


# Social Frailty and Depression Among Older Adults in Ghana: Insights from the WHO SAGE Surveys

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## Abstract

In this study, we examine the association between social frailty and depression among older adults in Ghana over time. We employed longitudinal data analysis to examine the association between social frailty, socioeconomic status and depression using data from the WHO-SAGE survey.

Our descriptive and cross-tabulation analyses show that the prevalence of depression and social frailty among older adults decreased considerably in 2014/2015 compared to 2007/2008. The finding also reveals a huge reduction in social frailty among older adults in northern Ghana—the most deprived regions in Ghana—compared to those in southern Ghana. The multivariate panel data analysis reveals that depression was significantly associated with social isolation, financial needs, and physical needs. The findings suggest an over time decline in social frailty and depression among older adults, as well as, reduction in regional differences in social frailty and depression among older adults in Ghana.

## Keywords

longitudinal analysis, financial needs, food security, social isolation, physical needs, Ghana

## Background

Research has established links between socioeconomic status and psychosocial wellbeing (Collins & Goldman, 2008; Marmot et al., 2008). The evidence suggests that older adults with limited social support and those of lower socioeconomic status have worse mental health; and also tend to be more susceptible to morbidities than their counterparts of higher socioeconomic status, consequently leading to early death (Allen et al., 2014; Cornwell & Waite, 2009; Ma et al., 2018; Yamada & Arai, 2018). While socioeconomic inequalities exist among all age groups, some researchers argue it is more amplified among older adults mainly due to their vulnerabilities to frailty and the pathway of life-course determinants that become exacerbated in late life (Benzeval et al., 2011; van Kippersluis et al., 2010). Older persons are thus said to be more vulnerable to social frailty than younger adults. Social frailty refers to the absence of crucial social and economic resources as well as self-management abilities vital for achieving one's social needs and invariably negatively impact physical and psychosocial wellbeing (Bunt et al., 2017; Ma et al., 2018).

Studies show that older adults living with greater social support and social assistance, including formal financial support from governments, have better mental health than their counterparts with less social support (Kobayashi & Steptoe, 2018; Min et al., 2016; O'Hara et al., 2016). In this context, social frailty among older adults is significantly associated with

depression (Ma et al., 2018). Kobayashi and Steptoe (2018) also found that socially isolated older adults in England were less physically active and have poorer nutritional behavior, contributing to their poor health status. Similar results have been reported in Ghana. Recent studies in Ghana shows that older adults with active social support network and those who participate in social events have better health outcomes (Ayer-nor, 2016; Christian et al., 2020; Gyasi et al., 2019, 2020; Ohemeng et al., 2019). Available evidence shows that socially disconnected older adults, that is older adults with a small social network, and those with limited social support have poorer mental health status compared to socially connected and well-supported older adults (Gyasi et al., 2019; Ohemeng et al.,

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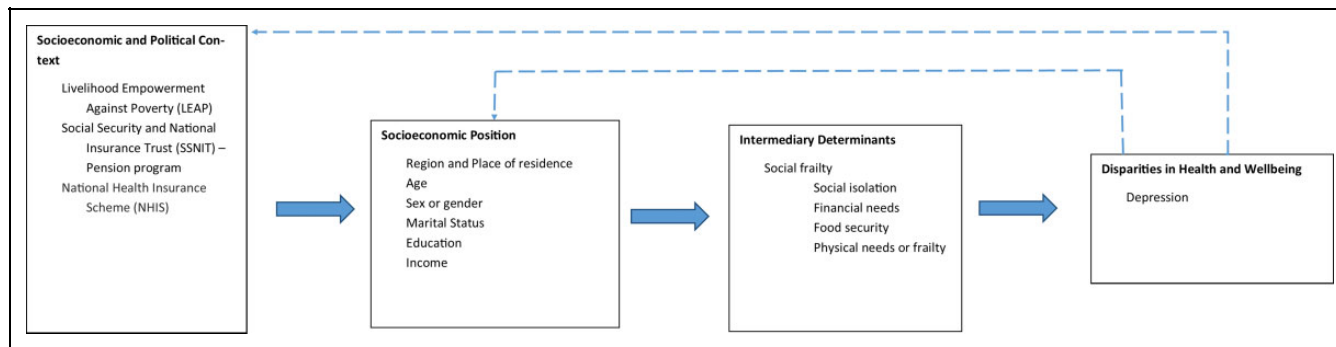
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**Figure 1.** Authors' variant of SDH framework for this study.

2019). Gyasi et al. (2019) in their study observed that older adults who maintained contact and received socioeconomic support from family members as well as those who actively participate in social events and emotional bonds are more likely to have better mental or psychological wellbeing.

