Research paper

Major depressive disorder and suicidal behavior among urban dwelling Ethiopian adult outpatients at a general hospital

Anjalene B. Whittier [a,*], Bizu Gelaye [b], Negussie Deyessa [c], Yonas Bahretibeb [c], Teshome Shibre Kelkile [d], Yemane Berhane [e], Michelle A. Williams [b]

[a] Department of Psychiatry, University of Cambridge, Cambridge, UK
[b] Department of Epidemiology, Harvard T.H. Chan School of Public Health, Boston, MA, USA
[c] Faculty of Medicine, Addis Ababa University, Addis Ababa, Ethiopia
[d] Horizon Health Network, Zone 3, New Brunswick, Canada
[e] Addis Continental Institute of Public Health, Addis Ababa, Ethiopia

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ABSTRACT

Background: We sought to evaluate the prevalence and correlates of major depressive disorder (MDD) and suicidal behavior among urban dwelling Ethiopian adults.

Methods: This was a cross-sectional study of 1097 outpatient adults (≥ 18 years of age) in a major hospital in Addis Ababa, Ethiopia. Sociodemographic and lifestyle characteristics were collected via structured interviews. MDD and suicidal behavior were assessed using the Composite International Diagnostic Interview (CIDI) among all study participants. Multivariable logistic regression models were fitted to estimate odds ratios (OR) and 95% confidence intervals (95% CI).

Results: Prevalence estimates for lifetime and 12-month MDD were 18.0% and 6.7%, respectively. The prevalence of suicidal behavior during the previous year (i.e., suicidal ideation, plan or attempt) was 15.2% with approximately 4% having reported attempts. Overall, women were more likely to report suicidal behavior (17.8%) than men (11.3%). MDD odds were 1.53-fold higher among women as compared with men (aOR=1.53, 95% CI 1.05–2.23). Lifetime MDD was significantly associated with age, sex, marital status, and self-reported physical health. Participants reporting poor mental health had approximately 3-fold increased odds of MDD (OR=2.93; 95%CI: 1.05–2.23); those between 35 and 44 years old (aOR=1.92; 95%CI: 1.06–3.49) and those older than 55 years (aOR=2.54; 95%CI: 1.16–5.57) had higher odds of MDD. Similarly suicidal behavior was significantly associated with sex, marital status, and self-reported physical and mental health.

Limitations: This cross-sectional study utilized self-reported data from outpatients. Causality cannot be inferred, and results may not be fully generalizable.

Conclusions: Overall results show that MDD and suicidal behavior are highly prevalent among urban-dwelling Ethiopian adults. Women and middle-age adults constitute a high-risk group and may therefore benefit from targeted interventions.

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1. Introduction

Globally mental disorders are highly prevalent and account for 7.4% of the total burden of disease, and 184 million of all years lived with disability (Whiteford et al., 2013). According to the World Health Organization (WHO), major depressive disorder (MDD) is a leading mental disorder and major contributor to the overall global burden of disease (WHO, 2016). MDD is strongly related to morbidity and mortality, responsible for 11% of years lived with disability (Greden, 2000; Kessler et al., 2003; Üstün et al., 2004; Whiteford et al., 2013). Suicidal behaviors (e.g., ideation, plans, and attempts) are also among the most common causes of global injury and mortality, with suicide ranked internationally as the 14th leading cause of death (Nock et al., 2008; WHO, 2014). It is expected that by 2020, an average of one suicide will be completed every 20 s and an attempt will be made every 1–2 s (Bertolote and Fleischmann, 2002).

