



Association between socioeconomic status and physical functioning among older adults in Ghana

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Abstract

Aim Physical function is a crucial part of healthy aging, as poor physical function increases the risk of adverse health issues such as impairment and mortality. There has been extensive research on the association between socioeconomic status and physical function, but this interaction is not really clear, particularly for older adults. This study is therefore aimed at examining the association between the socioeconomic status of the elderly and their physical functioning.

Subject and methods The data were derived from the Study on Global AGEing and Adult Health (SAGE) Wave 1 (2007–2010) of the World Health Organization ($n = 3710$). We measured physical functioning by assessing activities of daily living (ADL) and instrumental activities of daily living (IADL). Educational achievement, household income, access to healthcare and financial resources were assessed for the socioeconomic status.

Results The findings suggest that older adults with higher education and high income would likely maintain their physical function as they age. Those without access to healthcare services and insufficient financial resources will possibly have poor functioning of ADL and IADL.

Conclusion Our findings suggest that low socioeconomic status might have a negative impact on older adults' physical functioning. To facilitate a lifestyle that would enable older adults to maintain their physical function, the association between socioeconomic status and physical functioning should be examined.

Keywords Socioeconomic status · Physical functioning · Aging · Geriatrics · Non-Western societies

Introduction

The elderly population is increasing worldwide, and research findings from the past decade show that this is due to enhanced life expectancy and a decrease in mortality rates

(DeSA 2013). In addition, improved health and economic growth have created a favorable environment for this trend in a number of developing countries. However, the elderly are highly vulnerable to morbidity and mortality (WHO 2003; Thoa et al. 2013). Although there is consequently a broad debate on the need to enhance their living standards, in several developing countries this issue has still not been given adequate attention in the field of development policy.

Even though the aging population is often identified with advanced societies like America, Europe and Japan, this trend is also slowly gaining recognition in developing countries. In several regions of the developing world, including sub-Saharan Africa, the percentage of elderly people is projected to increase rapidly (Desa 2015; Rosenberg 2010). The elderly population is rising, with ever more problems, and chronic illnesses and disorders among them are excessively high. This drives up the demand for medical care and other social services. Due to their low economic growth, poor health services and minimal social security initiatives, addressing the

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needs of older adults in the developing world, particularly in sub-Saharan Africa, is, and will remain, a challenge.

Ghana's population is young compared with that of Western developed nations, as is the case for most sub-Saharan African countries. Over the past four decades, however, the number of older adults in the country has increased significantly (Aboderin and Beard 2015; Debpuur et al. 2010; Mba 2006). According to the Ghana Statistical Service, this number grew to approximately 1,600,000 in 2010, up from only about 200,000 older people in 1960 (Ghana Statistical Service 2010). In 2030, it is anticipated that the number will have increased to 2,400,000, and by 2050 will have doubled to 4,800,000. In 2015, the elderly comprised about 5.7% of the country's total population (United Nations 2015). While this number is relatively low compared with countries in the northern global economy, Ghana still has one of the world's fastest growing and oldest populations (Global AgeWatch Index 2015; Mba 2010).

Physical limitations and impairment have a negative effect on the living conditions of older people and put pressure on the individuals themselves, their families and society as a whole. Although improvements in economic conditions, medical technology, and healthcare systems help enhance older people's overall health, extended life expectancy also increases the risk of impairment (Gruenberg 1977). Preserving physical function is therefore a crucial part of healthy aging, as poor physical function increases the likelihood of negative health effects such as impairment, hospitalization and death (Cesari et al. 2009; Cooper et al. 2010; Onder et al. 2005). In addition, physical functioning outcomes are an essential component of healthcare, as they correlate with the ability to perform required daily functions independently. Physical impairment has therefore been described as discomfort in performing activities in any sphere of life, owing to a health or physical issue (Verbrugge and Jette 1994). It is often also defined as weakness in activities of daily living (ADL) and instrumental activities of daily living (IADL).

