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Review article

Global prevalence of suicide in patients living with HIV/AIDS: A systematic review and meta-analysis



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ABSTRACT

Background: In fact, people living with HIV are at a greater risk of mental health disorders. Based on lack of necessary information in this area the present systematic review and meta-analysis study was conducted to determine the magnitude of committed suicides among HIV/AIDS people as well as their associated factors in a global setting.

Method: Firstly we registered the protocol of study in PROSPRO. Then the publications were searched in the 4 main databases from January 2000 to April 2022. After removing duplication and inappropriate studies we applied inclusion and exclusion criteria. Finally 60 studies were included for analysis. Comprehensive meta-analysis software were used for analyzing.

Results: After reviewing 60 articles published from January 2000 to April 2021 in 24 countries, the total prevalence rate of suicide among 61,904 patients was estimated at 0.249 (95 % CI, 0.2–0.306). Findings indicated that the highest suicide prevalence was related to single patients estimated at 0.257 (95 % CI, 0.184–0.347). A gender-based meta-analysis depicted that the prevalence of suicide/ suicidal ideation was higher among females estimated at 0.22 (95 % CI, 0.15–0.29) compared with men at 0.17 (95 % CI, 0.11–0.23).

Conclusion: Health planners and policymakers should develop suicide-prevention strategies aimed at female patients in younger age groups who live alone and are deprived of social support to effectively promote their self-efficacy in successful management of the disease. Integrating mental health services into anti-retroviral therapy for HIV/AIDS patients is also suggested in order to effectively design integrated programs for the management of individuals living with HIV/AIDS.

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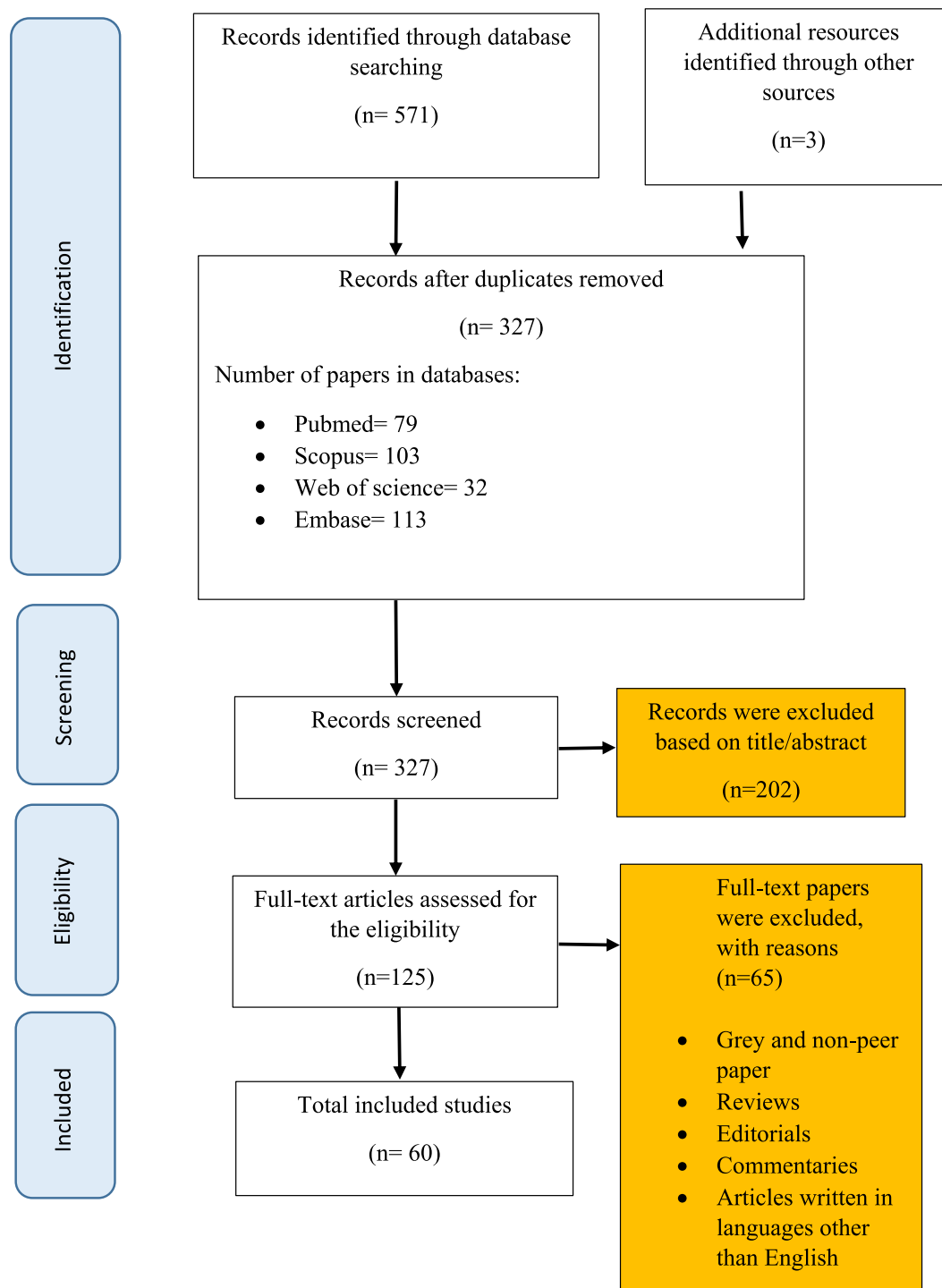


Fig. 1. Flow diagram of our review process (PRISMA).

the quality of studies along with dimensions including case definition, selection of controls, comparability of cases and controls, and exposure/outcome in three main sections of exposure/outcome ascertainment, selection of study groups, and their comparability. Each study was evaluated by two independent researchers; a study with score from 7 to 9, was mentioned as high quality, 4–6 as high risk, and 0–3 as very high risk of bias. To achieve consensus in case of any discrepancy, consulting with a third party was proposed. The lowest and highest NOS scores for each of the evaluated articles could be in a range between 0 and 10, so that an article with score below four was mentioned to have a low level of quality.

