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ORIGINAL PAPER

Depressive symptoms, suicidal ideation, and mental health care-seeking in central Mozambique

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Abstract

Purpose There is scant research on depressive symptoms (DS), suicidal ideation (SI), and mental health care-seeking in Mozambique.

Methods Generalized estimating equations were used to assess factors associated with DS, SI, and mental health care-seeking among 3080 individuals interviewed in a representative household survey in Sofala and Manica provinces, Mozambique.

Results 19% (CI 17–21%) of respondents reported DS in the past year and 17% (CI 15–18%) lifetime SI. Overall, only 10% (CI 8–11%) of respondents ever sought any care for mental illness, though 26% (CI 23–29%) of those reporting DS and/or SI sought care. 90% of those who sought care for DS received treatment; however, only 46% of those who sought care for SI received treatment. Factors associated with DS and SI include: female gender, divorced/separated, widowed, and > 55 years old. Respondents in the bottom wealth quintile reported lower DS, while those in upper wealth quintiles reported higher prevalence of SI. Individuals with DS or SI had significantly elevated measures of disability—especially in doing household chores, work/school activities, standing for long periods, and walking long distances. Factors associated with care-seeking include: female gender, rural residence, divorced/separated, and > 45 years old. Individuals in lower wealth quintiles and with no religious affiliation had lower odds of seeking care.

Conclusions DS and SI are prevalent in central Mozambique and treatment gaps are high (68% and 89%, respectively). An urgent need exists for demand- and supply-side interventions to optimize the delivery of comprehensive community-based mental healthcare in Mozambique.

Keywords Mozambique · Mental health · Depressive symptoms · Suicidal ideation · Care-seeking

Introduction

Factors associated with depression and suicide in low- and middle-income countries

Depression is ranked as the seventh most important cause of disease burden in low- and middle-income countries (LMICs) and 85% of suicides in the world occur in LMICs [1, 2]. Despite this high burden, epidemiologic data on depression and suicide are not readily available across many LMICs. A cross-national study conducted in 8 LMICs reported that the average lifetime and 12-month prevalence estimates of depression in LMICs were 11.9% and 5.9%, respectively [3]. The same study found that the average age of onset for depression in LMICs was 24 years, the female–male ratio was 2:1, and the strongest demographic correlate was being divorced or widowed. These findings are

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consistent with other studies, reporting that being female and unmarried are consistently correlated with major depressive episodes [4, 5]. Available evidence from LMICs suggests that there is either a nonmonotonic relationship between depression and age, or that the prevalence of depression increases with age [6–10].

With regard to suicide, a cross-national study conducted in seven LMICs found that the lifetime prevalence of suicidal ideation ranged from 3.1 to 12.4% [11]. A systematic review of suicide in African countries reported that risk factors for suicide include: interpersonal difficulties, mental and physical health problems, low socioeconomic standing, and drug and alcohol use/abuse [12]. Other commonly cited risk factors in LMICs include youth or old age, low levels of education, being unmarried, previous suicide attempts, family history of psychopathology, and stressful life events [11, 13–15]. It has also been reported in a number of studies in both LMICs and high-income countries (HICs) that females have higher rates of suicidal ideation and behavior than males, but males have higher mortality rates from suicide than females [16, 17].

In the Mozambican population, there is limited research on suicide and common mental disorders, such as depression. To our knowledge, there is currently only one peer-reviewed publication describing factors associated with suicidal attempts and deaths in Mozambique [17]. This paper focused at the clinic level and was limited in geographic scope. Two community-level mental health studies have been conducted previously in Mozambique [18, 19]. The former was focused solely on severe mental disorders, while the latter was specifically focused on depression among women.

The present paper seeks to describe the burden, risk factors, and care-seeking behavior for depressive symptoms and suicidal ideation in central Mozambique. This study aims to assess the burden of and care needs for common mental disorders and suicidal thoughts in Mozambique and other similar LMICs with high disease burden and limited resources.

Depression and suicide in Mozambique

In Mozambique, mental and substance use disorders are estimated to account for 21.7% of all years lived with disability for those aged 15–49 [20]. Mental, neurological, and substance use disorders are estimated to account for more years lived with disability in the country than HIV, TB, and malaria combined [21]. Additionally, modeling studies estimate that the suicide rate among Mozambican males (20.5/100,000) is nearly three times the Africa regional average (7.4/100,000) [22].

Mozambique has made great strides in reducing the treatment gap for mental health services. In 1994, the Ministry of Health implemented a task-shifting strategy through the development of a 30-month psychiatric technician training program, in which mid-level professionals are trained to provide mental health services in primary care settings [23]. This strategy has increased availability of mental health services, and this new cadre of health professionals currently provide the vast majority of psychiatric services nationwide [23, 24]. Despite this strategy, there is a significant shortage of mental health professionals and limited health system capacity to bring evidence-based mental health interventions to scale. For instance, essential psychotropic medications are routinely unavailable at primary care facilities, and psychiatric technicians are predominately located at district-level hospitals, leaving a majority of the population whose care is provided by primary care facilities without ready access to mental health services [24, 25]. This is particularly evident in central Mozambique, where it is estimated that 99% of formal healthcare is provided in the public sector, and primarily at the primary care level [26].

In addition to limited human and financial resources, research suggests that mood disorders are currently not well addressed by the Mozambique healthcare system. Less than 4% of yearly consultations in the primary care system are for mood disorders, which is far lower than would be expected given their estimated disease burden, as well as their link to suicide attempts and deaths [24]. Deeper community-level understanding of the prevalence and associated factors for depressive symptoms and suicidal ideation is needed to develop implementation strategies to address the treatment gap for community-based public-sector mental health services.

Methods

Study setting

Mozambique is a southeastern African country with among the lowest health and development indices globally. The country has a population of 28.9 million with over 50% of the population under the age of 18 [27–29]. Mozambique is classified as a low-income country, and a majority of the population (67%) resides in rural areas [28]. Mozambique has a high prevalence of HIV, with 13.2% of the adult population infected [30]. The child mortality rate has declined significantly in the past decade; however, children under five continue to die from preventable causes at a rate of 79/1000 live births [31].