In Ghana, studies show that between 6.7% and 9.7% of older adults suffer from depression compared to the global prevalence of 4.4% (Brinda et al., 2016; Peltzer & Phaswana-Mafuya, 2012; World Health Organization, 2017). Older adults in Ghana, like their counterparts in other sub-Saharan African countries, face considerable social and economic challenges (Kakwani & Subbarao, 2007; Zimmer & Das, 2014). Formal or public support for older adults is very limited. Most older adults rely on families for social and economic support (Aboderin & Hoffman, 2015; Apt, 2012; Oppong, 2006). However, research shows that familial support for older adults has declined in recent years due to out-migration of younger adults, the breakdown of the traditional family system due to modernization, urbanization, and economic hardships (Kpessa-Whyte, 2018; Ojembe & Ebe Kalu, 2018; Oppong, 2006).

While studies on social frailty and psychosocial health outcome in western countries abound, the research in sub-Saharan Africa especially among older adults is limited. Current studies on socioeconomic wellbeing and health among older adults in Ghana have enhanced our knowledge; albeit, their data and methodological approach have not enhanced our ability to draw a causal inference in this association or draw conclusions at national level. Existing studies (Gyasi et al., 2019; Ohemeng et al., 2019) use cross-sectional data or research design and do not account for temporal changes in this association or policies that have the potential to influence this observed association. These studies also do not consider the geographical differences in social frailty and depression. In view of this, we employ the current data from the Wave 1 and 2 of the World Health Organization's Study on Global Ageing and Health (WHO-SAGE) to examine the association between social frailty and depression among older adults in Ghana. Specifically, this study sought to answer the following research questions: a) what is the trend of social frailties and depression among older adults in Ghana over time? b) has regional differences in social frailty indicators increased or reduced over time? c) what are the

effects of different indicators of social frailty and socioeconomic status on depression among older adults?

### Conceptual Framework–Social Determinants of Health

Our study adopts the social determinants of health (SDH) framework as a conceptual tool for understanding the potential effect of social protection programs on the social frailty and depression among older adults. SDH posits that health outcomes among populations are the result of socioeconomic positions created through socioeconomic and geopolitical context (Braveman et al., 2011; Marmot et al., 2008). SDH argues that inequity in health outcomes and the burden of disease or illness are associated with the structural and immediate conditions people are born, grow, live, work and age (Allen et al., 2014; World Health Organization, 2010). SDH as a concept draws heavily on Diderichsen's and Hallqvist's work on the social production of disease (World Health Organization, 2010). They argued that through the process of social stratification, social context assigns individuals to different social positions due to differences in resource allocations and power distribution (Braveman et al., 2011; Marmot et al., 2008; World Health Organization, 2010). This process creates vulnerability among people with limited resources and less power; thus, increasing their risk of adverse health conditions. SDH comprise of three components; the first components of the framework deals with the socioeconomic and political context, the second looks at the structural and socioeconomic position, and the last focus on intermediary determinants. Figure 1 shows our variation of the SDH framework for factors that influence depression among older adults in Ghana.

The socioeconomic and political context of SDH embraces all social and political mechanisms that "generate, configure and maintain social hierarchies" such as education and health-care systems, and labor policies (World Health Organization, 2010). These socio-political mechanisms minimize or amplify socioeconomic disparity among a population through policies, programs, and plans that either enhance the equitable distribution of power and access to resources necessary to promote good health and wellbeing. In Ghana, these socio-political mechanisms have contributed to the sharp contrast between

socioeconomic development in southern and northern parts of the country (Oteng-Ababio et al., 2017; UNDP, 2018; World Bank, 2011). Southern Ghana generally displays better scores in the indicators of social and economic development, such as literacy, poverty, waged-employment and infrastructural development (Ghana Statistical Service, 2015; Oteng-Ababio et al., 2017; UNDP, 2018). This part of the country is also endowed with natural resources that serve as the economic backbone of the country. In contrast, the three northern regions fare poorly in socioeconomic indices; with high levels of poverty, low literacy rate, especially female literacy and low infrastructural development (Ghana Statistical Service, 2014; Molini & Pierella Paci, 2015). Reports estimate that between 37% and 40% of the country's poor live in the three northern regions; albeit, the residents in these regions only constitute 17% of the nation's population (Molini & Pierella Paci, 2015). Nevertheless, the reports also suggest that there has been an increase in the poverty depth among southern regions with the exception of the Greater Accra region—the national capital region (Cooke et al., 2016).

