.5	292	39.6	1384	33.5
High	92	14.4	155	18.4	1500	38.1
QoL range 0–100; M (SD)	40.3	11.7	39.1	12.0	47.1	12.5

M, Mean; s.d., Standard deviation.

Predictors of functional disability

In *univariate* analysis amongst men, older age, having primary education, being from the Indian or Asian population group, suffering from chronic conditions (stroke, angina, asthma, depression, nocturnal sleep problem), physical inactivity and lower quality of life were associated with functional disability. In *multivariate* analysis amongst men, older age, having some or primary education, being from the Indian or Asian population group, suffering from chronic conditions (stroke, nocturnal sleep problem), physical inactivity and lower quality of life were associated with functional disability.

In *univariate* analysis amongst women, older age, having primary education, being from the Indian or Asian population group, suffering from chronic conditions (stroke, angina, asthma, depression, nocturnal sleep problem), physical inactivity and lower quality of life were associated with functional disability. In *multivariate* analysis amongst women, older age, suffering from chronic conditions (angina, obesity, arthritis, nocturnal sleep problem) and lower quality of life were associated with functional disability (see Table 3).

Discussion

This study was aimed at investigating the prevalence and associations of functional disability amongst older South

**TABLE 2:** Functional disability by gender.

Domain	Question In the last 30 days, how much difficulty did you have ...	Moderate disability		Severe or very severe disability	
		Men (%)	Women (%)	Men (%)	Women (%)
Cognition	... concentrating on doing something for 10 minutes?	15.1	18.9	6.3	8.9
	... in learning a new task (for example, learning how to get to a new place, learning a new game, learning a new recipe)?	22.3	23.6	8.2	13.6
Mobility	... in standing long periods?	18.5	22.4	13.3	19.0
	... in walking a long distance such as a kilometre?	15.4	19.9	18.8	24.3
Self-care	... in bathing/washing your whole body?	2.6	1.7	0	0
	... in getting dressed?	3.1	4.1	2.3	1.8
Getting along	... with dealing with strangers?	4.8	8.2	0	0
	... with making new friendships or maintaining current friendships?	2.8	6.4	0	0
Life activities	... in taking care of your household responsibilities?	5.8	9.2	0	0
	... in your day to day work?	5.2	6.0	0	0
Participation	... in joining in community activities (for example, festivities, religious or other activities) in the same way as anyone else can?	6.1	9.2	0	0
	In the last 30 days, how much have you been emotionally affected by your health condition(s)?	19.7	21.7	7.4	10.2

TABLE 3: Regression analyses with functional disability by gender.