This survey was carried out in Manica and Sofala provinces in central Mozambique. Sofala's population is 2.2 million, while Manica's is 1.9 million [29]. Both have relatively high population densities (Sofala 24.8/km^2, Manica 23.3/km^2) [32]. Health and socioeconomic status indicators are comparable across both provinces, with approximately 60% of the population at or below the middle wealth quintile [30].

Study design and sampling procedure

Data for this study are from a cross-sectional infant mortality impact evaluation, powered to detect a 15% decrease in infant mortality in Sofala. Additional survey questions were added to assess the prevalence and factors associated with mental illness and noncommunicable diseases. The survey was conducted between September, 2016 and February, 2017. The full sampling methods for this community survey have been previously published [33]. Briefly, remote satellite imagery was used to develop a provincial-level representative community survey sampling frame. The satellite imagery was integrated with the open-source OpenStreetMap platform (http://www.openstreetmap.org) to digitize all buildings, which were then used to represent population density. The study area was divided into sampling units of approximately 2×2 km, and their population densities used to generate probability proportional to size sampling. Twenty households were invited to participate for each time a sampling unit was selected. Due to civil conflict, 8/31 administrative units in Sofala and 15/39 in Manica were excluded from our sample. The final sample included 1549 households in Sofala and 1538 households in Manica.

Data collection

Data were collected on Samsung tablets using Open Data Kit (ODK) software, and transferred from ODK to a REDCap database through a cloud server [34]. There were a total of 23 data collectors (10 male and 13 female). Each participant interview lasted approximately 30 min and was conducted inside the participant's home or outside close to it, according to their preference. Due to literacy barriers, the data collector asked each survey question verbally and recorded the participant's response.

The household survey questions were adapted from the 2011 Mozambique Demographic and Health Survey with an additional module to address the burden of mental health conditions and general disability. If a participant reported current suicidal ideation, he or she was referred to the nearest health facility.

Outcome and explanatory variables

We analyzed the prevalence and associated factors for three outcomes: depressive symptoms (DS), suicidal ideation (SI), and mental health care-seeking. Outcomes were defined as follows: (1) DS: Have you ever had a period of sadness and/or loss of energy lasting more than 2 weeks in the past 12 months?; (2) SI: Have you had thoughts of suicide or self-harm (in your lifetime, in the past month, and/or currently)?; and (3) care-seeking behavior: Have you ever sought care (allopathic or non-allopathic) for a mental health problem, depressive symptoms, and/or suicidal ideation?

DS were assessed as a single survey question and cannot be interpreted as clinical depression. While this question lacks specificity, we anticipate it is sensitive, allowing for a general understanding of DS in this study population. Our care-seeking variable included respondents who reported seeking any care for mental ill-health, DS, and/or SI. We included all three subcategories in our outcome given the common misconception that mental illness only refers to severe mental disorders.

Explanatory variables were selected from existing literature on factors associated with DS and SI, focusing on socio-demographic factors, but including additional survey variables hypothesized to increase risk for DS or SI. Factors assessed included age, gender, urban vs. rural household location, marital status, socioeconomic status (SES), education level, religious affiliation, alcohol consumption, history of injury in the past year, history of injury by assault in the past year, and overall disability (Table 1).

The SES variable was generated using principal component analyses (PCA) of household characteristics and ownership of household items [35, 36], and then categorized into wealth quintiles. Overall disability was measured using the short version of the WHO Disability Assessment Schedule 2.0 (WHODAS), which is a 12-item questionnaire to assess health and disability [37]. The 12 questions relate to the functioning difficulties experienced by the respondent during the previous 30 days and scores can range from 0 to 60. History of injury in the past year included all injury types, including injury by assault.

Statistical analyses

To calculate sampling weights, we enumerated all buildings in each sampling unit. Out of 176 sampling units, the study team excluded 23 due to sudden conflict and/or because they were too difficult to reach. To adjust for non-response in these 23 sampling units, their sampling weights were redistributed to neighboring areas by province, consistent with the province-stratified sampling approach. Sampling weights were applied to survey responses to generate prevalence estimates (Table 2) and analytical models (Tables 3 and 4). The full sampling methods have been previously published [33].

Factors associated with DS, SI, and mental health care-seeking were identified using generalized estimating equations with clustering by primary sampling unit, using the binomial family, a logit link function, and an exchangeable working correlation matrix. Selected explanatory factors were additionally analyzed stratified by gender to determine whether associations differed strongly. We conducted both univariable and

Table 1 Demographic characteristics of 3080 individuals interviewed in the present study, 2016–2017

Characteristic	Sofala *N* (%)	Manica *N* (%)	*N* (%)
Sex			
Male	757 (54%)	638 (46%)	1395 (46%)
Female	767 (47%)	879 (53%)	1646 (54%)
Urban or rural			
Urban	480 (53%)	434 (47%)	914 (30%)
Rural	1065 (49%)	1088 (51%)	2153 (70%)
Level of school			
No School	342 (60%)	232 (40%)	574 (19%)
Basic (literacy and primary)	803 (50%)	817 (50%)	1620 (54%)
Higher (secondary and higher)	340 (43%)	450 (57%)	790 (26%)
Age			
18–25	332 (47%)	373 (53%)	705 (23%)
26–35	457 (47%)	512 (53%)	969 (31%)
36–45	328 (52%)	302 (48%)	630 (20%)
46–55	199 (59%)	137 (41%)	336 (11%)
> 55	226 (57%)	168 (43%)	394 (13%)
Marital status			
Married	1272 (50%)	1284 (50%)	2556 (83%)
Divorced/separated	82 (48%)	88 (52%)	170 (6%)
Widowed	130 (54%)	110 (46%)	240 (8%)
Single	36 (50%)	36 (50%)	72 (2%)
Religion			
Pentecostal	678 (49)	707 (51%	1385 (46%)
Catholic	231 (59%)	158 (41%)	389 (13%)
Muslim	29 (74%)	10 (26%)	39 (1%)
Zion	138 (35%)	255 (65%)	393 (13%)
Anglican	22 (52%)	20 (48%)	42 (1%)
Johan Masowe/Johan Maranga	12 (38%)	20 (63%)	32 (1%)
No religion	287 (57%)	217 (43%)	504 (17%)
Other Christian	71 (57%)	53 (43%)	124 (4%)
Not sure	10 (83%)	2 (17%)	12 (0.4%)
Other	51 (58%)	37 (42%)	88 (3%)
SES			
1st quintile (poorest)	383 (62%)	232 (38%)	615 (20%)
2nd quintile	301 (49%)	312 (51%)	613 (20%)
3rd quintile	264 (43%)	348 (57%)	612 (20%)
4th quintile	256 (42%)	358 (58%)	614 (20%)
5th quintile	341 (56%)	271 (44%)	612 (20%)
Alcohol consumption			
Never	591 (36%)	1065 (64%)	1656 (54%)
Once a month or less	140 (46%)	166 (54%)	306 (10%)
2–4 × per month	47 (33%)	97 (67%)	144 (5%)
2–4 × per week	33 (35%)	60 (65%)	93 (3%)
4× or more per week	14 (44%)	18 (56%)	32 (1%)
Missing	729 (86%)	120 (14%)	849 (28%)
Overall disability			
0–12	498 (50%)	485 (50%)	993 (32%)
13–24	991 (52%)	913 (48%)	1904 (62%)
25–36	36 (31%)	81 (69%)	117 (4%)
37–60	29 (44%)	37 (56%)	66 (2%)

