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Prevalence and Associated Risk Factors for Major Depressive Disorder among Women Living with Human Immunodeficiency Virus

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Abstract:

Major depressive disorder is common among women living with HIV than their counterparts. The illness is associated with deleterious outcomes including antiretroviral therapy resistance, increased opportunistic infections, mortality, and increased socioeconomic burden to the individual, family, and society. Hence, investigating the prevalence of the illness and its risk factors among women living with HIV is important for further interventions. A health-facility based cross-sectional study was conducted at Machakos Level 5 and Kangundo Level 4 Hospitals, Kenya. Data was collected using a structured standardized scale and a researcher-generated questionnaire. Convenience sampling was used to select 313 participants. The prevalence of major depressive disorder was 35.5%. Inferential analysis revealed that attending religious service of some sort, financial constraint, alcohol use, and perception of health status as fair were risk factors for major depressive disorder ($p < 0.05$). Ministry of Health should routinely screen all women living with HIV for depressive symptoms and intervene early to avert further complications.

Keywords: Prevalence, HIV, depression, risk factors

1. Introduction

Globally, 36.7 million people were estimated to be living with human immunodeficiency virus (HIV) in 2016 (Joint United Nations Programme on HIV/AIDS, 2018). Women comprised 51% of the global total of individuals living with HIV in 2016 (World Health Organization, 2018). Also, WHO indicated that in sub-Saharan Africa, women who were living with HIV in 2014 were the majority (59%) in comparison to men (41%). Reports from Avert (2018) revealed that in 2017 approximately 20.9 million people were enrolled for antiretroviral therapy (ART) worldwide. In Kenya, about 1.6 million people were living with HIV by the end of 2016 (UNAIDS, 2017), and about 897,644 were accessing ART (Ministry of Health & National AIDS Control Council, 2016).

Depression was ranked among the most common psychiatric concerns globally (WHO, 2010). Further, globally, WHO (2016) indicated that nearly 380 million people of all ages suffered from depression. In 2014, an estimated 15.7 million adults aged 18 or older in the United States of America (USA) had at least one major depressive episode in the past year (Center for Behavioral Health Statistics and Quality, 2015). This number represented 6.7% of all United States (US) adults. Elsewhere in the world, Ferrari, Somerville, Baxter, Norman, and Patten (2012) reported that more than 5% of the population in North Africa, Caribbean, Middle East, Eastern Europe, and sub-Saharan Africa present with depression. Ferrari et al. also revealed that the prevalence of depression is lowest in some parts of the world such as East Asia, Australia, New Zealand and Southeast Asia. Further, Ferrari et al. pointed out that Afghanistan records the highest number of individuals who are depressed. Japan has the least (2.5%) cases of individuals diagnosed with depression. Additionally, in other parts of the world such as Ethiopia, findings from National Health Survey revealed that the prevalence of depressive episode among adult in general population was 9.1% (Hailemariam et al., 2012). A high prevalence of depression among the general populations in Kenya was also reported (Simon, 2011). Notably, Ferrari et al. (2013) indicated that globally, the prevalence rate of depression in 2010 was higher in women (5.0-6.0%) in comparison to men (3.0-3.6%).

The prevalence rate of depression among people living with HIV has been well established in many parts of the world. With reference to the US, among HIV-infected persons receiving care, the prevalence of a current episode of major depression and other depression, respectively, was 12.4% and 13.2% (Do et al., 2014). In Jamaica, Clarke, Gibson, Barrow, Abel, and Barton (2010) reported that the prevalence of depression among individuals seeking help at a HIV healthcare centre in Kingston was relatively high, that is, 43%. In sub-Saharan Africa, estimations of depression among HIV patients fluctuated from 2 to 56% (Antelman, Kaaya, Wei, Mbwambo, & Msamanga, 2007; Breur, Myer, Struthers & Joska, 2011; Seth et al., 2014). This was dependent on the context and population studied. These estimates are considerably greater

than the estimates of the general population in sub-Saharan Africa, which range from 1 to 34 % (Gureje et al., 2015; Kinyanda et al., 2011; Nduna et al., 2010).