2.5. Data extraction

Two independent investigators used a data extraction form to enter the data of included studies. The form contained information including author's name, publication date and country, data gathering tool, study design, study population, sampling method, region based on WHO classification, gender, age, time of suicide, marital status, risk of bias, and the prevalence of suicide.

2.6. Statistical analysis

The prevalence of suicide among people with HIV/AIDS was evaluated by random-effects model. Data was combined with the forest plot. The heterogeneity of preliminary studies was evaluated with I^2 test. In addition, subgroup analysis was used to determine heterogeneity based on different study settings and patients' socio-demographic characteristics. Meta-analysis was performed using Comprehensive Meta-Analysis software.

3. Results

To report the findings of this review, the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guideline was used. After reviewing 60 articles published from January 2000 to April 2021 in 24 countries, the total prevalence rate of suicide among 61,904 patients was estimated at 0.249 (95 % CI, 0.2–0.306) (Fig. 2).

3.1. Meta-analysis based on countries, continents and WHO regions

Based on meta-analysis, 24 countries were identified among 60 studies. Among the countries, Switzerland and Greece had the lowest prevalence of suicide among HIV/AIDS patients estimated at 0.01 (95 % CI, 0.008–0.012) and 0.015 (95 % CI, 0.01–0.012) respectively. Whereas, Iran and Nepal were reported to have the highest prevalence of suicide among these patients [0.829 (95 % CI, 0.732–0.896) and 0.736 (95 % CI, 0.685–0.781) respectively]. Furthermore, meta-analysis based on continents revealed that Asia had the highest prevalence of suicide estimated at 0.371 (95 % CI, 0.271–0.482) (Table 1).

In terms of WHO regions, findings also indicated that the Region of the Europe (EUR) had the lowest suicide rate at 0.074 (95 % CI, 0.015–0.298); while the highest prevalence rate of suicide was reported for Eastern Mediterranean region (EMR) (Table 1).

3.2. Meta-analysis based on marital status

According to the study results, findings indicated that the highest suicide prevalence was related to single patients estimated at 0.257 (95

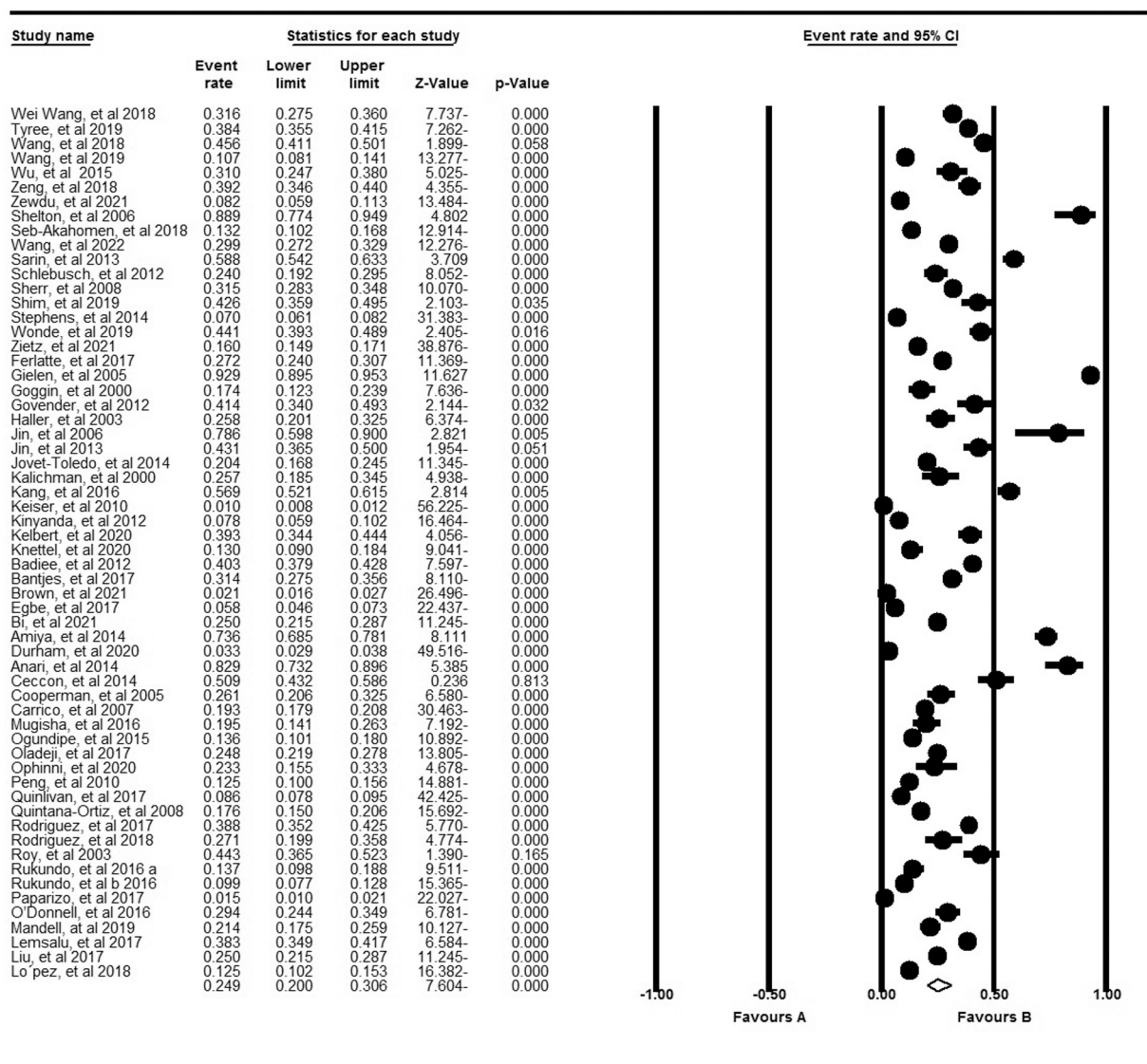


Fig. 2. The forest plot of suicide in patients living with HIV/AIDS.