Table 1 (continued)

Characteristic	Sofala *N* (%)	Manica *N* (%)	*N* (%)
Any injury (in the past year)			
No injury	1378 (50%)	1376 (50%)	2754 (90%)
Injury	170 (54%)	146 (46%)	316 (10%)
Injury by assault (in the past year)			
No assault injury	1535 (50%)	1506 (50%)	3041 (99%)
Assault injury	19 (49%)	20 (51%)	39 (1%)

Missing data were < 5% except where indicated

Table 2 Weighted prevalence of depressive symptoms and suicidal ideation among 3080 individuals in the present study, 2016–2017

Description	Percentage (95% CI)
Proportion of respondents who reported period of sadness or loss of energy that lasted more than 2 weeks (yes/no) out of total number of respondents	19.1% (17.1–21.0)
Proportion of respondents who reported thoughts of suicide or self-harm in their lifetime (yes/no) out of total number of respondents	17.0% (14.8–18.2)
Proportion of respondents who reported thoughts of suicide or self-harm in the last month (yes/no) out of total number of respondents	5.9% (4.9–6.8)
Proportion of respondents who reported thoughts of suicide or self-harm currently (yes/no) out of total number of respondents	1.6% (1.1–2.2)
Proportion of respondents who reported thoughts of suicide or self-harm in the last month (yes/no) out of total number of respondents with lifetime suicidal ideation	35.7% (31.4–40.0)
Proportion of respondents who reported thoughts of suicide or self-harm currently (yes/no) out of total number of respondents with lifetime suicidal ideation	10.0% (7.0–12.9)

95% CI 95% confidence interval

Table 3 WHO-DAS disability measures: ordered logistic regression analyses of individuals in the present study, 2016–2017

	Depressive symptoms		Suicidal ideation		Mental health care-seeking	
	AOR	*P* value	AOR	*P* value	AOR	*P* value
Difficulty standing for long periods of time	1.39	0.002	1.57	0.000	1.39	0.020
Difficulty doing household chores	1.92	0.000	1.57	0.005	1.93	0.000
Difficulty learning new task	1.45	0.001	1.19	0.171	1.26	0.081
Difficulty participating in community activities	1.04	0.794	1.32	0.032	1.12	0.514
Health affects emotional state	0.88	0.183	1.20	0.116	1.30	0.064
Difficulty concentrating 10 min	1.14	0.348	1.68	0.000	1.69	0.002
Difficulty walking long distance	1.53	0.002	1.48	0.011	1.86	0.000
Difficulty taking a bath	1.82	0.178	1.36	0.470	2.55	0.072
Difficulty getting dressed	2.01	0.123	1.95	0.136	2.16	0.159
Difficulty dealing with strangers	0.93	0.559	1.14	0.285	1.01	0.945
Difficulty maintaining friendships	0.78	0.060	1.15	0.357	1.11	0.534
Difficulty at work or in school	1.37	0.046	1.63	0.006	1.83	0.001

multivariable complete-case analyses for each exposure–outcome relationship. Adjustment variables in the multivariable models were selected a priori based on existing literature, and were selected individually for each exposure of interest. We also analyzed the associations between the 12 WHODAS disability measures and DS, SI, and mental health care-seeking. These associations were identified using ordered logistic regressions with robust standard errors clustered by primary sampling unit.

Table 4 Multivariable analyses of depressive symptoms, suicidal ideation, and mental health care-seeking in the present study, 2016–2017