Elsewhere, a study investigating the prevalence of depression and associated factors among people living with HIV (PLHIV) seeking treatments in antiretroviral therapy (ART) clinics in Harar town, Eastern Ethiopia revealed that the overall prevalence rate of depression among PLHIV was 45.8% (Mohammed, Mengistie, Dessie, & Godana, 2015). Similarly, in Nigeria, 39.1% of the participants met the criteria for depressive disorder in a study among attendees of a HIV/AIDS clinic at a teaching hospital in Imo State (Aguocha, Uwakwe, Duru, Diwe & Aguocha, 2015). In Tanzania, Christopher et al. (2017) investigated the prevalence of depression among women at ART initiation. They reported that 57.8% of the participants were presenting with depressive symptoms. Bromet (2011) pointed out that although depression is a global mental health concern with catastrophic consequences on the society, epidemiologic data in developing countries is limited. In Kenya, similar data is scarce for women living with HIV.

Furthermore, studies have demonstrated that PLHIV form the bulk of individuals at risk of developing MDD. For instance, in Uganda, Akena, Musisi, Joska, and Stein (2012) demonstrated that the risk factors for developing MDD among PLHIV are non-adherence to medications, increased opportunistic infections, and reduced immunity. Alcoholism, younger age, less social support, being female, and being in a challenging relationship, and being single were revealed as factors that predispose PLHIV to developing MDD (Seth et al., 2014). Additionally, a study in Thailand among HIV-infected women revealed that attending prenatal and antenatal clinics increased their vulnerability to MDD (Ross, Sawatphanit, Mizuno, & Tokeo, 2011). Low education level, diminished socio-economic status, parental responsibilities, and having dependents were predictors of depression (Wolff, Ruben, & Wolff, 2010). In Kenya, reports on the factors that increase the vulnerability of women to psychological problems such as depression are limited. This makes it comparative to continually examine the factors that predispose women living with HIV to MDD for guiding interventions.

It has been established that depression has adverse implications on the individual and society (Arseniou, Arvaniti & Samakouri, 2014; Seth et al., 2014). Among HIV patients, depression is associated with poor ART adherence, increased opportunistic infections, low productivity, and increased economic, social and emotional burden on the patient, the family, and society (HIV Clinicians Society, 2013; WHO, 2018). This underscores the need for increased attention to the psychological well-being of people living with HIV in order to minimize the impact of depression. In light of this, the objectives of the present study were: 1) to investigate the prevalence and severity of MDD among women living with HIV accessing ART in public hospitals in Machakos County, Kenya; 2) to examine the sociodemographic dynamics that are associated with increased risk of MDD among women living with HIV accessing ART in public hospitals in Machakos County, Kenya.

2. Methods

This research was approved by national commission for science and innovation (NACOSTI) of Kenya and Daystar university ethical review committee. A cross-sectional study was conducted among Women living with HIV on ART attending Machakos Level 5 and Machakos Level 4 Hospitals in Kenya. Patients who were HIV positive aged between 20 and 50 were eligible for inclusion in the study. Informed consent was sought prior enrollment, and those who declined to give consent were exempted from the study. The sampling goal was to recruit only those patients who were accessible and had characteristics of interest to the study. Participants were recruited at a central point where registration to receive routine ART care occurs. Clinical depression was assessed using BDI-11. The psychometric properties of BDI-11 have been proven to be sound with multiple international settings (Wanga & Gorenstein, 2013). Beck, Steer, & Garbin (1988) established that BDI-11 Cronbach alpha was 0.92 among diverse racial groups in the United States. In Kenya, BDI-11 was validated among HIV-infected populations, and its reliability coefficient 0.85 while its Cronbach's alpha was 0.81 (Daniel, 2013). Among HIV-infected individuals in Malawi, the BDI-11 scale Cronbach alpha was reported as 0.80 (Kim et al., 2014). Participants with BDI-11 score of between 20 and 63 were considered to have clinical depression. Sociodemographic data and other pertinent information was collected using a researcher-generated questionnaire. To examine the potential predictors of clinical depression, multinomial regression was computed while ODDS ratio (OR) from bivariate analyses was used to describe the association and magnitude of each predictor variable with depression. All statistical analysis were calculated using SPSS version 23, and the confidence level was set at 95%.

