



# BMJ Open Prevalence and correlates of depressive symptoms, and points of intervention, in rural central Uganda: results from a cross-sectional population-based survey of women and men

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## ABSTRACT

**Objectives** The present study aimed to identify the prevalence and correlates of depressive symptoms and potential intervention points among women and men from a population-based sample in rural central Uganda.

**Design** A cross-sectional study.

**Setting** Four districts in rural Uganda.

**Participants** Women and men aged 15–59 residing in four districts in rural Uganda accepting home-based HIV testing who completed a baseline survey at the time of testing.

**Primary outcome measures** Depressive symptoms measured by the 10-item Center for Epidemiological Studies Depression Scale using a cut-off score of 13 for significant depressive symptoms.

**Results** Among a sample of 9609 women and 6059 men, 1415 (14.7%) women and 727 (12.0%) men met criteria for significant depressive symptoms. Having ever received mental health services was associated with lower odds of significant depressive symptoms (women: adjusted OR (adjOR)=0.32, 95% CI=0.22 to 0.47; men: adjOR=0.36, 95% CI=0.18 to 0.62). Having received outpatient (women: adjOR=3.64, 95% CI=3.14 to 4.22; men: adjOR=3.37, 95% CI=2.78 to 4.07) or inpatient (women: adjOR=5.44, 95% CI=4.24 to 6.97; men: adjOR=3.42, 95% CI=2.21 to 5.28) care in the prior 6 months was associated with greater odds of significant depressive symptoms. For women only, known HIV positive status (adjOR=1.37, 95% CI=1.05 to 1.77), and for men only, alcohol misuse (adjOR=1.38, 95% CI=1.12 to 1.70), were associated with increased odds of significant depressive symptoms.

**Conclusion** Our findings suggest that depression screening within outpatient and inpatient settings may help to identify people in need of mental health services. Routine screening in outpatient or inpatient clinics along with the implementation of evidence-based interventions could ultimately help close the mental health gap for depression in this and similar settings.

## INTRODUCTION

Depression is a prevalent mood disorder, affecting more than 264 million people globally.<sup>1</sup> Although depressive symptoms

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ A strength of this study is its large, population-based sample.
- ⇒ Few population-based studies exist that assess depressive symptoms prevalence, correlates, and points of intervention among the general adult population in predominantly rural areas of Uganda and similar settings.
- ⇒ The cross-sectional nature of the study limits the ability to infer causation or determine directionality between the health and demographic variables assessed and significant depressive symptoms.
- ⇒ The sample was drawn from a region in central Uganda, limiting the generalisability to dissimilar settings.

vary in presentation and severity by individual, common symptoms include persistent sadness or depressed mood, fatigue, loss of interest or pleasure, and disruption in sleep and appetite, among others.<sup>2</sup> Depression interferes with daily functioning and quality of life.<sup>1</sup> When persistent and moderate-to-severe in intensity, it can lead to serious long-term health and social consequences, including suicide.<sup>1</sup>

The burden of depression is on the rise globally, particularly in low-income and middle-income countries (LMICs), where it poses a significant challenge for resource-constrained health systems.<sup>3</sup> Psychological and pharmacological treatments exist for moderate and severe depression,<sup>2</sup> and can be effective and cost-effective when implemented in LMICs.<sup>4</sup> However, an estimated 76%–85% of people suffering from mental disorders in LMICs lack access to the treatment they need.<sup>5</sup> In response, the World Health Organization (WHO) launched the Mental Health



Gap Action Programme (mhGAP) to scale up access to evidence-based mental health services in resource-limited countries.<sup>6</sup> These efforts are especially relevant for the Africa region, estimated to have the highest prevalence of depressive disorders (5.4%) globally, with depression accounting for 7.9% of all years lived with disability.<sup>3</sup>

In Uganda, mental health services are provided within outpatient facilities, but coverage, funding, and stock of essential medications are inadequate.<sup>7,8</sup> Studies conducted with the general population in rural areas estimate probable depression between 7% and 28%,<sup>9–13</sup> but most research on depression in Uganda has concentrated on people living with HIV, a population with especially high rates of depression.<sup>14,15</sup> In addition to HIV, female gender, middle age, lower education and socioeconomic status and food and water insecurity are identified correlates of depression in Uganda.<sup>10,16–18</sup> However, the limited number of population-based studies on depression conducted with the general population in Uganda calls for more research to inform targeted efforts to scale-up mental health treatment to high-burden populations.

Moreover, to our knowledge, little research has examined other health factors that have been associated with depressive symptoms in other settings, like pregnancy.<sup>19</sup> Studies in Uganda report depression in perinatal populations range from 5% to 10%.<sup>20–23</sup> Further, while evidence is mixed on a causal association between hormonal contraceptive use and depression risk,<sup>24,25</sup> it may be an important covariate in multivariable models. Examining pregnancy and contraceptive use, and use of health services generally, could have implications for points within the healthcare system that can serve as entry to intervention. Finally, examining these health-related variables along with other known correlates of depressive symptoms, such as HIV status and gender, can help build evidence on the importance of these factors in this setting. This approach also allows us to identify which socio-demographics and health-related factors are most relevant in this setting when controlling for known correlates of depressive symptoms.

This study aimed to identify the prevalence and correlates of significant depressive symptoms, that is, symptom levels that suggest probable depression, among a population-based sample of women and men in rural central Uganda. Based on the existing literature, we examine health variables (use of health services, HIV status, alcohol misuse, pregnancy/contraceptive use) and demographic variables (gender, age, household economic status, marital status, education) as correlates of depression. Building on prior studies in Uganda and similar settings,<sup>10,16–18</sup> we hypothesised that there would be greater odds of meeting criteria for significant depressive symptoms among women compared with men, older participants, those living with HIV, those meeting criteria for alcohol misuse, pregnant women and those using hormonal contraceptives and those with lower household economic status and education. We assessed whether meeting the criteria for significant depressive symptoms

was associated with use of health services to identify potential intervention points for depression screening and linkage to treatment.

