

Appendix A: Additional Tables and Figures

Table A1: Dataset overview by country

Country	Survey	Panel	Dates	Sampling	Sample size	Age min.	Depression
United States	HRS	Sixteen waves	1992–2022	Representative panel (plus addtl cohorts)	12,652	51	CESD-10
Brazil	ELSI	One wave	2015	Nationally representative panel of people aged 50+	9,412	50	CESD-8
China	CHARLS	Four waves	2011, 2013, 2015, 2018	Representative panel of people aged 45+ and partners	17,705	45	CESD-10
Costa Rica	CRELES	Three waves for first cohort; Two waves for second cohort	2005, 2007, 2009, 2010, 2012	Representative panel of people aged 60+, with refreshment sample	2,827 (cohort 1); 2,798 (cohort 2)	60 (cohort 1); 55–65 (cohort 2)	GDS-15
India	LASI	One wave	2017	Cohort profile	72,262	45	CIDI-SF and CESD-10
Malawi	MLSFH	Seven waves (only wave 7 has depression measure)	1998, 2001, 2004, 2006, 2008, 2010, 2012	Representative of rural population in Malawi (85% of population) from three districts (Balaka, Mchinji, Rumphi)	1,402 (wave 7)	45	PHQ9 (wave 7)
Mexico	MHAS	Five waves for cohort (plus refreshment samples)	2001, 2003, 2012, 2015, 2018	Representative panel of people aged 50+ and partners living in private dwellings in rural and urban areas	15,402	50	CESD-9, binary indicators
South Africa	HAALSI	Two waves (third wave in progress)	2017, 2019, (2021)	Community members in Agincourt, South Africa	5,059	40	CESD-8, binary indicators (wave 1); CESD-20, frequency indicators (wave 2)
Tamil Nadu	—	Two waves	2019, 2021	Representative of elderly in state of Tamil Nadu, India, oversampling of elderly living alone	6,294	55	GDS-15

Notes: This table summarizes the datasets used in the cross-country comparison analysis. For each country, the table lists the name of the survey, the panel structure (number of data collection waves), dates of the data collection rounds, sampling frame, sample size of the original cohort surveyed in the baseline round of data collection, minimum age requirement to be in the study, as well as the questionnaire used to measure depression symptoms.

Table A2: Depression measures overview by country

Country	Measure	Response	Scale	Cutoff	Source
United States	CESD-8	Binary	0–8	4	Steffick et al. (2000)
Brazil	CESD-8	Binary	0–8	4	Steffick et al. (2000)
China	CESD-10	4-point scale	0–30	10	Chen and Fang (2020); Andresen et al. (1994)
Costa Rica	GDS-15	Binary	0–15	5	Yesavage and Sheikh (1986)
India	CESD-10	Binary	0–10	4	Steffick et al. (2000); Hossain et al. (2022)
Malawi	W7: PHQ9	4-point scale	0–27	5	Kohler et al. (2015)
Mexico	CESD-9	Binary	0–9	5	Torres and Wong (2013); Aguilar-Navarro et al. (2007)
South Africa	CESD-8	Binary	0–8	3	Steffick et al. (2000); Turvey et al. (1999)
Tamil Nadu	GDS-15	Binary	0–15	5	Yesavage and Sheikh (1986)

Notes: This table summarizes the methodology used to calculate the fraction of individuals who are likely depressed for each country. For each of the depression scales used, a depression index score is assigned to each respondent based on the number of depression symptoms reported in the questionnaire. For each survey, a cutoff score is chosen as the threshold above which an individual is likely to be depressed. The table lists the name of the survey, the questionnaire used to calculate depression symptom prevalence, the response format (e.g. what answers the respondent could have given in response to each question), the total range of the depression scale, the cut-off score used to determine whether an individual is likely to be depressed, and the reference from the literature that was used to determine the cut-off.

Table A3: Example questionnaires for CESD-10 and GDS-15

<p>CESD-10: Please indicate how often you have felt this way during the past week by using the rating scale provided.</p> <p><i>Responses: Rarely or none of the time (less than 1 day), Some or a little of the time (1-2 days), Occasionally or a moderate amount of time (3-4 days), Most of the time (5-7 days)</i></p>
<ol style="list-style-type: none"> 1. I was bothered by things that usually don't bother me 2. I had trouble keeping my mind on what I was doing. 3. I felt depressed. 4. I felt that everything I did was an effort. 5. I felt hopeful about the future. 6. I felt fearful. 7. My sleep was restless. 8. I was happy. 9. I felt lonely. 10. I could not "get going."
<p>GDS-15: Choose the best answer for how you have felt over the past week.</p> <p><i>Responses: Yes, No</i></p>
<ol style="list-style-type: none"> 1. Are you basically satisfied with your life? 2. Have you dropped many of your activities and interests? 3. Do you feel that your life is empty? 4. Do you often get bored? 5. Are you in good spirits most of the time? 6. Are you afraid that something bad is going to happen to you? 7. Do you feel happy most of the time? 8. Do you often feel helpless? 9. Do you prefer to stay at home, rather than going out and doing new things? 10. Do you feel you have more problems with memory than most? 11. Do you think it is wonderful to be alive now? 12. Do you feel pretty worthless the way you are now? 13. Do you feel full of energy? 14. Do you feel that your situation is hopeless? 15. Do you think that most people are better off than you are?

Notes: This table lists the ten symptoms that are asked about in one shortened version of the Center for Epidemiological Studies Depression Scale (CESD) and 15 symptoms that are asked about in the shortened version of the Geriatric Depression Scale (GDS-15). For most of the surveys in our data that used CESD questionnaires, the questions were further simplified so that responses were binary indicators (Yes/No), and the question was modified to ask about whether the listed symptom was experienced most of the time in the past week. See [Andresen et al. \(1994\)](#) and [Yesavage and Sheikh \(1986\)](#) for more details.

