

## **SUPPLEMENTARY MATERIALS**

**Title:** Impairment in activities of daily living, care receipt and unmet needs in a middle-aged and older rural South African population: findings from the HAALSI study

**Supplementary Material 1: Questions on basic Activities of Daily Living, use of aids and assistance from baseline HAALSI questionnaire**

Please tell me whether you have difficulty performing any of the following tasks on a regular basis. Exclude any difficulties that you expect to last less than three months.

1. Because of a health or memory problem do you have any difficulty with walking across a room?
  - a. Yes
  - b. No
  - c. Can't do
  - d. Don't want to
2. Do you ever use equipment or devices (e.g., cane) when crossing a room?
  - a. Yes
  - b. No
3. What equipment is that? [Check all that apply]
  - a. Railing
  - b. Walker
  - c. Cane
  - d. Crutches
  - e. Orthopedic shoes
  - f. Leg/back brace
  - g. Prosthesis
  - h. Oxygen/respirator
  - i. Furniture/walls
  - j. Wheelchair/cart
  - k. Other: specify
4. Does anyone ever help you get across a room?
  - a. Yes
  - b. No
5. Because of health and memory problems, do you have any difficulty with dressing?  
Dressing includes taking clothes out, putting them on, buttoning up, and fastening a belt.
  - a. Yes
  - b. No
  - c. Can't do
  - d. Don't want to
6. Do you ever use equipment or devices (e.g., cane) when dressing?
  - a. Yes
  - b. No
7. What equipment is that? [Check all that apply]
  - a. Railing
  - b. Walker
  - c. Cane
  - d. Crutches
  - e. Orthopedic shoes
  - f. Leg/back brace
  - g. Prosthesis
  - h. Oxygen/respirator
  - i. Furniture/walls
  - j. Wheelchair/cart
  - k. Other: specify
8. Does anyone ever help you with dressing?
  - a. Yes
  - b. No

9. Because of health and memory problems, do you have any difficulty with bathing or showering?
- a. Yes
  - b. No
  - c. Can't do
  - d. Don't want to
10. Do you ever use equipment or devices (e.g., cane) when bathing or showering?
- a. Yes
  - b. No
11. What equipment is that? [Check all that apply]
- a. Railing
  - b. Walker
  - c. Cane
  - d. Crutches
  - e. Orthopedic shoes
  - f. Leg/back brace
  - g. Prosthesis
  - h. Oxygen/respirator
  - i. Furniture/walls
  - j. Wheelchair/cart
  - k. Other: specify
12. Does anyone ever help you with bathing or showering?
- a. Yes
  - b. No
13. Because of health and memory problems, do you have any difficulty with eating, such as cutting up your food? (By eating, we mean eating food by oneself when it is ready.)
- a. Yes
  - b. No
  - c. Can't do
  - d. Don't want to
14. Does anyone ever help you with eating?
- a. Yes
  - b. No
15. Do you have any difficulty with getting into or out of the place where you sleep?
- a. Yes
  - b. No
  - c. Can't do
  - d. Don't want to
16. Do you ever use equipment or devices (e.g., cane) when getting into or out of the place where you sleep?
- a. Yes
  - b. No
17. What equipment is that? [Check all that apply]
- a. Railing
  - b. Walker
  - c. Cane
  - d. Crutches
  - e. Orthopedic shoes
  - f. Leg/back brace
  - g. Prosthesis
  - h. Oxygen/respirator
  - i. Furniture/walls
  - j. Wheelchair/cart
  - k. Other: specify
18. Does anyone ever help you with getting into or out of the place where you sleep?
- a. Yes
  - b. No

19. Because of health and memory problems, do you have any difficulties with using the toilet, including getting up and down?
- a. Yes
  - b. No
  - c. Can't do
  - d. Don't want to
20. Do you ever use equipment or devices (e.g., cane) when using the toilet?
- a. Yes
  - b. No
21. What equipment is that? [Check all that apply]
- a. Railing
  - b. Walker
  - c. Cane
  - d. Crutches
  - e. Orthopedic shoes
  - f. Leg/back brace
  - g. Prosthesis
  - h. Oxygen/respirator
  - i. Furniture/walls
  - j. Wheelchair/cart
  - k. Other: specify
22. Does anyone ever help you with using the toilet?
- a. Yes
  - b. No
23. Do you use any of the following on a regular basis? (Check all that apply)
- a. Walking stick
  - b. Travel device
  - c. Manual wheelchair
  - d. Electric Wheelchair
  - e. Catheter, urine collection bag
  - f. Toilet Series
  - g. None of the above
24. Who most often helps you with dressing, bathing, eating, getting out of bed, using the toilet, controlling urination and defecation, doing chores, preparing hot meals, shopping, managing money, making phone calls, taking medications? (Choose up to 3 people)
- a. Spouse
  - b. Mother
  - c. Father
  - d. Mother-in-law
  - e. Father-in-law
  - f. Children
  - g. Sibling
  - h. Sibling of spouse
  - i. Brother-in-law, sister-in-law
  - j. Spouse of child
  - k. Grandchild
  - l. Other relative
  - m. Paid helper (such as nanny)
  - n. Volunteer or Employee of facility
  - o. Other
  - p. No one helped