Half of those individuals contemplating suicide have some form of mental disorder (Nock et al., 2009), and the association of suicidal ideation with MDD has been found to be particularly strong (Nock et al., 2009). Up to 15% of individuals with MDD die due to

* Correspondence to: University of Cambridge, Department of Psychiatry, 18D Trumpington Rd, Cambridge CB2 8AH, UK.
E-mail address: abw25@cam.ac.uk (A.B. Whittier).

suicide, with even greater risks exceeding 1 in 5 found in recurrent MDD cases (Davies et al., 2001). It is estimated that half of those who complete suicide also meet the diagnostic criteria for MDD (Chehil and Kutcher, 2012). There is wide cross-national variation in suicidal behavior, with studies indicating determinants may vary across cultures (Bertolote et al., 2005; Nock et al., 2008). However, little information exists regarding MDD and suicidal behavior among urban dwelling Sub-Saharan Africans. A study using data from 1994 found the lifetime prevalence of MDD in Addis Ababa to be 2.7%, with a 0.2% prevalence of recurrent episodes (Kebede and Alem, 1999a) while the prevalence of suicidal ideation was 2.7% and lifetime prevalence of suicide attempts was 0.9% (Kebede and Alem, 1999b). Collectively, available studies shown that low educational attainment, employment status, female sex, older age, widowed and divorced marital status, self-reported poorer physical and mental health, and substance abuse are risk factors for MDD and suicidal behavior among Ethiopians (Awas et al., 1999; Deyessa et al., 2008; Hailemariam et al., 2012; Kebede and Alem, 1999a,b; Shibre et al., 2014) although most prior studies were conducted in rural settings.

In light of the increasing economic burden among urban dwellers and the scarcity of epidemiologic studies evaluating the magnitude of MDD and suicidal behavior, we conducted the present study to estimate the prevalence and correlates of MDD and suicidal behavior among urban dwelling Ethiopian adults attending outpatient clinics in a major hospital.

2. Methods and materials

This study included 1097 participants who attended the Saint Paul General Hospital outpatient facility in Addis Ababa, Ethiopia. Saint Paul Hospital is a referral and teaching hospital under the Ethiopian Federal Ministry of Health. The hospital was established to serve the economically underprivileged population, providing services free of charge to about 75% of its patients. The hospital provides all basic services across various medical departments including: pediatrics, internal medicine, gynecology, neurology, general surgery, psychiatry, ophthalmology, and emergency medicine. For this study only patients evaluated in the internal medicine, general surgery and gynecological outpatient departments were eligible for inclusion. Data collection was conducted between July and December 2011. Study personnel included research nurses with public health training. Prior to the start of the study, research nurses participated in a four-day training session that included training modules on the contents of the questionnaire, ethical conduct of human subjects research, and appropriate data collection techniques. All study participants provided informed consent and all research protocols were approved by the Institutional Review Boards of Addis Continental Institute of Public Health, Addis Ababa, Ethiopia and the Human Subjects Division at the University of Washington, USA.

2.1. Study procedures

As noted earlier, research nurses were recruited and received structured training on administration of the CIDI. The training program was similar to the one that the principal investigator (BG) had attended at the Social Survey Institute at the University of Michigan (WHO Training Center). In addition to the structured training course for the interviewers, item-by-item description of questionnaires and role plays were used further by two days of debriefing and review after each interviewer had done at least three practice interviews. To ensure highest quality of data collection, while interviewers were in the field, they were provided strict on-site supervision and support. All paper and pencil

recorded questionnaires collected manually were entered using Blaise version 4.6 (Statistics Netherlands), which contained the entire WMH-CIDI algorithm along with an automatic checking mechanism to identify item omissions and unusual responses.

3. Major depressive disorder

The depression module of the Composite International Diagnostic Interview (CIDI) 3.0 (WHO, 1990) was used to identify MDD and suicidal behavior. The CIDI is a comprehensive, fully-structured interview, designed to be administered by trained lay interviewers for the assessment of mental disorders according to the definitions and criteria of the ICD-10 (WHO, 2004) and DSM-IV (APA, 2000). Three screening questions are included covering sadness and depressed mood, feelings of discouragement, and loss of interest lasting several days or longer. Participants endorsing any of these questions were given the depression module to complete, while the depression module was skipped for participants not endorsing any of the three screening questions. In accordance with DSM-IV criteria (APA, 2000), MDD was defined as the presence of five out of nine depressive symptoms that persist for two weeks or longer, are present for most of the day nearly every day, and cause significant distress or impairment. These symptoms include dysphoric mood or anhedonia (cardinal symptoms) that persist most of the day, and clinically significant weight gain/loss or appetite disturbance, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feelings of worthlessness or excessive guilt, diminished ability to concentrate or think clearly, and recurrent thoughts of death or suicide. For the purposes of this study, 12-month MDD was defined as experiencing MDD within the past 12 months without plausible organic causes and without history of mania or hypomania (Kessler et al., 2003). The plausible organic causes included MDD due to physical causes or injury or the use of medication, drugs, or alcohol.