## METHODS

This study uses cross-sectional, population-based data from a larger study implemented in central Uganda in predominantly rural communities in Butambala, Mpigi, Gomba and Mityana districts.<sup>26</sup> In these districts, hospitals offer limited mental healthcare through outpatient mental health clinics staffed with mental health nurses; more severe cases are referred out to other facilities that offer specialised services. The PATH/Ekkubo study tested an enhanced linkage to HIV care intervention in the context of home-based HIV testing and counselling (HBHCT) using a cluster randomised controlled trial. The study randomised villages (or clusters) to intervention or control (standard-of-care) arms using a matched-pair, stratified cluster sampling design. All households in the selected villages were included in the study.

The present paper used data collected from the baseline questionnaire at the time of HBHCT, along with the HIV test results obtained through rapid HIV counselling and testing. HIV testing was performed according to the WHO algorithm for generalised epidemics<sup>27</sup>; the algorithm for HIV testing and detailed study procedures are reported elsewhere.<sup>26,27</sup> All eligible and consenting (verbal) household members received HIV counselling and testing. Individuals who provided written or thumb-printed consent per institutional review board protocol to participate in the baseline survey in addition to HIV testing completed an individual structured interviewer-administered computer-based interview. Both male and female interviewers administered the questionnaire in a private setting at the time of enrolment. Interviewers were not matched to participants by sex but if a participant requested, indicated a preference for a sex-matched interviewer, or appeared uncomfortable with a different sex interviewer, they were interviewed by a same-sex interviewer.

Eligibility criteria for the baseline questionnaire included being 18–59 years of age or an emancipated or mature minor aged 15–17, accepting HIV testing, speaking Luganda or English, and residing in the household. In Uganda, mature minors are defined as individuals 14–17 years of age who have drug or alcohol dependency or a sexually transmitted infection (which includes HIV). Emancipated minors are defined as individuals below the age of majority (18 years) who are pregnant, married, have a child or are self-sufficient. Mature and emancipated minors are permitted to independently provide informed consent to participate in research where it is justified to not involve legal representatives/guardians in the consent process.<sup>28</sup>

Data for the present study, which includes measures of depressive symptoms and alcohol use, were collected beginning in November 2017, corresponding to when

these items were added to the baseline questionnaire. Therefore, data were collected between November 2017 and October 2019 from 32 villages in four districts, including 10 villages from Mpigi district, 4 villages from Butambala district, 6 villages from Mityana district and 12 villages from Gomba district. The overall study focus was on contiguous, primarily rural, districts in central Uganda without regional hospitals or (national) referral hospitals and with limited access to general hospitals. Districts were selected based on these characteristics. As described in detail in the overall study protocol paper,<sup>26</sup> villages within a district were pair matched by size and approximate distance/travel time to health facilities that provided HIV care. Villages within the subcounties surrounding the two general hospitals within these four districts were excluded. Since the overall study was a cluster randomised trial, using village computer generated random numbers, we assigned one village in a pair to be in the intervention arm and the other to the standard-of-care arm. Paired villages were initially excluded if villages randomised to different study arms were within 4 km of each other or, because of transit routes, could not be reached within 10 minutes. If only one village in the pair was near a village assigned to a different study arm, a replacement matching village was sought, if possible. Based on 2014 census data, 281 villages across the four districts were eligible for selection. During the period of data collection for the present study, 168 villages were eligible.

Within the selected villages, all households were included, which was 10 062 total households. Of the total households identified, 324 households were not recorded. Data were collected from 8806 men and 10 864 women meeting study eligibility criteria. Of those, 2210 men and 647 women were not found at home, 532 men and 599 women declined HIV testing, and an additional 5 men and 9 women declined to participate in the questionnaire interview. Thus, 6059 men and 9609 women completed the questionnaire interview and were tested for HIV.

## Measures

Demographic variables measured and included in the analysis include *gender* (dichotomous), *age* (continuous), *household economic status* (continuous), *marital status* (categorised into married/living together, married/separated, widowed, divorced, never married) and *education* (categorised into no schooling, primary, secondary or greater than secondary). We created the *household economic status* variable using procedures to calculate a Wealth Index<sup>29</sup> with items from the Uganda Demographic and Health Survey.<sup>30</sup> We conducted a factor analysis using seven household characteristics (eg, having a television; having a sofa; having electricity) as indicators.

Health variables included constructed measures for healthcare utilisation that assessed lifetime and recent (prior 6 months) receipt of health services. To assess *lifetime use of mental health services*, participants indicated which health services they had ever received from a health

facility from a list of health services (eg, malaria care, family planning, vaccination), including mental health services (yes/no). *Any use of health services in the prior 6 months* was constructed using two items: one that asked if participants had received any medical care in the prior 6 months at a clinic or hospital, and another that asked about being admitted or hospitalised for a physical health problem in the past 6 months. For analysis, we categorised responses into outpatient only, inpatient, or none.

Other health variables assessed included *HIV test results* obtained through rapid HIV testing performed according to the WHO algorithm for generalised epidemics.<sup>27</sup> For analysis, we categorised those who reported already knowing their HIV positive status at the time of testing as 'known positive', those newly diagnosed during HBHCT as 'newly diagnosed positive' and those who tested negative during HBHCT as 'HIV negative'.