## **Supplementary Material 2: Detailed methods for measurement of independent variables**

### ***Biologically measured chronic health conditions***

HIV status was measured based on dried blood spot analysis using Vironostika Uniform 11 assay (Biomerieux, France) Diabetes mellitus was defined as a fasting glucose level  $>7.0\text{mmol/L}$ , random glucose  $\geq 11.1\text{mmol/L}$ , or self-report of ever being told they had diabetes or use of medication. Glucose was measured from a fingerprick blood sample using a CareSensN point of care glucose monitor (iSens Inc. Seoul, S Korea). Hypertension was defined as a measured systolic blood pressure  $>140\text{mmHg}$ , or diastolic blood pressure  $>90\text{mmHg}$ , based on the mean of the second and third of three readings, or self-reported use of hypertensive medication. Anemia was diagnosed from point of care hemoglobin testing using the Hemocue 201 system (Hemocue AB, Angelholm, Sweden) and defined as a hemoglobin level of  $<13\text{g/dL}$  for men or  $<12\text{g/dL}$  for women, as per South African and WHO suggested thresholds (Shisana et al., 2014).

### ***Physical performance***

We measured physical performance, a likely predictor of both ADLs and need for care, in two ways. First, grip strength was measured twice in each hand in the seated position using a Smedley dynamometer; the maximum reading was used in this analysis. Second, gait speed was assessed over the sum of two 2.5m walks on level ground at usual walking pace.

### ***Cognition assessment***

Trained interviewers assessed cognition in the local language, XiTongsa, using a computer-assisted personal interview. Questions were based on the U.S. Health and Retirement Study (HRS). Three cognitive tests comprised a total cognitive score for a total of 24 possible points: orientation to the present date, month, year, and president of South Africa (up to 4 possible points), immediate recall of 10 words (up to 10 possible points), and delayed recall, after approximately one minute of other questioning, using the same word list (up to 10 additional points). Participants were given one of four randomly generated lists of words, and

all words were chosen to be culturally and geographically relevant to the participants. Participants who could not recall a single word after the word list was read aloud once were allowed to hear the word list up to two additional times. A *total cognitive score* was calculated to represent a summary measure of the three cognitive tests and create a brief screening tool for cognitive impairment following the HRS model. Total cognitive score could range from 0 points (no orientation and no immediate or delayed recall) to 24 points (perfect orientation and immediate and delayed recall). Those who were unable to complete the cognitive test were classified as a separate group.

**Supplementary Table 1: Variation in disability and unmet need by disease status and socioeconomic variables**

	Any ADL impairment or met need		Any unmet need	
	%	p	%	p
Female	12.1		27.5	
Male	12.4	0.77	19.8	0.03
<b>Age</b>				
40-49	4.7		44.2	
50-59	7.3		33.3	
60-69	10.3		20.1	
70-79	15.9		22.3	
80+	35.9	<0.001	18.3	0.001
HIV positive	8.5		28.1	
HIV negative	13.2	<0.001	23.2	0.32
Hypertension	13.8		19.9	
No hypertension	8.9	<0.001	33.3	<0.001
HT known to patient	15.6		21.4	
No HT known to patient	9.7	<0.001	26.9	0.11
Diabetes mellitus	19.7		20.0	
No diabetes mellitus	11.0	<0.001	24.8	0.29
Bronchitis	17.9		20.0	
No bronchitis	12.2	0.41	24.0	0.84
Angina	13.4		14.8	
No angina	12.1	0.41	24.9	0.08
Stroke	49.0		31.5	
No stroke	11.1	<0.001	23.0	0.11
Anemia	15.5		25.6	
No anemia	12.5	0.014	22.0	0.29
Top 4 quintiles of cognitive testing*	8.3		23.3	
Lowest quintile of cognitive testing*	23.2		20.9	
Unable to complete do cognitive test	48.4	<0.001	35.1	0.04
<b>Living arrangements</b>				
Living alone	14.5		22.1	
Living with one other person	16.2		24.1	
Living in 3-6 person household	11.8		25.3	
Living in 7+ person household	10.6	<0.001	22.6	0.90
Married or cohabiting	9.2		21.7	
Not married or cohabiting	15.4	<0.001	25.3	0.31
<b>Level of education <sup>a</sup></b>				
None	16.3		23.2	
Up to grade 7	10.1		25.3	
Grade 8 to 11	7.3		17.9	
Matriculation (grade 12) or above	5.7	<0.001	33.3	0.45
<b>Multimorbidity</b>				
0 or 1 comorbidities	11.0		24.6	
≥2 comorbidities	13.6	0.005	23.2	0.66
<b>Physical support quartile</b>				
Lowest	14.8		22.0	
Second most	9.4		22.1	
Third most	11.0		19.2	
Highest	13.7	<0.001	30.4	0.11
<b>In-person communication quartile</b>				
Lowest	14.3		26.1	
Second most	11.5		22.9	
Third most	11.5		21.9	
Highest	11.8	0.11	24.5	0.84