Sociodemographics	Men		Women	
	Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)	Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Age				
50–59	1.00	1.00	1.00	1.00
60–69	1.71 (1.15–2.53)**	1.03 (0.67–1.48)	1.28 (0.94–1.74)	1.41 (1.08–1.84)*
70–79	3.54 (1.81–6.91)***	4.40 (1.87–10.36)***	1.83 (1.20–2.78)**	2.36 (1.41–3.94)**
80 and over	8.68 (3.71–20.28)***	5.30 (1.32–21.33)*	3.26 (2.06–5.16)***	5.05 (2.59–9.84)***
Population group				
African Black	1.00	1.00	1.00	1.00
White	0.38 (0.12–1.14)	0.66 (0.20–2.19)	0.40 (0.19–0.86)*	0.64 (0.28–1.45)
Coloured	0.77 (0.43–1.36)	0.40 (0.17–0.91)*	0.62 (0.37–1.04)	0.50 (0.23–1.07)
Indian or Asian	1.90 (1.04–3.47)*	1.99 (1.09–3.66)*	1.16 (0.68–2.00)	1.47 (0.78–2.76)
Marital status				
Single	1.00	-	1.00	-
Married	0.79 (0.38–1.66)	-	0.87 (0.47–1.61)	-
Separated/Divorced	0.61 (0.29–1.25)	-	0.98 (0.55–1.73)	-
Widow	1.50 (0.60–3.71)	-	1.51 (0.86–2.66)	-
Educational level				
No schooling	1.00	1.00	1.00	1.00
Less than primary	1.57 (0.88–2.80)	2.36 (1.31–4.24)**	1.03 (0.66–1.61)	1.01 (0.59–1.72)
Primary	2.07 (1.37–3.12)***	2.47 (1.28–4.75)**	0.81 (0.49–1.35)	0.90 (0.47–1.73)
Secondary	0.62 (0.42–0.93)*	0.98 (0.37–2.45)	0.53 (0.32–0.88)*	0.75 (0.36–1.55)
Wealth				
Low	1.00	-	1.00	-
Medium	0.67 (0.36–1.27)	-	0.86 (0.50–1.47)	-
High	0.63 (0.32–1.23)	-	0.62 (0.30–1.25)	-
Geolocality				
Rural	1.00	-	1.00	-
Urban	0.69 (0.32–1.47)	-	0.97 (0.43–2.20)	-
Chronic conditions				
High blood pressure	1.14 (0.62–2.10)	-	1.50 (0.84–2.70)	-
Stroke	6.92 (4.32–11.07)***	5.61 (1.28–24.62)*	2.99 (1.41–6.37)**	1.77 (0.71–4.44)
Angina	1.85 (1.15–2.96)*	1.88 (0.72–4.90)	3.02 (1.58–5.79)***	2.73 (1.15–6.49)*
Diabetes	1.68 (0.83–3.39)	-	1.76 (0.97–3.19)	-
Obesity (BMI ≥ 30)	1.27 (0.90–1.79)	-	1.61 (1.18–2.20)**	1.52 (1.00–2.32)*
Arthritis	4.51 (2.34–8.71)	-	3.11 (2.01–4.80)***	3.30 (2.10–5.19)***
Asthma	3.63 (1.74–7.58)***	1.50 (0.69–3.27)	2.02 (1.11–3.66)*	1.30 (0.68–2.48)
Depression	3.96 (1.96–7.99)***	1.15 (0.46–2.85)	3.15 (1.61–6.18)***	1.37 (0.61–3.08)
Sleep problem (nocturnal)	4.66 (2.43–8.94)***	3.02 (1.21–7.54)*	8.70 (5.07–14.93)***	6.26 (2.68–14.62)***
Health habits				
Daily tobacco use	1.02 (0.57–1.83)	-	0.87 (0.48–1.55)	-
Alcohol use (10 drinks or more a week)	1.09 (0.44–2.69)	-	1.04 (0.32–3.36)	-
Physical inactivity	3.49 (2.02–6.01)***	3.18 (1.53–6.60)**	2.10 (1.37–3.23)***	1.87 (0.99–3.52)
Quality of Life				
Low	1.00	1.00	1.00	1.00
Medium	0.20 (0.14–0.29)***	0.27 (0.18–0.43)***	0.32 (0.22–0.46)***	0.41 (0.28–0.59)***
High	0.08 (0.03–0.19)***	0.09 (0.04–0.21)***	0.11 (0.05–0.23)***	0.18 (0.09–0.38)***

*, $p < 0.05$; **, $p < 0.01$; ***, $p < 0.001$



Africans. Overall, the prevalence in functional disability found in this study, measured with the WHODAS-II, was, with a mean score of 21, low. This seems to be lower than that found in other studies, including one in Ghana (mean of 29) (Debpuur *et al.* 2010) and a 57-country population-based survey in mainly low- and middle-income and a few high-income countries (mean 32) (Hosseinpoor *et al.* 2012:1). Similar to other studies (Debpuur *et al.* 2010; Gómez-Olivé *et al.* 2010; Hosseinpoor *et al.* 2012:1; Mwanyangala *et al.* 2010; Razzaque *et al.* 2010), we found that women have higher levels of disability compared with men. The highest disability was found in the domain of mobility, which was also the case in other studies (Aijänseppä *et al.* 2005:413).

A key finding of this study was that non-communicable diseases (NCDs) are important determinants of health and disability in South Africa. More than three-quarters (77.3%) had high blood pressure and close to half (46.7%) were obese. We also noted some gender differences in this regard. Chronic NCDs which were associated significantly with functional disability for both sexes were stroke, angina, asthma, depression and sleep problems (nocturnal), which was also found in a previous review (Rodrigues *et al.* 2009). We also found that physical inactivity was associated significantly with disability for both men and women. The study further revealed that sleeping problems and depression contributed to functional disability amongst both elderly men and women. This may lead to negative effects such as institutionalisation and dependency as well as serious public-health implications which may include increased utilisation of public-health services, an increase in the need for long-term care and ongoing social support (Fried & Guralnik 1997:92). Thus, it creates some implications with regard to caring for the elderly as comprehensive interventions incorporating not only disability but also psychological and social components are critical in order to provide relief for depressed elderly persons, especially those who may not respond positively to antidepressant medication treatment.