	Depressive symptoms		Suicidal ideation		Mental health care-seeking	
	AOR (95% CI)	*P* value	AOR (95% CI)	*P* value	AOR (95% CI)	*P* value
Sex[a]						
Male	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Female	1.40 (1.13–1.73)	0.002	1.46 (1.16–1.84)	0.001	1.37 (1.03–1.82)	0.030
Residence[b]						
Urban	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Rural	1.47 (1.08–1.99)	0.013	0.86 (0.62–1.18)	0.348	2.32 (1.52–3.55)	0.000
Level of School[c]						
No school	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Basic	0.96 (0.75–1.24)	0.777	0.80 (0.62–1.03)	0.081	1.18 (0.84–1.66)	0.336
Higher	0.96 (0.70–1.32)	0.796	0.64 (0.46–0.90)	0.010	0.88 (0.57–1.36)	0.565
Age[d]						
26–35	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
18–25	0.86 (0.67–1.12)	0.265	1.10 (0.81–1.43)	0.633	1.11 (0.79–1.57)	0.541
36–45	1.09 (0.84–1.42)	0.502	1.60 (1.20–2.09)	0.001	1.33 (0.94–1.88)	0.109
46–55	1.14 (0.83–1.56)	0.429[d]	1.76 (1.27–2.44)	0.001	1.73 (1.16–2.58)	0.007
> 55	1.83 (1.38–2.42)	0.000	1.62 (1.18–2.22)	0.003	1.57 (1.06–2.33)	0.024
Marital status[f]						
Married	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Divorced/separated	1.80 (1.24–2.62)	0.002	1.77 (1.20–2.60)	0.004	1.75 (1.10–2.78)	0.018
Widowed	2.00 (1.40–2.86)	0.000	1.73 (1.20–2.48)	0.003	1.00 (0.61–1.64)	0.991
Single	1.23 (0.67–2.26)	0.511	1.00 (0.49–2.08)	0.990	0.98 (0.41–2.31)	0.955
Religion[f]						
Pentecostal	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Catholic	1.06 (0.79–1.42)	0.715	0.78 (0.56–1.10)	0.163	0.96 (0.64–1.42)	0.826
Muslim	1.11 (0.49–2.48)	0.806	0.73 (0.25–2.12)	0.565	1.06 (0.36–3.12)	0.923
Zion	1.09 (0.81–1.47)	0.553	1.09 (0.80–1.49)	0.568	1.27 (0.88–1.85)	0.198
Anglican	1.30 (0.61–2.77)	0.503	0.61 (0.21–1.76)	0.363	0.75 (0.23–2.46)	0.638
Johan Masowe/Johan Maranga	0.42 (0.13–1.40)	0.159	1.10 (0.45–2.72)	0.833	0.71 (0.19–2.68)	0.617
No religion	0.72 (0.53–0.97)	0.033	0.91 (0.67–1.22)	0.528	0.64 (0.42–0.97)	0.036
Other Christian	0.62 (0.35–1.09)	0.098	1.09 (0.65–1.83)	0.739	1.01 (0.53–1.92)	0.971
Not sure	0.49 (0.06–3.82)	0.499	0.67 (0.09–4.76)	0.685	1.18 (0.16–8.87)	0.870
Other	1.56 (0.94–2.58)	0.086	1.08 (0.61–1.92)	0.792	0.96 (0.46–2.00)	0.917
SES[e]						
5th quintile	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
1st quintile (poorest)	0.65 (0.43–0.98)	0.041	1.44 (0.91–2.28)	0.118	0.51 (0.29–0.88)	0.015
2nd quintile	0.70 (0.47–1.04)	0.079	1.31 (0.83–2.05)	0.242[e]	0.47 (0.27–0.81)	0.007
3rd quintile	0.79 (0.54–1.15)	0.216	1.39 (0.90–2.13)	0.136	0.64 (0.39–1.07)	0.087
4th quintile	0.82 (0.60–1.14)	0.236	1.45 (1.01–2.07)	0.045	0.99 (0.64–1.52)	0.951
Alcohol[f]						
Never	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Once a month or less	1.31 (0.97–1.77)	0.081	1.46 (1.06–2.01)	0.019	1.06 (0.70–1.60)	0.783
2–4× per month	1.19 (0.77–1.84)	0.432	1.42 (0.90–2.23)	0.133	1.48 (0.88–2.51)	0.143
2–4× per week	1.58 (0.96–2.59)	0.073	1.63 (0.96–2.77)	0.073	0.95 (0.46–1.97)	0.894
4 or more per week	0.80 (0.31–2.11)	0.658	2.56 (1.15–5.71)	0.022	1.99 (0.76–5.21)	0.162
Overall disability[f]						
≤ 12	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
13–24	1.00 (0.81–1.23)	0.994	1.16 (0.92–1.46)	0.201	1.37 (1.03–1.82)	0.033
25–36	1.02 (0.63–1.67)	0.922	2.04 (1.29–3.23)	0.002	1.50 (0.81–2.75)	0.196

Table 4 (continued)

	Depressive symptoms		Suicidal ideation		Mental health care-seeking	
	AOR (95% CI)	*P* value	AOR (95% CI)	*P* value	AOR (95% CI)	*P* value
>=37	2.89 (1.64–5.09)	0.000	1.64 (0.85–3.18)	0.143	2.01 (0.93–4.32)	0.074
Any injury[f]						
No injury	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Injury	1.62 (1.21–2.13)	0.001	1.62 (1.20–2.18)	0.002	1.55 (1.09–2.20)	0.016
Assault injury[f]						
No injury from assault	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Injury from assault	1.49 (0.71–3.12)	0.289	2.08 (1.01–4.32)	0.048	1.75 (0.73–4.18)	0.208

[a]Adjusted for age, SES, education, residence

[b]Adjusted for age, SES, education, sex

[c]Adjusted for SES, sex, residence

[d]Adjusted for SES, residence

[e]Adjusted for age, sex, education, residence

[f]Adjusted for age, sex, education, SES, residence

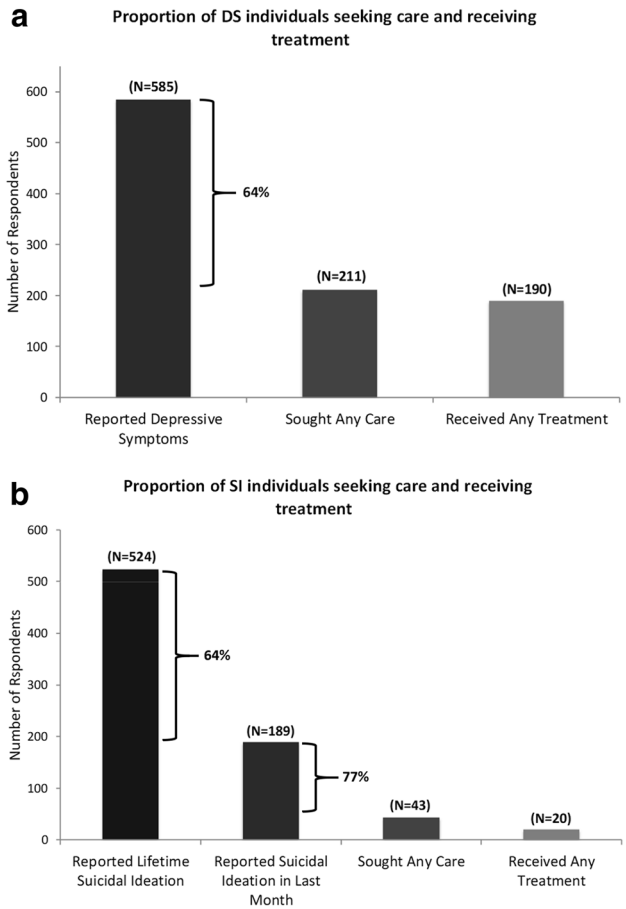

Fig. 1 Prevalence of depressive symptoms, suicidal ideation, and care-seeking behavior

Results

Prevalence estimates

The estimated weighted prevalence of DS in our study area is 19.1% (Table 2). Of those who reported DS ($n=591$), only 36.3% sought care, of whom 89.9% reported receiving treatment (Fig. 1a).