4. Suicidal behavior

Questions related to suicidal behavior were situated within the depression module. Participants were asked about the presence of ideation, plan(s) and/or attempt(s) during their most severe depressive episode within the past year. In particular, the following questions were included: "During that period, did you ever think that it would be better if you were dead?", "Did you make a suicide plan?" and "Did you make a suicide attempt?" In accordance with prior studies (Nock et al., 2010), suicidal behavior was classified as ideation, attempt, and plan based on participant self-reports.

4.1. Other covariates

Questions were also included regarding behavioral risk factors such as tobacco, alcohol, and khat consumption. Participants were classified according to their alcohol consumption habits: non-drinker, less than once a month, and ≥1 alcoholic beverage a week. Other variables were categorized as follows: age (years), sex (women, men), education (≤ primary education, secondary education, ≥ university degree), smoking history (never, former, current), and current khat consumption (yes, no).

4.2. Statistical analysis

Participant characteristics were summarized using means (± standard deviation) for continuous variables with normal distribution and counts and percentages for categorical variables.

Differences in categorical variables were evaluated using Chi-square tests or Fisher's exact test. For continuous variables, Student's *t*-tests were used to assess differences in means. Multivariable logistic regression models were fitted to identify risk factors associated with MDD and suicidal behaviors. Forward logistic regression modeling procedures combined with the change-in-estimate approach were used to select the final multivariable adjusted models. Variables of a priori interest (e.g., age and sex) were forced into final models. Statistical significance was set at $p < 0.05$. All analyses were completed using SPSS statistical software.

5. Results

Table 1 presents the summary of participant characteristics. A majority of the sample were women (60.4%), married (51.4%), and

Table 1
Characteristics of the entire study population (N=1097).

Characteristic	N	%
Mean age (years)[a]	35.6 ± 12.1	
Sex		
Women	663	60.4
Men	434	39.6
Marital status		
Married	561	51.4
Never married	345	31.6
Other (separated/divorce/widowed)	186	17.0
Education		
College graduate	236	21.5
Secondary (7–12)	370	33.7
≤ Primary (1–6)	491	44.8
Smoking status		
Never	944	86.1
Former	46	4.2
Current	107	9.8
Alcohol consumption past year		
None	627	57.2
Less than once a month	366	33.4
≥ 1 day a week	104	9.5
Khat chewing		
None	809	73.7
Former	64	5.8
Current	224	20.4
Self-reported physical health		
Excellent/very good/good	616	56.2
Poor/fair	481	43.8
Self-reported mental health		
Excellent/very good/good	722	65.8
Poor/fair	375	34.2
Lifetime MDD	197	18.0
12-month MDD	73	6.7
Suicidal behavior (any type)[b]	167	15.2
Suicidal ideation	*161*	*14.7*
Suicide plan	*66*	*6.0*
Suicide attempt	*45*	*4.1*