Socioeconomic status indicators have shown strong associations with health in older adults, which often impact on mortality, morbidity and a number of health conditions (Preston and Taubman 1994). The effect of socioeconomic factors on well-being has been investigated in many older adult societies around the world. Many studies (Kitagawa and Hauser 1973; Townsend and Davidson 1982; Marmot et al. 1984) have identified an ongoing correlation between higher socioeconomic status and better physical functioning. Several assessments in Western developed countries have resulted in similar findings (Dennis et al. 1993; Rogers 1992; Pappas et al. 1993). Often, this association can be linked to multiple dynamic psychosocial mechanisms such as lifestyle habits, social support, anxiety, feelings of self-efficacy and environmental conditions (House et al. 1994). The relationship is generally now regarded as so universal that physical

functioning among older adults in every society has been proven to differ by socioeconomic status (Véron 2001). However, this assertion remains only partially valid, as only a few reviews have taken non-Western societies into account. Also, recent assessments across different demographics show that there appears to be a strong inverse relationship between socioeconomic status and death, morbidity and disability (Kabir et al. 2003; Liang et al. 2001; Knesebeck et al. 2003; Zimmer and Amornsirisomboon 2001; Jiang et al. 2002; Liang et al. 2000). While such an inverse association is well known, the mode of action, particularly for older adults, is not really clear. Further studies are obviously necessary to determine whether socioeconomic status directly affects the functional status of older adults in sub-Saharan Africa in order to efficiently and objectively analyze, distribute and organize social and health services.

The relationship between physical functioning and age, gender and disease in older adults has been more centered in epidemiological studies (Kaplan 1992; Strawbridge et al. 1993; Verbrugge and Patrick 1995). Socioeconomic status has been applied in a number of these models as a possible confounder (Pope et al. 2001; Seeman et al. 1995; Launer et al. 1994). Additionally, many of these results have been documented among the older population aged 65 years or older, although historically there is evidence that a deterioration in functional status begins when the prevention of modifiable risk factors is perhaps more effective, namely between the ages of 40 and 55 (Feldman et al. 1997). The current study complements existing knowledge by addressing limitations in studies on older adults' physical function with respect to the effects of socioeconomic status in a non-Western society. The aim is to assess the extent to which the physical functioning of elderly people in Ghana is related to two socioeconomic indicators, education and income, using data from the World Health Organization (WHO) Study on Global AGEing and Adult Health (SAGE) Wave 1 (2007–2010).

Materials and methods

Data were derived from the WHO SAGE Wave 1 (2007–2010). SAGE is a cross-national survey of persons 50 years and over in six low- and middle-income countries (China, Ghana, India, Mexico, Russian Federation and South Africa) with just a smaller pool of younger people aged 18–49 (Kowal et al. 2012). Households in each country were selected as belonging to either the 18–49 or 50+ age group using stratified, multistage, random cluster sampling. Face-to-face interviews were conducted for all individuals aged 50 years or older, employing structured survey methods, preparation and procedures. The survey instruments, including the Rose Questionnaire, were centered on validated measures of proven accuracy and consistency. The interview questionnaires were,

however, converted into local languages for respondents who could not understand English (Nutakor et al. 2020). Country survey teams conducted primary data collection, testing and quality assurance, and were organized centrally by WHO Geneva (Yoon et al. 2016). The response rate was 83% for the Ghanaian study.

Measuring physical functioning

Self-reported ADL (Katz et al. 1963) and IADL (Lawnton and Brody 1969) were assessed to measure respondents' physical functioning. ADLs include the basic personal activities of everyday life. These are the fundamental self-care activities, which we first learn as children, and include walking, eating, dressing, toileting and bathing. In proposing an alternative definition of functional limitation, Nagi (1976) and Pope and Tarlov (1991) describe functional limitation as a particular state mediating impairment, or physiological anomaly, and characteristics of disability or actions that emerge from impairment (Nagi 1976; Pope and Tarlov 1991). Defined in this way, it involves limitation of basic body movements such as lifting an object or crouching (Kelly-Hayes et al. 1992). The self-assessed ability to perform such tasks was determined with the question, "In the last 30 days, how much difficulty did you have ... in bathing, getting dressed, getting to and using the toilet, moving inside your home (such as walking across a room), and eating (including cutting up your food)?" (Kowal et al. 2012). The survey classified the responses to each item into five categories, namely none, mild, moderate, severe and extreme. IADLs are somewhat more complex, but often focus on the capacity of a person to live independently and manage on their own. The IADL assessment items include a variety of questions emerging from global aging studies (Gu 2008). The interviewer asked the participants how much difficulty they had experienced in performing a variety of activities in the past 30 days, namely walking a longer distance such as a kilometer, climbing one flight of stairs without resting, carrying things or stooping, and kneeling or crouching (Kowal et al. 2012). The overall scores were 0 to 10 for ADL and 0 to 8 for IADL, with higher ADL and IADL scores suggesting weaker physical functioning in older adults.