Meta Analysis

Table 1
Meta-analysis based on countries, continents and WHO regions.

Sub-groups	Effect size and 95 % interval			Test of null (2-tail)	
	Point estimate	Lower limit	Upper limit	Z-value	P-value
Argentina	0.234	0.185	0.291	-7.876	0.000
Brazil	0.447	0.337	0.562	-0.904	0.366
Canada	0.687	0.063	0.986	0.443	0.658
China	0.356	0.299	0.418	-4.422	0.000
Ethiopia	0.211	0.031	0.692	-1.215	0.225
Georgia	0.070	0.061	0.082	-31.383	0.000
Greece	0.015	0.010	0.021	-22.027	0.000
India	0.588	0.542	0.633	3.709	0.000
Indonesia	0.233	0.155	0.333	-4.678	0.000
Iran	0.829	0.732	0.896	5.385	0.000
Kenya	0.160	0.149	0.171	-38.876	0.000
Korea	0.569	0.521	0.615	2.814	0.005
Nepal	0.736	0.685	0.781	8.111	0.000
Nigeria	0.129	0.062	0.250	-4.639	0.000
Peru	0.176	0.150	0.206	-15.692	0.000
Russia	0.383	0.349	0.417	-6.584	0.000
South Africa	0.336	0.270	0.408	-4.289	0.000
South Korea	0.426	0.359	0.495	-2.103	0.035
Switzerland	0.010	0.008	0.012	-56.225	0.000
Taiwan	0.125	0.100	0.156	-14.881	0.000
Tanzania	0.130	0.090	0.184	-9.041	0.000
Uganda	0.119	0.081	0.173	-9.068	0.000
United Kingdom	0.315	0.283	0.348	-10.070	0.000
United States	0.237	0.155	0.343	-4.395	0.000
Africa	0.179	0.131	0.239	-8.170	0.000
Asia	0.371	0.271	0.482	-2.260	0.024
Europe	0.075	0.009	0.418	-2.259	0.024
North America	0.254	0.168	0.365	-4.049	0.000
South America	0.339	0.223	0.478	-2.259	0.024
AFR	0.179	0.131	0.239	-8.170	0.000
AMR	0.268	0.188	0.368	-4.267	0.000
EMR	0.829	0.732	0.896	5.385	0.000
EUR	0.074	0.015	0.298	-2.970	0.003
SEAR	0.331	0.058	0.800	-0.658	0.510
WPR	0.376	0.300	0.459	-2.904	0.004

% CI, 0.184–0.347) (Table 2). (See Table 3.)

3.3. Meta-analysis based on type of suicide

Study findings showed that out of 8809 committed suicides among HIV/AIDS patients, 6 % (n = 529) had completed suicide, 17 % (n = 1498) had unsuccessful suicide and 77 % (n = 6782) had merely suicide ideation (Fig. 3).

3.4. Meta-analysis based on gender

A gender-based meta-analysis depicted that the prevalence of suicide/ suicidal ideation was higher among females estimated at 0.22 (95 % CI, 0.15–0.29) compared with men at 0.17 (95 % CI, 0.11–0.23) (Fig. 4).

3.5. Meta-regression based on age and year of publication

A meta-regression affirmed a significant indirect relationship

Table 2
Meta-analysis based on marital status.

Sub-groups	Effect size and 95 % interval			Test of null (2-Tail)	
	Point estimate	Lower limit	Upper limit	Z-value	P-value
Divorced	0.257	0.184	0.347	-4.842	0.000
Married	0.191	0.141	0.254	-7.700	0.000
Single	0.230	0.158	0.322	-5.098	0.000
Widowed	0.216	0.145	0.310	-5.190	0.000

Table 3
Meta-analysis based on type of suicide.

Sub-groups	Effect size and 95 % interval			Test of null (2-tail)	
	Point estimate	Lower limit	Upper limit	Z-value	P-value
Completed suicide	0.730	0.516	0.873	2.091	0.037
Suicide attempt	0.327	0.264	0.396	-4.698	0.000
Suicide ideation	0.909	0.872	0.935	12.015	0.000

between suicide prevalence in HIV/AIDS patients and year of study publication (P-value<0.05); so that a unit of increase in the study year led to 0.014 unit decreased in suicide prevalence. Furthermore, an inverse relationship between patient’s age and suicide prevalence was observed. It implied that a unit of increase in patients’ age led to 0.017 unit of decrease in the suicide prevalence (Fig. 5).

3.6. Meta-regression for quality assessment

In case of quality assessment, more than half of the included studies (n = 35) had high quality, while 13 studies were of medium quality and the rest were of low quality (Table 4).

3.7. Publication bias

The results of Egger’s statistical test showed the P-value (2-tailed) of 0.48, affirming no publication bias in the study (Fig. 6).