In an effort to reduce the socioeconomic inequalities in health and wellbeing, governments have implemented social interventions programs aimed at improving the socioeconomic status of the poor and vulnerable as well as improve access to basic health care services. These programs include the National Health Insurance Scheme (NHIS) and the Livelihood Empowerment Against Poverty (LEAP) program with pro-aging policies (Kpessa-Whyte, 2018; World Health Organization, 2014). For instances, the NHIS grants exemptions on premium payments for older adults aged 70 years and above; as well as, poor older adults who are 65 years and over registered through the LEAP program (Duku et al., 2015; Kuire et al., 2017). The LEAP program was implemented in 2008 as a social protection program that provides cash transfers and health insurance coverage for older adults and other vulnerable persons in the country (Handa et al., 2014; Kpessa-Whyte, 2018; Thome et al., 2014). The program aims to alleviate short-term poverty and develop long-term human capital (Handa et al., 2014). The LEAP program also provides unconditional grants to persons with disabilities and older adults while other eligible persons or groups have to adhere to some conditions, including enrolment and retention of school-age children in school (Handa et al., 2014; Thome et al., 2014). At its onset the LEAP program covered only 1,654 households in 21 districts; currently, the program covers 213,044 households in 254 districts as of 2016 (Ministry of Gender Children and Social Protection, 2018). In our study, these aging social protection programs captures the socioeconomic and political context of aging and wellbeing in Ghana.

Structural mechanisms and socioeconomic position refer to the individual social status that defines their access to resources and power. They create stratification and generate class divisions in societies (World Health Organization, 2010). Socioeconomic positions are defined by occupational status, educational status, income level and social class. In our study, we capture this element of SDH through sociodemographic factors or status. These positions together with the socio-

political context influence intermediary factors that in turn shape health outcomes. Intermediary factors refer to material, psychosocial, biological and behavioral circumstances that lead to poor health outcomes among populations. In this study, we focused on the material and biological (or physiological) aspects which we operationalize as social frailty. Thus, SDH as a conceptual framework enables us to understand the effect of socio-political context, in the form of social intervention policies or programs, on social frailty (intermediary determinants) on mental health outcomes among older adults. It offers a holistic perspective for understanding how the broader context and individual factors shape psychosocial health outcomes.

## Research Design and Methods

The data for this study are from wave 1 (2007–2010) and wave 2 (2014–2015) of the WHO-SAGE survey, the Ghana component. Full details of the survey and sample selection procedure are described elsewhere (Biritwum et al., 2013). The WHO SAGE evolved from the 2003 World Health Survey, a collaboration between the WHO and national health agencies of six lower and middle-income countries—namely: Ghana, China, Russia, South Africa, Mexico, and India. The goal of this survey is to gather data on older persons living in these countries in order to strengthen policy, planning, and research on older persons. In Ghana, a multi-stage stratified cluster design was employing is sampling respondents. The sample was stratified by the 10 administrative regions and the type of locality (rural and urban), resulting in 20 strata. Although the main target population for the survey was persons aged 50 years and above, the survey included a relatively small sample of respondents aged 18–49 years for a comparative purpose. For the purpose of our study, respondents below the age of 50 years were excluded from our analysis. The WHO-SAGE survey was approved by the ethical review board of the World Health Organization and institutional review boards of collaborative organization (Biritwum et al., 2016). No further ethical approval was need for the use of this data.

## Measures

Our outcome variable was depression. In the WHO-SAGE, depression was assessed by both self-reported cases and symptoms. Full details of the questions used to assess the symptoms have been discussed elsewhere (Brinda et al., 2016; Kulkarni & Shinde, 2015). Respondents were classified as having depression if they self-reported being diagnosed with depression or met the International Classification of Diseases, 10th revision (ICD-10) criteria for a mild depressive episode based on reported symptoms. The ICD-10 is a validated and widely used medical classification of diseases and health-related problems by the World Health Organization. Respondents were classified as having mild depression if they reported at least two of the three classic symptoms of depressed mood, low energy levels, or loss of interest (in a daily occurrence or lasting at least 2 weeks) and an additional symptom(s) related to poor

self-esteem or confidence, difficulty concentrating, hopelessness, suicidal behavior, psychomotor retardation or agitation, disrupted sleep, or appetite changes, making a total of four symptoms (Brinda et al., 2016; Kulkarni & Shinde, 2015). Depression was defined a binary variable with the responses “0 = Not depressed” and “1 = Depressed.”

In this study, social frailty was measured by five items: social isolation, financial need, food insecurity (eating less and going hungry or not eating), and physical need. Social isolation is an index created from three questions in the WHO-SAGE wave 2 that asked respondents if a) they lacked companionship b) felt left out and c) felt isolated. The questions had the following ordinal responses: never, rarely, sometimes, and often. The index had a range from 3 to 12 with higher scores indicating elevated social isolation; the index also had high internal reliability with Cronbach alpha ( $\alpha$ ) of 0.93. Financial need is an ordinal variable constructed from the SAGE question—“Do you have enough money to meet your needs?”. The valid responses for this question were: “completely”, “mostly”, “moderately”, “a little” and “none at all”. This variable was recoded into a four-response ordinal variable; that is, we merged completely and mostly into a single category labeled as “completely or mostly”. The survey had two questions on food insecurity: a) “In the last 12 months, how often did you ever eat less than you felt you should because there wasn’t enough food?” and “In the last 12 months, were you ever hungry, but didn’t eat because you couldn’t afford enough food?”. Both questions had the following responses: “every month,” “almost every month,” “some months, but not every month,” “only 1 or 2 months,” and “never.” We re-categorized the responses to these questions from six responses to three ordinal response namely: “0 = every month or almost every month,” “1 = occasional or some months,” and “2 = never.” The response “some months, but not every month” and “only 1 or 2 months” were grouped as a single response into the new response “occasional or some months.” A physical need was defined as older adults who needed assistance in one or more of the following basic functions (basic activities of daily living—ADL): toileting, dressing, eating, transferring and grooming. Respondents who need help with one or more of these basic functions were classified as having physical needs and coded as “1 = Yes”; otherwise coded as “0 = No”.

