Predictor of sleep difficulty among community dwelling older populations in 2 African settings

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Abstract

Sleep deprivation is a common phenomenon among older population and is commonly linked to behavioral, physiological, and psychosocial factors. Not much is known about sleep deprivation among older population in Africa. Therefore, in this study we aimed to investigate the basic sociodemographic and psychosocial predictors of self-reported sleep deprivation among older population.

In this study we analyzed cross-sectional data on 1495 community dwelling men and women aged 50 years and above. Data were collected from the SAGE Well-Being of Older People Study conducted in South Africa and Uganda. Outcome variable was self-reported sleep difficulty last 30 days. Multivariable logistic regression models were used to identify the variables significantly associated with sleep difficulty.

The prevalence of mild-moderate sleep difficulty was 32.6% (27.9, 37.6) and severe/extreme 23.0% (20.3, 26.0) respectively. Multivariable analysis revealed that sleep difficulty was associated with several behavioral, environment, and illness conditions. In South Africa, those who reported dissatisfaction with living condition had 1.592 [1.087, 2.787] times higher odds of reporting mild/moderate sleep difficulty. Poor subjective quality of life (QoL) was associated with higher odds of severe/extreme sleep difficulties (odds ratios [OR] = 4.590, 95% confidence interval [CI] = 2.641, 7.977 for South Africa, and OR = 4.461, 95% CI = 2.048 and 9.716 for Uganda). In Uganda, perceived depression was associated with higher odds of severe/extreme (OR = 2.452, 95% CI = 1.073, 5.602) sleep difficulties among men, and both mild/moderate (OR = 1.717; 95% CI = 1.011, 2.914) and severe/extreme sleep difficulties among women (OR = 2.504, 95% CI = 1.408, 4.453).

More than half of the participants had sleep difficulty of certain degrees, emphasising an urgent need for intervention for sleep deprivation in the population. Interventions targeting to promote subjective health, quality of life, and living environment may prove beneficial for improving sleep health in this regard.

Abbreviations: ACDIS = Africa Centre Demographic Information System, CI = confidence interval, LMICs = low-middle-income countries, NCDs = non-communicable chronic diseases, OR = odds ratios, QoL = quality of life, WHO = World Health Organization, WOPS = Wellbeing in Older Persons Study.

Keywords: living environment, quality of life, sleep difficulty, subjective health

1. Introduction

Sleep plays a pivotal role in maintaining a wide array of physiological processes that are vital for overall health and well-being including metabolism, immune and endocrine system, formation of memory and maintenance of cognitive health, controlling body temperature and appetite.[1–4] Duration and pattern of sleep varies across life stages, sex, environmental and biological factors. Clinical studies have also demonstrated that sleep homeostasis is altered by various behavioral, environmental, genetic, and psychosocial factors.[5–11] The sensitivity to these wide range of factors is an important characteristic of health which is known as plasticity of health,[12] and plays a key role in health and wellness.[13] Altered sleep homeostasis can trigger a
that may be associated with sleep deprivation. To this regard, we undertook the present study using cross-sectional data from the Wellbeing in Older Persons Study (WOPS) carried out by World Health Organization (WHO) during 2010 to 2013 in South Africa and Uganda. These surveys were conducted on a small segment of the population and may not represent the current situation of sleep health among older population in these countries. However, the WOPS survey is an important source of information on various demographic, social, and behavioral factors among older population and allows to retrospectively investigate the correlates of sleep difficulty. The evidences can be of good interest among researchers in sleep epidemiology based on low-resource settings.

2. Materials and methods

2.1. Data source

Data used in this survey obtained from SAGE WOPS of World Health Organization. These were sub-population surveys, and were carried out between 2009 (Wave 1) and 2013 (Wave 2): 2009 and 2013 for Uganda, and 2010 and 2013 for South Africa, in partnership with the Medical Research Council/Uganda Virus Research Unit Uganda Research Unit on AIDS, Uganda, and the Africa Centre Demographic Information System (ACDIS) and population-based HIV survey, South Africa. The objectives of these surveys are to provide data on the various health, demographic and social indicators relevant to the well-being and functional status among older 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.