4. Discussion

4.1. Overview

This study was a global systematic review and meta-analysis conducted to examine the prevalence rate of suicide and related factors among patients living with HIV/AIDS. Results of this study estimated the prevalence rate of suicide to be 24.9 %. Similarly, Necho et al. found that the pooled prevalence of suicidal ideation among infected individuals was 21.7 % which was nearly the same as prevalence rate reported at 24.38 % in a systematic review and meta-analysis by Tsegay and Ayano (Tsegay and Ayano, 2020; Necho et al., 2020). Relatively, Mortier et al. obtained a consistent result regarding the rate of suicidal thoughts among infected college students (Mortier et al., 2018). However, the reported rates were higher in studies conducted in African and Asian countries compared to those in developed regions (Lee et al., 2011; Ayano et al., 2019; Arseniou et al., 2014).

4.2. Major risk factors of suicide

Different socio-economic and cultural contexts could be regarded as main reasons for such variations. In fact, socioeconomic status is often associated with quality of life attributes in people living with HIV/AIDS as well as their psychological health (Pellowski et al., 2013). Furthermore, lower levels of socioeconomic position, limited economic opportunities and homelessness might result in riskier health behaviors such as substance use and risky sexual behaviors which potentially contribute to HIV/AIDS infection (Kalichman et al., 2011; Buot et al., 2014; Latkin et al., 2013). In addition, existing differences might be attributable to the variations of cultural factors and perceived HIV-related stigma among different countries (Institute of Medicine (US) Committee on Pathophysiology and Prevention of Adolescent and Adult Suicide; SK Goldsmith TC Pellmar AM Kleinman, et al. editors. Washington (DC): National Academies Press (US), 2002). Therefore a unified religious culture could act as a protective factor against suicidal ideation and attempt among HIV/AIDS patients.

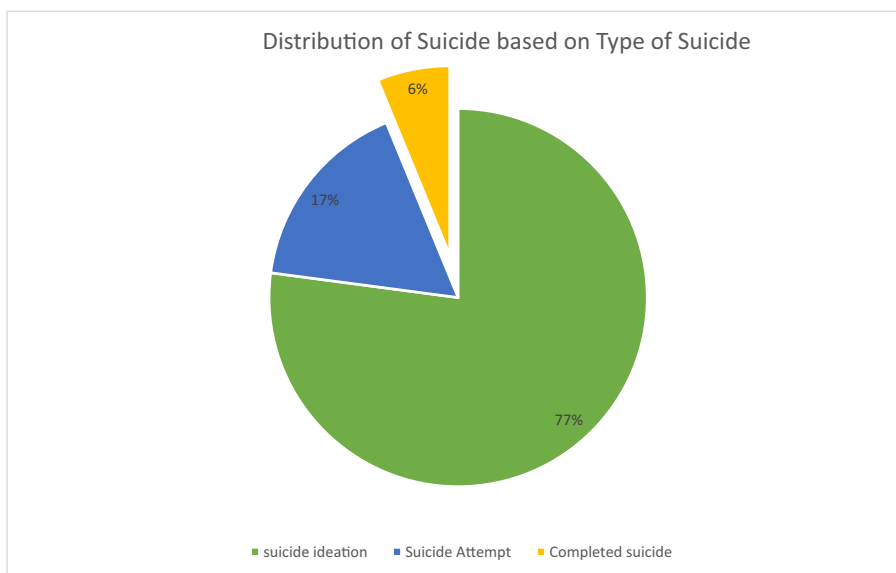


Fig. 3. Distribution of suicide based on type of suicide.

Male

Female

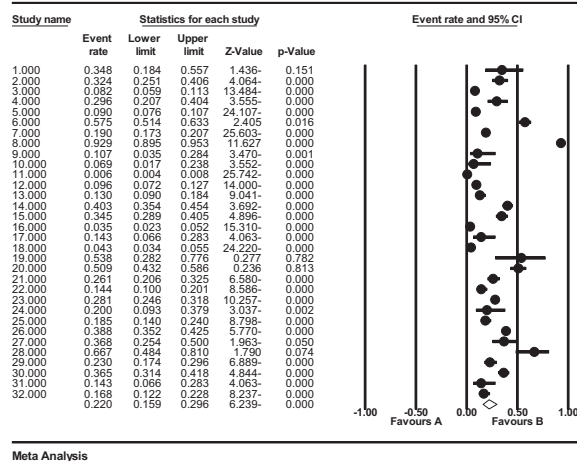
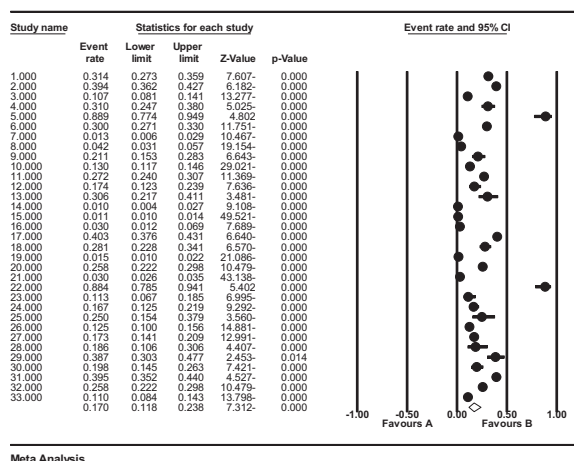


Fig. 4. Meta-analysis based on gender.

4.3. Minor risk factors

A suicide prevalence rate has also revealed significant differences based on the measurement tool, sample size, and year of publication. Living in impoverished urban areas of Asia has also been found to have significant association with suicide prevalence rate (Buot et al., 2014). Based on the level of poverty and unemployment, undesirable housing condition and violence rates in study regions, there were divergent trends in suicide prevalence among infected individuals (Latkin et al., 2013).