3. Results

The socio-demographic characteristics and other germane information of the sample are presented on Table 4.1. Of the 313 Women living with HIV enrolled in the study, more than a half (51.8%) were between 40 and 50 years while those who were between 30 and 39 years were 32.3% and those aged 20 to 29 were 16.0%. Nearly a half (45.7%) of the participants were married whereas those who were single were 20.4%, widowed (14.1%), separated (11.2%), and divorced (8.6%). Almost all the participants (90.7%) attended some sort of religious service in comparison to an insignificant proportion (9.3%) who did not. Majority (50.2%) of the participants had a secondary level of education while those who had attained primary level of education were 32.9%, college (13.1%), and university (3.8%).

Participants who were not in the workforce were the majority (29.7%) compared to those who worked on part-time basis (27.5%), self-employed (22.0%), and full-time (20.8%). Similarly, majority (67.7%) of the participants were financially constrained in comparison to those who were financially vibrant (32.3%). Participants who enjoyed strong family support were at 51.6% as opposed to those who did not (48.4%). In addition, majority of participants (86.8) had not being verbally stigmatized while a small proportion (13.2%) had being verbally stigmatized. Moreover the frequency of participants who perceived their health status as good was higher (44.7%) in comparison to those participants who

described their health status as fair (36.4%), excellent (16.9%) and poor (1.9%). Concerning participants' alcohol use, the distribution was higher among participants who indicated that they did not use alcohol at 222 (70.9%) whereas those who revealed that they used alcohol were 91 (29.1%).

Variables Categories	Frequency	Percentage
Age		
20-29	50	16.0
30-39	101	32.3
40-50	162	51.8
Gender		
Female	313	100
Marital Status		
Married	143	45.7
Divorced	27	8.6
Separated	35	11.2
Single	64	20.4
Widowed	44	14.1
Religious Service		
Yes	284	90.7
No	29	9.3
Level of Education		
Primary	103	32.9
Secondary	157	50.2
College	41	13.1
University	12	3.8
Employment Status		
Full-time	65	20.8
Part-time	86	27.5
Not in Workforce	93	29.7
Self-Employed	69	22.0
Financial Constraint		
Yes	210	67.7
No	100	32.3
Family Support		
Yes	151	48.4
No	161	51.6
Verbally Stigmatized		
Yes	41	13.2
No	269	86.8
Health Status		
Poor	6	1.9
Fair	114	36.4
Good	140	44.7
Excellent	53	16.9
Alcohol Use		
Yes	91	29.1
No	222	70.9

Table 1: Distribution of Study Participants by Socio-Demographic Characteristics (n=313)

The prevalence of major depressive disorder among HIV infected women was examined using BDI-11. Table 2 shows the proportion of participants with symptoms indicative of clinical and non-clinical depression according to BDI-11 scores. Participants whose scores on BDI-11 were above or equal to 21 were considered to have clinically significant depression while those who scored less than or equal to 20 were classified under non-clinically significant depression. It is worthwhile noting that scholars have proposed different cut-off points for depression based on the nature of study population and the goals of the study. Additionally, for undiagnosed samples, the guidelines are indeed different, with BDI-11 scores greater than or equal to 18 regarded as indicating likely depression (Barasso & Snadelowski, 2001). In this study, categorization was used in which gaining BDI-11 scores of 21 and/or above was viewed as the presence of clinically

significant depression. The frequency of non-clinical depression was higher (202, 64.5%) compared to clinical depression (111, 35.5%). This finding show that the prevalence for major depression disorder was high among HIV infected women receiving ART care in clinical settings in the study area.

Variables	Frequency	Percentage
≤ 20 Non-Clinical Depression	202	64.5
≥ 21 Clinical Depression	111	35.5
Total	313	100

Table 2: Distribution of Clinical and Non-Clinical Depression for Study Participants

Table 3 presents categorized distribution of scores on BDI-11 endorsed by the participants. Although the majority (43.4%) of the participants did not endorse depressive symptoms (normal range of BDI-11 scores), 23.4% of the participants exhibited moderate depression, 11.5% reported severe depression, 11.8% had mild mood disorder, and 9.3% had borderline clinical depression while an insignificant proportion of participants had extreme depression (0.6%). The results showed that MDD is a common psychiatric concern among HIV infected women under ART care in clinical settings in Machakos County.