[a] Mean ± standard deviation (SD); MDD: Major depressive disorder.
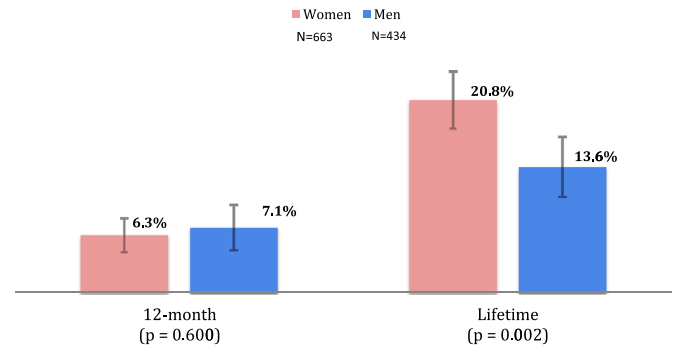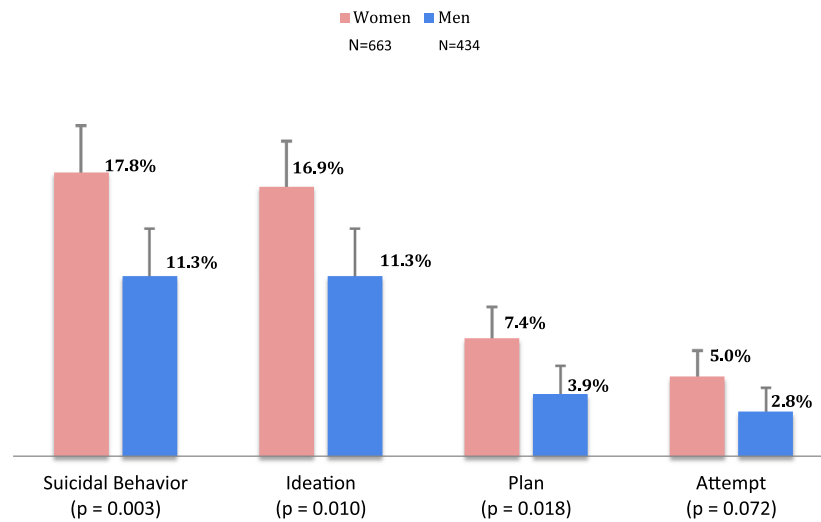[b] Non-mutually exclusive subcomponents.

Fig. 1. Prevalence of Major Depressive Disorders (12-month and lifetime) by sex.

with low educational attainment (< 12 years) (78.5%). Approximately 4% of participants reported being current smokers, while 56.7% reported no alcohol consumption in the past year. Current consumption of Khat, a green plant with amphetamine-like effects commonly used as a mild stimulant for social recreation and to improve work performance in Ethiopia (Belew et al., 2000; Kalix, 1987), was reported by 20.4% of participants. Poor physical health and mental health were self-reported by 43.8% and 34.2% of the sample, respectively. The lifetime prevalence of MDD was 18% (95% CI: 15.6–20.2%) while the 12 month prevalence was 6.7% (95%CI: 5.2–8.1%). The prevalence of suicidal behavior during the past year was 15.2%, with non-mutually-exclusive subcomponents of ideation at 14.7%, plan at 6.0%, and attempt at 4.1%. Among the 167 who ever had suicidal ideations, 60 had a suicide plan and 41 of them had suicidal attempt (Supplementary Table 2). As shown in Figs. 1 and 2, women were more likely to have higher prevalence estimates of MDD and suicidal behavior compared with men.

The associations between lifetime MDD and participants' characteristics are presented in Table 2. Depressed participants were more likely to be older, women, divorced or widowed. Depressed participants were also more likely to self-report poor physical and mental health status as compared with non-depressed participants. Table 2 also describes the associations of suicidal behavior with participants' characteristics. Participants with MDD and without MDD were similar with regards to education, smoking, alcohol consumption and Khat consumption. Participants with suicidal behavior were more likely to be women, widowed or divorced, and with poor physical and mental health status.

As shown in Table 3, the odds of MDD was 1.67-fold higher among women as compare with men (OR=1.67; 95%CI: 1.20–2.33). Middle aged (35–44 years) and older (≥ 55 years old) were more than 2-times as likely (OR=2.09; 95%CI: 1.27–3.46; and OR=2.11; 95%CI: 1.10–4.06, respectively) to have MDD compared with younger participants (18–24 year olds). After adjusting for age and sex, former smokers (OR=1.70; 95%CI: 1.00–2.89) and those who report poor physical health (OR=1.97; 95%CI: 1.44–2.71) were more likely to have MDD diagnosis compared to the referent groups. In the multivariate adjusted model participants who reported separated/divorced/widowed had more than two-fold increased odds of MDD (OR=2.51; 95%CI: 1.65–3.80); women were more likely to have MDD (OR=1.53; 1.05–2.23) compared to men. Similar increased odds of MDD was noted for middle aged (35–44 years) and older (≥ 55 years old) participants (OR=1.92; 95%CI: 1.06–3.49; and OR=2.54; 95%CI: 1.16–5.57, respectively) as well as those who reported poor mental health status (OR=2.93; 95%CI: 2.10–4.10).