Measuring socioeconomic status

In line with previous studies, socioeconomic status was derived by assessing the level of education and household income (Murayama et al. 2016; Winkleby et al. 1992). We also used two additional variables as an added measure of socioeconomic status indicated by previous studies, namely self-perceived sufficiency of financial resources and access to health services. Household income was broken down into five quintiles, derived from a set of 21 issues relating to the possession of household commodities, housing features and

access to services, including quality water supply, sanitation and fuel for cooking (Ferguson et al. 2003). The study used residential area, marital status and self-reported history of chronic diseases (stroke, diabetes, hypertension, lung disease and depression) as covariates.

Statistical methods

To investigate whether socioeconomic status was associated with physical functioning, we constructed ordered logistic regression models using the following modeling approach. We included age, gender, residence and marital status in Model 1. In addition to age and gender, we adjusted for education and income in Model 2, no access to healthcare and inadequate financial resources in Model 3, chronic diseases (stroke, diabetes, hypertension, lung disease and depression) in Model 4 and finally controlled all covariates in Model 5. Stata/SE software (StataCorp, College Station, TX, USA) was used to perform all analyses.

Results

We included 3710 older adults from Ghana in our analysis. Table 1 shows characteristics of the study population. More than half (52.45%) of all respondents were older men, and the highest proportion was between 50 and 59 years old (39.43%). The overall mean age of participants was 64.25 years. Residence (rural/urban) varied by age since older adults (50–79 years) were more clustered in rural areas relative to the oldest (80+) age group. The number of unmarried, currently married, cohabiting and separated/divorced older adults declined with age. Further, more than 50% of the study population was currently married, a trend which was more common among men relative to women, and among adults in the younger age group (50–59 years). In addition, being widowed in Ghana was more prominent among women (87.22%) in comparison with men (12.78%).

As for socioeconomic factors, 52.43% of the research population did not have any formal education, with a significant gender gap (males = 40.87%; females = 59.13%). Additionally, respondents aged 60–69 years old had the highest rate of no formal education. Most educated older adults had completed high school or equivalent. The proportion of the elderly population decreased from the lowest to the highest income. In addition, most respondents falling within the highest income quintile were men (males = 59.53%; females = 40.47%). In contrast, women were in the majority in the lowest income quintile, a group which also decreased with age.

Regarding healthcare services, the majority of older adults without access were men (54.46%). Healthcare access declined with age. Women (males = 46.78%; females = 53.22%) formed the majority without sufficient financial