Scores	Categories	Frequency	Percentage
0-10	Normal	136	43.4
11-16	Mild Mood Disorder	37	11.8
17-20	Borderline Clinical Dep.	29	9.3
21-30	Moderate Depression	73	23.4
31-40	Severe Depression	36	11.5
41+	Extreme Depression	2	0.6
Total		313	100

Table 3: Categorized Distribution of Scores on BDI-11 among the Participants

Table 4 provides a multinomial logistic regression analysis to determine whether socio-demographic features are risk factors of depressive illness among the participants. The result showed that perceiving health status as fair was statistically significantly associated with depression ($p=0.002$) as opposed to reporting health status as good or excellent. Similarly, alcohol use ($p=0.014$), and financial constraint ($=0.012$) were statistically significantly associated with depressive illness. This is interpreted to mean that health status, financial constraint, and alcohol use could predict depressive illness among women living with HIV. Participants' age, marital status, employment status, level of education, strong family support, and religious attendance did not predict depressive illness among women living with HIV ($p's > 0.05$).

Participants' Major Depressive Disorder		B	Std. Error	Wald	df	Sig.	Exp(B)	95% Confidence Interval for Exp(B)	
								Lower Bound	Upper Bound
≥ 20 = Clinical Depressive Illness	Intercept	-1.904	1.123	2.877	1	.090			
	Age 20-29	.148	.414	.128	1	.720	1.160	.515	2.610
	Age 30-39	.148	.330	.200	1	.655	1.159	.607	2.215
	Age 40-50	0 ^b	.	.	0	.	.	.	.
	M S Married	-.400	.412	.941	1	.332	.671	.299	1.503
	M S Divorced	.512	.624	.673	1	.412	1.669	.491	5.676
	M S Separated	-.962	.569	2.860	1	.091	.382	.125	1.165
	M S Single	-.902	.495	3.325	1	.068	.406	.154	1.070
	M S Widowed	0 ^b	.	.	0	.	.	.	.
	Religion Yes	-.400	.470	.725	1	.395	.670	.267	1.684
	Religion No	0 ^b	.	.	0	.	.	.	.
	Edu Primary	.028	.798	.001	1	.972	1.028	.215	4.918
	Edu Secondary	-.262	.763	.118	1	.731	.769	.172	3.433
	Edu College	.056	.817	.005	1	.945	1.058	.213	5.246
	Edu University	0 ^b	.	.	0	.	.	.	.
	Full-time	.352	.478	.542	1	.462	1.421	.557	3.625
	Part time	.695	.411	2.864	1	.091	2.004	.896	4.482
	No Workf.	-.226	.409	.305	1	.581	.798	.358	1.778
	Self Employed	0 ^b	.	.	0	.	.	.	.
	F. Constrd Yes	.946	.377	6.285	1	.012	2.575	1.229	5.394
	F. Constrd No	0 ^b	.	.	0	.	.	.	.
	Fam. Sup. Yes	.225	.295	.578	1	.447	1.252	.702	2.233
	Fam. Sup. No	0 ^b	.	.	0	.	.	.	.
	Verb. Stig. No	-.139	.427	.106	1	.745	.870	.377	2.009
	Verb. Stig. Yes	0 ^b	.	.	0	.	.	.	.
	Heath S. Poor	1.371	1.155	1.409	1	.235	3.938	.410	37.873
	Heath S. Fair	1.606	.508	10.005	1	.002	4.982	1.842	13.477
Heath S. Good	.473	.491	.928	1	.335	1.605	.613	4.203	
HeathS. Excel.	0 ^b	.	.	0	.	.	.	.
Alcohol Yes	.779	.318	6.005	1	.014	2.180	1.169	4.065	
Alcohol No	0 ^b	.	.	0	.	.	.	.