Table 4 examines the odds of suicidal behavior in relation to risk factors. Similar to MDD, other marital status, poor physical and mental health, and being women carried increased odds of suicidal behavior. In multivariate adjusted models, women had

Fig. 2. Prevalence of suicidal behavior* (ideation, plan and attempt) by sex. *Non-mutually exclusive subcomponents.

Table 2
Characteristics of subjects according to major depressive disorder and suicidal behavior (N=1097).

Characteristic	Depressed	Non-depressed	P-value	Suicidal behavior		P-value
	N=197	N=900		Present N=167	Absent N=930	
	%	%		%	%	
Mean age (years)[a]	37.5 ± 12.0	35.3 ± 12.1	**0.022**	35.3 ± 11.7	35.7 ± 12.2	0.712
Sex			**0.002**			**0.003**
Women	20.8	79.2		118 (17.8)	545 (82.2)	
Men	13.6	86.4		49 (11.3)	385 (88.7)	
Marital status			**< 0.001**			**0.001**
Married	15.2	84.8		71 (12.7)	490 (87.3)	
Never married	15.1	84.9		52 (15.1)	293 (84.9)	
Other (separated/divorce/widowed)	32.3	67.7		44 (23.7)	142 (76.3)	
Education			0.282			0.724
College graduate	16.5	83.5		32 (13.6)	204 (86.4)	
Secondary (7–12)	20.5	79.5		58 (15.7)	312 (84.3)	
≤ Primary (1–6)	16.7	83.3		77 (15.7)	414 (84.3)	
Smoking status			0.455			0.696
Never	17.4	82.6		142 (15.0)	802 (85.0)	
Former	21.5	78.5		19 (17.8)	88 (82.2)	
Current	21.7	78.3		6 (13.0)	40 (87.0)	
Alcohol consumption past year			0.771			0.087
Non-drinker	18.2	81.8		107 (17.1)	520 (82.9)	
Less than once a month	18.3	81.7		50 (13.7)	316 (86.3)	
≥ 1 day a week	15.4	84.6		10 (9.6)	94 (90.4)	
Khat consumption			0.736			0.715
None	17.4	82.6		122 (15.1)	687 (84.9)	
Former	19.6	80.4		37 (16.5)	187 (83.5)	
Current	18.8	81.3		8 (12.5)	56 (87.5)	
Self-reported physical health			**< 0.001**			**< 0.001**
Excellent/very good/good	13.1	86.9		61 (9.9)	555 (90.1)	
Poor/fair	24.1	75.9		106 (22.0)	375 (78.0)	
Self-reported mental health			**< 0.001**			**< 0.001**
Excellent/very good/good	12.6	87.4		70 (9.7)	652 (90.3)	
Poor/fair	28.3	71.7		97 (25.9)	278 (74.1)	

[a] Mean ± standard deviation (SD).

Table 3
Odds ratios (OR) and 95% confidence intervals (CI) of lifetime MDD (N=1097)**.