Alcohol misuse was measured using the Alcohol Use Disorders Identification Test Consumption (AUDIT-C) screening tool questions, a 3-item screening tool for identifying alcohol misuse, or any risky drinking or a Diagnostic and Statistical Manual of Mental Disorders (DSM)-IV alcohol use disorder in the prior year.<sup>31</sup> The AUDIT-C is an abbreviated version of the full AUDIT scale, which has been validated in Ugandan populations, finding good diagnostic properties compared with the Timeline Follow Back, DSM-5 and phosphatidylethanol, an alcohol biomarker.<sup>32</sup> The AUDIT-C is scored on a scale of 0–12; a score of 3 or more for women and 4 or more for men indicates alcohol misuse.<sup>31</sup> For analysis, we dichotomised scores into no alcohol misuse (<3 for women; <4 for men) versus alcohol misuse (≥3 for women, ≥4 for men), consistent with the cut-off scores used in other research in Uganda.<sup>33–36</sup>

To assess *hormonal contraceptive use/pregnancy*, women were first asked 'Are you pregnant now?' (yes/no) and were then asked to identify which family planning methods they were currently using from a list. For analysis, we constructed a variable that combined these two items into three categories, including using hormonal contraceptives (eg, oral pill, implant, injections), pregnant and neither.

Finally, the outcome of depressive symptoms was measured using the 10-item Center for the Epidemiological Studies of Depression Short Form (CES-D-10),<sup>37</sup> an abbreviated version of the original 20-item scale.<sup>38</sup> Participants indicate how frequently during the past week they had experienced each of a set of depressive symptoms (response options: rarely, some or a little of the time, occasionally or a moderate amount of time, mostly or all of the time). For example, 'You were bothered by things that usually don't bother you', 'Your sleep was restless' and 'You felt lonely'. The Cronbach's  $\alpha$  for the total sample was 0.87 (women=0.88; men=0.86). The original validation study of the CES-D-10 identified a cut-off score of 8 or 10 as optimal to identify individuals at-risk for depression in a population of older adults in the United States (US).<sup>37</sup> However, using the common cut-off score



may over classify individuals with possible depression in sub-Saharan African settings, as demonstrated by a validation study in South Africa.<sup>39</sup> Baron *et al* found cut-off scores of 11–13 were more appropriate to identify individuals at-risk for depression in three populations in South Africa. Comparing Baron and colleagues' classifications in our sample against Uganda's national estimates for depression prevalence,<sup>40</sup> we chose to classify participants with scores of 13 or higher as meeting criteria for possible depression.

### Data analysis approach

Data were analysed in SPSS V.28. We used frequencies and descriptive statistics to describe the sample characteristics. Population weights were applied to balance the distribution of the sample by subcounty (subunit of a county within a district) relative to the subcounty population aged 18–59 using 2014 census data.<sup>41</sup> Models were estimated applying the weights and accounting for potential clustering within villages and households. Bivariate and multivariable logistic regression models tested associations between health (recent use of health services, lifetime use of mental health services, HIV status, alcohol misuse, pregnancy/contraceptive use) and demographic variables (gender, age, household economic status, marital status, education) with significant depressive symptoms, with separate models run for women and men. Variables that were not statistically significant in bivariate associations at  $p < 0.05$  for either men or women were planned to be dropped from multivariable models, unless deemed theoretically important to retain as a covariate. We tested separate models for men and women because women's final model included pregnancy/hormonal contraceptive use, which was not included for men. Because we tested separate models for women and men, we tested the bivariate association between gender and depressive symptoms separately, with the full sample (reported in text). Finally, we conducted a sensitivity analysis to compare the results of the multivariable models using the US CES-D-10 cut-off for depressive symptoms of 10 (reported in text). We present odds ratios (ORs) and 95% CIs for bivariate models and adjusted ORs (AdjOR) and 95% confidence intervals (CIs) for multivariable models.

### RESULTS

A total of 15 668 individuals completed the questionnaire (women=9609; men=6059). A third of the sample ( $n=5193$ ) were individuals who were the sole participant from their household, 66.86% ( $n=10 475$ ) of the sample consisted of individuals from households with two or more participants (range 2–12) with the majority of those ( $n=6918$ ) being individuals in households with two participants included in the sample. The mean age of the sample was approximately 31 years ( $SD=11.2$ ). Two-thirds of the sample were married (living together or separated), as opposed to widowed, divorced or never married. Men were more likely to report having never married (29.8%

vs 12.0%) and were less likely to report being separated than women (0.7% vs 14.3%). Most of the sample reported primary-level as their highest level of educational attainment (61.5%). The overall HIV prevalence was 5.5%, with similar new diagnoses between men and women (1.7% for each), but with more women already known positive than men at the time of testing (4.9% vs 2.0%). Men were nearly twice as likely to be classified as having alcohol misuse on the AUDIT-C compared with women (22.3% vs 12.9%).

Of the sampled individuals, 13.7% of the sample met the criteria for significant depressive symptoms indicating probable depression based on a CES-D-10 cut-off score of 13, with slightly more women meeting the criteria than men (14.70% vs 12.0%). Women also reported greater engagement in health services in the past 6 months (outpatient (women: 41.6%; men: 36.9%), inpatient (women: 5.8%; men: 3.0%), none (women: 52.6%; men: 60.2%)), and were slightly more likely to have received mental health services in their lifetime than men (women: 6.9%; men: 5.0%). See [table 1](#) for more details on participant characteristics and [table 2](#) for the CES-D-10 item responses reported for the full sample and for men and women.