The estimated weighted prevalence of lifetime SI in our study area is 16.5%. The estimated weighted prevalence of SI in the last month is 5.9% and current SI is 1.6%. Of those who reported SI in the last month ($n=181$), only 23.1% sought care, of whom only 45.8% reported receiving treatment (Fig. 1b).

A small proportion (9.7%) of all respondents had ever sought any care for a mental health problem. Of these, the vast majority sought care for DS (94.8%). Among those who reported DS and/or SI ($n=896$), roughly one quarter (26.1%) sought any care for mental ill-health and 22.9% received any treatment.

Factors associated with depressive symptoms

Being female [adjusted odds ratio (aOR): 1.40, 95% Confidence Interval (CI) 1.13–1.73] and living in a rural area (aOR: 1.47, CI 1.08–1.99) was significantly associated with self-reported DS. There was a monotonic positive relationship between age and DS; however, the association was significant only for those aged > 55 years (aOR: 1.83, CI 1.38–2.42) compared to those aged 26–35 years. Of all socio-demographic factors, marital status had the strongest association with DS, with unmarried single, divorced or separated, and widowed individuals having greater odds of DS in comparison to married individuals (aOR: 1.23,

CI 0.67–2.26; aOR: 1.80, CI 1.24–2.62; aOR: 2.00, CI 1.40–2.86 respectively). In stratified analyses, associations between marital status and DS were stronger among women than men (Appendix Table 7). In contrast to our hypothesis, the lowest wealth quintile had lower self-reported DS (aOR: 0.65, CI 0.43–0.98) in comparison to the highest wealth quintile, and individuals with higher levels of education did not differ significantly from individuals with no schooling (Table 3).

Factors associated with suicidal ideation

Factors associated with DS were similar to factors associated with SI. Females were more likely to report SI (aOR: 1.46, CI 1.16–1.84) in comparison to males. Divorced or separated individuals (aOR: 1.77, CI 1.20–2.60) and widowed individuals (aOR: 1.73, CI 1.20–2.48) had greater odds of SI in comparison to married persons. There was a monotonic positive association between age and SI, with individuals 36–45 (aOR: 1.60, CI 1.20–2.09), 46–55 (aOR: 1.76, CI 1.27–2.44), and > 55 years (aOR: 1.62, CI 1.18–2.22) being significantly more likely to report lifetime SI than individuals aged 26–35 years. A similar monotonic positive association was observed between age and SI in the last month as well.

Compared to highest wealth quintile SES, all other quintiles were more likely to report lifetime SI; however, the only statistically significant difference was among the 4th quintile (aOR: 1.45, CI 1.01–2.07). Individuals with higher levels of education were less likely to report SI than those with no schooling (aOR: 0.64, CI 0.46–0.90).

Factors associated with mental health care-seeking

Mental health care-seeking was estimated for multiple subgroups, including: (1) all respondents; (2) respondents who reported DS and/or SI; (3) respondents who reported DS only; and (4) respondents who reported SI only. Generally speaking, the associations were similar across all subgroups (Appendix Table 6).

Among all respondents, females were significantly more likely to seek care for mental health than males (aOR: 1.42, CI 1.06–1.89). Older individuals were more likely to seek care compared to those aged 26–35 years (46–55 years aOR: 1.78, CI 1.18–2.68; > 55 years aOR: 1.51, CI 1.00–2.27). Compared to married individuals, those who were separated or divorced were significantly more likely to have sought mental health care (aOR: 1.80, CI 1.12–2.88). Individuals with lower levels of SES were significantly less likely to seek care for mental health compared to high SES individuals (first quintile SES aOR: 0.51, CI 0.29–0.89; second quintile SES aOR: 0.53, CI 0.30–0.92). Rural residents were more likely to seek care than urban residents (aOR: 2.28, CI 1.49–3.51).

Discussion

Prevalence of depressive symptoms, suicidal ideation, and care-seeking

One out of every five (19%) respondents self-reported DS in the past year and one out of every six (17%) reported lifetime SI. These prevalence estimates are comparable to a recently published study in central Mozambique which found that 14% of female heads-of-household screened positive for depression [19]. However, generally speaking, these results are higher than previous research in LMICs. For example, a study conducted in 18 countries found that the average 12-month prevalence of individuals who screened positive for depression in LMICs was 10.5% [3]. Similarly, a nationally representative household survey in South Africa found that 4.9% of respondents experienced a depressive episode in the past 12 months [38]. With regard to suicide, a cross-national study conducted in 17 countries found that the average lifetime prevalence of SI was 9.2% [11]. And a community-level study conducted in Nigeria found that the weighted prevalence of SI was 7.3% [39].

The higher prevalence estimates we obtained may partly be explained by our definition of DS, which is not based on a validated screening tool and may be an overestimate of the true prevalence of depression. However, our SI questions are unlikely to be misinterpreted and believed to produce valid SI prevalence results. An additional challenge to these comparisons is the scant evidence regarding prevalence of SI globally.

It is reasonable to infer that civil unrest is one key underlying cause of these high prevalence estimates. There is a significant amount of research suggesting that war-affected and post-disaster regions have a higher prevalence of depressive symptomatology and suicidal ideation [40–45]. After gaining independence from Portugal in 1975, Mozambique endured a 16-year civil war that displaced millions of refugees and destroyed key infrastructure, disproportionately affecting central Mozambique. Furthermore, in the 1970s, central Mozambique served as a base for neighboring Zimbabwe's guerrilla campaign against the minority government [46]. Recently, there has been a flare-up of tensions with the RENAMO opposition group resulting in ongoing conflict, violent attacks, and nighttime raids, especially in Sofala and Manica provinces.