2.2. Measures

The outcome measure of this study was self-reported sleep difficulty. This was assessed by the following question: “Overall in the last 30 days, how much of a problem did you have with sleeping, such as falling asleep, waking up frequently during the night or waking up too early in the morning or sleeping too much?”, with the answers being: none, mild, moderate severe, extreme. For the purpose of this study, sleep difficulty was recategorized as: none, mild-moderate, and severe-extreme.

The potential predictor variables were chosen based on their known association with sleep health from previous studies from a biopsychosocial perspective. Although the data were secondary with limited set of variables, we aligned the selection strategy with the domains outlined in the biopsychosocial model, for example, demographic, social, environmental, behavioral, biological: age (50–59, 60–69, 70–79, 79+ years); sex (female, male); current marital status (married, not married); religion (Christian, Islam/ Other); ever used tobacco (yes, no); ever alcohol consumption (yes, no); health satisfaction (very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, very dissatisfied); quality of life (very good, good, moderate, bad, very bad); satisfaction with living condition (very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied, very dissatisfied); perceived depression (yes, no), anxiety, stress.

Health satisfaction, satisfaction with living condition, and quality of life were further trichotomized by merging “very satisfied/very good,” “good” as satisfied/good, and “dissatisfied, very dissatisfied/bad,” “very bad” as dissatisfied/not-good.
Perceived 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?” with “Yes” and “No” options for answers. Participants were classified “Depressed” if they responded “Yes” and “Not depressed” if they responded otherwise. This one-item brief 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 the overall psychosocial situation from the patient’s perspective, and better methodological homogeneity and comparability of the condition of groups across studies and countries.\textsuperscript{2,25,41} 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.\textsuperscript{43} Throughout the results and discussion, the term “depression” was used to represent “feeling of sadness, empty, or depressed” during last 12 months.

2.3. Data analysis

Inclusion criteria were being aged above 50 years. Data analyses were carried out using STATA version 14. The data were merged to perform pooled analysis. Sample characteristics and sleep difficulty were calculated by descriptive analyses with Pearson chi-squared test ($\chi^2$) and presented as percentages with 95% CIs (Table 1). Given the sociocultural heterogeneity of the sampling populations, we reported the data for South Africa and Uganda separately throughout the analysis. Next, we ran 3 sets of multivariate logistic regression models for each country: one for pooled sample, one for male and one for female sample. The results of regression analysis were presented as odds ratios and 95% CIs. A two-tailed $P$-value of $<0.05$ was set as level of 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 statistics

Sample characteristics were presented in Table 2 (N=1495). Majority of the participants were in the youngest age group of 50 to 59 years (57.5%), women (51.7%), currently unmarried (79.1%), followers of Christianity (72.6%), never used tobacco (74.3%), and used to have alcoholic drinks (57.8%). About three-fifth (58.7%) reported living condition as satisfactory and 12% as not satisfactory. Poor health and QoL was reported by respectively 17.9% and 33.2% of the participants. Little less than two-fifth (39.9%) reported having depressive symptoms.

Table 3 shows the degree of correlation of the independent and the outcome variable. Sleep difficulty had significant correlation with all the covariates except for smoking. None of the covariates showed any strong collinearity with each other.

The prevalence of sleep difficulty was analyzed for each of the covariate (Table 4) to examine how it differed across the sociodemographic categories. Mild-moderate sleep difficulty was reported by 32.6% (27.9, 37.6) and severe/extreme by 23.0% (20.3, 26.0) of the participants. Results indicate that the

### Table 1

Predictors of sleep difficulty among older men and women in South Africa.