The bivariate model testing gender as a correlate of depressive symptoms in the full sample revealed women were at 1.24 greater odds (95% CI=1.11 to 1.37) of reporting significant depressive symptoms than men. In the separate bivariate logistic regression models testing associations with significant depressive symptoms for women and men, results were similar between the two groups (see [table 3](#)). Statistically significant ( $p < 0.05$ ) health variables associated with significant depressive symptoms for women and men included having attended outpatient (women: OR=3.88, 95% CI=3.36 to 4.48; men: OR=3.60, 95% CI=2.98 to 4.35) and inpatient health services (women: OR=5.50, 95% CI=4.31 to 7.01; men: OR=3.67, 95% CI=2.42 to 5.58) in the prior 6 months compared with no health services in the prior 6 months. Having ever received mental health services in one's lifetime was associated with lower odds of significant depressive symptoms (women: OR=0.25, 95% CI=0.17 to 0.37; men: OR=0.29, 95% CI=0.16 to 0.53). Classifying for alcohol misuse was also associated with greater odds of significant depressive symptoms (women: OR=1.46, 95% CI=1.23 to 1.74; men: OR=1.82, 95% CI=1.50 to 2.21). For women, being known HIV positive at the time of HBHCT (women: OR=1.95, 95% CI=1.54 to 2.49) was associated with higher odds of depressive symptomology and using hormonal contraceptives (OR=0.77, 95% CI=0.66 to 0.89) was associated with lower odds of depressive symptomology.

For women and men, among the statistically significant ( $p < 0.05$ ) demographic variables associated with significant depressive symptoms ([table 3](#)), older age was associated with greater odds of significant depressive symptoms (women: OR=1.39, 95% CI=1.32 to 1.47; men: OR=1.34, 95% CI=1.24 to 1.43). Education was negatively

**Table 1** Participant characteristics of a population-based sample of women and men in central Uganda, 2017–2019, N=15 668

	Total sample (N=15 668)		Women (n=9609)		Men (n=6059)	
	n (%) / mean (SD)	Range	n (%) / mean (SD)	Range	n (%) / mean (SD)	Range
<b>Demographics variables</b>						
Age	31.41 (11.19)	15–59	30.80 (10.87)	15–59	32.40 (11.61)	16–59
Marital status						
Married, living together	8080 (51.60)		5140 (53.60)		2940 (48.50)	
Married, separated	1966 (12.50)		1376 (14.30)		590 (0.70)	
Widowed	408 (2.60)		372 (3.90)		36 (0.60)	
Divorced	2255 (14.40)		1567 (16.30)		688 (11.40)	
Never married	2959 (18.90)		1154 (12.00)		1805 (29.80)	
Education						
Greater than secondary	670 (4.30)		388 (4.0)		282 (4.70)	
Secondary	4267 (27.20)		2747 (28.60)		1520 (25.10)	
Primary	9642 (61.50)		5726 (59.6)		3916 (64.60)	
No schooling	1089 (7.00)		748 (7.80)		341 (5.60)	
<b>Health variables</b>						
Healthcare past 6 months						
Outpatient only	6233 (39.80)		4000 (41.60)		2233 (36.90)	
Inpatient	734 (4.70)		554 (5.80)		180 (3.00)	
None	8701 (55.50)		5055 (52.60)		3646 (60.20)	
Ever received mental health services	971 (6.20)		667 (6.90)		304 (5.00)	
HIV test results						
Known positive	592 (3.80)		468 (4.90)		124 (2.00)	
Newly diagnosed positive	262 (1.70)		159 (1.70)		103 (1.70)	
HIV negative	14 814 (94.50)		8982 (93.50)		5832 (96.30)	
Alcohol misuse	2587 (16.50)		1237 (12.90)		1350 (22.30)	
Contraceptive use/pregnancy						
Uses hormonal contraceptive	–		3037 (31.60)		–	
Pregnant	–		929 (9.70)		–	
Neither	–		5643 (58.70)		–	
<b>Depression</b>						
CES-D-10 score	5.67 (5.69)	0.00–30.00	5.83 (5.83)	0.00–30.00	5.30 (5.43)	0.00–30.00
Significant depressive symptoms	2142 (13.70)		1415 (14.70)		727 (12.0)	

Alcohol misuse=AUDIT C score  $\geq 3$  for women and  $\geq$  for men; significant depressive symptoms=CES-D-10  $> 13$ . AUDIT-C, Alcohol Use Disorders Identification Test Consumption ; CES-D-10, 10-item Center for the Epidemiological Studies of Depression.

associated with significant depressive symptoms only for women. Having primary (OR=0.79, 95% CI=0.63 to 0.99), secondary (OR=0.67, 95% CI=0.52 to 0.86) or greater than secondary education (OR=0.56, 95% CI=0.38 to 0.85) was associated with lower odds of significant depressive symptoms compared with those with no schooling. Being married and living with one's partner (women: OR=1.79, 95% CI=1.39 to 2.32; men: OR=1.86, 95% CI=1.47 to 2.35), widowed (women: OR=3.54, 95% CI=2.46 to 5.09; men: OR=3.64, 95% CI=1.56 to 8.48) and divorced (women: OR=3.27, 95% CI=2.47 to 4.34; men: OR=2.33,

95% CI=1.73 to 3.14) were all associated with greater odds of significant depressive symptoms for women and men compared with being never married. For women, but not men, being married and separated was also associated with greater odds of significant depressive symptoms (women: OR=2.57, 95% CI=1.92 to 3.42) compared with being never married. Household economic status was not associated with significant depressive symptoms for women or men.

The multivariable models testing associations with significant depressive symptoms are displayed in [table 4](#).