Table A4: Likelihood of depression, diagnosis, and treatment

Country	Depression	Pct of sample	Pct ever diagnosed	Pct medication	Pct other treatment
China	Not likely depr	54.7	0.7	0.3	0
China	Likely depr	35.7	2.3	1	0.2
India (Tamil Nadu)	Not likely depr	57.1	1.9	0.2	—
India (Tamil Nadu)	Likely depr	34.7	3.9	0.6	—

Notes: This table compares the proportion of the population that is likely to be depressed (following the methodology outlined in Table A2) to the proportion of the population that has ever been diagnosed with any “emotional, nervous, psychiatric problems” (including depression and anxiety, among other conditions). For the China Health and Retirement Longitudinal Study study, there were also questions about whether the respondent is currently taking medication for psychiatric conditions or receiving any psychological treatment. For the Tamil Nadu study in India, respondents are only asked about whether they are taking medication for any “emotional, nervous, mental health, or psychiatric problems.” Note that only those who respond “yes” to having ever been diagnosed with a mental health problem are asked about whether they take medication for the problem.

Table A5: Empirical pairwise tests among age, gender, and country groups

<i>Panel A: International versus United States</i>		
Group	US	Intl - US (s.e.)
Men - 55-60	0.127	0.128 (0.01)
Men - 61-70	0.113	0.151 (0.009)
Men - 71-80	0.082	0.204 (0.011)
Men - 81 and over	0.126	0.242 (0.018)
Women - 55-60	0.182	0.161 (0.01)
Women - 61-70	0.140	0.216 (0.009)
Women - 71-80	0.145	0.244 (0.011)
Women - 81 and over	0.179	0.239 (0.015)
<i>Panel B: Old (above 71) versus young (70 and below)</i>		
Group	Young	Old - Young (s.e.)
Men - Intl	0.260	0.047 (0.005)
Men - US	0.119	-0.024 (0.008)
Women - Intl	0.350	0.047 (0.005)
Women - US	0.158	-0.001 (0.008)
<i>Panel C: Women versus men (Non-US only)</i>		
Group	Men	Women - Men (s.e.)
Intl - 55-60	0.255	0.088 (0.006)
Intl - 61-70	0.264	0.092 (0.005)
Intl - 71-80	0.286	0.103 (0.008)
Intl - 81 and over	0.368	0.05 (0.013)
<i>Panel D: Living alone versus Living with others (Non-US only)</i>		
Group	Living w others	Alone - Others (s.e.)
Men - 55-60	0.254	0.053 (0.024)
Men - 61-70	0.259	0.104 (0.018)
Men - 71-80	0.279	0.095 (0.02)
Men - 81 and over	0.362	0.068 (0.034)
Women - 55-60	0.338	0.121 (0.02)
Women - 61-70	0.346	0.11 (0.013)
Women - 71-80	0.374	0.099 (0.016)
Women - 81 and over	0.405	0.077 (0.023)

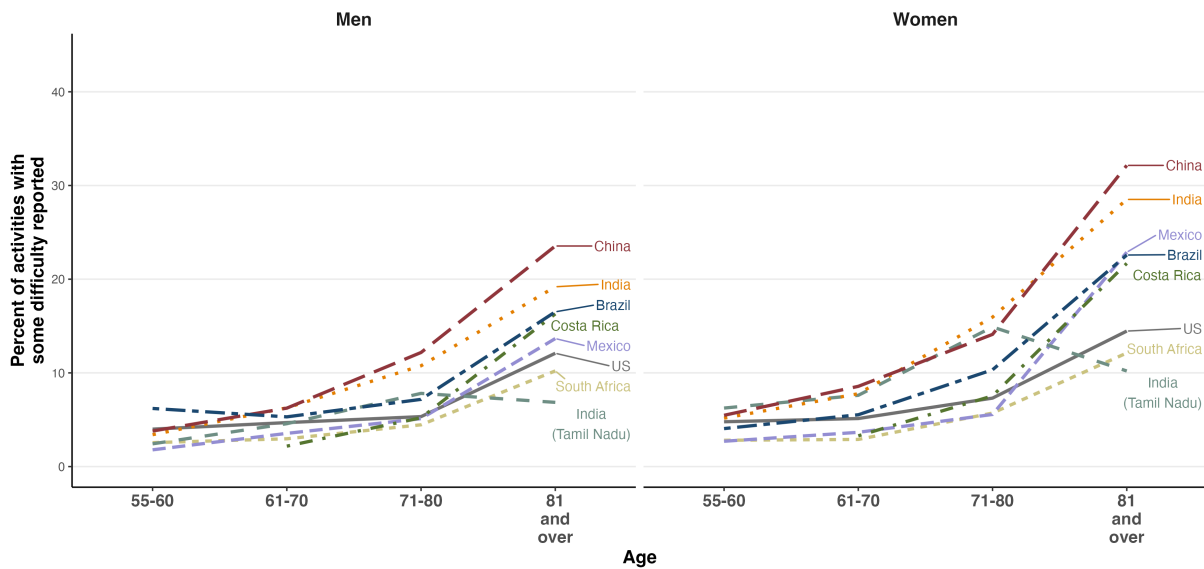
Notes: Observations are reweighted so that relative survey weights for national representativeness are maintained while across-country comparisons are weighted by number of observations in each country dataset. Standard errors of group differences are shown in parentheses.

