Study on global AGEing and adult health (SAGE):
Food insecurity in relation to physical, cognitive, and emotional challenges among older adults

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Introduction

Food security is considered a basic measure of population well-being. Even though older adults are recognized as an age group at risk, comparatively little food security research has been conducted among aging populations (Quandt et al., 2001).

Traditionally, "food insecurity" has been defined as, "whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain" (Parker, 1991). In recent decades, researchers have broadened this definition to capture determinants of older adult food insecurity such as limited or uncertain ability to acquire food (e.g., "too hard to get to the store"), and inability to prepare, gain access to, and/or eat food that is available in the household because of functional impairments (Wolfe et al., 2003; Lee & Frongillo, 2001). Research guided by this broader perspective has now established that older adult food insecurity is linked to physical and mental health conditions that may become more prevalent with age (Sharkey et al., 2002). Further, the risks may be intensified for women, individuals with lower education and income, rural residents, and marginalized groups (e.g., ethnic/racial minorities) whose experiences of social and occupational inequities over the life course may translate into higher risk of food insecurity in older years (Kaida & Boyd, 2011). Despite these valuable insights, knowledge gaps remain as nearly all research on older adult food insecurity has been conducted in the U.S. and Canada, and Europe.

Objective

To increase understanding of food insecurity among older adults worldwide, the current study investigated links between food insecurity and physical, cognitive, and affective well-being using data from the World Health Organization's Study on global AGEing and adult health (SAGE) conducted in the six middle income countries of China, Ghana, India, Mexico, Russia, and South Africa.

Participants, Methods & Procedures

The present study investigates links between physical and mental health conditions and food insecurity among adult participants 60 years and older (n=20,863) in SAGE Wave 1 (2007-2010). SAGE is a longitudinal study with nationally representative samples of persons aged 50+ years in China, Ghana, India, Mexico, Russia and South Africa(Kowal et al., 2012). These countries provide a broad representation from different geographic regions of the world, different stages in the demographic, economic and health transition, and include the two most populous countries of the world.

The SAGE website (www.who.int/healthinfo /sage) provides additional details and access to survey materials.

Food insecurity was appraised through two questions that asked participants how often in the last 12 months **a**) they had eaten less than they felt they should because there wasn't enough food, and **b**) were hungry but didn't eat because they couldn't afford enough food. Responses for both items were based on a 5-point Likert-type scale appraising frequency of hunger or limited food consumption (1 = every month to 4 = only 1 or 2 months to 5 = never) and were

Comment [T1]: HRS in the year 2000 includes: In the last two years, have you always had enough money to buy the food you need?

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recoded into a single dichotomous variable reflecting ever or never having experienced hunger or limiting one's food consumption. **Physical mobility** was measured through two separate items: **a**) a timed walk variable and **b**) self-reported difficulty performing household activities (both variables were included separately in final models). Three cognitive performance tests were used to create a z-scored summary variable of **cognitive function** for each participant; tests included immediate and delayed verbal recall, forward and backward digit span, and verbal fluency. **Depression** was reflected in a dichotomous variable (0 = no; 1 = yes) based on symptom reporting and algorithm to assign diagnosis based on the World Mental Health CIDI (Kessler et al., 2010).

Logistic regression was used to identify predictors of food insecurity controlling for key covariates (sex, age, stable household income, urban/rural residence, and highest level of schooling completed). Several indicators affirm the fit of nearly all country data with the model; the omnibus test for China (p = .10) raises questions as to the adequacy of model fit, which may be due to the very low rate of food insecurity reported by Chinese participants (at 1.3%). Statistical analyses were performed using SPSS 21.0.

Key Findings

Overall prevalence. Among SAGE adults 60 years and older, 15.7% reported they ate less because of insufficient food, and 11.9% reported they experienced hunger in the past year, with both variables combined to reflect an overall prevalence of food insecurity at 15.8%. When examined separately by country, Chinese adults reported the lowest food insecurity (1.3%), with Ghanaian adults reporting the highest prevalence (41.8%). India (16.1%), Mexico (25.1%), South Africa (25.0%), and Russia (14.4%) all reported higher rates than that for a similar age cohort in the U.S. (at 12.0%; Ziliak & Gundersen, 2011). Logistic regression results (**Table 1**; significant findings = p < .01) suggest that poorer **physical mobility** increases the likelihood of food insecurity among Indian and Mexican older adults by 27.2% and 32.2%, respectively. Poorer **cognitive function** among South African adults predicted a 29.5% increase in food insecurity. In contrast, poorer cognitive function among Ghanaian adults predicted a 34.3% *decrease* in food insecurity. **Depression** increased the odds of older adult food insecurity in Ghana (489.6%) and South Africa (258.6%).