Characteristics	Unadjusted OR (95% CI)	Age and sex adjusted OR (95% CI)	*Multivariable adjusted[a] OR (95% CI)
Marital status			
Married	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Never married	0.99 (0.68–1.45)	1.26 (0.81-1.96)	1.13 (0.72–1.79)
Other (separated/divorced/widowed)	**2.67 (1.82–3.92)**	**2.38 (1.59-3.55)**	**2.51 (1.65–3.80)**
Education			
College graduate	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Secondary (7–12 yrs)	1.31 (0.85–2.00)	1.21 (0.78-1.87)	1.06 (0.68–1.66)
≤ Primary (1–6 yrs)	1.01 (0.67–1.54)	0.86 (0.56-1.32)	**0.55 (0.35–0.88)**
Smoking status			
Never	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Former	1.30 (0.80–2.13)	**1.70 (1.00−2.89)**	1.45 (0.78–2.70)
Current	1.32 (0.64–2.72)	2.13 (0.99-4.60)	1.51 (0.60–3.83)
Alcohol consumption			
None	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
< 1 per month	1.01 (0.72–1.41)	1.05 (0.75-1.48)	1.19 (0.83–1.70)
≥ 1 day a week	0.82 (0.46–1.45)	1.12 (0.60-2.09)	1.04 (0.54–1.98)
Khat chewing status			
Never	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Former	1.16 (0.80–1.69)	1.38 (0.92-2.05)	1.09 (0.68–1.75)
Current	1.09 (0.57–2.10)	1.50 (0.75-2.97)	1.22 (0.54–2.80)
Physical health			
Excellent/very good/good	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Fair/poor	**2.10 (1.53–2.87)**	**1.97 (1.44-2.71)**	1.28 (0.88–1.84)
Mental health			
Excellent/very good/good	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Fair/poor	**2.73 (2.00–3.74)**	**2.67 (1.94-3.68)**	**2.93 (2.10–4.10)**
Sex			
Men	1.00 (Reference)	N/A	1.00 (Reference)
Women	**1.67 (1.20–2.33)**		**1.53 (1.05–2.23)**
Age (years)			
18–24	1.00 (Reference)	N/A	1.00 (Reference)
25–34	1.51 (0.92–2.48)		1.47 (0.85–2.55)
35–44	**2.09 (1.27–3.46)**		**1.92 (1.06–3.49)**
45–54	1.16 (0.63–2.14)		1.01 (0.49–2.06)
≥ 55	**2.11 (1.10–4.06)**		**2.54 (1.16–5.57)**

**MDD was present in 197 of participants.

[a] Adjusted for age, sex, and all other covariates in the table.

1.63-increased odds of suicidal behavior (OR=1.63; 95%CI: 1.13–2.36) compared to men. Participants who reported poor physical health (OR=1.64; 95%CI: 1.12–2.42) and poor mental health (OR=2.49; 1.71–3.64) had increased odds of suicidal behavior compared with those who reported excellent/good physical and mental health status, respectively.

6. Discussion

The results of this study confirm a high prevalence of MDD and suicidal behavior among urban dwelling Ethiopians. As expected in our study, women were more likely to exhibit MDD (OR=1.67; 95%CI: 1.20–2.33) and suicidal behaviors (OR=1.63; 95%CI: 1.13–2.36) compared with men. Further, we also found that self-reported physical health (OR=1.64; 95%CI: 1.12–2.42) and mental health (OR=2.49; 1.71–3.64) status are associated with increased

odds of suicidal behaviors compared with those who reported excellent/good physical and mental health status, respectively.

The lifetime MDD prevalence estimates widely vary cross-nationally and have been found to range between 3% (Japan) and 16.9% (United States), with the majority of estimates falling between 8% and 12% (Andrade et al., 2003). In addition, the global 12-month prevalence of MDD is estimated to be 4.7% (Ferrari et al., 2013). The lifetime and 12-month prevalence estimates of MDD among urban dwelling adults attending outpatient clinics in the present study are similar to those reported in the Brazil, Mexico, and Chile (Andrade et al., 2003), but higher than prior studies conducted among community based samples in rural Ethiopia (Mogga et al., 2006; Kebede and Alem, 1999a). Nock et al. (2008) in their WHO World Mental Health Surveys of community-based adults found overall lifetime prevalence estimates for suicidal behavior to be 9.2%. In the present study, the prevalence of any type of suicidal behavior was 15.2%. These are lower than

Table 4
Odds ratios (OR) and 95% confidence intervals (CI) of suicidal behavior (N=1097)[**].