Obesity and arthritis were only associated with functional disability for women. A few studies (Rodrigues *et al.* 2009; Taş *et al.* 2007:276) also seem to suggest that it is possible that obesity and arthritis may represent a greater risk of functional disability. One reason for this gender difference may be because the prevalence of obesity and arthritis is higher amongst women as compared with men. Furthermore, it was found that lack of schooling was only associated with functional disability for men. Grundy and Glaser (2000:149) also found that increased severity of disability and new incidence of disability were associated with lower socioeconomic status, but did not find gender differences. Further to this, research is needed for understanding of socioeconomic status in relation to gender differences in functional disability. These gender disparities in health status during old age need to be taken note of. Whilst women have higher life expectancies than men (Apt 2007), these findings show that they experience poor or ill health and higher levels of disability. Other studies have also found similar results

(Debpuur *et al.* 2010; Gómez-Olivé *et al.* 2010; Hosseinpoor *et al.* 2012):

Whilst national health-sector strategic plans in South Africa and other sub-Saharan African countries have started to highlight the need for policies to prevent disabilities and ensure access to curative and rehabilitative care among older individuals, there is only a limited understanding of the trajectories of health and disability among mature and elderly adults in sub-Saharan Africa, and of the health needs that will result from the oncoming growth of the mature adult and elderly population in many sub-Saharan African contexts. The required health sector responses to population aging in sub-Saharan African are thus inadequately informed by the existing literature, which has often focused on the health of younger individuals and/or health concerns resulting from infectious diseases, rather than chronic and/or noncommunicable diseases and disabilities that affect older individuals. (Payne, Mkandawire & Kohler 2013:3)

Recommendations

In terms of policy, a life-course approach to addressing these gender disparities in health has been recommended (Nyirenda *et al.* 2012:12). Such inequalities to be addressed are linked to gender-related differences in access to education, participation in the labour market and access to material resources. The risk factors for most of these chronic NCDs are modifiable and can be managed from an early age through lifestyle changes. The policy implication is that health promotion programmes, for example, smoking cessation, physical activity and nutritional programmes, should be a priority. This form of primary prevention will ensure healthy ageing and lesser costs for managing conditions later in life. Our findings call for a policy shift, specifically on how management of chronic NCDs and functional disability can be integrated within the existing healthcare system, especially at a primary-healthcare level.

Limitations of the study

This study had several limitations. Firstly, the self-report of health variables such as depression symptoms, tobacco or alcohol use should be interpreted with caution; it is possible that measurement errors occurred. Secondly, this study was based on data collected in a cross-sectional survey. We cannot, therefore, ascribe causality to any of the associated factors in the study. However, follow-up studies are planned. Finally, data were collected from older adults who were available in the household on the day of the survey. Respondents who were institutionalised (prison, hospital, care home) and not returning to the household within seven days, as well as those who had moved more than 50 kilometres away from the study household, were not included and we may this have underestimated the prevalence of disability.

Conclusion

This study found that disability is prevalent amongst older adult South Africans. The highest disability was found for the domain of mobility, followed by cognition and participation and in all domains women had higher disability prevalence



than men, except for the domain of self-care. Amongst men, older age, having some or primary education, being from the Indian or Asian population group, suffering from chronic conditions (stroke, nocturnal sleep problem), physical inactivity and lower quality of life were associated with functional disability. Amongst women, older age, suffering from chronic conditions (angina, obesity, arthritis, nocturnal sleep problem) and lower quality of life were associated with functional disability. Future research is suggested to ascertain whether results found are replicable longitudinally and with different samples of older South Africans.

Acknowledgements

Funding was provided predominantly by the National Department of Health, with additional funding provided by the United States National Institute on Aging through an interagency agreement with the WHO and the HSRC, South Africa.

Competing interests

The authors declare that they have no financial or personal relationship(s) which may have inappropriately influenced them in writing this article.

Authors' contributions

K.P. (Human Sciences Research Council) conducted the analysis, N.P.M. (Human Sciences Research Council) and all other authors (S.R., W.C., Z.K.) (Human Sciences Research Council) wrote, corrected and approved the article.

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