|                  | Pooled          |                           |                           |                           |                           |
|------------------|-----------------|---------------------------|---------------------------|---------------------------|---------------------------|
|                  | Mild-moderate   | Severe-extreme           | Mild-moderate             | Severe-extreme            | Mild-moderate             |
|                  |                 |                           |                           |                           |                           |
| Age (50–59)      |                 |                           |                           |                           |                           |
| 60–69            | 1.018 [0.699, 1.483] | 0.991 [0.636, 1.454]     | 0.963 [0.638, 1.454]     | 1.062 [0.453, 2.490]     | 1.034 [0.639, 1.670]     |
| 70–79            | 0.999 [0.633, 1.578] | 1.332 [0.813, 2.183]     | 0.728 [0.357, 1.485]     | 1.286 [0.598, 2.772]     | 1.338 [0.713, 2.510]     |
| 80+              | 0.829 [0.446, 1.540] | 0.822 [0.418, 1.620]     | 0.420 [0.132, 1.355]     | 0.705 [0.223, 2.172]     | 1.196 [0.543, 2.632]     |
| Current marital status (unmarried) |                 |                           |                           |                           |                           |
| Married          | 0.733 [0.502, 1.069] | 0.723 [0.462, 1.132]     | 0.685 [0.403, 1.162]     | 0.794 [0.429, 1.468]     | 1.339 [0.681, 2.635]     |
| Religion (Christian) |                 |                           |                           |                           |                           |
| Islam/Other      | 0.556* [0.390, 0.794] | 0.661* [0.452, 0.965]    | 0.887 [0.540, 1.457]     | 0.911 [0.530, 1.564]     | 0.322*** [0.189, 0.548] |
| Smokes (no)      |                 |                           |                           |                           |                           |
| Yes              | 1.010 [0.717, 1.424] | 1.228 [0.827, 1.826]     | 0.905 [0.602, 1.643]     | 1.087 [0.605, 1.954]     | 0.949 [0.565, 1.594]     |
| Alcohol (no)     |                 |                           |                           |                           |                           |
| Yes              | 0.840 [0.608, 1.163] | 0.916 [0.640, 1.311]     | 0.575* [0.348, 0.952]    | 0.897 [0.500, 1.578]     | 1.228 [0.788, 1.913]     |
| Living condition (satisfactory) |                 |                           |                           |                           |                           |
| Neutral          | 1.024 [0.748, 1.420] | 0.812 [0.568, 1.159]     | 0.965 [0.617, 1.509]     | 0.922 [0.563, 1.509]     | 1.196 [0.754, 1.897]     |
| Not satisfactory | 1.592* [1.087, 2.878] | 1.495 [0.925, 2.416]     | 1.289 [0.690, 2.407]     | 1.180 [0.590, 2.359]     | 1.746 [1.179, 3.467]     |
| SRH (good)       |                 |                           |                           |                           |                           |
| Neutral          | 1.205 [0.870, 1.668] | 1.629* [1.117, 2.351]    | 0.820 [0.508, 1.322]     | 1.729* [1.019, 2.934]    | 1.798* [1.108, 2.918]    |
| Not good         | 2.036* [1.280, 3.214] | 3.350* [2.088, 5.375]    | 2.331* [1.218, 4.462]    | 4.329* [2.232, 8.399]    | 1.784 [0.891, 3.569]     |
| QoL (good)       |                 |                           |                           |                           |                           |
| Neutral          | 1.957*** [1.336, 2.865] | 1.987*** [1.214, 3.252]  | 1.964* [1.140, 3.382]    | 1.997* [0.932, 4.277]    | 1.756* [1.006, 3.074]    |
| Not good         | 2.507*** [1.551, 4.052] | 4.590*** [2.641, 7.977]  | 1.919 [0.967, 3.809]     | 4.662* [2.031, 10.70]    | 3.140 [1.545, 6.382]     |
| Depression diagnosed (no) |                 |                           |                           |                           |                           |
| Yes              | 1.325 [0.961, 1.825] | 1.988*** [1.392, 2.639]  | 1.287 [0.795, 2.083]     | 1.833* [1.053, 3.193]    | 1.333 [0.849, 2.029]     |

Numbers represent odds ratios. 95% confidence intervals in [ ] brackets. Reference categories in ( ) brackets. QoL = quality of life, SRH = self-reported health.

$^*$ $P<0.05$.

$^*$ $P<0.01$.

$^*$ $P<0.001$. 