Table 1 Characteristics of the study sample

Characteristic	Gender		Age			
	Male No. (%)	Female No. (%)	50–59 No. (%)	60–69 No. (%)	70–79 No. (%)	80+ No. (%)
Age (in years)	1946 (52.45)	1764 (47.55)	1463 (39.43)	1046 (28.19)	834 (22.48)	367 (9.89)
50–59	825 (56.39)	638 (43.61)				
60–69	565 (54.02)	481 (45.98)				
70–79	384 (46.04)	450 (53.96)				
80+	172 (46.87)	195 (53.13)				
Residence						
Urban	737 (48.55)	781 (51.45)	644 (42.42)	426 (28.06)	315 (20.75)	133 (8.76)
Rural	1209 (55.16)	983 (44.84)	819 (37.36)	620 (28.28)	519 (23.68)	234 (10.68)
Marital status						
Never married	23 (54.76)	19 (45.24)	20 (47.62)	10 (23.81)	6 (14.29)	6 (14.29)
Currently married	1614 (77.45)	470 (22.55)	993 (47.65)	594 (28.50)	361 (17.32)	136 (6.53)
Cohabiting	21 (67.74)	10 (32.26)	19 (61.29)	6 (19.35)	5 (16.13)	1 (3.23)
Separated/divorced	157 (29.73)	371 (70.27)	225 (42.61)	154 (29.17)	120 (22.73)	29 (5.49)
Widowed	131 (12.78)	894 (87.22)	206 (20.10)	282 (27.51)	342 (33.37)	195 (19.02)
Education level						
No formal education	795 (40.87)	1150 (59.13)	518 (26.63)	547 (28.12)	576 (29.61)	304 (15.63)
Less than primary school	202 (48.33)	216 (51.67)	192 (45.93)	130 (31.10)	69 (16.51)	27 (6.46)
Primary school	245 (62.66)	146 (37.34)	204 (52.17)	101 (25.83)	71 (18.16)	15 (3.84)
Secondary school	139 (81.29)	32 (18.71)	98 (57.31)	47 (27.49)	24 (14.04)	2 (1.17)
High school (or equivalent)	466 (71.47)	186 (28.53)	383 (58.74)	173 (26.53)	80 (12.27)	16 (2.45)
College/university/postgraduate	99 (74.44)	34 (25.56)	68 (51.13)	48 (36.09)	14 (10.53)	3 (2.26)
Income quintile						
Lowest	342 (47.90)	372 (52.10)	241 (33.75)	208 (29.13)	174 (24.37)	91 (12.75)
2	362 (49.93)	363 (50.07)	272 (37.52)	187 (25.79)	184 (25.38)	82 (11.31)
3	386 (51.60)	362 (48.40)	280 (37.43)	214 (28.61)	185 (24.73)	69 (9.22)
4	403 (52.89)	359 (47.11)	336 (44.09)	211 (27.69)	144 (18.90)	71 (9.32)
Highest	453 (59.53)	308 (40.47)	334 (43.89)	226 (29.70)	147 (19.32)	54 (7.10)
Access to healthcare						
Yes	1641 (52.10)	1509 (47.90)	220 (39.29)	166 (29.64)	126 (22.50)	48 (8.57)
No	305 (54.46)	255 (45.54)	1243 (39.46)	880 (27.94)	708 (22.48)	319 (10.13)
Adequate financial resources						
Yes	1489 (54.48)	1244 (45.52)	296 (30.30)	270 (27.64)	266 (27.23)	145 (14.84)
No	457 (46.78)	520 (53.22)	1167 (42.70)	776 (28.39)	568 (20.78)	222 (8.12)
Chronic diseases						
Stroke						
Yes	49 (52.13)	45 (47.87)	21 (22.34)	30 (31.91)	34 (36.17)	9 (9.57)
No	1897 (52.46)	1719 (47.54)	1442 (39.88)	1016 (28.10)	800 (22.12)	358 (9.90)
Diabetes						
Yes	71 (47.97)	77 (52.03)	47 (31.76)	57 (38.51)	34 (22.97)	10 (6.76)
No	1875 (52.45)	1687 (47.36)	1416 (39.75)	989 (27.77)	800 (22.46)	357 (10.02)
Hypertension						
Yes	201 (40.04)	301 (59.96)	176 (35.06)	150 (29.88)	139 (27.69)	37 (7.37)
No	1745 (54.40)	1463 (45.60)	1287 (40.12)	896 (27.93)	695 (21.66)	330 (10.29)
Lung disease						
Yes	14 (56.00)	11 (44.00)	7 (28.00)	8 (32.00)	8 (32.00)	2 (8.00)
No	1932 (52.43)	1753 (47.57)	1456 (39.51)	1038 (28.17)	826 (22.42)	365 (9.91)
Depression						
Yes	18 (29.03)	44 (70.97)	10 (16.13)	15 (24.19)	21 (33.87)	16 (25.81)
No	1928 (52.85)	1720 (47.15)	1453 (39.83)	1031 (28.26)	813 (22.29)	351 (9.62)

No. = number

resources. Furthermore, hypertension was by far the most prevalent chronic disease (502/13.53%), followed by diabetes (148/3.99%), stroke (94/2.53%), depression (62/1.67%) and lung disease (25/0.67%). Generally, chronic diseases were more common in women than men, and among older adults aged 60 years and above.

The association between socioeconomic status and reporting physical functional disability was examined in Tables 2 and 3. Our results show that compared with males, females were associated with higher ADL scores in all models except in Model 5, where no significant correlation existed (Table 2). In addition, aging was associated with higher