4.4. Gender and marital status

Our study also showed that factors such as being female, being divorced, being single, and being in older age groups were among the main determinants of committing suicide in HIV patients (Bitew et al., 2016; Wonde et al., 2019). In fact, women with adequate social support revealed lower rates of suicide compared to men and those having to

cope with psychological burden of the disease with no family support (Bitew et al., 2016; Rukundo et al., 2016; Adeyemo et al., 2019). These findings were affirmed in similar studies and highlighted the fact that female patients with poor social support face with several challenges in coping with HIV/AIDS as a chronic disease and feel hopeless associating with an increased risk of suicidal ideation (Abram et al., 1971; Hong et al., 2007; Lari et al., 2014; Paone et al., 1999). Higher risks of suicide among female patients might be due to their higher level of psychological distress and emotional vulnerability (The United Nations Children’s Fund (UNICEF), 2012; Nishigaya, 2002). The effects of poor social support, socio-economic pressures and partner relationship problems were also confirmed in the literature (Schlebusch, 2005; Schlebusch and Vawda, 2010; Lishman, 2005; Kelly et al., 1998).

4.5. Other risk factors

In line with our research findings, Perry et al. found a significant inverse relationship between patients’ age and rate of suicidal behavior;

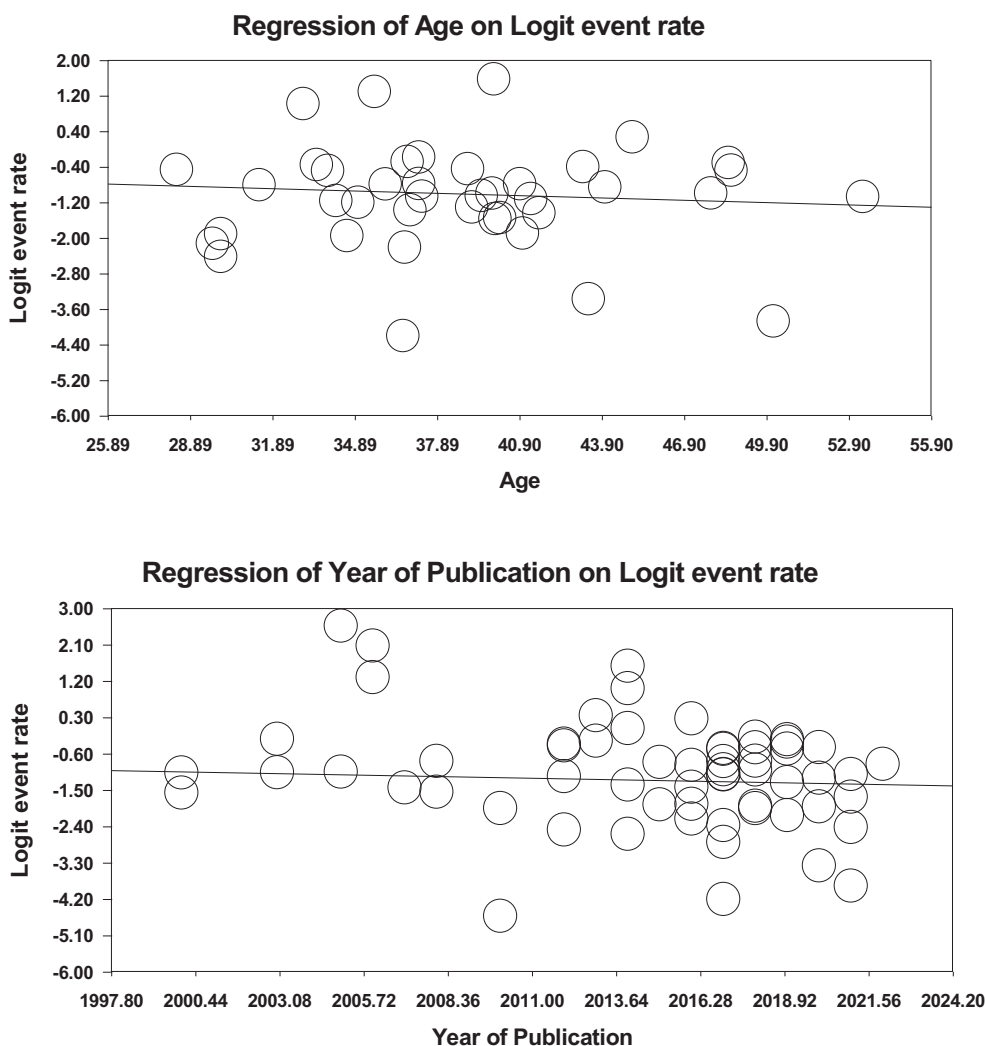


Fig. 5. Meta-regression based on Age.

Table 4
Meta-analysis based on quality of studies.

Sub-groups	Number studies	Effect size and 95 % interval			Test of null (2-tail)	
		Point estimate	Lower limit	Upper limit	Z-value	P-value
High	35	0.274	0.191	0.375	-4.107	0.000
Low	12	0.196	0.119	0.307	-4.626	0.000
Medium	13	0.243	0.179	0.322	-5.726	0.000

so that younger HIV-infected individuals encounter with more stressful situations, financial challenges, and other psychosocial disorders which potentially serve to increased susceptibility to suicidal ideation (Schlebusch, 2005; Schlebusch and Vawda, 2010; Wasserman and Wasserman, 2009; Joe et al., 2008; Ackermann and de Klerk, 2002; Rose-Innes, 2006). Furthermore, limited job opportunities, abuse in the workplace, and poverty had significant negative impacts on young infected persons and therefore had the potential to increase their risk for suicidal ideation and attempt (Schlebusch, 2005). Finally, suicide rate was reported to be relatively lower in recently published articles. The probable reason might be the reducing stigma and raising awareness about mental health issues directing the community towards appropriate activities in preventing suicide attempts (Necho et al., 2020). Similarly, Ruffieux et al. reported a substantially decreased in suicide rates among people living

with HIV in the last three decades (Ruffieux et al., 2019). In an analysis of 40 studies of impact of HIV on suicide, some other factors including availability of treatment, taking antiretroviral therapy, and decreased HIV-related stigma were also mentioned as associated factors with reducing trend of suicide rate among HIV/AIDS patients (Wisnousky et al., 2021).