Studies show that sociodemographic factors have confounding effects on both social frailty and depression (Ma et al., 2018; Min et al., 2016). Age, region of residence, place of residence, sex marital status, education, and household wealth quintile were included as control variables. With this knowledge in mind, region of residence was categorized into three groups: Greater Accra, Southern Ghana and Northern Ghana. Northern Ghana consists of the three northern regions in the country (that is Northern region, Upper East region and Upper West regions); these three regions are the most deprived regions in the country. In this study, Southern Ghana is made up of all regions in the country except the Greater Accra region and the three northern regions. Place of residence was defined as urban and rural.

## Analysis

The baseline WHO-SAGE in 2007 consisted of 5,573 individuals (4,732 persons aged 50 years and above) while the follow-up had 4,735 individuals (3,575 individuals aged 50 years and above). For the purpose of our study, respondents below 50 years in the baseline were excluded from our analysis. The exclusion criteria for our study were: no follow-up time (that is, participated in wave 1 or wave 2 only). This led to a total of 2,222 eligible respondents who participated in both wave 1 and wave 2 of the WHO-SAGE–Ghana component. The proportion of missing cases in the study variables ranges from 0.18% (wealth index) to 5.87% (depression). Little’s test shows that the missing data were completely at random ( $\chi^2 = 364.67$ ,  $p < 0.001$ ). We impute missing values for our dependent and independent variables by applying multiple imputations using STATA’s *mi* imputed chained function.

Descriptive statistical analysis was conducted to examine the proportion distribution of our study variables, as well as, to assess the proportion of socially frail older adults in wave 1 and wave 2. We employed a bivariate cross-tabulation analysis to examine the proportional distribution of the measures of social frailty by region of residence. Our outcome was asymmetrically distributed hence using the logistic link function could result in biased parameter estimates. Thus, we employed the complementary log-log link function for panel data (*xtcloglog*), specifying the random effects option, to examine the association between social frailty, socioeconomic status, and depression. Complementary log-log relaxes the symmetrical distribution assumption and it is suitable for events or outcomes with a very large or very small probability (incidence) of occurrence (Bonate, 2011, p. 436). Our first model examines the association between indicators of social frailty (financial need, eating less, going hungry, physical need and social isolation) and depression (Model 1). The second model (Model 2) explores the association between measures of socioeconomic status and depression; our final model includes social frailty and socioeconomic status as predictors of depression (Model 3). To facilitate easy interpretation of our panel complementary log-log regression results, we report the exponentiated beta coefficients. All statistical analyses we performed using STATA statistical software package version 14.2 by StataCorp (College Station, TX).

## Results

Table 1 shows the respondents’ baseline sociodemographic characteristics. The descriptive result shows that 68.2% and 51.6% respondents were residents of Southern Ghana (excluding Greater Accra) and urban areas, respectively. The mean age of our sample was approximately 62 years and 52.4% of respondents were older adult males. The most respondents were married (63.1%), had no formal education (45.5%) and lived in poor households (55.6%). Table 2 shows the distribution of depression and social frailty among respondents at the baseline and follow-up. The result shows that the prevalence of

**Table 1.** Baseline Sociodemographic Characteristics of Respondents (n = 2,222).

	Proportion/Mean (CI)
Region of residence	
Greater Accra	14.9 (10.8–19.1)
Southern Ghana (excluding Greater Accra)	68.2 (64.2–72.2)
Northern Ghana	16.9 (14.5–19.2)
Place of residence	
Urban	51.6 (47.5–55.2)
Rural	48.4 (44.8–52.0)
Age	61.9 (61.1–62.6) <sup>a</sup>
Sex	
Male	52.4 (48.8–56.1)
Female	47.6 (43.9–51.2)
Marital Status	
Married or cohabiting	63.1 (59.9–66.4)
Never Married	1.0 (0.4–1.6)
Separated or divorced	12.7 (10.5–14.8)
Widowed	23.2 (20.7–25.7)
Education	
No formal education	45.5 (41.9–49.0)
Primary education	24.9 (21.1–28.8)
Secondary education	25.9 (22.6–29.3)
Post-secondary education	3.7 (2.3–5.0)
Wealth Index	
Poor	55.6 (51.9–59.4)
Middle	21.0 (17.9–24.1)
Rich	23.4 (20.0–26.8)

Note. a = mean.