Table A6: Regressions of depression on demographics

	Likely depressed			
	Intl vs US	Men vs Women	Older vs Young	Living alone vs not
	(1)	(2)	(3)	(4)
Is Intl	0.187*** (0.004)			
Women		0.043*** (0.007)		
Is Intl x Women		0.046*** (0.008)		
Age			-0.001 (0.0004)	
Age x Is Intl			0.004*** (0.0004)	
Alone				0.073*** (0.008)
Alone x Is Intl				0.038*** (0.010)
Avg depr in US (all groups)	0.138	—	—	—
Control for gender	X		X	X
Control for age bin	X	X		X
Control for country		X	X	X
Observations	93,670	93,670	93,670	93,670
R ²	0.033	0.051	0.051	0.046

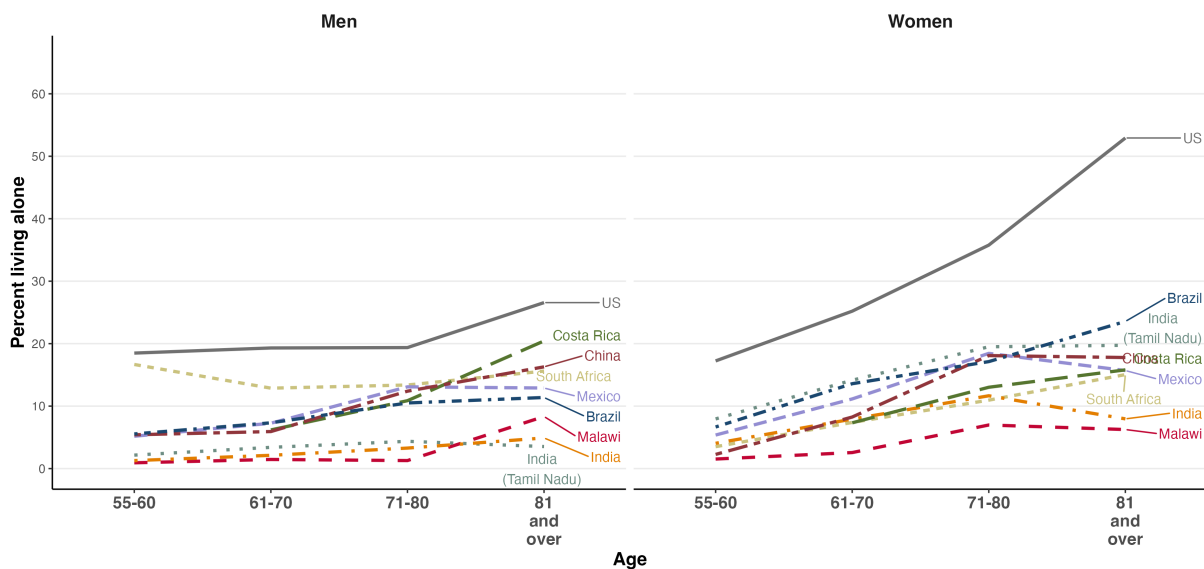
Note: This table shows regressions that test whether the fraction likely depressed differs (i) between low- and middle-income countries and the US, (ii) across gender (iii) across age; and (iv) across living arrangements (alone vs. not). The dataset pools all observations from the various datasets including the US. “Is Intl” refers to whether the person is not from the United States (i.e. not from the HRS). *p<0.1; **p<0.05; ***p<0.01. Observations are reweighted so that relative survey weights for national representativeness are maintained while across-country comparisons are weighted by number of observations in each country dataset.

Figure A1: Average functional impairment by gender, age, and country
Functional impairment by gender, age, and country



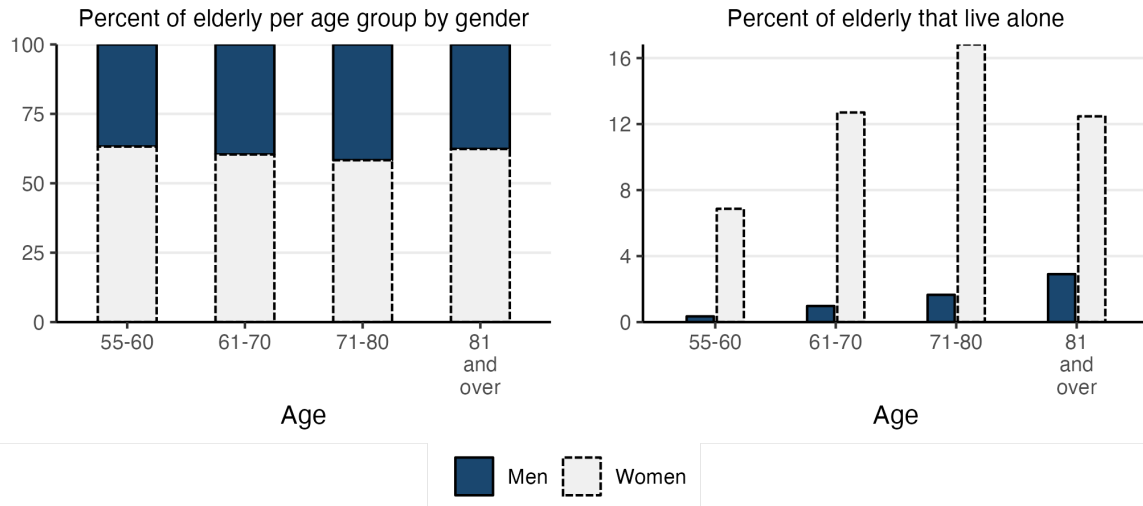
Notes: This figure shows the average share of Activities of Daily Living for which respondents reported having some difficulty for each country, age group, and gender. For India (Tamil Nadu) data, the y-axis corresponds to the share of activities for which the respondent reported having severe or extreme difficulty, whereas for the other countries we report the share of activities for which the respondent reported having some difficulty (often asked as a binary yes or no response question).