**Monthly household income (US\$)**

None	11.3		32.1	
<245	5.8		34.0	
245-362	16.0		19.0	
>362	12.7	<0.001	23.7	0.06

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	ADL impairment			Unmet need		
	Yes	No	p	Yes	No	p
Median Grip strength (kg)						
Males	23.2(14.2, 30.8)	31.8 (24.6, 37.9)	<0.001	21.8 (0.00, 28.6)	23.7 (14.9, 31.1)	0.25
Females	16.8 (9.9, 21.7)	23.1 (18.6, 27.9)	<0.001	15.0 (0.00, 21.0)	17.6 (11.4, 22.1)	0.02
Median Walk speed (m/s)						
Males	0.42 (0.00, 0.56)	0.63 (0.56, 0.83)	<0.001	0.50 (0.00, 0.63)	0.42 (0.00, 0.56)	0.68
Females	0.36 (0.00, 0.50)	0.63 (0.50, 0.83)	<0.001	0.38 (0.00, 0.56)	0.36 (0.00, 0.50)	0.68

ADLs: Activities of Daily Living. Values for continuous variables are medians and interquartile ranges, statistical tests are Pearsons chi-squared for categorical comparisons, and Mann-Whitney U test for continuous variables.

**Supplementary Table 2: Number of Activity of Daily Living impairments and level of unmet need, stratified into younger-old (40-59 years) and older-old (60+ years)**

	ADL impairment				Met need <sup>a</sup>		Of which (%): Partially met need <sup>b</sup>		Unmet need <sup>c</sup>	
	N		% of all respondents		40-59	60+	40-59	60+	40-59	60+
	40-59	60+	40-59	60+						
<b>Any impairment</b>	145	470	6.3	20.9	17.9	26.8	45.5	53.2	36.6	20.0
Walking	124	422	5.4	15.5	24.4	30.3	50.0	58.3	26.6	11.4
Eating	21	44	0.9	1.6	0.0	0.0	57.1	56.8	42.9	43.2
Bathing	55	169	2.4	6.2	21.8	24.3	56.4	62.7	21.8	13.0
Toileting	82	263	3.5	9.7	34.1	43.3	54.9	50.2	11.0	6.5
Bed transfer	67	223	2.9	8.2	38.9	39.0	50.7	54.7	10.4	6.3
Dressing	56	147	2.4	5.4	25.0	25.2	48.2	60.5	26.8	14.3
<b>Impairment count</b>										
1	47	165	2.0	6.1	25.6	44.2	40.4	37.6	34.0	18.2
2	28	79	1.2	2.9	14.3	39.2	57.1	53.2	28.6	7.6
3	24	91	1.0	3.3	25.0	15.4	45.8	72.5	29.2	12.1
4	12	37	0.5	1.4	16.7	13.6	25.0	45.9	58.3	40.5
5	22	62	1.0	2.3	9.1	3.2	54.5	72.6	36.4	24.2
6	12	35	0.5	1.3	0.0	0.0	41.7	51.4	58.3	48.6

ADLs: Activities of Daily Living. Sample sizes: n=2311 for those aged 40-59 and n=2723 for those aged 60+. For ‘any impairment’ and ‘impairment count’, <sup>a</sup> refers to all needs met, <sup>b</sup> to those with no unmet but  $\geq 1$  partially met need and <sup>c</sup> to  $\geq 1$  unmet need.

**Supplementary Figure 1. Median walk speed for each category of met or unmet need with walking activity.**

Difficulty	Help given	Walking aids	Category of need	Median (IQR) walk speed (m/s)	
				Men	Women
No problem	Help from others	-	Met need	0.50 (0.31-0.83)	0.33 (0.00-0.59)
	No help from others	Aids used No aids used	Met need No needs	0.45 (0.36-0.71) 0.63 (0.56-0.83)	0.42 (0.28-0.50) 0.63 (0.50-0.83)
Difficulty	Help from others	-	Partly met need	0.00 (0.00-0.42)	0.16 (0.00-0.50)
	No help from others	Aids used No aids used	Partly met need Unmet need	0.42 (0.00-0.56) 0.50 (0.45-0.65)	0.33 (0.00-0.45) 0.50 (0.30-0.56)
Cannot do	-	-	Unmet need	0 (0-0)	0 (0-0)

IQR: Inter-quartile range. m/s : meters per second.