ADL score across all models. Adults aged 60 years and older were more likely to report weaker physical functioning than those younger than 60. In Model 1, marital status was associated with lower ADL score after adjustment for gender and age. Older adults who were currently married, cohabiting, separated/divorced or widowed were more likely to have less difficulty performing ADLs than those never married. The association was still statistically significant in Model 5 (coefficients with 95% confidence intervals [CIs] were -1.02 [$-1.68; -0.36$], -1.43 [$-2.52; -0.34$], -1.11 [$-1.79; -0.43$] and -0.82 [$-1.49; -0.15$], respectively, for those who were currently married, cohabiting, separated/divorced and widowed). In Model 2, we found that those who had completed secondary school, high school (or equivalent) and college/university/postgraduate school were significantly associated with the likelihood of reporting difficulty with performing ADLs compared to those who had completed primary school and below. Additionally, those who had completed high school (or equivalent) and college/university/postgraduate school were likely to report lower ADL scores relative to those who had completed secondary school only and who were associated with a higher ADL score. In Model 5, this correlation remained statistically significant after all covariates had been controlled. Compared to the lowest, second and fourth quintiles of income, older adults in the third income quintile were more likely to report difficulty in performing ADLs, while those in the highest quintile were likely to perform better. There was no significant association between the inability to access healthcare services and ADL score in Model 3, but the association became significant with higher ADL scores in Model 5. In addition, having inadequate financial resources was strongly associated with higher ADL scores, but in Model 5, the correlation was not statistically significant. Stroke and lung disease in Model 4 showed a significant association with higher ADL scores, but the correlation in Model 5 was only statistically significant for stroke, hypertension and lung disease after all covariates were controlled.

There were some variations with respect to IADL as compared to ADL (Table 3). Female older adults and those aged 60 and more were significantly associated with higher IADL score across all models compared to males and those under the age of 60, respectively. In Model 1, the association between rural dwellers and higher IADL scores was significant after adjusting for gender and age. However, this relationship did not remain significant in Model 5 after controlling for all covariates. In Model 2, completing high school or equivalent was significantly associated with lower IADL scores. The link remained significant after controlling for all covariates in Model 5. As a result, those who completed high school were likely to report better physical functioning relative to those without formal education. The second, fourth and highest quintiles of income were significantly associated with lower IADL score compared to the lowest quintile. After controlling

for all covariates, this correlation remained significant in Model 5. In Model 3, the inability to access healthcare services and inadequate financial resources were both significantly associated with higher IADL scores. Furthermore, in Model 4, the only chronic diseases significantly associated with higher IADL score were stroke and hypertension. Model 5 maintained this significant relationship. Older adults with stroke and hypertension were more likely to report having difficulty performing most IADLs.

Discussion

This study explored the relationship between socioeconomic status and the functioning of ADL and IADL in older Ghanaian adults. Notwithstanding the fact that there are multiple reports confirming that socioeconomic status in developed societies is associated with physical functioning (Dennis et al. 1993; Rogers 1992; Pappas et al. 1993), only a few studies have been conducted in sub-Saharan Africa. Therefore, it is important to examine the relationship between the socioeconomic status and functionality of older people in sub-Saharan Africa to facilitate a lifestyle that would enable older adults to maintain their physical function. Our results showed that better functioning of ADL was associated with older adults who had completed high school education and above, and those with the highest income. With respect to IADL, the same strong performance was shown by older adults who had completed high school and those in the highest income quintile. Additionally, our study shows that having sufficient financial resources and access to healthcare are necessary to sustain physical functioning in older adults.

Lower ADL scores were associated with older adults who had completed high school and above, and those in the highest income quintile. Our findings were similar to those of past studies (Taylor and Lynch 2004) indicating a better physical functioning in older adults with higher education. However, in an earlier study (Taylor and Lynch 2004), the ADL and IADL scores were summed, and the true impact of higher education on ADL was therefore very difficult to identify. Unlike our research, an earlier study on older adult populations in the United States found no association between education and physical functioning (Kelley-Moore and Ferraro 2004; Taylor 2010; Xu et al. 2015). Similarly, another study of older Chinese people (Yang et al. 2018) found no clear association between higher education and ADL scores. Nonetheless, our results suggest that people of high socioeconomic status usually have the necessary knowledge, social and economic means to improve their health behavior and use medical services, which significantly decreases their vulnerability to negative health outcomes. Females and older adults (60 years and above) were significantly associated with higher ADL scores. Studies have shown that men report fewer diseases and fewer

Table 2 Associations between socioeconomic status and physical functioning (ADL)