Table 4: Multinomial Regression Showing Estimate of Socio-Demographic Features as Risk Factors of Depressive Illness among Women Living with HIV

a. The Reference Category Is: ≥20 = Clinical Depressive Illness

b. This Parameter Is Set to Zero because it is Redundant

Further analysis were carried out using the odds ratios with an aim to determine whether certain participants' socio demographic characteristics were risk factors for major depressive disorder, and to compare the magnitude of the risk factors for that outcome (Table 5). The odds of MDD given the presence of attending religious service washigher (OR 1.668, 95% CI: 1.131-5.300), and this was statistically significant (p=0.020). Although financial constraint was associated with lower odds of MDD (OR -0.627, 95% CI: 0.174-0.542), this association was statistically significant (p=0.000). Similarly, the odds of MDD given the presence of alcohol use was lower (OR -0.466, 95% CI: 0.627- -1.473). Despite this, further analysis showed a strong statistical significance between alcohol use and MDD (p=0.000). Having strong family support and being verbally stigmatized did not predict MDD (p's >0.05). The results seem to imply that attending religious service, financial constraints, and alcohol use were predictors of MDD among women living with HIV in Machakos County, Kenya.

Variable	Estimate	In Estimate	Std. err	95 % Confidence Level		Odds Ratio		OR Asymptotic Sig.	Cochran's Sig.
				Lower	Upper	Lower	Upper		
Attending Rel. Service	2.449	.896	.394	1.131	5.300	.123	1.668	0.023	0.020
Financial Constrained	.307	-1.182	.290	.174	.542	-1.751	-.612	0.000	0.000
Yes Strong Fam. Sup	.985	-.016	.237	.619	1.565	-.479	.448	0.947	0.947
Verbally Stigmatized	.746	-.293	.342	.382	1.458	-.963	.377	0.391	0.390
Alcohol Use	.379	-.970	.257	.229	.627	-1.473	-.466	0.000	0.000

Table 5: Mantel-Haenszel Common Odds Ratio Estimate and Depressive Illness

The Mantel-Haenszel Common Odds Ratio Estimate is Asymptotically Normally

Distributed under the Common Odds Ratio of 1.000 Assumptions, So Is the Natural Log of the Estimate

4. Discussion

With regard to the prevalence and severity of MDD among females living with HIV, this study found out that respondents experienced high level of depressive symptoms, reporting approximately 35.5% MDD prevalence rate. This finding agrees with previous reports in Kenya that seem to indicate that MDD prevalence rate is high among HIV patients. For instance, Aboge et al. (2015) reported 51.7% MDD prevalence rate among HIV positive individuals living with disabilities from Western parts of Kenya. Ryn et al. (2016) also recorded a high prevalence (63.3%) of severe depressive disorder among HIV positive women in Kenya. Although the current study appears to have recorded a slightly lower MDD prevalence rate among HIV patients, this may be due to differences in the study design and measurement instruments employed. Subsequently, a national study in Kenya on the prevalence of MDD and associated factors among HIV positive females may provide richer insights into this topic.

The findings of the present study are also in keeping with studies conducted in other parts of the world that have recorded high prevalence of MDD among HIV positive populations. For example, in Southern India, Nyamathi et al. (2011) investigated the prevalence of MDD among rural women living with HIV and associated correlates of depression. They reported that about 54% of the participants had depression. Similarly, Unnikrishnan et al. (2012) documented high prevalence rate (51%) of depression among women living with HIV in coastal South India while Matsumoto et al. (2017) revealed that depression among women living with HIV in Hanoi, was high (26.2%).

In sub-Saharan Africa, evidence indicating that depression is high among women is well documented. For instance, in Uganda, a cross-sectional study conducted by Akena et al. (2012) on the prevalence of MDD among HIV patients in Uganda revealed that MDD occurred in 17.4% of the participants. Earlier studies done in Uganda had shown higher prevalence (ranging between 20% and 40%) of MDD in similar populations (Maling, Todd, Vander, Grosskurth, & Kinyanda, 2011; Nakasujja et al., 2010; Nakimuli-Mpungu, Musisi, Katabira, Nachage, & Bass, 2011). Similarly, reports in Cameroon demonstrated that MDD is significantly associated with people living with HIV. In this connection, Gaynes, Pence, Astashili, O'Donnell, Kats, and Ndumbe, (2012) studied the prevalence and predictors of MDD in HIV infected individuals in an antiretroviral care setting in Cameroon. They uncovered the lifetime epidemiology of depression in HIV patients among the participants as high, with 21% lifetime MDD prevalence, and 8% MDD prevalence. Also, in the US, Do et al. (2014) revealed that MDD occurred in about 12.4% people living with HIV. It is worthwhile noting that in all these studies, MDD was more common among females in comparison to males. From these findings, it appears logical to presume that individuals living with HIV are at risk of developing depressive symptoms regardless of their country of origin. Although the present study makes this assumption, future research needs to examine inter-country HIV prevalence rates and associated risk factors to inform HIV programming as per the needs of various countries.