Figure A2: Share of elders living alone by age, gender, and country
Living alone by gender, age, and country



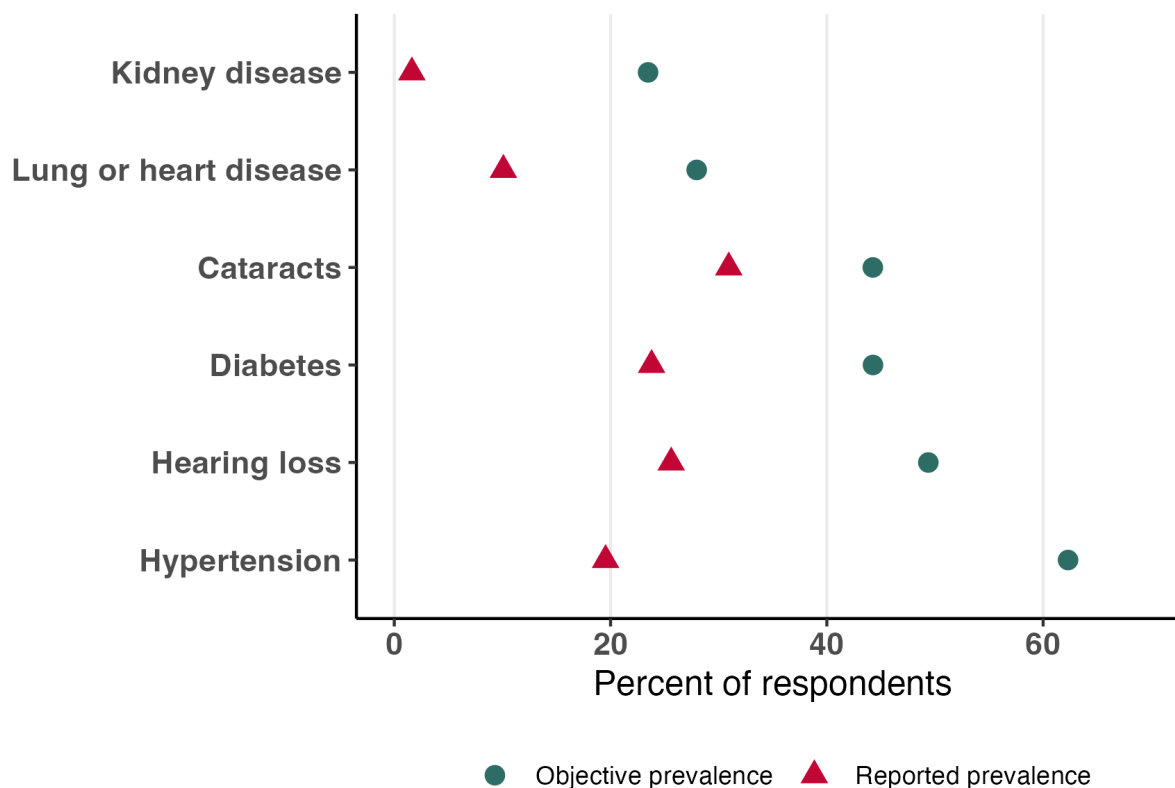
Notes: This figure shows the share of elders who are living alone for each country, age group, and gender.

Figure A3: Elder demographics and living arrangements by age and gender



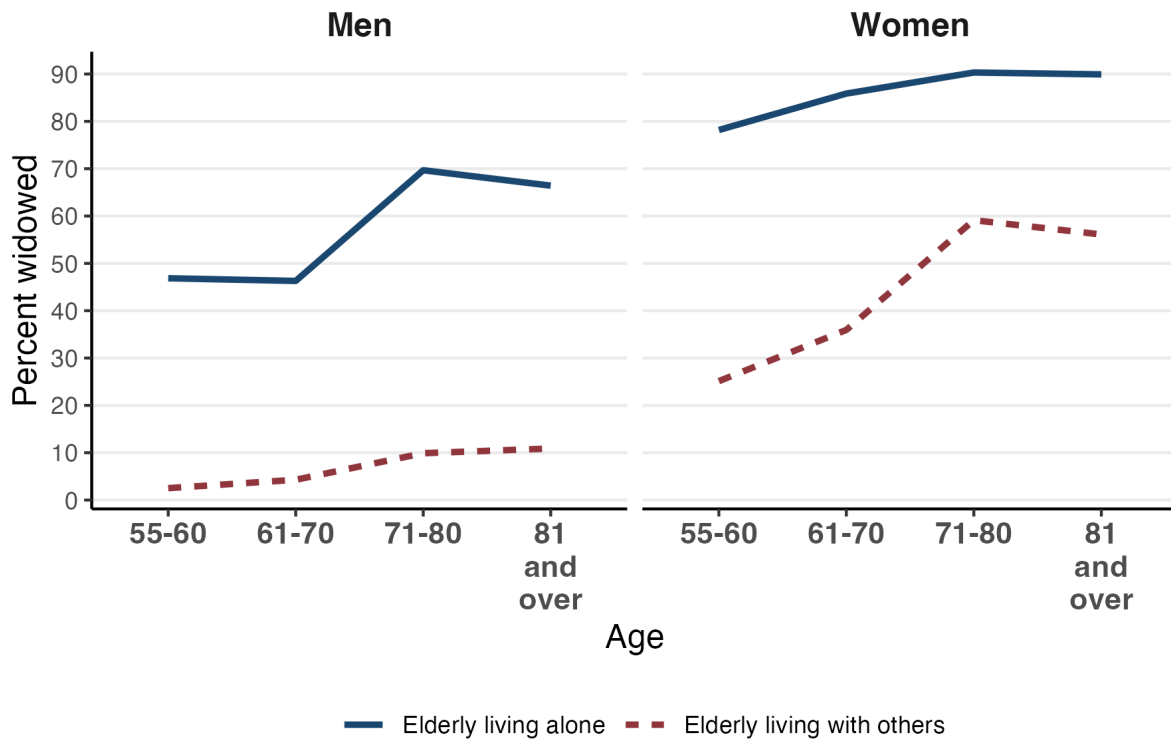
Notes: This figure shows the elder demographics and living arrangements from the listing activity of the Tamil Nadu panel. The left panel of the figure shows the percentage of the elderly by gender for each age group. The right panel shows the fraction of elderly living alone for each age category and gender as a share of the total population of elderly surveyed in the census exercise ($N = 43,548$) for the Tamil Nadu survey data. See the Data Construction section in the Appendix for more details on sampling design.