	Model 1 (95% CI)	Model 2 (95% CI)	Model 3 (95% CI)	Model 4 (95% CI)	Model 5 (95% CI)
Gender					
Male	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.21 [0.03; 0.38]*	0.24 [0.10; 0.39]*	0.30 [0.16; 0.44]*	0.30 [0.16; 0.44]*	0.12 [-0.05; 0.30]
Age (in years)					
50–59	Ref.	Ref.	Ref.	Ref.	Ref.
60–69	0.44 [0.27; 0.62]*	0.43 [0.26; 0.61]*	0.46 [0.29; 0.64]*	0.44 [0.27; 0.62]*	0.37 [0.18; 0.55]*
70–79	1.00 [0.81; 1.18]*	0.97 [0.78; 1.16]*	1.03 [0.85; 1.21]*	1.01 [0.82; 1.19]*	0.86 [0.67; 1.06]*
80+	1.54 [1.29; 1.79]*	1.53 [1.28; 1.79]*	1.60 [1.36; 1.85]*	1.62 [1.38; 1.87]*	1.43 [1.16; 1.69]*
Residence					
Urban	Ref.				Ref.
Rural	0.01 [-0.12; 0.15]				-0.07 [-0.24; 0.08]
Marital status					
Never married	Ref.				Ref.
Currently married	-1.10 [-1.74; -0.45]*				-1.02 [-1.68; -0.36]*
Cohabiting	-1.50 [-2.57; -0.43]*				-1.43 [-2.52; -0.34]*
Separated/divorced	-1.13 [-1.79; -0.46]*				-1.11 [-1.79; -0.43]*
Widowed	-0.85 [-1.51; -0.19]*				-0.82 [-1.49; -0.15]*
Education level					
No formal education		Ref.			Ref.
Less than primary school		-0.04 [-0.27; 0.17]			-0.07 [-0.30; 0.16]
Primary school		-0.12 [-0.37; 0.12]			-0.17 [-0.42; 0.08]
Secondary school		0.56 [0.21; 0.91]*			0.48 [0.12; 0.83]*
High school (or equivalent)		-0.52 [-0.75; -0.29]*			-0.57 [-0.81; -0.34]*
College/university/postgraduate		-0.48 [-0.94; -0.02]*			-0.57 [-1.04; -0.10]*
Income quintile					
Lowest		Ref.			Ref.
2		-0.01 [-0.23; 0.20]			-0.01 [-0.24; 0.20]
3		0.29 [0.07; 0.51]*			0.28 [0.05; 0.50]*
4		0.03 [-0.19; 0.25]			-0.01 [-0.24; 0.23]
Highest		-0.31 [-0.55; -0.06]*			-0.42 [-0.69; -0.15]*
No access to healthcare			0.02 [-0.21; 0.17]		0.06 [-0.26; 0.13]*
Inadequate financial resources			0.15 [0.31; 0.01]*		0.03 [-0.20; 0.13]
Chronic diseases					
Stroke				1.39 [0.92; 1.87]*	1.39 [0.91; 1.88]*
Diabetes				0.15 [-0.19; 0.51]	0.25 [-0.11; 0.63]
Hypertension				0.13 [-0.07; 0.34]	0.31 [0.09; 0.53]*
Lung disease				0.85 [0.01; 1.69]*	0.99 [0.12; 1.85]*
Depression				0.32 [-0.20; 0.86]	0.36 [-0.18; 0.92]

The model results are reported as beta coefficients with 95% confidence intervals (CIs)

*Statistically significant ($p < .05$)

ADL = activities of daily living

Ref. = reference category

Model 1: Gender + age + residence + marital status

Model 2: Gender + age + education + income

Model 3: Gender + age + access to healthcare + adequate financial resources

Model 4: Gender + age + chronic diseases

Model 5: Gender + age + residence + marital status + education + income + access to healthcare + adequate financial resources + chronic diseases

Table 3 Associations between socioeconomic status and physical functioning (IADL)