Characteristics	Unadjusted OR (95% CI)	Age and sex adjusted OR (95% CI)	[*]Multivariable adjusted[a] OR (95% CI)
Marital status			
Married	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Never married	1.23 (0.83–1.80)	1.27 (0.81–2.01)	1.15 (0.39–3.38)
Other (separated/divorced/widowed)	**2.14 (1.41–3.25)**	**1.95 (1.26–3.02)**	1.38 (0.71–2.67)
Education			
College graduate	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Secondary (7–12 yrs)	1.19 (0.74–1.89)	1.08 (0.67–1.74)	0.94 (0.58–1.54)
≤ Primary (1–6 yrs)	1.19 (0.76–1.85)	1.06 (0.68–1.68)	0.70 (0.43–1.14)
Smoking status			
Never	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Former	1.22 (0.72–2.07)	1.66 (0.95–2.92)	1.38 (0.71–2.67)
Current	0.85 (0.35–2.04)	1.28 (0.51–3.19)	1.15 (0.39–3.38)
Alcohol consumption			
None	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
< 1 per month	0.77 (0.54–1.11)	0.81 (0.56–1.17)	0.87 (0.59–1.29)
≥ 1 day a week	0.52 (0.26–1.03)	0.70 (0.34–1.45)	0.63 (0.30–1.33)
Khat chewing status			
Never	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Former	1.11 (0.75–1.67)	1.37 (0.90–2.10)	1.09 (0.66–1.79)
Current	0.80 (0.37–1.73)	1.05 (0.48–2.32)	0.91 (0.36–2.31)
Physical health			
Excellent/very good/good	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Fair/poor	**2.57 (1.83–3.62)**	**2.51 (1.77–3.54)**	**1.64 (1.12–2.42)**
Mental health			
Excellent/very good/good	1.00 (Reference)	1.00 (Reference)	1.00 (Reference)
Fair/poor	**3.25 (2.32–4.56)**	**3.15 (2.24–4.43)**	**2.49 (1.71–3.64)**
Sex			
Men	1.00 (Reference)	N/A	1.00 (Reference)
Women	**1.70 (1.19–2.43)**		**1.63 (1.13–2.36)**
Age (years)			
18–24	1.00 (Reference)	N/A	1.00 (Reference)
25–34	1.04 (0.64–1.68)		0.97 (0.56–1.67)
35–44	1.25 (0.76–2.04)		1.13 (0.62–2.05)
45–54	0.71 (0.38–1.33)		0.64 (0.31–1.34)
≥ 55	0.92 (0.45–1.89)		0.99 (0.42–2.33)

[**]Suicidal behavior was endorsed by 167 of participants.

[a] Adjusted for age, sex, and all other covariates in the table.

estimates reported in Sweden among a random sample of the general population and mental health care staff members (Ramberg and Wasserman, 2000); in a national community-based survey of participants aged 16 years in New Zealand (Beautrais et al., 2006); and among working-age adults in Hong Kong (Liu et al., 2006), but are much higher than previous estimates from community based studies conducted in rural Ethiopia among the general population (Alem et al., 1999a,b; Kebede and Alem, 1999b). Collectively, despite variations in how MDD and suicidal behavior are operationally defined and differences in characteristics of study populations (e.g., clinic outpatients, general population, urban, rural residents), the high prevalence of MDD and suicidal behavior found in our study and those of others (Nock et al., 2008; Andrade et al., 2003) suggests that greater attention and further research on the impact of MDD and suicidal behavior on other health outcomes specifically in African populations is warranted and remains in great need as the global burden of disease

continues to shift from communicable to non-communicable illnesses in many sub-Saharan African countries.

The observation that women had 53% higher odds of having lifetime MDD than men (OR=1.53, 95% CI 1.05–2.23) is consistent with prior studies (Kessler and Bromet, 2013). It has been proposed that women are at higher risk due to cyclical hormonal fluctuations that intensify their stress response, and increased vulnerability to depression (Seeman, 1997). Social factors such as more sexual and physical abuse, higher reliance on emotional and social support, and more willingness to report symptoms of depression to physicians predispose women to have higher rates of MDD, beginning in adolescence and persisting through adulthood (Cyranowski et al., 2000). Moreover, we found that women had 63% higher odds of endorsing suicidal behavior than men (OR=1.63; 95% CI 1.13–2.36). Globally, rates of completed suicides tend to be higher in men, while women report more suicidal behavior and deliberate self-harm (Hawton, 2000). The explanation

for this is often placed on gender roles, suggesting complex yet culturally-specific dynamics of masculinity, power, and powerlessness (Canetto, 2008). Although the present study did not include information on completed suicides, the difference in suicidal behavior by sex deserves further investigation. Strategies to prevent and manage suicidal behaviors in Ethiopia should be adapted in light of these findings. For example, our findings suggest that there may be merits to focusing on addressing suicidal behavior and treating depression symptomatology in women. Of note, educating physicians in depression recognition and treatment as well as restricting access to lethal means for suicide (Mann et al., 2005) are two of the most widely recommended programs that could be effective for those who are disproportionately affected.