**Table 2.** Proportional Distribution of Depression and Social Frailty Among Respondents at Baseline and Follow-up (n = 2,222).

	Baseline (CI)	Follow-up (CI)
Depression status		
Not-depressed	94.0 (92.8–95.2)	94.2 (93.1–95.4)
Depressed	6.0 (4.8–7.2)	5.8 (4.6–6.9)
Social Need Indicators		
Social isolation	4.2 (4.0–4.3) <sup>a</sup>	4.1 (4.00–4.25) <sup>a</sup>
Financial need		
None at all	21.0 (18.7–23.4)	10.9 (9.0–12.8)
Little	8.8 (5.7–11.8)	16.3 (12.6–20.0)
Moderately	24.4 (21.2–27.6)	39.2 (36.2–42.2)
Completely or mostly	45.8 (42.1–49.6)	33.7 (30.7–36.6)
Food need–Eat less		
Every month or almost every month	6.0 (4.3–7.6)	4.6 (3.0–6.1)
Occasional or some months	32.9 (29.8–36.1)	18.7 (16.1–21.4)
Never	61.1 (57.7–64.5)	76.7 (73.8–79.6)
Food need–Hungry or did not eat		
Every month or almost every month	5.5 (3.9–7.0)	4.1 (2.6–5.6)
Occasional or some months	20.3 (18.0–22.7)	15.3 (12.9–17.6)
Never	74.2 (71.5–77.0)	80.7 (78.0–83.3)
Physical need		
No	63.9 (60.7–67.1)	64.0 (60.9–67.2)
Yes	36.1 (32.9–39.3)	36.0 (32.8–39.1)

Note. a = mean.

depression among older adults in the follow-up is relatively lower (5.8%) than the prevalence at the baseline (6.0%). In the baseline, 21.0% of older adults surveyed indicated that they did not have enough money to meet their needs (none at all). The proportion of older adults who did not have enough money to meet their needs (none at all) almost halved (10.9%) at the follow-up. The proportion of older adults who had little money and moderately had enough money to meet their needs increase in the follow-up compared to the baseline. A higher proportion of older adults reported never eating less (76.7%) and never going hungry or not eating (80.7%) in the follow-up compared to the baseline—61.1% and 74.2%, respectively. The proportion of older adults in need of physical support decreased marginally in the follow-up compared to the baseline; that is, from 36.1% in the baseline to 36.0% in the follow-up. Likewise, the mean isolation score in the follow-up decreases marginally to 4.1 from 4.2 in the baseline.

Table 3 presents the result for the regional trends in social frailty before (baseline) and after (follow-up). The proportion of older adults with depression in Southern and Northern Ghana reduced in the follow-up, albeit the decrease for Southern Ghana (excluding Greater Accra) was marginal. Interestingly, the proportion of older adults with depression or depressive symptoms in the Greater Accra increased from 1.0% in the baseline to 4.5% in the follow-up. While the mean score of social isolation decreased for older adults in Southern Ghana (excluding Greater Accra), the results reveal a marginal increase in the mean social isolation score for older adults in Greater Accra and Northern Ghana. The proportion of older adults who did not have enough money to meet their needs (none at all) in the baseline decrease in the follow-up for residents in Southern (excluding Greater Accra) and Northern Ghana. In Northern Ghana, 43.8% of older adults indicated they did not have enough money to meet their needs (none at all) in the baseline; this reduced to 9.2% in the follow-up. Regarding food insecurity, the result indicates a significant drop in the proportion of older adults who ate less in all three regions. At the baseline, 19.6%, 37.1% and 63.4% of older adults in Greater Accra, Southern Ghana (excluding Greater Accra) and Northern Ghana, respectively, indicated they eat less every month, almost every month or occasionally. In the follow-up, this reduced to 15%, 21.5% and 39.3% in Greater Accra, Southern Ghana (excluding Greater Accra) and Northern Ghana, respectively. The proportion of older adults who went hungry decreased in Southern (excluding Greater Accra) and Northern Ghana, however, it increased among older adults in the Greater Accra region. At the baseline 92.4% of older adults in Greater Accra indicated they never went hungry; this dropped to 89.7% in the follow-up. Contrarily, the proportion of older adults who never went hungry increased from 76.9% and 46.9%, in Southern Ghana (excluding Greater Accra) and Northern Ghana respectively, to 81.8% and 67.0%. The results further reveal that physical need among older adults in Southern Ghana (excluding Greater Accra) decreased in the follow-up, albeit, increased in the follow-up for Greater Accra and Northern Ghana.

**Table 3.** Proportional Distribution of Depression and Social Frailty Among Respondents at Baseline and Follow-up by Regions (n = 2,222).

