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Self-Reported Food Insecurity and Depression among the Older Population in South Africa

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Abstract: South Africa represents one of the most rapidly aging countries in sub-Saharan Africa with a rising burden of age-related psychological morbidities. Despite having one of the highest human development scores in the region, the country faces serious poverty and food insecurity related challenges. Previous studies have shown a positive association between food insecurity and poor mental health among the adult population, however there is no systematic evidence on this association among the elderly population in an African setting. In the present study, we aimed to address this research gap by analyzing cross-sectional data (n = 931) on the over-50 population (>50 years) from the SAGE (Study on global AGEing and adult health) Well-Being of Older People Study (WOPS) of the World Health Organization, conducted between 2010 and 2013. The outcome variable was perceived depression and the explanatory variables included several sociodemographic factors including self-reported food insecurity. The independent associations between the outcome and explanatory variables were measured using multivariable regression analysis. Results showed that close to a quarter of the population (22.6%, 95% CI = 21.4, 24.7) reported having depression in the last 12 months, with the percentage being markedly higher among women (71.4%). In the multivariable regression analysis, self-reported food insecurity was found to be the strongest predictor of depression among both sexes. For instance, severe food insecurity increased the odds of depression by 4.805 [3.325, 7.911] times among men and by 4.115 [2.030, 8.341] times among women. Based on the present findings, it is suggested that national food security programs focus on promoting food security among the elderly population in an effort to improve their mental health status. Nonetheless, the data were cross-sectional and the associations can't imply causality.

Keywords: food insecurity; depression; over-50 population; South Africa

1. Introduction

In general terms, food insecurity refers to having inconsistent access to adequate food for maintaining a healthy life because of financial and other barriers (US Department of Agriculture) [1]. Food insecurity is global concern and affects millions of children and adults in developed and developing countries alike [2–5]. Worldwide, an estimated 800 million individuals lack access to sufficient food, and >2 billion experience key micronutrient deficiencies, with the majority of these people being located in the low-income countries [6]. Chronic food insecurity is associated with a plethora of physical and psychological issues including anemia, diabetes, hypertension, cardiovascular diseases, obesity, and other nutritional disorders [7–11].

Chronic suboptimal dietary intake can act as a strong biological and psychosocial stressor that provides the preconditions for poor mental, social, and psycho-emotional health across the life course [6,12,13]. Thus, the overall outcome of chronic food insecurity can not only affect physical health, but also compromise emotional health, quality of life and the overall well-being of individuals [14,15]. The outcomes of food insecurity are particularly concerning among the elderly population owing to their declining mobility, frailty, higher need of care, social isolation and greater vulnerability to ill health that limits their capacity to achieve nutritional well-being [16]. Food insecurity has a multidimensional etiology, and among the over-50 population it results more from non-financial constraints such as functional impairment, inadequate housing, and mobility issues [16–18].

The combination of food insecurity and population aging thus poses a serious public health issue in many low-and-middle income nations like South Africa. South Africa represents one of the most rapidly aging countries in the sub-Saharan African region (4.6 million in 2017 vs. 2.8 million in 1996) [19] and has the highest prevalence of non-communicable diseases [3]. Apart from the changing demographic and epidemiological structure, South Africa also faces widespread poverty and food insecurity issues which makes intervention efforts even more challenging. According to a literature review study, the prevalence of food insecurity in South Africa dropped from 52.3% to 25.9% between 1999 and 2008 [20], with the proportion of people at risk of food insecurity remaining more or less unchanged during this period [21]. Evidence of the high prevalence of psychological morbidities such as depression were also reported by two high profile surveys, including the South African Stress and Health study [22] and the Study of Global Ageing and Adult Health (SAGE wave 1) [23]. However, the association between food insecurity and depression remains to be clarified, especially among the elderly population in South Africa. In the present study, we therefore aimed to address this research gap by using data from the SAGE Well-Being of Older People Study (WOPS) of the World Health Organization (WHO) conducted between 2010 and 2013. The main objective was to examine the demographic and socioeconomic corelates of perceived depression among the older population (aged 50 years and above) with a special focus on food security.

2. Methods

2.1. Data Source

Data used in this survey were obtained from SAGE Well-Being of Older People Study (WOPS) of the World Health Organization. These were sub-population longitudinal surveys, and were carried out between 2010 and 2013 by the Africa Centre Demographic Information System (ACDIS) and population-based HIV survey, South Africa [24]. The objectives of these surveys were to provide data on the various health, demographic and social indicators relevant to the well-being and functional status of over-50 people either infected with HIV themselves, or affected by HIV/AIDS in their families. Details of sampling procedures and study protocols were published as WHO reports [25].