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prevalence of sleep difficulty was progressively lower among the younger age group, higher among women, currently unmarried, followers of Christianity, reported living condition as unsatisfactory, never used tobacco, ever used alcohol, reported poor health and QoL, no depression (except for severe sleep difficulty), and living in Uganda.

Binary regression analyses were performed to identify the variables independently associated with sleep difficulty separately for South Africa (Table 1) and Uganda (Table 5). Age and marital status showed no association with sleep difficulty in either countries. However, women who reported Islam/other affiliation had lower odds of mild/moderate sleep difficulty for Uganda, and both mild/moderate and severe/extreme sleep difficulties for South Africa. Alcohol drinking was inversely associated mild/moderate sleep difficulty among men in Uganda only (odds ratio = 0.575, 95% CI = 0.348, 0.952).

In South Africa, those who reported dissatisfaction with living condition had 1.592 [1.087, 2.787] times higher odds of reporting mild/moderate sleep difficulty. Dissatisfaction with living condition was associated higher odds of mild/moderate (OR = 1.732, 95% CI = 1.069, 3.898) and severe/extreme (2.365, 95% CI = 1.018, 5.494) sleep difficulty in Uganda. Compared with those who reported good SRH, those reported otherwise had significantly higher odds of sleep difficulties in both populations. In Uganda, for example, those who reported health status as moderate, and those who reported not good, had respectively 2.412 [1.210, 4.806] and 4.652 [2.178, 9.935] times higher odds of reporting mild/moderate and severe/extreme sleep difficulties. Similar to SRH, poor QoL was also associated with odds of sleep difficulties for both countries, particularly for severe/extreme (OR = 2.452, 95% CI = 1.408, 4.453).

4. Discussion

Sleep disorders are becoming increasingly prevalent and affecting health and quality of life especially among older populations.
However, little is known regarding the predictors of this silent epidemic in the LMICs. In this study we presented a comparative scenario of sleep difficulties between South Africa and Uganda, respectively categorized as low- and upper-middle income country World Bank. We found that self-reported sleep difficulty was more prevalent among Ugandan older population than among the South Africans. One-quarter of the participants in Uganda reported mild-moderate sleep difficulty compared with one-quarter in South Africa, indicating a potential correlation between sleep health with the degree of human development. Sleep health status among South African adults has been reported among certain populations, however that on Ugandan population is notably scarce. Comparable findings are still lacking, but a recent South African study based on Study of Global Ageing and Adult Health (SAGE Wave 1, 2007–2010) data reported that the prevalence of short sleep ranged from 16.9% to 18.8% respectively among white African women and men, meaning that the overall prevalence was lower compared with the present findings. The remarkably high prevalence of self-reported sleep difficulty among older population in Uganda reflect the need for urgent intervention. Sleep quality is an important metric of overall health and quality of life among adults and should be regarded as priority topic for research and health promotion policies.

Apart from the high prevalence, the findings also indicate significant environmental and epidemiological pattern in the distribution of sleep difficulty. We found that satisfaction with living environment is a strong predictor of sleep difficulty in both South Africa (among women only) and Uganda. Although physical environment plays key roles on various aspects of health and quality of life, its influence on sleep health is arguably more immediate and can be regarded as an important mechanism through which environment exerts its role on health. Ambient air pollution, noisy and congested living places with poor ventilation, and temperature control facilities can compromise quality of sleep particularly among those already suffering from poor sleep hygiene. These findings highlight the need for paying attention to living environment among older population with sleep complaints. Poor sleep can exacerbate health and other illness conditions through negative effects on psychosocial, cognitive, and behavioral mechanisms. Old age is associated with higher prevalence of chronic type illness that require life-long treatment and behavioral management, therefore, investing on living environment can be an important strategy not only for improving sleep health but also for better management of health conditions for the growing elderly population in Africa. Although our data were cross-sectional and cannot indicate any causal relationship, the association between living environment and sleep difficulty is a convincing one warrants attention in clinical interventions. As highlighted by previous researches on healthy cities and Ottawa Charter for Health Promotion, environmental factors should be given a special priority in meeting the health issues of the increasingly aging population in the developing countries.