Our study has a number of limitations. First, our review included the studies which have been published in English which might possibly disregard some of the relevant researches. Second, we did not evaluate the effects of psychological disorders such as anxiety, stress, depression and perceived HIV-related stigma on the prevalence of suicide among infected persons. Furthermore we did not consider the potential confounding role of medical comorbidities, socioeconomic factors and unhealthy life-style as associated factors for increased risk of suicide.

5. Conclusion

The results of this systematic review and meta-analysis on suicide prevalence and related factors among HIV/AIDS patients have potential implications for key, evidence-based decision making. Based on findings, health planners and policymakers should develop suicide-prevention strategies aimed at female patients in younger age groups who live alone and are deprived of social support to effectively promote their self-efficacy in successful management of the disease. Integrating mental health services into anti-retroviral therapy for HIV/AIDS patients

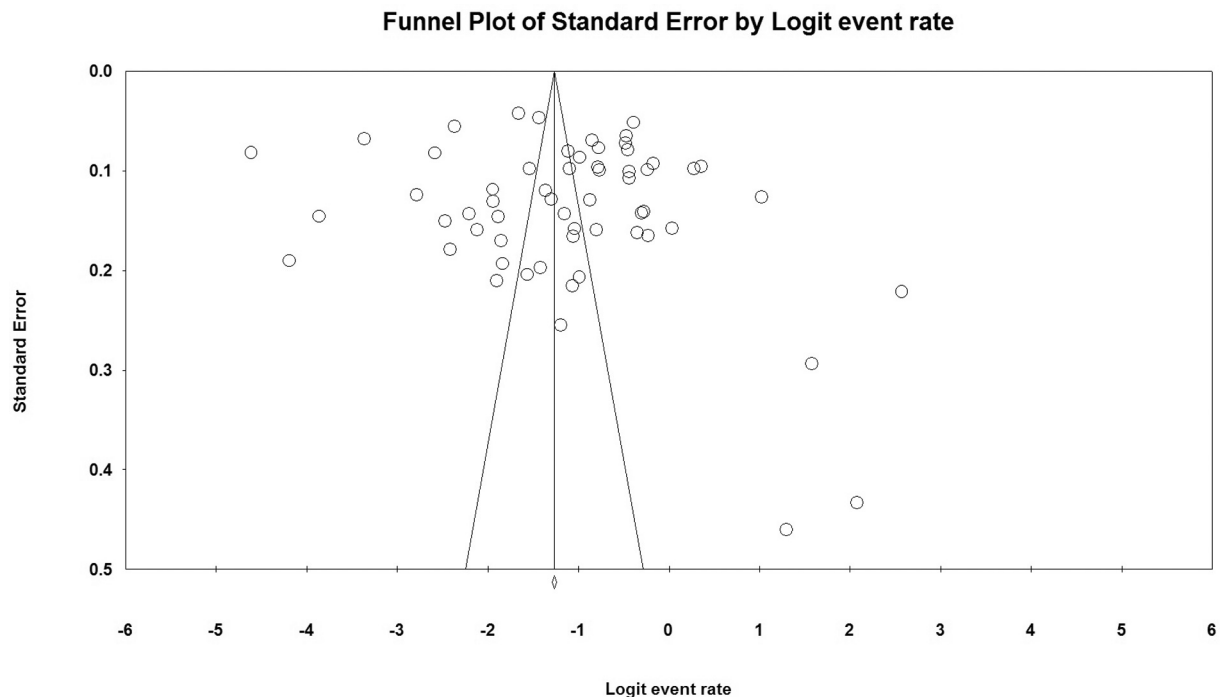


Fig. 6. The publication bias funnel plot.

is also suggested in order to effectively design integrated programs for the management of individuals living with HIV/AIDS.

CRediT authorship contribution statement

1. Category

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Acquisition of data: Elahe sadat Vaziri Shahrebabak, Fatemeh Pashazadeh Kan, Samira Raoofi, Negin Vali.

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2. Category

Drafting the manuscript: Maryam Mir, Ahmad Ghashghae, Akbar Javan Biparva,

Revising the manuscript critically for important intellectual content: Ahmad Ghashghae,

Approval of the version of the manuscript to be published: Samira Raoofi, Ahmad Ghashghae, Sima Rafiei, Akbar Javan Biparva.

Declaration of competing interest

The authors declare that they have no competing interests.

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Availability of data and materials

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Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