Figure A4: Discrepancy between health condition prevalence and awareness among the elderly



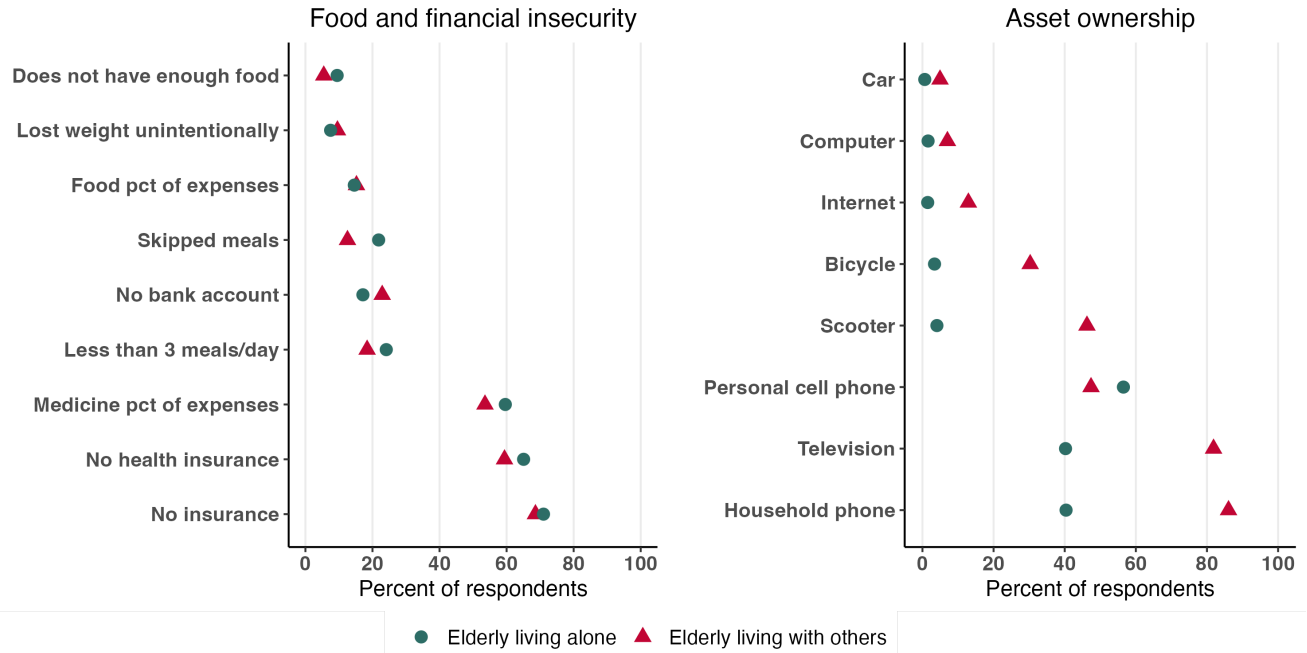
Notes: This figure shows discrepancies between own-health awareness and objectively measured disease prevalence in Tamil Nadu. To construct a measure of objective disease prevalence, we rely on the set of objective health measurements taken for a subset of the study respondents. For arthritis, the c reactive protein level had to be greater than 3g/ml. For lung or heart disease, the measured SPO2 had to be less than 94 or the respiratory rate greater than 18 for those without mobility impairments or greater than 25 for those bedridden or with mobility impairments. For kidney disease, the serum creatinine level had to be greater than 1.2 for women and greater than 1.4 for men. For hearing loss, the medical examiner had to record any one of the following: hearing loss in either ear, failed ear exam in either ear, or failed Rinne or Weber hearing tests. For cataracts, medical examiner had to record cataract presence in either eye during eye exam. For diabetes, the measured level of HbA1c had to be greater than or equal to 6.5. For hypertension, the measured systolic blood pressure exceeded 130 and/or diastolic blood pressure exceeded 80. To construct a measure of self-reported disease prevalence we used the following survey questions. For arthritis, either respondent or proxy had to report that the respondent was diagnosed with arthritis or a similar joint disease. For lung or heart disease, either respondent or proxy had to report that the respondent was either: diagnosed with a heart problem; diagnosed with chronic lung disease; or diagnosed with tuberculosis. For kidney disease, either respondent or proxy had to report that the respondent was diagnosed with a kidney condition. For hearing loss, either respondent or proxy had to report that the respondent has difficulty hearing or that they have been prescribed a hearing aid. For cataracts, either respondent or proxy had to report that the respondent has been diagnosed with cataracts. For diabetes, either respondent or proxy had to report that the respondent has been diagnosed with diabetes. For hypertension, either respondent or proxy reports that the respondent has been diagnosed with hypertension.