**Table 2** CES-D-10 item responses for the full sample, and by gender, among women and men in central Uganda, 2017–2019, N=15 668

Item	Total sample N=15 668	Women n=9609	Men n=6059
During the past week:			
<b>You were bothered by things that usually do not bother you</b>			
Rarely or none of the time (less than 1 day)	10 631 (67.9%)	6491 (67.7%)	4160 (68.3%)
Some or a little of the time (1–2 days)	2597 (16.6%)	1589 (16.5%)	1008 (16.6%)
Occasionally or a moderate amount of the time (3–4 days)	1668 (10.6%)	1016 (10.6%)	652 (10.8%)
Mostly or all of the time (5–7 days)	772 (4.9%)	513 (5.3%)	259 (4.3%)
<b>You had trouble keeping your mind on what you were doing</b>			
Rarely or none of the time (less than 1 day)	10 955 (69.9%)	6650 (69.2%)	4305 (71.1%)
Some or a little of the time (1–2 days)	2740 (17.5%)	1684 (17.5%)	1056 (17.4%)
Occasionally or a moderate amount of the time (3–4 days)	1307 (8.3%)	851 (8.9%)	456 (7.5%)
Mostly or all of the time (5–7 days)	666 (4.3%)	424 (4.4%)	242 (4.0%)
<b>You felt depressed</b>			
Rarely or none of the time (less than 1 day)	10 343 (66%)	6230 (64.8%)	4113 (67.9%)
Some or a little of the time (1–2 days)	3304 (21.1%)	2090 (21.8%)	1214 (20.0%)
Occasionally or a moderate amount of the time (3–4 days)	1466 (9.4%)	929 (9.7%)	537 (8.9%)
Mostly or all of the time (5–7 days)	555 (3.5%)	360 (3.7%)	195 (3.2%)
<b>You felt that everything you did was an effort</b>			
Rarely or none of the time (less than 1 day)	9209 (58.8%)	5542 (57.7%)	3667 (60.5%)
Some or a little of the time (1–2 days)	3403 (21.7%)	2130 (22.2%)	1273 (21%)
Occasionally or a moderate amount of the time (3–4 days)	1282 (8.2%)	850 (8.8%)	432 (7.1%)
Mostly or all of the time (5–7 days)	1774 (11.3%)	1087 (11.3%)	687 (11.3%)
<b>You felt hopeful about the future</b>			
Rarely or none of the time (less than 1 day)	1025 (6.5%)	648 (6.7%)	377 (6.2%)
Some or a little of the time (1–2 days)	2385 (15.2%)	1544 (16.1%)	841 (13.9%)
Occasionally or a moderate amount of the time (3–4 days)	4897 (31.3%)	3016 (31.4%)	1881 (31%)
Mostly or all of the time (5–7 days)	7361 (47%)	4401 (45.8%)	2960 (48.9%)
<b>Your sleep was restless</b>			
Rarely or none of the time (less than 1 day)	11 228 (71.7%)	6762 (70.4%)	4466 (73.7%)
Some or a little of the time (1–2 days)	2953 (18.8%)	1873 (19.5%)	1080 (17.8%)
Occasionally or a moderate amount of the time (3–4 days)	1110 (7.1%)	715 (7.4%)	395 (6.5%)
Mostly or all of the time (5–7 days)	377 (2.4%)	259 (2.7%)	118 (1.9%)
During the past week:			
<b>You felt fearful</b>			
Rarely or none of the time (less than 1 day)	10 441 (66.6%)	6215 (64.7%)	4226 (69.7%)
Some or a little of the time (1–2 days)	3680 (23.5%)	2279 (23.7%)	1401 (23.1%)
Occasionally or a moderate amount of the time (3–4 days)	1170 (7.5%)	849 (8.8%)	321 (5.3%)
Mostly or all of the time (5–7 days)	377 (2.4%)	266 (2.8%)	111 (1.8%)
<b>You were happy</b>			
Rarely or none of the time (less than 1 day)	1156 (7.4%)	714 (7.4%)	442 (7.3%)
Some or a little of the time (1–2 days)	2888 (18.4%)	1825 (19.0%)	1063 (17.5%)
Occasionally or a moderate amount of the time (3–4 days)	5228 (33.4%)	3245 (33.8%)	1983 (32.7%)
Mostly or all of the time (5–7 days)	6396 (40.8%)	3825 (39.8%)	2571 (42.4%)
<b>You felt lonely</b>			

Continued

Table 2 Continued

Item	Total sample N=15 668	Women n=9609	Men n=6059
Rarely or none of the time (less than 1 day)	10 734 (68.5%)	6505 (67.7%)	4229 (69.8%)
Some or a little of the time (1–2 days)	3338 (21.3%)	2061 (21.4%)	1277 (21.1%)
Occasionally or a moderate amount of the time (3–4 days)	1259 (8%)	815 (8.5%)	444 (7.3%)
Mostly or all of the time (5–7 days)	337 (2.2%)	228 (2.4%)	109 (1.8%)
<b>You felt like you had no motivation to do anything*</b>			
Rarely or none of the time (less than 1 day)	11 444 (73%)	6912 (71.9%)	4532 (74.8%)
Some or a little of the time (1–2 days)	3020 (19.3%)	1882 (19.6%)	1138 (18.8%)
Occasionally or a moderate amount of the time (3–4 days)	791 (5%)	532 (5.5%)	259 (4.3%)
Mostly or all of the time (5–7 days)	413 (2.6%)	283 (2.9%)	130 (2.1%)

\*Item modified from original phrasing, 'you could not get going,' for cultural equivalency. CES-D-10, 10-item Center for the Epidemiological Studies of Depression.

The odds of significant depressive symptoms were 5.44 times greater for women who received inpatient care, and 3.64 times greater for women who received outpatient care, compared with those receiving no care in the prior 6 months (inpatient: AdjOR=5.44, 95% CI=4.24 to 6.97; outpatient: AdjOR=3.64, 95% CI=3.14 to 4.22). Men's odds of significant depressive symptoms were 3.42 times greater for those who reported receiving inpatient care, and 3.37 times greater for those who reported receiving outpatient care, compared with those not reporting medical care in the prior 6 months (inpatient: AdjOR=3.42, 95% CI=2.21 to 5.28; outpatient: AdjOR=3.37, 95% CI=2.78 to 4.07). For both women and men, having ever received mental health services was associated with lower odds of significant depressive symptoms compared with having never received mental health services (women: AdjOR=0.32, 95% CI=0.22 to 0.47; men: AdjOR=0.36, 95% CI=0.18 to 0.62). Men's odds of significant depressive symptoms were 1.38 times higher for those classifying for alcohol misuse compared with those who did not (AdjOR=1.38, 95% CI=1.12 to 1.70). Among women, the odds of significant depressive symptoms were 1.37 times greater for women who were known HIV positive at the time of testing compared with HIV negative (AdjOR=1.37, 95% CI=1.05 to 1.77). Alcohol misuse and hormonal contraceptive use did not remain statistically significant predictors of significant depressive symptoms for women.