Conclusions

Current study findings allow for comparison of older adult food insecurity prevalence in high and middle income nations. Compared to the rate of 12% older adult food insecurity in the U.S., only one nation, China, reported a lower rate, with Russian and Indian rates slightly higher than found in the U.S.

Findings indicate important country differences in predictors of older adult food insecurity. South African adults confront multiple and interrelated cognitive, emotional, and physical risks for food insecurity (confirmed in follow-on Pearson's correlations; data not shown here).

Indian and Mexican adults' food security appears related to physical mobility, with Ghanaians' food security most challenged by depression. The finding that Ghanaian older adults faced reduced food insecurity risk with lower cognitive function is surprising given prior work showing that poorer cognitive function among older adults is associated with increased food insecurity (Gao et al., 2009). Fulfillment of filial obligations may account for this finding in older Ghanaianadults (Aboderin 2005). Finally, none of the three predictor variables were associated with older adult food insecurity in China or Russia.

Findings suggest that older adults' vulnerability to food insecurity is intimately linked to country-specific cultural, social, and economic values and conditions. These may include distinct cultural meanings of aging and related elevations or demotions in the social status of aging adults, and varying senses of social obligation by families and communities and by

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economic and social institutions (e.g., government services). Further, though the present study focused on depression and physical and cognitive function, results from logistic regression indicate that certain sociodemographic factors (e.g., poverty in Russia) may exert greater influence on older adult risk of food insecurity. These results suggest multiple targets of policy and public health intervention to reduce risks of older adult food insecurity in middle income nations.

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Table 1. Results of logistic regression on predictors of food insecurity among older adult SAGE participants.

Country	Variables	B	S.E.	Sig.	Exp(B)
China	Sex	.122	.276	.659	1.130
	Age	-.020	.024	.396	.980
	URREC	.228	.339	.502	1.256
	SchoolR	.246	.133	.063	1.279
	income	-.552	.355	.120	.576
	Depression	.975	.544	.073	2.651
	Walk	-.072	.115	.530	.930
	DffHs	.271	.158	.087	1.311
	ZCognitionComposite	.175	.166	.294	1.191
	Constant	-4.253	1.934	.028	.014
Ghana	Sex	-.300	.186	.106	.741
	Age	.002	.013	.851	1.002
	URREC	.035	.183	.850	1.035
	SchoolR	-.210	.066	.002	.811
	income	-1.489	.227	.000	.225
	Depression	1.774	.283	.000	5.896
	Walk	.009	.012	.435	1.009
	DffHs	.159	.090	.078	1.172
	ZCognitionComposite	.295	.097	.002	1.343
	Constant	.037	1.015	.971	1.038
India	Sex	-.132	.205	.520	.876
	Age	-.007	.013	.559	.993
	URREC	.099	.203	.625	1.104
	SchoolR	-.263	.085	.002	.769
	income	-1.535	.190	.000	.215
	Depression	-.227	.223	.310	.797
	Walk	-.057	.044	.199	.945
	DffHs	.240	.081	.003	1.272
	ZCognitionComposite	-.049	.103	.633	.952
	Constant	.065	1.054	.951	1.068
Mexico	Sex	-.034	.152	.824	.967
	Age	-.041	.011	.000	.960
	URREC	.010	.163	.953	1.010
	SchoolR	-.348	.080	.000	.706
	income	-1.204	.204	.000	.300
	Depression	.443	.201	.028	1.557
	Walk	.024	.020	.250	1.024
	DffHs	.279	.067	.000	1.322
	ZCognitionComposite	-.011	.108	.922	.990
	Constant	1.568	.858	.068	4.799
South Africa	Sex	-.063	.162	.698	.939
	Age	-.026	.012	.033	.974
	URREC	-.055	.182	.761	.946
	SchoolR	-.177	.088	.044	.837
	income	-1.413	.187	.000	.243
	Depression	1.277	.324	.000	3.586
	Walk	.011	.008	.202	1.011
	DffHs	.058	.079	.459	1.060
	ZCognitionComposite	-.349	.092	.000	.705
	Constant	1.520	.910	.095	4.571
Russia	Sex	.130	.195	.504	1.139
	Age	-.026	.014	.055	.974
	URREC	-.300	.214	.162	.741
	SchoolR	-.216	.095	.023	.805
	income	-1.810	.252	.000	.164
	Depression	.544	.238	.022	1.723
	Walk	.020	.012	.089	1.020
	DffHs	.217	.092	.019	1.243
	ZCognitionComposite	.108	.112	.334	1.114
	Constant	-.250	1.194	.834	.778

Key: URREC: urban/rural; DffHs: difficulty with household activities.

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