Self-reported health and quality of life also predicted sleep difficulty in both countries. Arguably, sleep quality itself can serve as an indicator of health and quality of life measures. However, the relationship is essentially directional as sleep health is inextricably linked with overall health status of individuals.

Our findings support the fact that improving sleep health should be regarded as an important area for promoting health status among older population. Similar to health and quality of life, perceived depression also appeared to be a significant predictor of sleep difficulty in the study population. The negative effect of poor sleep and psychological morbidities has been well-documented in previous studies.

Over the last two-three decades, the number of aged populations has increased substantially with concomitant rise in NCDs such as diabetes mellitus, hypertension, and obesity.

### Table 3

| Correlation among the study variables. | Age | Sex | Marital | Religion | Smokes | Alcohol | Living | SRH | QOL | Depression | Multimorbidity |
|--------------------------------------|-----|-----|---------|----------|--------|---------|--------|-----|-----|------------|----------------|
| Age                                  | 1.0000 |               |          |          |        |         |        |     |     |            |                |
| Sex                                  | 0.1427 | 1.0000 |          |          |        |         |        |     |     |            |                |
| P-value                               | .0000  |       |          |          |        |         |        |     |     |            |                |
| Marital                               | 0.1461 | 0.2613 | 1.0000   |          |        |         |        |     |     |            |                |
| P-value                               | .0000  | .0000 |          |          |        |         |        |     |     |            |                |
| Religion                              | 0.2294 | 0.1220 | 0.1177   | 1.0000   |        |         |        |     |     |            |                |
| P-value                               | .0000  | .0000 |          |          |        |         |        |     |     |            |                |
| Smokes                                | 0.1546 | 0.1846 | 0.1836   | 0.1167   | 1.0000 |         |        |     |     |            |                |
| P-value                               | .0000  | .0000 |          |          |        |         |        |     |     |            |                |
| Alcohol                               | 0.2839 | 0.0441 | 0.2384   | 0.0195   | 0.1471 | 1.0000  |        |     |     |            |                |
| P-value                               | .0000  | .0885 |          |          | .4503  | .0000   |        |     |     |            |                |
| Living                                | 0.0381 | 0.0408 | 0.0681   | 0.0008   | 0.0829 | 0.0026  | 1.0000 |     |     |            |                |
| P-value                               | .1422  | .1152 |          | .0086    | .9744  | .0014   | .9208  |     |     |            |                |
| SRH                                   | 0.2620 | 0.1181 | 0.0035   | 0.0037   | 0.0350 | 0.0911  | 0.0112 | 1.0000 |     |            |                |
| P-value                               | .0000  | .0000 |          | .8915    | .8862  | .1769   | .0004  | .6646 |     |            |                |
| QOL                                   | 0.1013 | 0.0190 | 0.0605   | 0.1387   | 0.0030 | 0.0200  | 0.1037 | 0.3867 | 1.0000 |            |                |
| P-value                               | .0001  | .4647 |          | .0199    | .0000  | .9090   | .4424  | .0001 | .0000 |            |                |
| Depression                            | 0.2489 | 0.0640 | 0.2112   | 0.2780   | 0.0984 | 0.2104  | 0.0657 | 0.1497 | 0.2638 | 1.0000      |                |
| P-value                               | .0000  | .0240 |          | .0000    | .0005  | .0000   | .0238  | .0000 | .0000 |            |                |
| Multimorbidity                        | 0.1121 | 0.1241 | 0.0327   | 0.0663   | 0.1067 | 0.0269  | 0.0500 | 0.1125 | 0.0522 | 0.0774      | 1.0000        |
| P-value                               | .0005  | .0001 |          | .3091    | .0390  | .0009   | .4015  | .1201 | .0004 | .1050      | .0371        |
| Sleep                                 | 0.0883 | 0.0533 | 0.1105   | 0.0645   | 0.0307 | 0.0454  | 0.3554 | 0.2107 | 0.2104 | 0.2328      | 0.0618        |
| P-value                               | .0059  | .0393 |          | .0000    | .0128  | .2365   | .0394  | .0000 | .0000 | .0000      | .0171        |