2.2. Measures

The outcome variable was self-reported depression in last 12 months. Self-reported depression was assessed by the question: *During the last 12 months, have you had a period lasting several days when you felt sad, empty or depressed?* The options for answers were "Yes" and "No".

Participants were classified "Depressed" if they responded "Yes" and "Not depressed" if responded otherwise. This brief, one-item screening scale of lifetime depressive disorders is a commonly used tool in population surveys. The advantages of the brief and self-reported measure are its capacity to capture overall psychosocial situation from the patient's perspective, and better methodological homogeneity and comparability of the condition of groups across studies and countries [26,27]. However, this relies on the assumption that the symptomatology of a particular disorder (as defined by DSM-IV) will not vary substantially between different countries [26].

The explanatory variable of main interest was food insecurity, which was assessed by the question: *In the last 12 months, how often did you eat less than you felt you should because there wasn't enough food?* The answers were: (1) Never, (2) Only in 1 or 2 months, (3) Almost every month (4) Some months, but not every month and (5) Every month. For this study, food insecurity was categorized as severe (Every month), moderate (Only in 1 or 2 months or Almost every month or some months, but not every month), and none (Never).

In order to assess the independent associations, the following variables were included in the analysis: Age (50–59, 60–69, 70–79, 79+ years); Sex (female, male); Current marital status (married, not married); Religion (Christian, Islam/Other); Ever uses tobacco (Yes, no); Ever consumes alcohol (Yes, no); Living condition (Very Satisfied, Satisfied, Neither satisfied nor dissatisfied, Dissatisfied, Very dissatisfied);Rating of health (Very Satisfied, Satisfied, Neither satisfied nor dissatisfied, Dissatisfied, Very dissatisfied); Sleep difficulty (None, Mild/moderate, Severe/extreme); Activities of daily living (ADL) difficulties (None/1–3/4–6/>6); Self rated health (Bad, Good); Quality of Life (Bad, Good). For analytical convenience, variables (health rating, quality of life and living condition) with five categories were dichotomized by merging the positive reports (Very Satisfied, Satisfied,) as Good/satisfactory and the rest as Not good/Not satisfactory. For instance, living condition was recategorised as Satisfied (Very Satisfied, Satisfied), Neutral (Neither satisfied nor dissatisfied) and Dissatisfied (Dissatisfied, Very dissatisfied).

ADL difficulties were measured based on the following questions: In the last 30 days/month, how much difficulty did you have with: (1) moving around, (2) Concentrating and remembering things, (3) Learning a new task, (4) Standing for long time, (5) Bathing/washing, (6) Getting dressed, (7) Carrying things, (8) Eating, (9) Getting up from lying, (10) Using toilet, (11) Using public transportation, (12) Going out. The possible answers were: (1) None, (2) Mild, (3) Moderate, (4) Severe, and (5) Extreme. Those who reported no difficulty were classified as "No functional difficulties", and participants were classified as "Has functional difficulties" if they reported otherwise. The number of ADL difficulties were categorised as: None/1–3/4–6 and >6 [28].

2.3. Data Analysis

Data analyses were carried out using STATA (Software for Statistics and Data Science) version 14. The main inclusion criteria were being aged 50 years or older, and availability of the information on all the variables of interest. A small proportion of observations (n = 9) were removed from the analysis as they did not provide any data on depression. The proportion of sample population reporting depression was presented as percentages with 95% CI to account for study design. Cross-tabulation with chi-squared tests were used to measure the bivariate association between depression and the covariates. Following that, multivariate regression models were run to measure the independent association between depression and the individual covariates. Two additional models were run stratified by sex. The results of regression analysis were presented as ORs and 95% CIs. A two-tailed p-value of <0.05 was set as the level of statistical significance for all calculations.

2.4. Ethics Statement

The WOPS survey was approved by the implementing bodies in the respective countries. The datasets were made available in the public data repository of WHO in anonymized form, hence no further approval was necessary for this study.

3. Results

3.1. Descriptive Analysis

Table 1 shows the basic sociodemographic characteristics of the sample population (n = 931). Less than a quarter of the population (22.6, 95% CI = 21.4, 24.7) reported having episodes of depression during the last 12 months. The proportion was relatively higher among those aged 60–69 years (33.2%),

female (71.4%), currently unmarried (79.1%), followers of Christianity (89.3%), non-users of tobacco (32.9%), user of alcohol (74.9%), mild (35.0%) and severe (40.7%) sleep difficulty, had ADL difficulties, poor self-rated health (85.7%) and quality of life (89.7%), and reported moderate (30.9%) to severe food insecurity (37.4%).