The second objective of this study sought to examine the risk factors for MDD in the study population. The present study findings demonstrated some similarities as well as some inconsistencies with studies conducted in other parts of the world on risk factors for MDD. In respect to inconsistencies, this study found out that age was statistically insignificantly associated with depression ($p>0.5$). In contrast, Akena, Musisi and Kinyanda (2010) study that compared the clinical features of depression in HIV-positive and HIV-negative patients in Uganda documented that older age is a risk factor for MDD. Also, the present study findings seem to contradict reports by Akena et al. (2012) study that examined the relationship between HIV stigma and MDD among Ugandans living with HIV that provided strong evidence on the association between being young and depression.

Another factor that did not predict MDD reported by the present study was marital status ($p>0.05$). On one hand, this finding seem to align with a study that was conducted among PLHIV in Nigeria that demonstrated that marital status was not associated with depression (Obadeji, Ogunlesi, & Adebowale, 2014). On the other hand, this finding contradict other studies that investigated risk factors for MDD. For instance, Unnikrishnan et al. (2012) revealed that depression was higher among widowed HIV positive women than in other categories of marital status. Also, contrary to present finding, Nyamathi et al. (2011) revealed that living with a spouse was linked to lower levels of depression while being single was associated with higher depressive symptoms. Nyamathi et al.'s study focused on the associates of depression among HIV-positive women from rural settings in Southern India.

The present scientific inquiry documented that there was no strong statistical evidence to show that having strong family support was a protective factor for depression ($p=0.947$). This revelation appears to be both consistent and

inconsistent with exiting literature. In alignment with the present study, Unnikrishnan et al. (2012) acknowledged that there was no statistical association between depression and strong social support among women living with HIV in Coastal South India. In contrast, Matsumoto et al. (2017) carried out a study among HIV positive individuals receiving HIV care at a clinic in Hanoi, Vietnam with an aim to shed light on whether social support was a protective factor against depression. Their study provided strong statistical evidence on the role of social support in guarding HIV individuals from developing depression. Therefore, the finding of the present study seem to suggest that strong family support serve as both a protective factor and a risk factor for depressive illnesses, and this is well supported by reports from other parts of the world. This means that HIV care providers and other stakeholders need scale up their efforts in sensitizing communities on the benefits of social support for HIV positive individuals.

Concerning the health status of the study participants, this study underscores the role of participants' perception of their health in predicting depression ($p=0.002$). This is in agreement with existing literature. For instance, Kingori et al. (2010) indicated that poor health status was a predictor variable for depression among HIV patients. The present study finding that financial constrains was a risk factor to depression ($p=0.000$) is in agreement with existing literature such as Benard et al.'s (2017) meta-analysis study on HIV prevalence and associated factors in sub-Saharan Africa in HIV positive individuals. Their study pointed out that most studies in sub-Saharan Africa suggested that there exists a positive correlation between low socio-economic status and depression among HIV-infected individuals. Bernard, Dabis, and de Rekeneire (2017) also observed that being female was a risk factor for MDD in HIV positive populations. Even though this study did not seek to compare the risk factors for MDD among men and women, the present study affirms that women living with HIV are at risk for developing depression. Therefore, comparative studies on associated risk factors for depression between men and women would offer deeper insights in the subject.