Cross-nationally, some of the most consistent risk factors for MDD and suicidal behavior are being unmarried and having a lower educational level (Nock et al., 2008). In the present study compared with college graduates, those with primary-level educational attainment or lower had decreased odds (OR=0.55; 95% CI 0.35–0.88) of lifetime MDD. We do not have a clear explanation for this. A study in Canada found that the lowest rates of MDD based on education level were seen among individuals with less than secondary school while the highest rates were found in those with other post-secondary education (Akhtar-Danesh and Landeen, 2007), while higher prevalence estimates of MDD were found among those with lower levels of education in South Africa (Tomlinson et al., 2009). In the present study we also found that marital status was statistically significantly associated with MDD. There is an established bidirectional relationship between MDD and marital disruption. The high prevalence of MDD in separated or divorced individuals is considered due to both the increased risk of marital disruption for those with MDD and increased risk of MDD among those who have experienced marital disruption (Bulloch et al., 2009). Although there is no clear explanation for this finding, it may be that those who are married are more likely to have settled and share the burden of increasing living cost and more positive health behaviors that may contribute to reduced mental distress (Gelaye, 2012).

Those reporting poor mental health status were nearly 3 times as likely to have lifetime MDD (OR=2.93; 95% CI 2.10–4.10) compared to those who reported good/excellent mental health status. Depression is a highly recurrent disorder. People who have suffered one episode of depression have a 50% chance of having another, and those who have suffered two episodes are 80% more likely to have another episode (Burcusa and Iacono, 2007). Furthermore, family history of mental illness or another affective disorder is related to recurrence of depression (Kessler and Magee, 1994).

A framework consisting of several proposed interventions has suggested that it has the potential to reduce the global burden of MDD by 10–30% (Chisholm et al., 2004). However, resources must be appropriately allocated and solutions must be consistently implemented in order to garner results. Yearly global mental health spending per person averages under $3 USD, and is below $0.25 in low- and middle-income countries (LAMICs) (WHO, 2011). Increasing spending would allow researchers, health care providers, and other actors in the global health and global mental health arena to better target mental health concerns such as MDD and suicidal behavior. As LAMICs currently shelter a high burden of disease from mental disorders yet have a low capacity to properly address these illnesses (Patel, 2007), devoting additional resources would pave way for a more equitable situation. In recent years, mental health resources have become increasingly more integrated with primary care (WHO, 2008). Perhaps expanding this model would be useful. This can also be thought of as cost-effective. Every disability-adjusted life year avoided by improving primary care based MDD resources costs less than one year of average

per capita income, even in resource-limited settings (Chisholm et al., 2004).

Our study had major strengths including its relatively large sample size, use of clinical diagnostic assessments, and the diversity present within its participants. However, some important caveats must be considered when interpreting the results of our study. First, the cross-sectional study design precludes delineation of the temporal relation between correlates and MDD or suicidal behavior. Second, MDD and suicidal behaviors were based on self-report and are thus subject to non-systematic errors in recall and systematic nondisclosure. Both types of errors may have led to some misclassification in our study. Finally, study findings may not be generalized to the broader Ethiopian population since our study was limited to urban dwelling adults attending outpatient clinics.

Overall, our study results show that MDD and suicidal behavior are highly prevalent among urban-dwelling Ethiopian adults. Women, middle-age adults, and those who were divorced or widowed, and who reported poorer physical and mental health constitute a high-risk group for both MDD and suicidal behavior and would therefore benefit from targeted intervention programs. Further work must be done in order to fully understand the burden of MDD and suicidal behavior and their impact on other health outcomes in LAMICs. Mental health promotion and prevention programs should be enhanced to respond to groups identified as at risk for MDD and suicidal behavior.

Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.jad.2016.02.052.

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