Figure A5: Widowhood among the elderly living alone



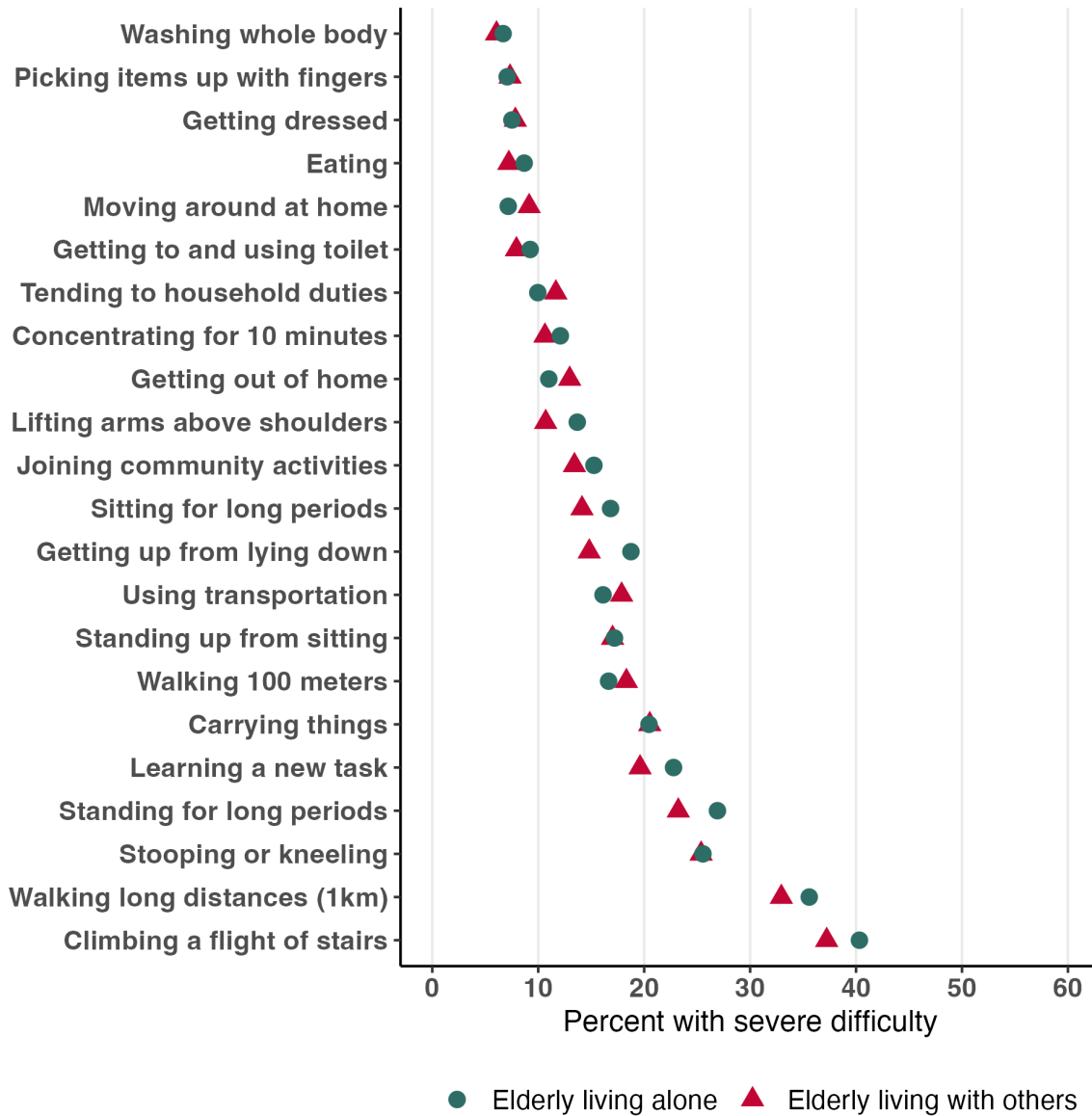
Notes: This figure shows the percent of male and female elderly living alone (male N = 225; female N = 1,309) versus elderly living with others (male N = 2,283; female N = 2,476) who were widowed at the time of the baseline survey in Tamil Nadu. Respondents are marked as widowed based on their response to a question about their marital status.

Figure A6: Financial well-being among the elderly living alone



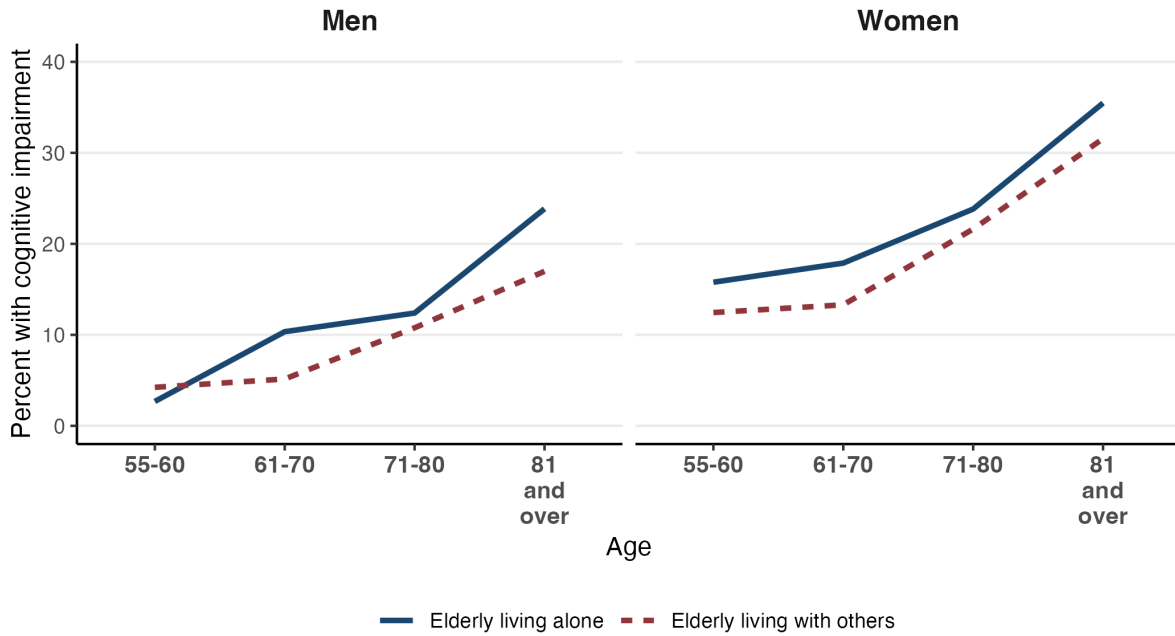
Notes: This figure shows the fraction of respondents who answered affirmatively to each question asked about various indicators of financial insecurity and about ownership of various assets, separately for the elderly living alone and elderly living with others in Tamil Nadu. We control for age and gender interacted, in the same methodology as the construction for cross-country comparison figures.