Among the demographic variables tested in the multivariable models (table 4), older women and men were at increased odds for significant depressive symptoms (women: AdjOR=1.31, 95% CI=1.22 to 1.40; men: AdjOR=1.25, 95% CI=1.14 to 1.36). Being married but separated and being divorced were associated with greater odds of significant depressive symptoms than being never married for women (married/separated: AdjOR=1.60; 95% CI=1.17 to 2.19; divorced: AdjOR=2.05; 95% CI=1.49 to 2.82). For men, being divorced was associated with increased odds of significant depressive symptoms

compared with being never married (AdjOR=1.49, 95% CI=1.05 to 2.10). Education and household economic wealth were not statistically significant for men or women.

When classifying depressive symptoms at the commonly used US cut-off of 10, 22.6% of the total sample are classified as having significant depressive symptoms compared with 13.7% of the sample using the cut-off of 13. This aligns with the findings reported from a study in South Africa that suggests a higher CES-D-10 threshold may be appropriate for sub-Saharan African populations due to a possible over classification of significant depressive symptoms.<sup>39</sup> In sensitivity analyses using 10 as the cut-off, all correlations identified in multivariable analyses remained statistically significant and similar in effect size in both women and men's models, with two exceptions. Education was statistically significant for women, with greater odds of significant depressive symptoms for women with primary (AdjOR=1.41, 95% CI=1.14 to 1.74), secondary (AdjOR=1.29, 95% CI=1.01 to 1.64) and greater than secondary (AdjOR=1.52, 95% CI=1.08 to 2.15) levels of education compared with no education. For men, marital status, specifically being divorced, was not statistically significant in its association with significant depressive symptoms.

## DISCUSSION

This study examined significant depressive symptoms (ie, probable depression) prevalence, correlates and points of intervention in a sample of adults living in a predominantly rural area of central Uganda. The findings provide insight into the occurrence of depression in the general population in rural Uganda, adding to and strengthening the limited existing literature with this large, population-based sample in a region in central Uganda. Nearly 14% of the sample met the criteria for probable depression, which falls within the range of estimates reported by other studies within the general population in rural Uganda.<sup>9–12</sup> Women had greater odds of experiencing significant



**Table 3** Bivariate logistic model associations with significant depressive symptoms among a population-based sample of women and men in central Uganda, 2017–2019, N=15 668

	Women (n=9609)		Men (n=6059)	
	OR	95% CI	OR	95% CI
<b>Health variables</b>				
Healthcare past 6 months				
Outpatient only	<b>3.88</b>	<b>3.36 to 4.48</b>	<b>3.60</b>	<b>2.98 to 4.35</b>
Inpatient	<b>5.50</b>	<b>4.31 to 7.01</b>	<b>3.67</b>	<b>2.42 to 5.58</b>
None (ref.)	–	–	–	–
Ever received mental health services				
Yes	<b>0.25</b>	<b>0.17 to 0.37</b>	<b>0.29</b>	<b>0.16 to 0.53</b>
No (ref.)	–	–	–	–
HIV test results				
Known positive	<b>1.95</b>	<b>1.54 to 2.49</b>	1.64	0.98 to 2.74
Newly diagnosed positive	1.48	0.94 to 2.33	1.51	0.86 to 2.65
HIV negative (ref.)	–	–	–	–
Alcohol misuse (AUDIT-C+)				
Yes	<b>1.46</b>	<b>1.23 to 1.74</b>	<b>1.82</b>	<b>1.50 to 2.21</b>
No (ref.)	–	–	–	–
Hormonal contraceptive use/pregnancy				
Uses hormonal contraceptive	<b>0.77</b>	<b>0.66 to 0.89</b>	–	–
Pregnant	0.89	0.71 to 1.13	–	–
Neither (ref.)	–	–	–	–
<b>Demographics variables</b>				
Age	<b>1.39</b>	<b>1.32 to 1.47</b>	<b>1.34</b>	<b>1.24 to 1.43</b>
Household economic status	0.96	0.92 to 1.00	0.97	0.92 to 1.02
Marital status				
Married, living together	<b>1.79</b>	<b>1.39 to 2.32</b>	<b>1.86</b>	<b>1.47 to 2.35</b>
Married, separated	<b>2.57</b>	<b>1.92 to 3.42</b>	1.34	0.93 to 1.93
Widowed	<b>3.54</b>	<b>2.46 to 5.09</b>	<b>3.64</b>	<b>1.56 to 8.48</b>
Divorced	<b>3.27</b>	<b>2.47 to 4.34</b>	<b>2.33</b>	<b>1.73 to 3.14</b>
Never married (ref.)	–	–	–	–
Education				
Greater than secondary	<b>0.56</b>	<b>0.38 to 0.85</b>	1.24	0.71 to 2.17
Secondary	<b>0.67</b>	<b>0.52 to 0.86</b>	1.02	0.67 to 1.55
Primary	<b>0.79</b>	<b>0.63 to 0.99</b>	1.09	0.74 to 1.62
No schooling (ref.)	–	–	–	–
Bold indicates p<0.05. AUDIT-C, Alcohol Use Disorders Identification Test Consumption ; CI, Confidence Interval; OR, Odds Ratio.				

depressive symptoms than men and the profiles of significant depressive symptom correlates between women and men were similar with the exception of alcohol misuse associating with significant depressive symptoms for only men and HIV status associating with significant depressive symptoms for only women. Those experiencing significant depressive symptoms had lower odds of having ever accessed mental health services and had greater odds of having recently engaged with general healthcare

services compared with those not experiencing depressive symptoms. These findings highlight a gap in mental health service access among those suffering from depression, while identifying outpatient and inpatient settings as potential intervention points to identify women and men in need of depression treatment.