	Greater Accra		Southern (excluding Greater Accra)		Northern	
	Baseline	Follow-up	Baseline	Follow-up	Baseline	Follow-up
Depression status						
Not-depressed	99.0 (97.9–100.0)	95.5 (92.4–98.6)	93.3 (91.8–94.7)	93.5 (92.1–94.9)	92.5 (89.3–95.7)	96.2 (94.0–98.5)
Depressed	1.0 (0.4–2.1)	4.5 (1.4–7.6)	6.7 (5.3–8.2)	6.5 (5.1–7.9)	7.5 (4.3–10.7)	3.8 (1.5–6.0)
Social Need Indicators						
Social isolation	4.5 (3.9–5.1) <sup>a</sup>	4.5 (3.9–5.1) <sup>a</sup>	4.0 (3.9–4.2) <sup>a</sup>	4.0 (3.9–4.1) <sup>a</sup>	4.4 (4.1–4.6) <sup>a</sup>	4.5 (4.3–4.7) <sup>a</sup>
Financial need						
None at all	5.1 (2.2–8.0)	5.7 (2.8–14.3)	18.9 (16.3–21.5)	12.4 (10.6–14.3)	43.8 (36.8–50.8)	9.2 (6.0–12.5)
Little	44.8 (28.5–61.0)	29.4 (16.1–42.5)	47.4 (43.6–51.3)	33.7 (31.0–36.5)	40.2 (32.6–47.7)	37.4 (32.0–42.8)
Moderately	31.7 (16.6–46.8)	32.6 (20.9–44.3)	25.7 (22.7–28.8)	38.7 (35.7–41.8)	12.8 (7.1–18.4)	47.7 (42.0–53.5)
Completely or mostly	18.4 (7.0–29.9)	32.3 (14.4–50.2)	8.0 (4.3–11.6)	15.2 (12.4–17.9)	3.2 (1.1–5.4)	5.7 (3.5–7.9)
Food need–Eat less						
Every month or almost every month	4.1 (0.7–8.18)	0.2 (0.2–0.6)	6.5 (4.4–8.5)	6.6 (4.4–8.74)	5.6 (1.9–9.2)	0.0 (0.0–0.1)
Occasional or some months	15.5 (3.6–27.4)	14.8 (2.1–27.6)	30.6 (27.6–33.7)	14.9 (12.7–17.18)	57.8 (50.7–65.0)	39.3 (33.9–44.7)
Never	80.4 (68.1–92.8)	85.0 (72.2–97.7)	62.9 (59.5–66.3)	78.5 (75.6–81.4)	36.6 (29.7–43.5)	60.7 (55.3–66.1)
Food need–Hungry or did not eat						
Every month or almost every month	0 (0.0–0.1)	0.3 (0.3–1.0)	5.9 (3.9–7.8)	5.7 (3.6–7.9)	8.7 (4.8–12.6)	0.5 (0.2–1.1)
Occasional or some months	7.6 (2.1–13.1)	10.0 (0.9–20.8)	17.2 (14.8–19.6)	12.5 (10.3–14.6)	44.4 (37.2–51.5)	32.5 (27.4–37.7)
Never	92.4 (86.9–97.9)	89.7 (78.9–100.0)	76.9 (74.0–79.9)	81.8 (79.0–84.6)	46.9 (39.5–54.4)	67.0 (61.9–72.2)
Physical need						
No	69.4 (56.9–82.0)	67.1 (52.2–82.1)	63.3 (59.9–66.7)	66.4 (63.5–69.2)	61.5 (54.9–68.1)	50.7 (44.8–56.5)
Yes	30.6 (18.0–43.1)	32.9 (17.9–47.8)	36.7 (33.3–40.1)	33.6 (30.8–36.5)	38.5 (31.9–45.1)	49.3 (43.5–55.2)

Note. a = mean.

Table 4 shows the results of our panel complementary log-log regression analysis. The results of the multivariate analysis show that in Model 1, social isolation, financial need and physical need were significantly associated with depression. A unit increase in social isolation score results in ~18% increase in the likelihood of having depression or depressive symptoms ( $\text{exp}\beta = 1.178$ ,  $p < 0.001$ ). Reduction in the level of financial need resulted in a decrease in the likelihood of having depression or depressive symptoms. Older adults who reported having little, moderately, and completely or mostly enough money to meet their needs were ~60% and ~71%, respectively, less likely to have depression or depressive symptoms. Older adults with physical needs were twice ( $\text{exp}\beta = 2.256$ ,  $p < 0.001$ ) more likely to have depression or depressive symptoms. In Model 2, the results show that age and marital status was significantly associated with depression. An increase in age increased the risk of depression by 2.2% ( $\text{exp}\beta = 1.022$ ,  $p < 0.001$ ). Compared to married older adults, older adults who were separated or divorced ( $\text{exp}\beta = 1.796$ ,  $p < 0.01$ ) and widowed ( $\text{exp}\beta = 1.584$ ,  $p < 0.05$ ) were more likely to have depression or depressive symptoms. For our final model (Model 3), social isolation, financial need and physical need remained statistically significant after introducing socioeconomic indicators as additional covariates. A unit increase in social isolation index resulted in ~17% increase in the likelihood of having depression or