QoL = quality of life, SRH = self-reported health.
Therefore, studies on geriatric health are particularly important for healthcare systems in sub-Saharan Africa to ensure the provision of holistic care for the elderly. In the current literature there is insufficient evidence regarding the health issues among elderly population in African countries, and particularly so for sleep health. From this perspective, the findings of the present study can be useful for health practitioners as well as geriatric health researchers in South Africa, Uganda, and in other countries across the continent. Due to data constraints, we were not able to examine the role of relevant dietary and sociocultural determinants that are also known as strong determinants of sleep health. Future studies should focus on exploring the situation of sleep health by using a broader set of indicators.

The findings of our study make important contributions to current literature on sleep health among older population in LMICs. Apart from the contributions, there are several limitations to report. As mentioned earlier, the surveys were cross-sectional and therefore cannot indicate any causality between sleep and the predictor variables. Living environment is an important predictor and should include more direct indicators such as walkability, noise level, pollution. Health and quality of life status were measured by self-report, which although recommended by many researchers for its strength and ease of use, is not without limitations, for example, reporting bias. Data collection was done about a decade ago, therefore, the prevalence estimates may not represent the current situation. Information on total sample was not available for all surveys. Given the small sample size, especially the the population affected by HIV, selection/sampling bias might have occurred as well. The sample population were not representative and are not generalizable for the entire elderly population in the countries being studied. Also, the variables were self-reported and thereby remain subject to recall and reporting bias. The survey included participants either infected with HIV themselves, or affected by HIV/AIDS in their families, however we considered all participants aged above 50 years regardless of their HIV status. Last but not least, we could not adjust the analysis for several proximate indicators such as dietary factors and medication use which are associated with sleep disturbance. Some of the variables (such as self-reported health) were merged for ease of