	Model 1 (95% CI)	Model 2 (95% CI)	Model 3 (95% CI)	Model 4 (95% CI)	Model 5 (95% CI)
Gender					
Male	Ref.	Ref.	Ref.	Ref.	Ref.
Female	0.62 [0.40; 0.83]*	0.66 [0.42; 0.80]*	0.69 [0.51; 0.87]*	0.68 [0.50; 0.86]*	0.52 [0.40; 0.82]*
Age (in years)					
50–59	Ref.	Ref.	Ref.	Ref.	Ref.
60–69	0.69 [0.48; 0.83]*	0.66 [0.45; 0.86]*	0.72 [0.51; 0.92]*	0.70 [0.50; 0.90]*	0.61 [0.40; 0.82]*
70–79	1.54 [1.25; 1.83]*	1.49 [1.20; 1.78]*	1.59 [1.31; 1.88]*	1.58 [1.29; 1.87]*	1.41 [1.11; 1.72]*
80+	2.01 [1.50; 2.52]*	1.91 [1.40; 2.42]*	2.05 [1.55; 2.55]*	2.12 [1.62; 2.63]*	1.83 [1.31; 2.35]*
Residence					
Urban	Ref.				Ref.
Rural	0.20 [0.03; 0.38]*				0.12 [−0.07; 0.33]
Marital status					
Never married	Ref.				Ref.
Currently married	0.26 [−1.11; 0.57]				−0.06 [−0.92; 0.79]
Cohabiting	−0.85 [−1.99; 0.27]				−0.56 [−1.71; 0.58]
Separated/divorced	−0.20 [−1.08; 0.66]				−0.05 [−0.94; 0.83]
Widowed	−0.03 [−0.90; 0.83]				0.07 [−0.81; 0.95]
Education level					
No formal education		Ref.			Ref.
Less than primary school		−0.22 [−0.51; 0.06]			−0.26 [−0.56; 0.02]
Primary school		0.07 [−0.23; 0.38]			−0.01 [−0.32; 0.30]
Secondary school		−0.21 [−0.60; 0.18]			−0.29 [−0.70; 0.11]
High school (or equivalent)		−0.57 [−0.81; −0.33]*			−0.63 [−0.87; −0.38]*
College/university/postgraduate		−0.21 [−0.33; 0.23]			−0.32 [−0.78; 0.13]
Income quintile					
Lowest		Ref.			Ref.
2		−0.44 [−0.74; −0.13]*			−0.44 [−0.75; −0.12]*
3		−0.19 [−0.50; 0.12]			−0.20 [−0.52; 0.11]
4		−0.46 [−0.77; −0.16]*			−0.48 [−0.80; −0.16]*
Highest		−0.53 [−0.84; −0.22]*			−0.58 [−0.93; −0.24]*
No access to healthcare			0.54 [0.31; 0.76]*		0.54 [0.31; 0.77]*
Inadequate financial resources			0.26 [0.31; 0.76]*		0.06 [−0.29; 0.16]
Chronic diseases					
Stroke				1.68 [0.52; 2.85]*	1.67 [0.50; 2.84]*
Diabetes				0.17 [−0.32; 0.67]	0.32 [−0.18; 0.84]
Hypertension				0.40 [0.10; 0.70]*	0.63 [0.31; 0.94]*
Lung disease				−0.06 [−1.17; 1.05]	−0.01 [−1.15; 1.12]
Depression				−0.13 [−0.40; 0.13]	−0.43 [−1.20; 0.33]

The model results are reported as beta coefficients with 95% confidence intervals (CIs)

*Statistically significant ($p < .05$)

IADL = instrumental activities of daily living

Ref. = reference category

Model 1: Gender + age + residence + marital status

Model 2: Gender + age + education + income

Model 3: Gender + age + access to healthcare + adequate financial resources

Model 4: Gender + age + chronic diseases

Model 5: Gender + age + residence + marital status + education + income + access to healthcare + adequate financial resources + chronic diseases

limitations in daily activities in older ages compared to women. Women tend to assess their health as poorer and report more functional limitations and disabilities relative to men (Shi et al. 2008; Knurowski et al. 2004). Also, we found that a decreased functioning of ADL was associated with a lack of access to healthcare services, which could reflect their relevance to older adults' physical performance. Our results illustrate the different effects of chronic diseases on ADL. Only three chronic diseases (stroke, hypertension and lung disease) were significant in the prediction of poor ADL functioning. Similar to earlier studies, our results suggest that people suffering from stroke have trouble performing basic self-care activities like bathing, dressing, eating and toileting. Additionally, previous research has shown that stroke was strongly associated with functional dependence, no matter whether other chronic diseases were involved or not (Martin and Schoeni 2014; Millán-Calenti et al. 2010; Wolff et al. 2005). These results show the general impact of high socioeconomic status on ADL functioning.