Table 1. Sample profile and prevalence of self-reported depression (n = 931).

Variables	Description	%	No Depression (77.4, 95%CI = 75.1, 79.6)	Has Depression (22.6, 95%CI = 21.4, 24.7)	*p*-Value
Age groups	Current age of the participant				
50–59		35.3	29.7 [26.4, 33.2]	29.0 [23.3, 35.5]	<0.001
60–69		30.7	26.6 [23.4, 30.0]	33.2 [26.7, 40.4]	
70–79		23.6	28.0 [24.4, 31.9]	22.6 [17.1, 29.2]	
80+		10.4	15.7 [12.6, 19.4]	15.2 [9.8, 22.8]	
Sex	Sex of the participant				
Male		38.1	37.6 [33.8, 41.6]	28.6 [22.3, 35.9]	<0.001
Female		61.9	62.4 [58.4, 66.2]	71.4 [64.1, 77.7]	
Current marital status	Current marital status of the participant				
Not Married		68.2	69.5 [65.8, 73.0]	79.1 [73.0, 84.1]	<0.001
Married/Cohabitating		31.8	30.5 [27.0, 34.2]	20.9 [15.9, 27.0]	
Religion	Religious affiliation of the participant				
Christian		85.4	83.5 [80.3, 86.3]	89.3 [84.3, 92.9]	0.003
Islam/others		14.6	16.5 [13.7, 19.7]	10.7 [7.1, 15.7]	
Has employment	Current working status of the participant				
Yes		79.7	71.1 [68.1, 73.6]	70.6 [62.8, 77.3]	0.059
No		21.3	28.9 [26.4, 31.8]	27.8 [21.2, 35.6]	
Smokes tobacco	Whether or not the participant ever smoked tobacco				
Yes		32.5	30.9 [27.4, 34.6]	32.9 [26.1, 40.4]	0.021
No		67.5	69.1 [65.4, 72.6]	67.1 [59.6, 73.9]	
Drinks alcohol	Whether or not the participant ever uses alcoholic drink				
Yes		76.7	75.2 [71.4, 78.6]	74.9 [67.9, 80.8]	<0.001
No		23.3	24.8 [21.4, 28.6]	25.1 [19.2, 32.1]	
Living condition	Self-reported satisfaction with living place				
Satisfied		60.0	54.7 [50.8, 58.7]	69.8 [62.3, 76.3]	0.051
Neutral		26.4	31.2 [27.7, 34.9]	15.9 [10.7, 23.0]	
Dissatisfied		13.6	14.1 [11.5, 17.1]	14.3 [10.0, 20.1]	
Sleep difficulty	Self-reported sleep difficulty				
None		44.5	43.8 [39.9, 47.7]	24.3 [18.9, 30.5]	<0.001
Mild		35.7	37.5 [33.7, 41.4]	35.0 [28.5, 42.2]	
Severe		19.8	18.7 [15.6, 22.3]	40.7 [33.6, 48.3]	
ADL difficulties	Total number of difficulties in activities in daily living				
None		7.7	4.8 [3.8, 6.1]	0.4 [0.1, 1.5]	<0.001
1–3		42.6	32.7 [29.4, 36.1]	25.1 [20.2, 30.8]	
4–6		33.2	37.9 [34.1, 41.8]	37.0 [30.5, 44.0]	
>6		16.5	24.6 [20.7, 29.0]	37.5 [30.1, 45.5]	
SRH	Self-reported health status				
Bad		66.5	71.9 [68.6, 75.0]	85.7 [81.0, 89.4]	<0.001
Good		33.5	28.1 [25.0, 31.4]	14.3 [10.6, 19.0]	
QoL	Self-reported quality of life				
Bad		78.9	83.9 [81.3, 86.2]	89.7 [85.6, 92.8]	<0.001
Good		21.1	16.1 [13.8, 18.7]	10.3 [7.2, 14.4]	
Food insecurity	Measured in terms of perceived inadequacy of food				
None		17.8	16.9 [13.2, 21.5]	31.7 [24.0, 40.5]	<0.001
Moderate		19.6	16.9 [13.6, 20.7]	30.9 [22.6, 40.7]	
Severe		62.6	66.2 [61.4, 70.7]	37.4 [29.0, 46.7]	

N.B. ADL = activities of daily living, QoL = quality of life, SRH = self-reported health; 95% confidence intervals in [] brackets.