As hypothesised, women were more likely to meet the criteria for significant depressive symptoms than men in our sample. This finding is consistent with the literature



**Table 4** Multivariable logistic model associations with significant depressive symptoms among a population-based sample of women and men in central Uganda, 2017–2019, N=15 668

	Women (n=9609)		Men (n=6059)	
	AdjOR	95% CI	AdjOR	95% CI
<b>Health variables</b>				
Healthcare past 6 months				
Outpatient only	<b>3.64</b>	<b>3.14 to 4.22</b>	<b>3.37</b>	<b>2.78 to 4.07</b>
Inpatient	<b>5.44</b>	<b>4.24 to 6.97</b>	<b>3.42</b>	<b>2.21 to 5.28</b>
None (ref.)	–	–	–	–
Ever received mental health services				
Yes	<b>0.32</b>	<b>0.22 to 0.47</b>	<b>0.36</b>	<b>0.18 to 0.62</b>
No (ref.)	–	–	–	–
HIV test results				
Known positive	<b>1.37</b>	<b>1.05 to 1.77</b>	1.07	0.60 to 1.88
Newly diagnosed positive	1.47	0.90 to 2.40	1.06	0.59 to 1.92
HIV negative (ref.)	–	–	–	–
Alcohol misuse (AUDIT-C+)				
Yes	1.15	0.96 to 1.38	<b>1.38</b>	<b>1.12 to 1.70</b>
No (ref.)	–	–	–	–
Hormonal contraceptive use/pregnancy				
Uses hormonal contraceptive	0.94	0.79 to 1.10	–	–
Pregnant	1.15	0.89 to 1.48	–	–
Neither (ref.)	–	–	–	–
<b>Demographics variables</b>				
Age	<b>1.31</b>	<b>1.22 to 1.40</b>	<b>1.25</b>	<b>1.14 to 1.36</b>
Household economic status	0.99	0.94 to 1.03	0.98	0.92 to 1.03
Marital status				
Married, living together	1.23	0.92 to 1.64	1.24	0.94 to 1.65
Married, separated	<b>1.60</b>	<b>1.17 to 2.19</b>	0.90	0.61 to 1.34
Widowed	1.46	0.94 to 2.26	1.37	0.55 to 3.42
Divorced	<b>2.05</b>	<b>1.49 to 2.82</b>	<b>1.49</b>	<b>1.05 to 2.10</b>
Never married (ref.)	–	–	–	–
Education				
Greater than secondary	1.11	0.69 to 1.63	1.77	0.95 to 3.26
Secondary	1.16	0.87 to 1.53	1.50	0.96 to 2.34
Primary	1.11	0.87 to 1.42	1.42	0.94 to 2.17
No schooling (ref.)	–	–	–	–
Bold indicates p<0.05. AdjOR, adjusted OR; AUDIT-C, Alcohol Use Disorders Identification Test Consumption ; CI, Confidence Interval.				

globally, and in Uganda.<sup>9 18 42</sup> Women's elevated risk for depression may be particularly high in LMICs, due to a disproportionate burden of poverty-related stressors affecting them, driven by gender inequity, such as food insecurity, intimate partner violence and limited educational and economic opportunities.<sup>17 43</sup> Other possible contributors to this gender disparity could be a general under-reporting of depressive symptoms in men and the occurrence of externalising depressive symptoms

among men not captured in standardised measures of depression.<sup>44</sup> However, future research should explore the gendered experience of depression in the Ugandan context further, as this research hails from high-income settings.

Also aligned with the broader literature, those of older age and those separated, divorced or widowed were more likely to have significant depressive symptoms.<sup>9 16 45</sup> However, counter to our hypotheses and prior research,<sup>16</sup>



education and household economic status were not significant correlates of significant depressive symptoms. Smith *et al* found subjective, but not objective, relative wealth was associated with depression in a population-based study in rural Uganda.<sup>10</sup> Their finding supports relative deprivation hypothesis, which posits that socio-economic status (SES) affects health primarily through social comparisons, making relative, rather than absolute SES more pertinent to health.<sup>46</sup> Future research on depression in Uganda should consider the inclusion of perceived social and economic standing relative to others in relation to depression.<sup>10</sup> Hormonal contraceptive use and pregnancy were also not supported as correlates of significant depressive symptoms in our final models. Other studies also report mixed results on the association between pregnancy and depression in Uganda.<sup>20 47</sup> Further, a recent review of clinical studies and randomised placebo-controlled trials suggests associations between depression and contraceptives may be an outcome of confounding rather than causation; women with psychiatric disorders reported similar or lower rates of mood symptoms in hormonal contraceptive users compared with non-users.<sup>25</sup>