References

- Institute of Medicine (US) Committee on Pathophysiology and Prevention of Adolescent and Adult Suicide; SK Goldsmith TC Pellmar AM Kleinman et al editors. Washington (DC): National Academies Press (US); 2002.
- Abram, H.S., Moore, G.L., Westervelt Jr., F.B., 1971. Suicidal behavior in chronic dialysis patients. *Am. J. Psychiatry* 127 (9), 1199–1204.
- Ackermann, L., de Klerk, G.W., 2002. Social factors that make South African women vulnerable to HIV infection. *Health Care Women Int.* 23, 163–172.
- Adeyemo, S., Olorunkoya, O.G., Chinelo, O.L., Babalola, G., Abojei, C.O., 2019. Prevalence and psychosocial correlates of suicidal ideation among adolescents living with HIV in Southwestern Nigeria, West Africa. *HIV AIDS Rev.* 18 (4), 273–278.
- Alderete-Aguilar, C., Cruz-Maycott, R., Candela-Iglesias, M., et al., 2017. Assessment of depression, anxiety, hopelessness and suicidal risk in HIV+ inpatients. *Salud Ment.* 40, 23–28.
- Amare, T., Getinet, W., Shumet, S., Asrat, B., 2018. Prevalence and associated factors of depression among PLHIV in Ethiopia: systematic review and meta-analysis, 2017. *AIDS Res. Treat.* 2018, 1–9.
- Anlay, D.Z., 2019. Strong Association Between Stigma and Depression Among Adults People Living With HIV/AIDS in Ethiopia: A Systematic Review and Meta-analysis. Paper Presented at: 30th EPHA Annual Conference.
- Apter, A., 2012. Suicide and suicidal behavior. *Public Health Rev.* 34 (2), 1.
- Arseniou, S., Arvaniti, A., Samakouri, M., 2014. HIV infection and depression. *Psychiatry Clin. Neurosci.* 68 (2), 96–109.
- Aryankhesal, A., Ghashghae, A., Sardari, E., et al., 2022. Prevalence of depression in patients with cancer in Iran: a systematic review and meta-analysis. *BMJ Support. Palliat. Care* 12 e518-e525.
- Ayano, G., Tsegay, L., Abraha, M., Yohannes, K., 2019. Suicidal ideation and attempt among homeless people: a systematic review and meta-analysis. *Psychiatr. Q.* 9, 1–14.
- Bitew, H., Andargie, G., Tadesse, A., Belete, A., Fekadu, W., Mekonen, T., 2016. Suicidal ideation, attempt, and determining factors among HIV/AIDS patients, Ethiopia. *Depress. Res. Treat.* 2016, 1–6.