3.2. Regression Analysis

The results of the multivariable regression analysis are presented in Table 2. A higher age showed a protective effect against depression among both sexes. Men and women aged 80 years and above had respectively 0.495 [95% CI = 0.309, 0.782] and 0.529 [95% CI = 0.381, 0.770] times lower odds of reporting depression. Tobacco smoking was associated with higher odds of depression among men [odds ratio (OR) = 2.426; 95% CI = 1.033, 5.698] and lower odds of repression among women [OR = 0.503; 95% CI = 0.256, 0.985]. Reporting satisfaction regarding living condition was associated with lower odds of depression among women only [OR = 0.358, 95% CI = 0.158, 0.810]. A neutral living condition was significant for the pooled sample. Severe sleep difficulty was also associated with depression; however, the significance was lost after stratifying by sex ($p > 0.05$). For ADL difficulties, although the association was significant for the overall sample, no significant relationship was observed in sex-stratified analysis. The strongest predictor of depression appeared to be self-reported food insecurity among both sexes. Severe food insecurity increased the odds of depression by 4.805 [95% CI = 3.325, 7.911] times among men and by 4.115 [95% CI = 2.030, 8.341] times among women.

Table 2. Predictors of perceived depression among men and women in South Africa. Well-being of older people study (WOPS) 2010–2013.

	Pooled	Male	Female
Age groups (50–59)			
60–69	0.721	0.577	0.830
	[0.421, 1.234]	[0.212, 1.568]	[0.421, 1.636]
70–79	0.356 **	0.665 **	0.410 *
	[0.189, 0.669]	[0.528,0.817]	[0.180, 0.934]
80+	0.479 ***	0.495 **	0.529 *
	[0.350, 0.691]	[0.309, 0.782]	[0.381, 0.770]
Sex (Male)			
Female	0.848	NA	NA
	[0.487, 1.477]		
Marital status (Never Married)			
Married/Cohabitating	0.881	0.806	1.045
	[0.497, 1.560]	[0.342, 1.901]	[0.447, 2.444]
Religion (Christian)			
Islam/others	0.667	0.510	0.808
	[0.339, 1.312]	[0.112, 2.313]	[0.361, 1.810]
Smokes tobacco (Yes)			
No	0.821	2.426 *	0.503 *
	[0.496, 1.358]	[1.033, 5.698]	[0.256, 0.985]
Drinks alcohol (Yes)			
No	1.082	0.478	1.387
	[0.610, 1.919]	[0.0981, 2.332]	[0.720, 2.673]
Living condition (Dissatisfied)			
Neutral	0.295 ***	0.997	0.871
	[0.163, 0.534]	[0.375, 2.648]	[0.756, 1.389]
Satisfied	0.478 *	1.016	0.358 *
	[0.251, 0.911]	[0.301, 3.427]	[0.158, 0.810]
Sleep difficulty (None)			
Mild	1.242	1.303	1.099
	[0.712, 2.168]	[0.507, 3.352]	[0.526, 2.296]
Severe	2.112 *	2.469	2.067
	[1.168, 3.819]	[0.823, 7.406]	[0.964, 4.432]
ADL difficulties (none)			
1–3	5.044 *	1.878	0.531
	[1.106, 23.00]	[0.343, 10.27]	[0.211, 1.336]
4–6	6.207 *	2.251	0.697
	[1.283, 30.03]	[0.349, 14.53]	[0.337, 1.441]
>6	8.434 *	2.617	1.403
	[1.618, 43.97]	[0.316, 21.71]	[0.714, 2.192]
SRH (Bad)			
Good	0.540	0.512	0.488
	[0.289, 1.011]	[0.188, 1.399]	[0.205, 1.161]
QoL (Bad)			
Good	0.986	0.691	1.086
	[0.508, 1.913]	[0.225, 2.122]	[0.456, 2.586]
Food insecurity (None)			
Moderate	2.794 ***	2.678 *	3.114 **
	[1.623, 4.809]	[1.033, 6.944]	[1.540, 6.295]
Severe	4.411 ***	4.805 ***	4.115 ***
	[2.537, 7.670]	[3.325, 7.911]	[2.030, 8.341]

Numbers represent odds ratios; 95% confidence intervals in [] brackets. Reference categories in () brackets. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

4. Discussion

The present study aimed to explore the predictors of perceived depression among men and women over 50 in South Africa. Several important findings were observed in the descriptive and regression analysis. Firstly, in line with the current literature, we observed a noticeable sex difference in the percentage of reported depression. The crude percentage of reported depression was more than twofold among women compared with their male counterparts. The present analysis does not provide insight on this gendered disparity in the burden of depression; however, previous studies have also reported a higher prevalence of depression among women, as the global female: male depression ratio stands at 1.70:1.12 [29]. Certain authors suggest that the gender disparity may stem primarily from differences in behavioral and socioeconomic factors such as diet, smoking, alcohol drinking, and education [30]. Some others explained that the higher prevalence of depression among women can be partially explained by conditions such as premenstrual dysphoric disorder, postpartum depression and postmenopausal depression and anxiety, which are associated with changes in ovarian hormones [31].