depressive symptoms. Similar to Model 1, older adults who indicated they had little (~60%), moderately (~70%) and completely or mostly (70%) enough money to meet their needs were less likely to have depression or depressive symptoms, compared to those who had none at all. Older adults with physical needs were twice ( $\text{exp}\beta = 2.138$ ,  $p < 0.001$ ) more likely to have depression or depressive symptoms. Again age and marital status were significantly associated with depression. An increase in age resulted in 1.2% likelihood of having depression or depressive symptoms. Never married, separated or divorced and widowed older adults were more likely to have depression or depressive symptoms, compared to their married counterparts. Random effect component of our models ( $\rho$ ) show that ~53%, ~49% and ~50% of the variation in depression or depressive symptoms in Model 1, Model 2 and Model 3, respectively, were contributed by individual-specific effect (across time).

## Discussion and Implications

Knowledge from existing studies shows that older adults in Ghana and other parts of the sub-Saharan African region are increasingly becoming socially vulnerable due to the decline in social and material support (Aboderin & Hoffman, 2015; Apt, 2012; Gyasi et al., 2020). This situation implies older adults in the country do not have the requisite social and materials

**Table 4.** Complementary Log-Log Random-Effects Estimates for Social Frailty and Socioeconomic Status (n = 2222).

	Model 1	Model 2	Model 3
<b>Social Frailty Indicators</b>			
Social isolation	1.178 (0.040)***		1.165 (0.039)***
<b>Financial need</b>			
None at all (ref)			
Little	0.398 (0.066)***		0.393 (0.066)***
Moderately	0.285 (0.058)***		0.295 (0.062)***
Completely or mostly	0.291 (0.095)***		0.299 (0.099)***
<b>Food–Eat less</b>			
Every month or almost every month (ref)			
Occasional or some months	1.148 (0.530)		1.395 (0.657)
Never	0.570 (0.269)		0.638 (0.310)
<b>Food need–Hungry or did not eat</b>			
Every month or almost every month (ref)			
Occasional or some months	1.209 (0.593)		1.178 (0.594)
Never	1.978 (0.975)		1.676 (0.858)
<b>Physical need</b>			
No (ref)			
Yes	2.256 (0.322)***		2.138 (0.332)***
<b>Socio-demographic Characteristics</b>			
<b>Region of residence</b>			
Greater Accra (ref)			
Southern Ghana (excluding Greater Accra)		1.239 (0.363)	1.222 (0.378)
Northern Ghana		1.112 (0.408)	0.821 (0.322)
<b>Place of residence</b>			
Urban (ref)			
Rural		1.265 (0.210)	1.195 (0.186)
Age		1.022 (0.007)***	1.012 (0.007) <sup>+</sup>
<b>Sex</b>			
Male (ref)			
Female		1.279 (0.238)	1.103 (0.216)
<b>Marital Status</b>			
Married or cohabiting (ref)			
Never Married		1.882 (0.808)	2.158 (0.961) <sup>+</sup>
Separated or divorced		1.796 (0.406)**	1.648 (0.390)*
Widowed		1.584 (0.301)*	1.517 (0.300)*
<b>Education</b>			
No formal education (ref)			
Primary education		1.105 (0.201)	1.279 (0.245)
Secondary education		1.018 (0.214)	1.272 (0.283)
Post-secondary education		0.544 (0.304)	0.836 (0.431)
<b>Wealth Index</b>			
Poor (ref)			
Middle		1.062 (0.203)	1.198 (0.243)
Rich		0.960 (0.173)	1.298 (0.250)
Richest			
Insign2u	0.602 (0.233)	0.436 (0.229)	0.490 (0.252)
sigma_u	1.351 (0.158)	1.244 (0.143)	1.278 (0.161)
rho	0.526 (0.058)	0.485 (0.057)	0.498 (0.063)
F test	14.58***	3.35***	6.72***

Note. standard error in parenthesis; \*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05, <sup>+</sup>p < 0.1.

resources they need to function adequately and maintain psychosocial wellbeing. However, the implementation of social intervention programs, such as the LEAP program, has the potential to salvage the situation. The findings of our study show that there has been a decline in depression and social frailty among older adults in Ghana. The findings also show that social isolation financial needs and physical needs as

indicators of social frailty have a significant association on depression among older adults in Ghana.