### Table 4

|                  | None 44.3% (37.8, 51.0) | Mild/Moderate 32.6% (27.9, 37.6) | Severe/Extreme 23.0% (20.3, 26.0) | P-value |
|------------------|-------------------------|----------------------------------|----------------------------------|---------|
| Age groups       |                         |                                  |                                  |         |
| 50–59            | 54.2% (46.4, 61.8)       | 46.6% (38.4, 54.9)               | 54.4% (46.4, 62.1)               | <.001   |
| 60–69            | 22.2% (16.5, 26.4)       | 23.1% (18.2, 28.9)               | 16.5% (11.9, 22.5)               |         |
| 70–79            | 16.7% (13.1, 21.2)       | 19.8% (15.2, 25.4)               | 21.0% (16.8, 25.9)               |         |
| 80+              | 6.8% (4.6, 9.9)          | 10.5% (7.7, 14.2)                | 8.1% (5.8, 11.3)                 |         |
| Sex              |                         |                                  |                                  |         |
| Male             | 48.1% (42.7, 53.6)       | 43.2% (38.8, 47.6)               | 44.5% (38.2, 51.1)               | <.001   |
| Female           | 51.9% (46.4, 57.3)       | 56.8% (52.4, 61.2)               | 55.5% (48.9, 61.8)               |         |
| Marital status   |                         |                                  |                                  |         |
| Not married      | 74.4% (70.1, 78.3)       | 78.0% (71.5, 83.3)               | 86.5% (82.7, 89.6)               | <.001   |
| Married/Cohabitating | 25.6% (21.7, 29.9)   | 22.0% (16.7, 28.5)               | 13.5% (10.4, 17.3)               |         |
| Religion         |                         |                                  |                                  |         |
| Christian        | 73.3% (68.9, 77.4)       | 79.4% (72.9, 84.7)               | 67.3% (61.1, 73.0)               | <.001   |
| Islam/Other      | 26.4% (22.4, 30.8)       | 20.4% (15.2, 26.8)               | 32.4% (26.6, 38.8)               |         |
| Living condition |                         |                                  |                                  |         |
| Satisfactory     | 62.2% (54.2, 69.6)       | 15.6% (12.4, 19.4)               | 16.3% (13.4, 19.6)               | <.001   |
| Neural           | 28.3% (22.8, 34.5)       | 29.9% (24.6, 35.7)               | 25.7% (19.7, 32.8)               |         |
| Not satisfactory | 9.0% (6.9, 11.8)         | 54.1% (48.9, 59.3)               | 57.5% (51.6, 63.3)               |         |
| Tobacco          |                         |                                  |                                  |         |
| Yes              | 26.4% (22.0, 31.3)       | 28.5% (25.2, 32.0)               | 24.2% (20.1, 28.8)               | <.001   |
| No               | 73.4% (68.5, 77.9)       | 71.4% (68.0, 74.5)               | 75.5% (71.0, 79.6)               |         |
| Alcohol          |                         |                                  |                                  |         |
| Yes              | 59.2% (54.8, 63.5)       | 63.5% (59.0, 67.8)               | 54.1% (46.8, 61.3)               | <.001   |
| No               | 40.6% (36.3, 45.0)       | 36.5% (32.2, 41.0)               | 45.6% (38.4, 53.1)               |         |
| SRH              |                         |                                  |                                  |         |
| Good             | 50.6% (38.9, 62.2)       | 20.1% (16.3, 23.9)               | 24.3% (18.2, 31.6)               | <.001   |
| Moderate         | 39.4% (30.4, 49.2)       | 46.9% (40.4, 53.4)               | 43.3% (36.0, 50.9)               |         |
| Bad              | 10.0% (7.0, 14.2)        | 33.0% (27.2, 39.5)               | 32.4% (26.2, 39.3)               |         |
| QoL              |                         |                                  |                                  |         |
| Good             | 29.8% (18.9, 43.5)       | 13.4% (9.0, 19.4)                | 8.4% (5.4, 12.7)                 | <.001   |
| Moderate         | 48.5% (39.7, 57.4)       | 51.9% (45.6, 58.2)               | 34.8% (30.2, 39.6)               |         |
| Bad              | 20.8% (17.0, 25.3)       | 35.6% (29.5, 38.0)               | 56.1% (51.4, 60.6)               |         |
| Self-rated depression |               |                                  |                                  | <.001   |
| No               | 71.1% (67.0, 74.9)       | 66.2% (61.4, 70.6)               | 42.4% (38.5, 46.3)               | <.001   |
| Yes              | 28.9% (25.1, 33.0)       | 33.8% (29.4, 38.6)               | 57.6% (53.7, 61.5)               |         |
| Country          |                         |                                  |                                  | <.001   |
| South Africa     | 31.4% (23.9, 40.0)       | 24.2% (16.0, 35.0)               | 39.5% (30.5, 49.2)               |         |
| Uganda           | 68.6% (60.0, 76.1)       | 75.8% (65.0, 84.0)               | 60.5% (50.8, 69.5)               |         |

**P-values from chi-squared tests. QoL = quality of life, SRH = self-reported health.**
analysis, which could have resulted in loss of information. As far as we are concerned, currently there is no public data on these indicators among older population in Africa, and therefore remains subject to further research.

5. Conclusions

In conclusion, the present findings indicate that sleep difficulty may be a widely prevalent health issue among older men and women in South Africa and Uganda. More than half of the participants reported sleep difficulty of certain degrees, emphasizing an urgent need for intervention for sleep deprivation in the population. Findings also indicate that environmental, health, depression, and quality of life significant predicted sleep difficulty in the sample population. To this regard, interventions targeting to promote subjective health, quality of life, and living environment may prove beneficial for improving sleep health. The data were collected several years ago and hence may not represent the present situation of sleep health. Current evidence on sleep health in African countries is extremely scarce and the evidence on the predictors of sleep quality is inconclusive. More surveys should be carried out to generate quality evidence on the underlying causes of sleep difficulty especially among the elderly population.