Figure A7: Functional impairment among the elderly living alone



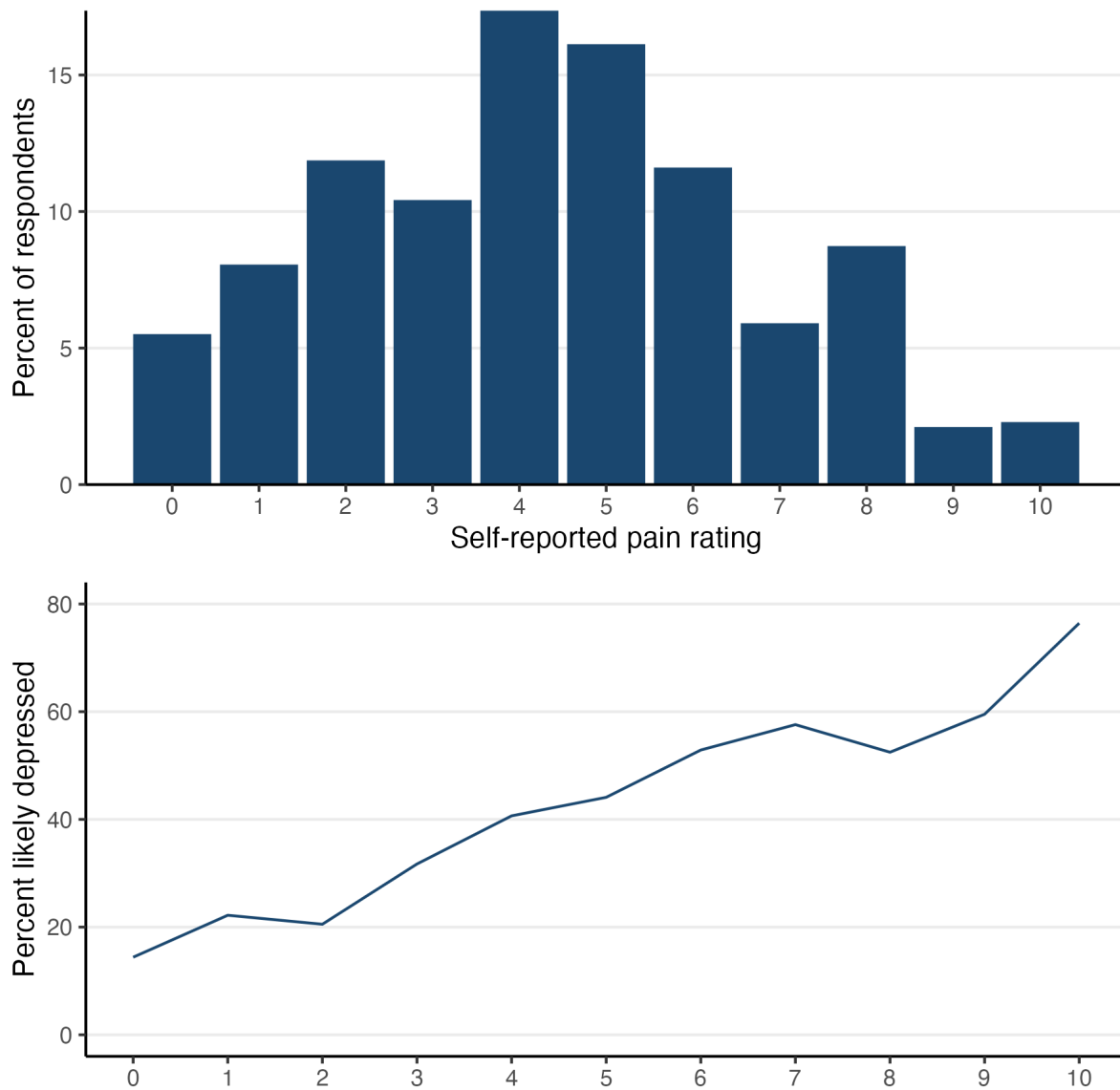
Notes: This figure shows the percentage of elderly living alone (N = 1,453) and elderly living with others (N = 4,408) who report having severe or extreme difficulty carrying out the specified tasks independently in Tamil Nadu. The 22 listed tasks are based on the activities of daily living and instrumental activities of daily living that the World Health Organization included in their Study on Global Ageing and Adult Health. The figure controls for age and gender interacted, following a similar methodology to the construction for cross-country comparison figures.

Figure A8: Cognitive impairment among the elderly living alone



Notes: This figure shows the percentage of male and female elderly living alone (male N = 228; female N = 1,297) versus elderly living with others (male N = 2,276; female N = 2,463) who demonstrate mild-to-severe or severe cognitive impairment by age group in Tamil Nadu. Cognitive impairment is determined by responses to the Hindi Mental State Examination, which is an adapted version of the Mini-Mental State Examination, a standard 30-item test of cognition, for low-literacy settings. Cognitive impairment corresponds to 10 or more incorrect items on the 30-item assessment.

Figure A9: Distribution of self-rated pain levels and depression rates by self-rated pain



Notes: This figure uses data from the follow-up wave in 2022 for the Tamil Nadu study, in which a question was added on self-reported pain. The question asked: In the last week, how much physical pain would you say you have been in on a scale of 0-10, with 0 being “No Pain” and 10 being “Worst Pain possible”. For this question, about 20 percent of pain ratings are missing from the data (1,138 observations missing) due to proxy respondents, refusals, and responses of not knowing. The top panel shows the distribution of respondents who reported pain levels for each level between 0 and 10. The bottom panel shows the percentage of individuals who are likely depressed for each level of pain.