Despite the high burden of self-reported mental health issues in our survey, only 9.7% of respondents had ever sought care for mental health, including 36% of respondents who reported DS and 23% of respondents who reported

SI in the last month. Most of those who sought care for DS (89.9%) reported receiving treatment; however, only 45.8% of respondents who sought care for SI reported receiving treatment. As such, the treatment gap for SI is much higher than the treatment gap for DS (89.3% and 67.9%, respectively). Similar to a study conducted in Sofala, these findings suggest that a large proportion of individuals with common mood disorders do not receive treatment [24].

We found that the vast majority (94.8%) of mental health care-seeking was for DS; yet, previous research indicates that mood disorders represent a very low proportion (less than < 4%) of yearly psychiatric consultations at facilities across Sofala province [24]. The differences in these findings may be due to alternative care pathways for treatment of depression outside of formal psychiatric services. It would not be surprising for individuals to seek community resources over clinical care, especially in settings where the formal mental health system is nascent and focuses primarily on severe mental illness. Previous work in Haiti, Nigeria, and Ethiopia has found that it is common for individuals to seek mental health care from traditional or religious leaders prior to, or instead of, allopathic clinical care [47–49]. These findings highlight the need to expand mental health services beyond district-level facilities and to engage with informal health providers and community resources [47, 50].

Our findings that 89.3% of individuals with SI and 67.9% of individuals with DS did not receive treatment highlights the urgent need for multifaceted and multi-level implementation strategies to close the mental health treatment gap in low-resource settings. Such approaches include improving community-level screening for common mental disorders [51, 52], integrating mental healthcare within the primary care system [53–55], reducing community-level stigma [56, 57], creating links between community and health facility allopathic care pathways [50, 58], increasing use of mental health services [59], and optimizing the performance of the existing mental health system.

Factors associated with depressive symptoms and suicidal ideation

Socio-demographic factors (female gender, being unmarried, and older age) associated with DS and/or SI are generally consistent with previous literature [3–7]. Epidemiologic research indicates that being female is associated with a twofold increased risk of a lifetime diagnosis of major depressive disorder, as well as an increased risk of SI [3, 5, 17, 60]. We found similar patterns in our study, with women having 40% higher odds of DS and 50% higher odds of SI.

Our study is also in line with previous research showing that low levels of social support, due to being single, divorced, or widowed, can result in social isolation and increased potential for development of SI or depression [4, 15]. Widowhood and divorce are well recognized as stressful life events that precipitate DS or SI. Our associations with widowhood and divorce were predominately driven by women; in stratified analyses, associations between marital status and DS/SI were much stronger among women than men (Appendix Table 7). These findings suggest that the social consequences of divorce and widowhood may be greater for females than males in central Mozambique. Last, our findings are consistent with the limited research in LMICs that suggests an increasing prevalence of depression with age [6, 7, 9, 10], and that old age is a risk factor for suicide deaths [13].

Both self-reported DS and SI were strongly associated with a history of injury and injury by assault in the past year. In our study population, 10% of respondents experienced any injury in the past year, of which 14% were injuries by assault. There is limited research in LMICs on the relationship between injury and DS or SI. However, substantial evidence in HICs demonstrates a strong relationship between traumatic physical injury and subsequent DS and/or SI [61, 62]. Recovery from physical trauma is emotionally challenging, and can have many impacts on health and well-being, including employment and ability to carry out general physical activities [63]. The process of recovering from physical trauma may be particularly difficult in low-resource settings where a loss of employment or persistent disability could result in catastrophic difficulties for maintaining household income.

Coinciding with the downstream impact of injuries on mental health, individuals with DS and/or lifetime SI had significantly elevated measures of disability—especially expressing difficulty standing for long periods of time, doing household chores, walking long distances, and completing work or school activities. These results concur with the published literature that adults with disability have a significantly higher incidence of DS than the general population [64, 65]. Our observed strong association between DS and disability also suggests face validity of our question to represent clinically important depressive symptomatology, and suggests there is a large number of individuals with depression-related function impairment who currently are not receiving treatment and likely would benefit from clinical treatment interventions.

Our findings that lower SES was associated with lower levels of self-reported DS and that higher quintiles of SES were significantly associated with SI bears additional discussion. Given that low SES populations experience more adverse living circumstances than their counterparts, this subpopulation tends to have higher rates of DS and SI. Our observation is contrary to most of the published literature, which predominantly finds an inverse relationship between increasing levels of SES and common mental disorders [66, 67]. Given the high rates of poverty in central Mozambique,

it is likely that the majority of our study sample is poor. Therefore, individuals in the higher wealth quintile may represent the 'working poor' who feasibly experience heightened distress, as they are busy maintaining regular employment, but remain in relative poverty, potentially unable to save money or support their families.

In comparison to abstainers, alcohol consumption was associated with elevated levels of DS and SI. These associations were especially strong for SI. We found that 46% increased odds of SI associated with minimal alcohol consumption compared to no alcohol consumption, and 156% increased odds of SI for significant alcohol consumption compared to no alcohol consumption. These findings concur with previous research, which indicates that excessive alcohol consumption and DS commonly co-occur and that alcohol misuse predisposes to suicidal behavior [68–70], though we are not able to determine from our data whether alcohol consumption predated mental health symptoms. When stratified by gender, females generally had stronger associations between alcohol consumption and DS or SI than men (Appendix Table 7).

Factors associated with mental health care-seeking

In the present study, we found that being female was significantly associated with mental health care-seeking. This appears consistent with published literature, where women are generally more likely to seek healthcare than men [71–73]. We also found that older age groups (46–55 years and > 55 years) had increased odds of care-seeking. These findings also coincide with the literature, which has found that middle-aged persons more likely to seek help for DS than other age groups [71]. However, this research is primarily from HICs and may not be representative of LMICs.

Contrary to initial hypotheses, rural residents were significantly more likely to seek care for mental ill-health than urban residents. Given the shortage of mental health professionals in Mozambique and that psychiatric technicians are predominately located at district-level health facilities, it is counterintuitive that rural residents were more likely to seek mental health care. One explanation for this finding may be that our care-seeking question did not specify if care-seeking was allopathic or non-allopathic, or from the formal or informal care delivery sectors. It is possible that many individuals reporting mental health care-seeking utilized non-allopathic community providers, given previous research suggesting nearly half of individuals seeking care for mental health in Africa choose traditional and religious healers over allopathic clinical care [74].