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Table 5

Predictors of sleep difficulty among older men and women in Uganda.

| Predictor | Pooled | Men | Women |
|-----------|--------|-----|-------|
|          | Mild-moderate | Severe-extreme | Mild-moderate | Severe-extreme |
|          | 95% CI |          | 95% CI |          |
| Age (50–59) | | | | |
| 60–69 | 0.748 [0.484, 1.157] | 0.888 [0.525, 1.494] | 0.635 [0.381, 1.030] | 1.329 [0.481, 3.130] |
| 70–79 | 0.689 [0.414, 1.157] | 1.148 [0.646, 2.041] | 0.594 [0.255, 1.387] | 1.533 [0.584, 4.023] |
| 80+ | 0.527 [0.363, 1.031] | 0.659 [0.310, 1.464] | 0.272 [0.071, 1.042] | 0.785 [0.212, 2.904] |
| Current marital status (unmarried) | | | | |
| Married | 0.701 [0.469, 1.106] | 0.666 [0.416, 1.067] | 0.658 [0.330, 1.369] | 1.461 [0.707, 3.016] |
| Single | 1.319 [0.647, 2.744] | 1.400 [0.438, 4.393] | 0.456 [0.235, 0.889] | 0.757 [0.380, 1.514] |
| Never married | 1.043 [0.696, 1.562] | 1.102 [0.690, 1.753] | 1.368 [0.705, 2.372] | 1.173 [0.545, 2.523] |
| Marital status (age group) | | | | |
| 60–69 | 0.773 [0.467, 1.302] | 0.640 [0.390, 1.021] | 0.668 [0.350, 1.270] | 1.408 [0.703, 2.837] |
| 70–79 | 0.899 [0.510, 1.565] | 1.163 [0.647, 2.103] | 0.700 [0.352, 1.430] | 1.468 [0.673, 3.192] |
| 80+ | 0.662 [0.390, 1.113] | 0.750 [0.443, 1.286] | 0.537 [0.292, 0.975] | 1.548 [0.763, 3.143] |
| Religion (Christian) | | | | |
| Yes | 1.472 [0.924, 2.344] | 1.010 [0.585, 1.745] | 0.731 [0.244, 2.184] | 0.677 [0.195, 2.431] |
| No | 1.472 [0.924, 2.344] | 1.010 [0.585, 1.745] | 0.731 [0.244, 2.184] | 0.677 [0.195, 2.431] |
| Alcohol (no) | 1.000 [1.000, 1.000] | 1.000 [1.000, 1.000] | 1.000 [1.000, 1.000] | 1.000 [1.000, 1.000] |
| Living condition (satisfactory) | | | | |
| Neutral | 0.882 [0.563, 1.391] | 0.593 [0.353, 0.979] | 0.664 [0.314, 1.403] | 0.508 [0.214, 1.206] |
| Not satisfactory | 1.488 [0.796, 2.781] | 1.900 [0.977, 3.698] | 1.273 [0.431, 3.756] | 1.667 [0.509, 5.459] |
| SRH (good) | | | | |
| Neutral | 1.202 [0.776, 1.862] | 1.596 [0.925, 2.752] | 0.746 [0.351, 1.585] | 2.272 [0.874, 5.906] |
| Not good | 2.412 [1.210, 4.808] | 4.652 [2.178, 9.955] | 3.651 [1.089, 12.14] | 8.089 [2.246, 34.55] |
| Qal. (good) | | | | |
| Neutral | 2.309 [1.403, 3.798] | 2.098 [1.132, 3.889] | 2.768 [1.162, 6.594] | 1.542 [0.546, 4.357] |
| Not good | 4.271 [2.146, 8.501] | 4.461 [2.048, 9.716] | 3.703 [0.704, 16.00] | 4.322 [1.800, 10.38] |
| Depression diagnosed (no) | | | | |
| Yes | 1.794 [1.175, 2.740] | 2.468 [1.552, 3.925] | 1.975 [0.921, 4.329] | 2.452 [1.073, 5.602] |

Numbers represent odds ratios. 95% confidence intervals in brackets. Reference categories in brackets. SRH= self-reported health, QOL= quality of life.

* P < .05
** P < .01
*** P < .001.
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