Appendix B: Data Construction Details

1. **Activities of Daily Living (ADLs).** The six activities asked about are: dressing, eating, bathing, getting in and out of bed, using the toilet, and walking across the room. For China, the sixth activity was controlling urination and defecation instead. Responses with more than two activities missing were dropped from this analysis.
2. **Survey waves used in analysis.** Except for the US and Malawi, the two waves used for comparison consist of the first (baseline) and second waves of each study. For the US, we use data from the 2014 and 2016 waves (the two most recent non-COVID waves with non-missing survey response weights). For Malawi, we use data from the 2012 wave. Specific dates of each survey can be found in Appendix Table A3.
3. **Controls for age and gender.** In several figures, we control for age and gender (interacted) in the following way: for a given country, we first take the weighted average of the outcome for those who are not likely depressed to construct the “Not likely depressed” average. Then, we add to this the regression coefficient on an indicator for whether an individual was likely to be depressed, controlling for interactions between each age bin and gender to construct the “Likely depressed” average. These are then the two averages shown for each country, for both outcomes.
4. **Survey weights for representative estimates.** When available, survey weights are used to calculate averages that are representative of older adults in each country or area.
5. **Depression measurements across surveys.** Details on the different depression scales we use and an example of a standard questionnaire are presented in Appendix Tables A2 and A3 (which also include details on our cutoff selection). Most studies in the HRS family use a version of the Center for Epidemiological Studies Depression Scale (CES-D) with 8, 9, 10, or 15 questions. One study uses the Geriatric Depression Scale (GDS), which was specifically designed to screen for depression in the elderly; in validations, it has shown similar accuracy to the CES-D (Yesavage et al., 1983; Wancata et al., 2006). Another study uses the Patient Health Questionnaire (PHQ-9), which has also been validated across many contexts (Moriarty et al., 2015). This depression measure is coded as missing for those who missed more than one third of the questions. For example, if an individual did not respond to more than 5 out of 15 questions for the GDS-15, we code that response as missing and do not include that observation in the analysis. For those who missed fewer than one third of questions, we rescale the raw score proportionally so that it is interpretable as a value out of the total number of questions in the index, in line with the guidelines outlined for the GDS from Yesavage et al (1986).
6. **Cognition score (MMSE).** For a measure of cognitive impairment, we use an inverted transformation of the MMSE score, which is usually scored from 0 to 30 where higher values correspond to higher cognitive functioning. Instead, we construct a measure of cognitive impairment by subtracting the raw MMSE score from the total possible points out of 30, so that higher values correspond to more severe cognitive impairment and any respondent with a score above a certain threshold is classified as having “At least mild cognitive impairment”. In our data, we present the share of respondents with at least mild cognitive impairment. Note that some items on the test require being physically able to use their hands or to speak out loud. Except for the case in which questions can’t be answered by physically impaired respondents, as agreed by the survey team, most missing values (e.g. refused, don’t know, other) are counted as not being able to perform the task.
7. **Sampling design for Tamil Nadu data.** The population surveyed is comprised of elderly from five districts of Tamil Nadu, chosen to reflect the diversity of living situations across the state: Greater Chennai, Dharmapuri, Kanyakumari, Tiruvannamalai, and Trichy. Urban and rural locales in these districts were selected for the panel through a multi-stage sampling procedure. Elderly living alone and elderly who were not receiving the Old-Age Pension but were likely eligible for it were over-sampled. Sampling weights in the dataset adjust for the sampling process, weighting individuals within a district to generate statistics representative of the district, while giving each district an equal weight since the five districts were selected to reflect different living conditions. For more information on the sampling procedure and weight construction, please refer to the explanation in the data repository: <https://doi.org/10.7910/DVN/SXEYFW>.

References

- Aguilar-Navarro, S. G., A. Fuentes-Cantú, J. A. Ávila-Funes, and E. J. García-Mayo (2007). Validez y confiabilidad del cuestionario del enasem para la depresión en adultos mayores. *salud pública de méxico* 49(4), 256–262.
- Andresen, E. M., J. A. Malmgren, W. B. Carter, and D. L. Patrick (1994, March). Screening for depression in well older adults: Evaluation of a short form of the CES-d. *American Journal of Preventive Medicine* 10(2), 77–84.
- Chen, Y. and H. Fang (2020). The state of mental health among the elderly chinese. *NBER Working Paper 16690*.
- Hossain, B., V. P. Nagargoje, M. I. K. Sk, and J. Das (2022, 12). Social exclusion and mental health among older adults: cross-sectional evidence from a population-based survey in india. *BMC Psychiatry* 22.
- Kohler, H. P., S. C. Watkins, J. R. Behrman, P. Anglewicz, I. V. Kohler, R. L. Thornton, J. Mkandawire, H. Honde, A. Hawara, B. Chilima, C. Bandawe, V. Mwapasa, P. Fleming, and L. Kalilani-Phiri (2015, 5). Cohort profile: The malawi longitudinal study of families and health (mlsfh). *International Journal of Epidemiology* 44, 394–404.
- Moriarty, A. S., S. Gilbody, D. McMillan, and L. Manea (2015). Screening and case finding for major depressive disorder using the patient health questionnaire (phq-9): A meta-analysis. *General Hospital Psychiatry* 37(6), 567–76.
- Steffick, D. E., R. B. Wallace, A. R. Herzog, et al. (2000). Documentation of affective functioning measures in the health and retirement study. *Ann Arbor, MI: University of Michigan*, 15.
- Torres, J. M. and R. Wong (2013). Childhood poverty and depressive symptoms for older adults in mexico: a life-course analysis. *Journal of cross-cultural gerontology* 28, 317–337.
- Turvey, C. L., R. B. Wallace, and R. Herzog (1999). A revised ces-d measure of depressive symptoms and a dsm-based measure of major depressive episodes in the elderly. *International psychogeriatrics* 11(2), 139–148.
- Wancata, J., R. Alexandrowicz, B. Marquart, M. Weiss, and F. Friedrich (2006). The criterion validity of the geriatric depression scale: a systematic review. *Acta Psychiatrica Scandinavica* 114(6), 398–410.
- Yesavage, J. A., T. Brink, T. L. Rose, O. Lum, V. Huang, M. Adey, and V. O. Leirer (1983). Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research* 17(1), 37–49.
- Yesavage, J. A. and J. I. Sheikh (1986). Geriatric depression scale (gds): recent evidence and development of a shorter version. *Clinical Gerontologist: The Journal of Aging and Mental Health*.