Lastly, respondents with lower SES (1st and 2nd quintiles) were significantly less likely to seek care for mental ill-health. These findings are consistent with the literature, where SES is one of the most significant determinants of health-seeking behavior [75, 76]. Barriers to care-seeking for low SES populations, including medical expenses, transport to health facilities, and loss of income, inhibit low SES populations from accessing health care.

Study limitations

This study has a number of important limitations. First, as a cross-sectional community household survey, only associations can be inferred between explanatory and outcome variables; we cannot infer the temporal direction. Second, as mentioned previously, the DS outcome variable was a single non-validated survey question that cannot be interpreted as a clinical diagnosis of depression. We recognize this question lacks specificity, but believe it is sensitive and able to capture a general understanding of DS in the study population. Third, several administrative units of Sofala and Manica provinces were excluded from data collection due to violent civil conflict ongoing at the time of study. Unfortunately, the exclusion of these administrative units negatively impacts the representativeness of our sampling frame. It is important to highlight notable strengths of this study, namely, this study is the first community-level assessment of SI and mental health care-seeking in Mozambique, and the second community-level assessment of DS. It includes a relatively large sample and relied on an up-to-date sampling frame that used satellite imagery to enumerate households.

Conclusions

There is a high prevalence of DS and lifetime SI in central Mozambique; yet, the majority of individuals suffering from these common mental health conditions do not receive treatment (68% and 89%, respectively). Urgent investments are needed to develop approaches to scale up access to care and treatment for common mental disorders, such as community-level screening, decreased stigma, explicit linkages between allopathic and non-allopathic community providers, programs to increase demand for mental healthcare, the integration of mental health services within the primary care system, and systems analysis and improvement approaches to optimize the delivery of existing of community-based public-sector mental healthcare. There were substantial similarities between our findings and research in LMICs regarding factors associated with DS and SI, with particularly high odds among women, unmarried, older, rural residents, and those with low education. Policymakers and health systems managers should consider targeting limited resources towards these populations.

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Author contributions BHW, KA, and SH conceived the idea. BHW, OA, SG, KS, KA and the INCOMAS Study Team collected the data. KA and SH designed the analysis with input from BHW. SH wrote the first draft of the manuscript under mentorship of KA and creative input from BHW. All authors read and approved the final manuscript.

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Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

Ethical approval and consent to participate The study was approved by the Institutional Bio-ethics Committee of the National Institute of Health in Mozambique. All survey respondents provided written informed consent. In cases where participant could not read or write, s/he provided a thumbprint.

Statement of Originality The authors attest that all work is original and that it has not been published or submitted anywhere other than to Social Psychiatry and Psychiatric Epidemiology.

Appendix

See Tables 5, 6, 7.

Table 5 Prevalence of Mental Health Care-seeking among 3080 individuals in the present study, 2016

Description	Percentage (95% CI)
Proportion of respondents who sought care for mental health (yes/no) out of total number of respondents	9.7% (8.2–11.2)
Proportion of respondents who sought care for mental health (yes/no) out of total number of respondents who identified a mental health problem	31.0% (27.7–34.4)
Proportion of respondents who sought care for mental health (yes/no) out of total number of respondents who identified depressive symptoms and/or suicidal ideation	26.0% (22.8–29.3)
Proportion of respondents who sought care for depressive symptoms out of total number of respondents who sought care	94.8% (91.8–97.8)
Proportion of respondents who were treated for mental health (yes/no) out of total number of respondents	8.4% (7.1–9.7)
Proportion of respondents who were treated for depression (yes/no) out of total number of respondents who identified period of sadness or loss of energy that lasted more than 2 weeks	33.0% (28.8–37.3)
Proportion of respondents who were treated for suicidal ideation (yes/no) out of total number of respondents who identified thoughts of suicide or self-harm in the last month	10.7% (5.2–16.2)

Table 6 Mental Health Care-seeking: multivariable analyses of individuals in the present study, 2016–2017