Secondly, there was an inverse relationship between age and perceived depression, such that those in the 80+ age groups had relatively lower odds of reporting depression compared with those in the youngest. Mental health status generally worsens with increasing age, perhaps due to the fact that elderly people are more likely to accept ill health as an effect of aging and are also less likely to be able to gauge their cognitive status. Younger people, on the other hand, tend to be more aware of their psychological issues [32] and show a higher degree of sensitivity to any decline in their mental well-being and cognitive capacity. The declining trend in depression with higher age was reported in review studies as well [31].

Another interesting finding was the sex difference in the association between smoking and depression. While the association was positive for men, women who smoked had a lower likelihood of depression. Although many studies report a positive correlation between smoking and depression, the literature is largely mixed, and the direction of this association is also unclear. A recent meta-analysis reported that smoking was associated with depression and anxiety and vice versa, thus indicating a bidirectional relationship between the two [33,34]. The present findings, however, need to be interpreted with caution, as we had no data on level of smoking. More studies are necessary to explain the mechanisms through which smoking can relate to depression.

Consistent with some past findings, our results also showed significantly positive associations between ADL difficulties [35,36] and sleep difficulty [37,38] with depression; however, the associations were not statistically significant when stratified by sex. Finally, we found strong positive associations between food insecurity and depression. Both food insecurity and depression are multifactorial issues, and the mechanisms through which food insecurity affects depression are not adequately understood. There is a general consensus regarding the idea that food insecurity can act as a strong environmental stressor that can lead to depressive disorders [39,40]. Depression is also known to be an outcome or poor nutrition and dietary imbalance [41,42], reflecting the role of food insecurity in its etiology. Promoting food security is often an overlooked issue in the context of healthcare, especially among the elderly population. Addressing food at the population level may eventually contribute to better mental health and psychological well-being in the elderly population as well. Our findings suggest that promoting food security should be regarded as an important aspect of preventing psychological morbidity among the food-insecure elderly population.

In the current literature, the link between nutritional deficiencies and physical morbidities is well-documented. In contrast, the association between nutrition and psychiatric illnesses is less clear. Although the etiology of depression is generally thought of as strictly philological or behavioral, the emerging field of nutritional psychiatry [43,44] is attempting to address the onset as well as the severity of depressive disorders. Given the growing phenomenon of population aging and the rising burden of non-communicable and psychological morbidities, studies on the sociodemographic patterns of mental health issues among the elderly population represent an urgent imperative. In the context

of South Africa, and in many other African nations, the healthcare systems are largely unprepared to meet the broader health and psychosocial needs of the elderly population. Although evidence is emerging on these issues, there is insufficient information in the current literature regarding mental healthcare among the elderly population in African countries. From this perspective, the findings of the present study can provide important insights for health practitioners and policy makers in South Africa. However, the findings of the present study need to be interpreted in light of several limitations. Firstly, the data were cross-sectional, and hence no causality can be inferred between the outcome and predictor variables. This was a sub-national study and the results are not generalizable for the overall elderly population. Another important limitation was that the we didn't adjust the analysis for HIV status among the participants. Previous studies have shown that HIV is associated with food insecurity and poor mental health outcomes [45,46]. Also, depression was assessed with a single-item question, which doesn't necessarily reflect factors such as the length of the episodes, or associated symptoms such as anhedonia. Finally, the variables were self-reported which means that results remain subject to recall and reporting bias.

5. Conclusions

Our findings suggest an age and gendered pattern in the prevalence of depression. Further studies are required to explore the underlying causes of such disparities in the South African population. There was no clear sociodemographic pattern in the distribution of depression; however, self-reported food insecurity was found to be strongly associated with depression among both men and women. This is an important finding that can be of especial significance to healthcare researchers and clinicians involved in the areas of mental health among the elderly population in South Africa, as well as in countries with similar stages of demographic and economic transition. These findings suggest that the national food security agenda stresses promoting food security among the elderly population in an effort to improve mental health status and overall health.

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