The present study suggests that HIV related stigma did not predict depression among HIV patients, which appears to contradict existing literature. For instance, a study conducted in Uganda seeking to examine the relationship between HIV stigma and MDD among people living with HIV (Akena et al., 2012) revealed that there was a link between sociodemographic and MDD. The Ugandan study particularly documented HIV related stigma as one of the risk factors for MDD. Furthermore, Grov, Golub, Parsons, Brennan and Karpiak (2010) investigation targeting HIV-infected older individuals in the US demonstrated that HIV-related stigma was significantly linked to depression. Also, contrary to the present study, Seymour (2010) study seeking to gain better acumens of the relationship between depression and HIV/AIDS among older PLHIV in the US revealed that HIV related-stigma correlated with MDD. Although the current study did not provide sufficient evidence to show that there was a connection between HIV related stigma and depression, there is a need to sensitize communities on negative impacts of HIV related stigma since sufficient evidence in support of the association is available from many parts of the world. Additionally, empirical evidence has shown that any form of discrimination, notwithstanding HIV related stigma may negatively affect individual's psychological wellbeing (Abubakar et al., 2017; UNAIDS, 2017).

Additionally, this study revealed that employment status was not a potential risk factor for MDD ($p>0.05$). The finding seems to be inconsistent with a systematic review report in Ethiopia focusing on the prevalence and factors associated with depression among PLHIV (Amare et al., 2018). The report found out that occupation and income were positive predictors of depression among people living with HIV/AIDS. Reports from Australia found out that less secure employment was a potential risk factor for depression (Batterham, Christensen, & Mackinnon, 2009). Furthermore, an investigation targeting women living with HIV in a health care setting in Kenya revealed that low income was a positive predictor for MDD (Murei, 2012).

Regarding alcohol use, the present study revealed that use of alcohol was related with depression ($p=0.000$). This is consistent with studies conducted in other parts of the world. For example, a systematic review conducted in Ethiopia on the prevalence and risk factors of depression in general population showed that substances use was associated with depression (Bitew, 2014). Also, corresponding to the present study finding, Seth et al.'s (2014) cross-sectional facility-based study among HIV positive persons across Kenya, Namibia, and Tanzania indicated that alcohol use posed potential risk to depression.

Education level was found not to influence depression by the present study ($p>0.05$). This is contrary to Aboge et al.'s (2015) findings that reported an association between low level of education and depression among HIV positive individuals in Kenya. This study also shows that religious attendance was a potential risk factor for depressive illness among the participants ($P=0.020$). The finding is comparable to results of another study that focused on establishing the severity of suicidal behaviors among parasuicidal adults with comorbidities (MDD, Bipolar, and psychotic disorders) in Nigeria (Ojuade, Munene, & Mbutu, 2018). According to that study, being a Christian particularly of Protestant affiliation was associated with suicidal tendencies in the sample population.

5. Conclusions

The present study examined the prevalence of MDD among HIV infected women who were under ART care in Machakos County, Kenya. The finding demonstrated that the prevalence of MDD was high in this population. Factors associated with MDD in the sample population were also investigated. Results indicated that financial constraint ($p=0.000$), attending religious service ($p=0.020$), perceiving health status as fair ($p=0.002$), and alcohol use ($p=0.000$) were risk factors for MDD among women living with HIV receiving ART services in Machakos County. Age, marital status, strong family support, educational level, employment status, and verbal stigmatization did not predict MDD in the study population ($p's >0.05$).

6. Recommendations

- The national government and county governments in Kenya should pass legislations and policies that call for compulsory routine screening for MDD in HIV patients enrolled for HIV care in all health care facilities in Kenya.
- The national and county governments in Kenya ought to hire qualified professionals including psychologists, clinical psychologists and counseling psychologist to assist in screening and provision of psychological interventions to HIV patients diagnosed with MDD.
- Counselling professionals should have a comprehensive understanding of risk factors for depression for better management of the illness. Additionally, counseling professionals must seek continuing education for better understanding on how to detect and assess depression among HIV infected individuals.
- To mitigate financial constraints among women living with HIV, county governments in Kenya should provide interest-free loans to women living with HIV. These monies would be used to start income generating activities.
- Civil society including non-governmental organizations, faith-based organizations, and community-based organizations should design mental health awareness and prevention programs targeting women living with HIV. Through these programs, women living with HIV could learn how to identify symptoms of mental illnesses and seek counseling the earliest time possible.
- Religious leaders should investigate why their followers are prone to depression yet attending church service should provide hope and peace of mind among the faithful. Most importantly, religious leaders should devise strategies that promote the mental health of individuals rather than serve as hindrances.

7. References

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