	Care-seeking among depressive symptoms and suicidal ideation		Care-seeking among depressive symptoms only		Care-seeking among suicidal ideation only	
	AOR	*P* value	AOR	*P* value	AOR	*P* value
Sex[a]						
Male	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Female	1.07 (0.75–1.52)	0.710	1.12 (0.74–1.69)	0.586	1.07 (0.63–1.83)	0.798
Urban or rural[b]						
Urban	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Rural	1.78 (1.13–2.79)	0.012	1.38 (0.84–2.27)	0.204	2.01 (0.99–4.07)	0.054
Level of school[c]						
No school	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Basic	0.96 (0.64–1.46)	0.858	1.00 (0.62–1.61)	0.99	0.72 (0.41–1.27)	0.256
Higher	0.75 (0.44–1.28)	0.288	0.71 (0.39–1.31)	0.271	0.65 (0.29–1.42)	0.279
Age[d]						
26–35	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
18–25	1.04 (0.67–1.63)	0.856	1.10 (0.66–1.83)	0.717	1.21 (0.61–2.41)	0.583
36–45	1.21 (0.78–1.87)	0.396	1.36 (0.82–2.24)	0.229	1.35 (0.72–2.54)	0.356
46–55	1.31 (0.78–2.22)	0.313	1.66 (0.91–3.00)	0.097	1.13 (0.52–2.42)	0.760
> 55	1.18 (0.74–1.89)	0.489	1.22 (0.72–2.05)	0.461	0.94 (0.42–2.07)	0.872
Marital status[f]						
Married	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Divorced/separated	1.51 (0.87–2.63)	0.145	1.27 (0.65–2.47)	0.482	2.37 (1.11–5.06)	0.025
Widowed	0.72 (0.41–1.28)	0.265	0.64 (0.34–1.20)	0.162	1.20 (0.53–2.72)	0.654
Single	0.83 (0.26–2.62)	0.754	0.95 (0.27–3.29)	0.932	1.28 (0.24–6.86)	0.771
Religion[f]						
Pentecostal	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Catholic	0.92 (0.55–1.52)	0.732	0.59 (0.33–1.04)	0.067	2.06 (0.95–4.47)	0.068
Muslim	0.63 (0.13–3.04)	0.564	0.57 (0.11–2.99)	0.503	2.18 (0.20–23.84)	0.523
Zione	1.21 (0.76–1.94)	0.426	1.00 (0.58–1.72)	0.998	1.75 (0.90–3.40)	0.102
Anglican	0.55 (0.12–2.63)	0.456	0.48 (0.10–2.39)	0.37	1.31 (0.12–14.63)	0.827
Johan Masowe/Johan Maranga	0.72 (0.14–3.71)	0.698	N/A	N/A	2.33 (0.40–13.69)	0.348
No religion	0.66 (0.39–1.12)	0.128	0.75 (0.41–1.38)	0.355	0.85 (0.40–1.82)	0.682
Other Christian	1.12 (0.46–2.72)	0.801	1.38 (0.47–4.06)	0.558	1.65 (0.53–5.14)	0.39
Not sure	N/A	N/A	N/A	N/A	N/A	N/A
Other	0.76 (0.33–1.77)	0.522	0.70 (0.28–1.76)	0.446	0.65 (0.13–3.13)	0.59
SES[e]						
5th quintile	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
1st quintile	0.56 (0.29–1.08)	0.083	0.70 (0.34–1.44)	0.328	0.53 (0.20–1.42)	0.209
2nd quintile	0.55 (0.29–1.04)	0.067	0.57 (0.28–1.17)	0.125	0.58 (0.22–1.53)	0.272
3rd quintile	0.76 (0.42–1.36)	0.349	0.87 (0.45–1.68)	0.682	0.42 (0.16–1.08)	0.071
4th quintile	1.03 (0.61–1.72)	0.923	1.13 (0.63–2.03)	0.682	0.93 (0.42–2.04)	0.847
Alcohol[f]						
Never	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Once a month or less	0.62 (0.37–1.05)	0.078	0.66 (0.37–1.20)	0.174	0.48 (0.21–1.07)	0.074
2–4× per month	1.08 (0.55–2.12)	0.822	1.50 (0.68–3.31)	0.318	1.03 (0.38–2.82)	0.953
2–4× per week	0.78 (0.32–1.92)	0.595	0.79 (0.31–2.03)	0.625	1.46 (0.56–4.70)	0.522
4 or more per week	1.31 (0.38–4.57)	0.671	2.83 (0.45–17.64)	0.265	1.43 (0.26–7.71)	0.678
Overall disability[f]						
≤ 12	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
13–24	1.23 (0.86–1.75)	0.264	1.29 (0.86–1.92)	0.216	1.57 (0.89–2.77)	0.121
25–36	1.19 (0.58–2.44)	0.632	1.53 (0.63–3.70)	0.346	1.18 (0.42–3.34)	0.752

Table 6 (continued)

	Care-seeking among depressive symptoms and suicidal ideation		Care-seeking among depressive symptoms only		Care-seeking among suicidal ideation only	
	AOR	*P* value	AOR	*P* value	AOR	*P* value
>=37	1.02 (0.41–2.54)	0.968	0.73 (0.27–2.03)	0.551	0.57 (0.07–4.27)	0.581
Any injury (in the past year)[f]						
No injury	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Injury	1.17 (0.75–1.83)	0.476	1.35 (0.82–2.22)	0.245	0.92 (0.48–1.78)	0.805
Injury by assault (in the past year)[f]						
No assault injury	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Assault injury	0.76 (0.24–2.39)	0.644	0.76 (0.19–3.03)	0.696	0.89 (0.17–4.58)	0.891

[a]Adjusted for age, SES, education, residence

[b]Adjusted for age, SES, education, sex

[c]Adjusted for SES, sex, residence

[d]Adjusted for SES, residence

[e]Adjusted for age, sex, education, residence

[f]Adjusted for age, sex, education, SES, residence

Table 7 Multivariable analyses of individuals in the present study stratified by gender, 2016–2017

	Depressive symptoms		Suicidal ideation		Mental health care-seeking	
	AOR (95% CI)	*P* value	AOR (95% CI)	*P* value	AOR (95% CI)	*P* value
Marital status[a]						
Female						
Married	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Divorced/separated	1.96 (1.32–2.92)	0.001	1.74 (1.15–2.62)	0.008	1.93 (1.17–3.18)	0.010
Widowed	2.33 (1.55–3.50)	0.000	1.54 (1.02–2.33)	0.040	1.17 (0.67–2.06)	0.576
Single	1.85 (0.88–3.88)	0.106	1.30 (0.55–3.10)	0.549	0.77 (0.23–2.62)	0.680
Male						
Married	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Divorced/separated	1.12 (0.31–3.94)	0.876	1.82 (0.52–6.41)	0.353	1.58 (0.35–7.20)	0.551
Widowed	0.42 (0.05–3.67)	0.435	0.72 (0.09–5.67)	0.759	0.95 (0.12–7.73)	0.962
Single	0.87 (0.29–2.63)	0.806	0.54 (0.13–2.37)	0.418	2.03 (0.57–7.22)	0.272
Alcohol[a]						
Female						
Never	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Once a month or less	1.74 (1.15–2.64)	0.009	1.63 (1.06–2.51)	0.025	0.90 (0.50–1.62)	0.733
2–4× per month	2.35 (1.15–4.80)	0.019	2.07 (0.99–4.32)	0.053	1.14 (0.42–3.12)	0.792
2–4× per week	2.50 (1.04–6.02)	0.040	0.57 (0.16–1.99)	0.377	0.66 (0.15–3.00)	0.590
4 or more per week	0.68 (0.15–3.16)	0.627	3.34 (1.00–11.17)	0.050	1.31 (0.27–6.32)	0.737
Male						
Never	1 (ref)	(ref)	1 (ref)	(ref)	1 (ref)	(ref)
Once a month or less	1.05 (0.67–1.65)	0.820	1.40 (0.86–2.29)	0.175	1.42 (0.78–2.56)	0.248
2–4× per month	0.90 (0.52–1.56)	0.705	1.27 (0.69–2.31)	0.442	2.05 (1.09–3.88)	0.027
2–4× per week	1.62 (0.89–2.96)	0.117	2.55 (1.37–4.75)	0.003	1.25 (0.53–2.94)	0.612
4 or more per week	0.97 (0.29–3.25)	0.965	2.03 (0.65–6.35)	0.223	2.61 (0.74–9.20)	0.137

[a]Adjusted for age, sex, education, SES, residence

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