HIV positive status for those who already knew their status from a prior HIV test was associated with significant depressive symptoms for women, but not men, while alcohol misuse associated with significant depressive symptoms for men but not women. Alcohol is a known correlate of depression, with evidence to suggest a bidirectional relationship.<sup>48</sup> The association between alcohol misuse and significant depressive symptoms for men and not women in this setting may be because alcohol use is a more culturally sanctioned practice for men than women.<sup>49</sup> There is also strong evidence from sub-Saharan Africa to suggest elevated depression among people living with HIV (PLHIV).<sup>50</sup> A 2018 meta-analysis found a pooled prevalence of depression of 31% among PLHIV in Uganda, and a range of factors strongly associated with depression in PLHIV that may partially explain elevated depression in this population (eg, stressful life events, food insecurity, perceived stigma, low income).<sup>51</sup> The present study's findings highlight the need for interventions to address depression among those with alcohol misuse, as well as among PLHIV, in this setting—a growing body of research already exists to support the latter.<sup>52 53</sup>

Depression screening within outpatient and inpatient settings may help to identify those in need of mental health services. The odds of significant depressive symptoms were greater for men and women who recently used inpatient and outpatient services than for those that did not, but those with significant depressive symptoms had lower odds of accessing mental health services. Moreover, lifetime use of any mental health services was low (6.2%)—a possible product of limited availability of these services and/or barriers to accessing mental healthcare locally.<sup>7</sup> Although not assessed in this study, others identify poverty and lack of transportation, mental health stigma, traditional beliefs about mental illness and preference

for traditional healers as barriers to mental health service utilisation in Uganda.<sup>54 55</sup> Depression is associated with a number of chronic conditions,<sup>56</sup> which may explain the greater use of general health services among those experiencing significant depressive symptoms in our sample. Nevertheless, these findings highlight an opportunity to identify both women and men experiencing depression in outpatient and inpatient care through the scale-up of depression screening, a critical step in linking those in need of depression treatment to care.

The WHO mhGAP Intervention Guide provides guidance for the scale-up of interventions for depression in non-specialist health settings, including evidence-based recommendations to improve the detection of depression through multiple clinical assessment points.<sup>57</sup> While this study is not a direct assessment of the implementation of such screening, it points to a potential gap in this area that could help address an unmet need for depression treatment among our population. Specifically, a missed opportunity for diagnosis among individuals with significant depressive symptoms who are in contact with health facilities.

Prior research on the implementation of depression screening in Ugandan public health facilities found that of the patients screened positive for depressive symptoms, only 4%–24% received treatment,<sup>13 58</sup> underscoring the need to strengthen all stages of the mental healthcare continuum in Uganda. The shortage of mental health professionals is a key barrier to depression care in Uganda. Thus, researchers propose task-shifting models of care that shift duties to less specialised cadres of health workers for screening and intervention as a possible solution.<sup>54 59</sup> Research in Uganda focuses on HIV care as an entry point for depression treatment; several studies on task shifting for depression screening and care within HIV care are ongoing.<sup>53 59 60</sup> One cluster randomised controlled trial concluded that nurses can provide quality depression care to HIV clients using two task-shifting models, a structured protocol (protocolised) and one that relied on the judgement of trained providers (clinical acumen).<sup>61</sup> The present study points to the need for research on other entry points and task-shifting approaches for non-HIV specific populations as well. Research suggests task-shifting may be an effective and cost-effective approach to increasing access to mental health services, but the knowledge gaps are considerable.<sup>62</sup>

In other LMIC settings, the integration of screening, referral and treatment for mental health disorders using mHealth tools have been reported as acceptable, but challenged by time constraints and workload, and need to be tailored to the local contexts to address stigma and lack of knowledge about mental disorders among health workers.<sup>63 64</sup> Research on integrating depression screening and treatment in non-specialised health settings would benefit from implementation science frameworks and methods that pay special consideration to issues of personnel and resource constraints, cost-effectiveness and other challenges to feasibility in resource-limited

settings.<sup>7 65</sup> Our study suggests depression screening within in/outpatient care could work for identifying both women and men, but attention should be paid to gender differences in acceptability/feasibility of such services in future research, so that they can be made gender-specific, if appropriate.

This study's major methodological strength is the use of a large, population-based sample. However, the cross-sectional nature of the study limits the ability to infer causation or determine directionality between the health and demographic variables assessed and significant depressive symptoms. In addition, the sample was drawn from a predominantly rural region in central Uganda, limiting the generalisability to dissimilar settings. Even urban settings within Uganda differ considerably in their exposure to different social and environmental risk factors for depression, warranting separate investigation.<sup>66</sup> Challenges inherent in the measurement of depression and depressive symptoms also limit this study and depression research in LMICs more broadly. Cultural differences in the recognition and conceptualisation of depression could affect the accurate measurement of depression in sub-Saharan Africa.<sup>54 67</sup> However, the CES-D-10 has been widely validated for use in African settings.<sup>21 39 68</sup> Following others, we altered the cut-off score for 'significant depressive symptoms' to be more appropriate for sub-Saharan African populations.<sup>39</sup> In sensitivity analyses, a threshold of 10 did classify more of our sample as experiencing significant depressive symptoms than a threshold of 13, but the results of our multivariable models were similar. Finally, the CES-D measures depressive symptoms rather than clinical diagnoses of depression. Future research may use diagnostic instruments to examine the prevalence of clinical depression in this setting.

## CONCLUSION

This population-based study highlights the need to scale-up depression screening and treatment for adult women and men in rural, central Uganda. The identified correlates of depressive symptoms provide insight into subgroups at elevated risk for depression who may benefit from tailored screening and intervention, including women, those of older age, women living with HIV and men meeting criteria for alcohol misuse. In this study, individuals experiencing significant depressive symptoms had lower odds of ever receiving mental health services, pointing to a potential unmet need for depression care. However, those experiencing significant depressive symptoms had greater odds of receiving other health services through inpatient or outpatient care. Thus, there is an opportunity to identify and link those in need of treatment to care through the scale-up of depression screening and treatment in non-specialised health services. Given considerable personnel and other resources constraints in this setting, more research is needed that focuses on cost-effective approaches to depression screening and treatment in settings like Uganda.

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