With regard to our first and second research questions, the findings of the study suggest that there has been a downward reduction in depression and social frailty among older adults in Ghana, as well as, reduction in the regional difference in depression and social frailty. The most significant reduction

was in the proportion of older adults who did not have enough money for their daily needs (financial needs), while depression and other indicators of social frailty had a marginal decrease in prevalence. The cross-tabulation analysis also shows a significant reduction in depression and social frailty among other adults, particularly for older adults in Northern Ghana. Significant improvements in financial need and food insecurity indicators were observed among older adults in the three Northern regions while a relative increase was observed in the proportions of older adults with depression and food insecurity (hungry or did not eat) in Greater Accra. We hypothesize that the introduction of age friendly social intervention programs (such as the LEAP program) that seeks to reduce financial vulnerabilities among older adults in Ghana could potentially account for the reduction in social frailty over time. For instance, ~52.74% of households covered by the LEAP program are located in the three northern regions of Ghana. This could potentially explain the significant reduction in social frailty and depression in this part of the country. By targeting households in poverty endemic areas of the country, the social intervention programs seem to have reduced the burden of financial frailty and food insecurity among older adults, particularly in the northern regions.

Nevertheless, the findings of our studies suggest the need to pay attention to older adults in supposedly better-endowed regions of the country (Greater Accra). Vulnerable older adults in this part of the country have financial and social challenges similar to their counterparts in the three Northern regions. In the context of inadequate support and high cost of living, older adults in Southern Ghana (excluding Greater Accra), particularly, the Greater Accra region risk experiencing social frailty (food insecurity) and depression as evident from our study. Knowledge from existing studies shows that social protection schemes protect older adults from the risk of loneliness or isolation and depression (Ma et al., 2018; Min et al., 2016). The guaranteed financial, material and medical assistance from such a scheme provide socioeconomically vulnerable older adults with the mental stability needed to actively engage in social or community activities without worrying about their unmet social needs.

Our multivariate analysis support knowledge from existing studies that social frailty increases the risk of depression among older adults (Gyasi et al., 2019; Ma et al., 2018; O'Hara et al., 2016). Older adults who lack companionship are at risk of being lonely and isolated. Knowledge from existing studies shows that loneliness or isolation is directly associated with depression (Ma et al., 2018; Tsutsumimoto et al., 2018). Socially isolated and lonely older adults often show negative emotions and high dissatisfaction with life (Amegbor et al., 2018; Christian et al., 2020; Ohemeng et al., 2019). Such older adults do not benefit from communal resources and support for dealing with stressful or adverse life events that contribute to depression or depressive state (Min et al., 2016). The finding also reveals that older adults with financial difficulties and physical needs are more likely to experience or have depression while indicators of food insecurity were not statistically

significant predictors of depression. We argue that in Ghana, issues of food insecurity among older adults may not be as pressing as financial and physical needs, given the majority of the population including older adults rely on subsistence economic activities (Gyasi et al., 2019). For instance, the 2010 PHC estimates that 63.1% of economically active<sup>1</sup> older adults are food crop farmers (Ghana Statistical Service, 2013). In such context and as evident in Table 1, the incidence of older adults eating less or going hungry are rare. With the decline in familial support and out-migration of younger adults, Ghanaian older adults with constraint financial resources and those with physical needs are more likely to have depression or depressive symptoms due to lack for support. Similar to previous studies, our findings suggest the protective effect of marriage on psychosocial wellbeing or depression. Studies show the marriage offer older adults companionship, financial, physical and emotional support often absent for persons who have lost or separated (or divorced) their partners and never married individuals (King et al., 2019; Stokes & Moorman, 2018). The loss of one's partner and breakdown of a marriage can also have negative consequences on the mental health of a person.

Our study has its strengths and limitation. In terms of strength, our study is the first to examine the temporal trend of social frailty and depression among Ghana older adults. In doing so, the study helps us understand the potential effect of existing social intervention programs on the psychosocial wellbeing of older adults in the country. Also, the use of longitudinal data also facilitates exploring the potential causal relationship between social frailty and depression; albeit, we cautiously note that the WHO-SAGE as an observational longitudinal study does not prove causality. Proving causality between social frailty and depression requires longitudinal intervention research or study. Our regional analysis of social frailty and depression also further our understanding of the potential effect of social intervention programs, in bridging regional socioeconomic disparities among older adults in Ghana. Our study has several limitations. First, we can only infer the possible effect of social intervention programs given the WHO-SAGE survey did not capture whether respondents were beneficiaries or recipients of these programs. The reduction in social frailty thus could be the result of other factors beyond the scope of this study such as general improvement in the socioeconomic status of the population.

## Conclusion

Our study shows a decline in social frailty and depression among older adults in Ghana. The findings reveal that over time regional disparities in social frailty among older adults have reduced, however, it also highlights the need to pay attention to vulnerable older adults in economically endowed regions of the country. The findings suggest that with the decline in familial support for older adults, public social intervention programs may necessary to enable older adults to function effectively and reduce their risk of adverse health outcomes (including depression). The findings of the study

suggest that reducing or eliminating social isolation, financial need and aiding for older adults with physical needs have the potential of reducing the risk of depression or depressive symptoms among older adults in Ghana.

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### Note

1. The 2010 PHC indicate that 58.5% of the older adult population in Ghana are economically active.

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