As far as IADL is concerned, older adults who have completed high school, as well as those in the fourth to highest income quintiles, were associated with better physical functioning. In addition, our study found that older people without formal education showed less functionalities than older adults who had completed high school. These results are in line with previous studies. The prevalence of functional disabilities in less educated people is greater than in highly educated individuals (Liu et al. 2013; Mahmoudi and Meade 2015). In contrast, some studies have shown an inversely associated impact of IADL impairment with higher income (Beydoun and Popkin 2005; Rautio et al. 2001). Our findings suggest that older adults with higher incomes will retain their IADL advantage as they grow older relative to those within the lower quintile of household income. In addition, older adults who live under better financial conditions have higher living standards and a better quality of life, which in turn improves their physical functionality. The inability to access healthcare was also associated with poor physical functioning. This finding suggests that access to healthcare is needed to sustain older adults' physical functioning. In Ghana, socioeconomically disadvantaged older adults tend to report problems with basic functional tasks such as walking, climbing, lifting, crouching and doing household activities. Our study also shows that women and older adults of 60 years and above were significantly associated with higher IADL scores, indicating that women and older adults are likely to have poor physical functioning. In terms of gender, two explanations are possible to account for the disparity we found in functional disabilities between men and women. Firstly, women have longer life expectancy and therefore more functional disabilities associated with age than men simply because they live longer (Murtagh and Hubert 2004). Secondly, women in Ghana tend to be economically or socially marginalized and do not usually

have the necessary resources to access healthcare relative to men (Mba 2006; Mba 2007). Similar to results in ADL, stroke and hypertension were associated with a higher IADL score, suggesting poor physical functioning. Older adults with stroke are primarily affected by functional disabilities, mainly because of cognitive impairment in the brain cells which control motion, attention and continuity. In addition, the occurrence of stroke usually leads to a failure in the ability to carry out basic functional activities (Hyndman and Ashburn 2003).

Older adults in Ghana, like their peers worldwide, face major health challenges. Our results show that functional limitations and poor health increase considerably with age, with more women reporting health issues than men. Sadly, Ghana's older people have to deal not only with their functional limitations, but also with chronic conditions like stroke and hypertension in a country with insufficient healthcare and poor social support systems. In order to enhance the health and quality of life of older adults, public policy and health initiatives that support healthier lifestyles and increase access to healthcare are essential. While urbanization is on the rise, the majority of older adults in Ghana live in rural areas where there are only limited health and social services. Vigorous policies and decision-making are required to include the challenges of aging and adult health in all areas of national strategic planning. Our research has illustrated the socioeconomic status and health conditions of older adults in Ghana, and we hope that the knowledge will be expanded in order to help formulate policies effectively. A strength of our research was the use of a nationally representative sample of older adults in Ghana focusing on face-to-face interviews. This study reinforces existing literature in non-Western countries about the physical functioning of elderly people.

Limitations

Our research did not include arthritis, a chronic disease that can greatly impair physical functioning. The social and economic status, chronic diseases and variables of physical functioning were self-reported, and there may be a question of reliability of the status or conditions recorded. It is possible that socioeconomic and health issues were overvalued or undervalued. We note, however, that self-reported physical functioning is standard and regarded as an accurate measure in health research and major studies such as SAGE. Furthermore, the translation of questionnaires from English into local languages for those who could neither speak nor read English may have led to subtle changes in the meaning and wording of questions related to physical functioning.

Conclusion

Our study shows that older adults with higher education or higher household incomes performed better physically in

terms of ADL and IADL. Further, having sufficient financial resources and access to healthcare services significantly enhances the total physical functioning of older adults. Special attention needs to be paid to health policies and programs which improve physical function and well-being in older adults.

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Authors' contributions Conceptualization: Baozhen Dai and Jonathan Aseye Nutakor. Methodology: Jonathan Aseye Nutakor and Jianzai Zhou. Data analysis: Jonathan Aseye Nutakor and Ebenezer Larnyo. Writing—review and editing: Jonathan Aseye Nutakor, Baozhen Dai, Maxwell Kwabena Asare and Nana Ama Asi Danso. Funding acquisition: Baozhen Dai and Jianzai Zhou; supervision: Baozhen Dai.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethics approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institution or practice where the study was conducted. SAGE obtained ethical approval from the Ethical Review Committee of the WHO (RPC146) and the Ethics and Protocol Review Committee of the University of Ghana Medical School (Accra).

Consent to participate Informed consent was obtained from all individual participants included in the study.

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