- Bolakale, A.S., Taju, N.F., Olubukola, A., 2016. Suicidality among HIV patients in a treatment center in Kaduna metropolis, Nigeria. *Sahel Med. J.* 19 (4), 196.
- Buot, M.L.G., Docena, J.P., Ratemo, B.K., Bittner, M.J., Burlew, J.T., Nuritdinov, A.R., Robbins, J.R., 2014. Beyond race and place: distal sociological determinants of HIV disparities. *PLoS ONE* 9 (4), e91711.
- Catalan, J., et al., 2011. HIV infection and mental health: suicidal behaviour—systematic review. *Psychol. Health Med.* 16 (5), 588–611.
- Chikezie, U., Otakpor, A., Kuteyi, O., James, B., 2012. Suicidality among individuals with HIV/AIDS in Benin City, Nigeria: a case-control study. *AIDS Care* 24 (7), 843–845.
- Duko, B., Geja, E., Zewude, M., Mekonen, S., 2018. Prevalence and associated factors of depression among patients with HIV/AIDS in Hawassa, Ethiopia, cross-sectional study. *Ann. Gen. Psychiatry* 17 (1), 45.
- Egbe, C.O., Dakum, P.S., Ekong, E., Kohrt, B.A., Minto, J.G., Ticao, C.J., 2017. Depression, suicidality, and alcohol use disorder among people living with HIV/AIDS in Nigeria. *BMC Public Health* 17 (1), 542.
- Gebremariam, E.H., Reta, M.M., Nasir, Z., Amdie, F.Z., 2017. Prevalence and associated factors of suicidal ideation and attempt among people living with HIV/AIDS at Zewditu Memorial Hospital, Addis Ababa, Ethiopia: a cross-sectional study. *Psychiatry J.* 2017, 2301524.
- Hong, Y., Li, X., Fang, X., Zhao, R., 2007. Depressive symptoms and condom use with clients among female sex workers in China. *Sex. Health* 4 (2), 99–104.
- Joe, S., Stein, D.J., Seedat, S., Herman, A., Williams, D.R., 2008. Non-fatal suicidal behavior among South Africans: results from the South Africa stress and health study. *Soc. Psychiatry Psychiatr. Epidemiol.* 43, 454–461.
- Kabore, I., Bloem, J., Etheredge, G., et al., 2010. The effect of community-based support services on clinical efficacy and health-related quality of life in HIV/AIDS patients in resource-limited settings in sub-Saharan Africa. *AIDS Patient Care STDs* 24 (9), 581–594.
- Kalichman, S.C., Pellowski, J., Kalichman, M.O., Cherry, C., Detorio, M., Caliendo, A.M., Schinazi, R.F., 2011. Food insufficiency and medication adherence among people living with HIV/AIDS in urban and peri-urban settings. *Prev. Sci.* 12, 324–332.
- Kelly, B., Raphael, B., Judd, F., 1998. Suicidal ideation, suicide attempts and HIV infection. *Psychosomatics* 39, 405–415.
- Kessler, R.C., Üstün, T.B., 2004. The world mental health (WMH) survey initiative version of the world health organization (WHO) composite international diagnostic interview (CIDI). *Int. J. Methods Psychiatr. Res.* 13 (2), 93–121.
- Kim, A.Y., Onofrey, S., Church, D.R., 2013. An epidemiologic update on hepatitis C infection in persons living with or at risk of HIV infection. *J. Infect. Dis.* 207 (suppl. 1), S1–S6.
- Lari, M.A., Bagheri, P., Ameli, F., 2014. Mental health and HIV-related high-risk behaviors among female sex workers. *Shiraz E-Med. J.* 15 (4), e2232.
- Latkin, C.A., German, D., Vlahov, D., Galea, S., 2013. Neighborhoods and HIV: a social ecological approach to prevention and care. *Am. Psychol.* 68, 210–224.
- Lee, B., Chhabra, M., Oberdorfer, P., 2011. Depression among vertically HIV-infected adolescents in Northern Thailand. *J. Int. Assoc. Phys. AIDS Care* 10 (2), 89–96.
- Lishman, W.A., 2005. *Organic Psychiatry. The Psychological Consequences of Cerebral Disorder*, 3rd. Blackwell, Oxford, UK.
- Martinez, J., Hosek, S.G., Carleton, R.A., 2009. Screening and assessing violence and mental health disorders in a cohort of inner city HIV-positive youth between 1998–2006. *AIDS Patient Care STDs* 23 (6), 469–475.
- Moher, D., Liberati, A., Tetzlaff, J., Altman, G.D., 2009. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *BMJ* 339, b2535.
- Mortier, P., Cuijpers, P., Kiekens, G., Auerbach, R., Demyttenaere, K., Green, J., et al., 2018. The prevalence of suicidal thoughts and behaviours among college students: a meta-analysis. *Psychol. Med.* 48 (4), 554–565.
- Necho, M., Belete, A., Getachew, Y., 2020. The prevalence and factors associated with alcohol use disorder among people living with HIV/AIDS in Africa: a systematic review and meta-analysis. *Subst. Abuse Treat. Prev. Policy* 15 (1), 1–15.
- Nishigaya, K., 2002. Female garment factory workers in Cambodia: migration, sexwork and HIV/AIDS. *Women Health* 35 (4), 27–42.
- Paone, D., Cooper, H., Alperen, J., Shi, Q., Des Jarlais, D.C., 1999. HIV risk behaviors of frequent sex workers attending syringe exchange: the experiences of women in five US cities. *AIDS Care* 11 (3), 269–280.
- Pellowski, J.A., Kalichman, S.C., Matthews, K.A., Adler, N., 2013. A pandemic of the poor: social disadvantage and the U.S. HIV epidemic. *Am. Psychol.* 68, 197–209.
- Peng, E.Y.C., Yeh, C.Y., Lyu, S.Y., Morisky, D.E., Chen, Y.M.A., Lee, M.B., et al., 2010. Prevalence and correlates of lifetime suicidal ideation among HIV-infected male inmates in Taiwan. *AIDS Care* 22 (10), 1212–1220.
- Rose-Innes, O., 2006. *Sociocultural Aspects of HIV/AIDS. Health 24-HIV/AIDS, The South African Culture* [(Accessed on 09 July 2022)]. Available online: <http://www.health24.com>.
- Ruffieux, Y., Lemsalu, L., Aebi-Popp, K., Calmy, A., Cavassini, M., Fux, Ch.A., et al., 2019. Mortality from suicide among people living with HIV and the general Swiss population: 1988–2017. *J. Int. AIDS Soc.* 22 (8), e25339.
- Rukundo, G.Z., Mishara, B., Kinyanda, E., 2016. Psychological correlates of suicidality in HIV/AIDS in semi-urban south-western Uganda. *Trop. Dr.* 46 (4), 211–215.
- Schlebusch, L., 2005. *Suicidal Behaviour in South Africa*. University of KwaZulu-Natal Press, Pietermaritzburg, South Africa.
- Schlebusch, L., Vawda, N., 2010. HIV-infection as a self-reported risk factor for attempted suicide in South Africa. *Afr. J. Psychiatry* 13, 280–283.
- Shirey, K.G., 2013. In: *Suicide and HIV. Mental Health Practitioner's Guide to HIV/AIDS*. Springer, Berlin, pp. 405–407.
- Stang, A., 2010. Critical evaluation of the Newcastle-Ottawa scale for the assessment of the quality of nonrandomized studies in meta-analyses. *Eur. J. Epidemiol.* 25 (9), 603–605.
- The United Nations Children's Fund (UNICEF), 2012. *Examining Life Experiences and HIV Risks of Young Entertainment Workers in Four Cambodian Cities*. UNICEF, Phnom Penh, Cambodia.
- Troncoso, F.T., Conterno, LdeO, 2015. Prevalence of neurocognitive disorders and depression in a Brazilian HIV population. *Rev. Soc. Bras. Med. Trop.* 48, 390–398.
- Tsegay, L., Ayano, G., 2020. The prevalence of suicidal ideation and attempt among young people with HIV/AIDS: a systematic review and meta-analysis. *Psychiatr. Q.* <https://doi.org/10.1007/s11126-020-09851-1>.
- Vega-Ramirez, H., Rodriguez, V., Cruz, J., et al., 2015. Impulsivity and depressive symptoms in people with HIV diagnosed with a common mental disorder from an HIV clinic in Mexico City. *J. Int. AIDS Soc.* 18 (3 (Suppl 2)), 20.
- Wang, W., Xiao, C., Yao, X., Yang, Y., Yan, H., Li, S., 2018. Psychosocial health and suicidal ideation among people living with HIV/AIDS: a cross-sectional study in Nanjing, China. *PLoS One* 13 (2), e0192940.
- Wasserman, D., Wasserman, C. (Eds.), 2009. *The Oxford Textbook of Suicidology and Suicide Prevention. A Global Perspective*. Oxford University Press, Oxford, UK.
- Wisnousky, H., Lazzara, N., Ciarletta, M., et al., 2021. Rates and risk factors for suicidal ideation, suicide attempts and suicide deaths in persons with HIV: a protocol for a systematic review and meta-analysis. *BMJ Open* 11, e037154.
- Wonde, M., Mulat, H., Birhanu, A., Biru, A., Kassew, T., Shumet, S., 2019. The magnitude of suicidal ideation, attempts and associated factors of HIV positive youth attending ART follow ups at St. Paul's hospital Millennium Medical College and St. Peter's specialized hospital, Addis Ababa, Ethiopia, 2018. *PLoS ONE* 14 (11), e0224371.
- World Health Organization, 2018. *Hiv prevalence*. Available: http://www.who.int/gho/hiv/epidemic/status/prevalence_text/en/.