

Socio-economic inequality in HIV-related perceived stigma, mental health, and quality of life among people living with HIV in Iran: a cross-sectional study

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Abstract

Background: Socio-economic inequality is one of the most important issues in public health. This study aimed to assess socio-economic inequalities resulting from human immunodeficiency virus (HIV)-related perceived stigma, mental health, and quality of life (QoL) among people living with HIV (PLHIV) in Markazi Province, Iran.

Material and methods: This cross-sectional study included PLHIV in Markazi Province in 2019. An 12-item perceived stigma, general health questionnaire, and WHOQOL-HIV BREF questionnaire were administered to measure the perceived stigma, mental health, and QoL among PLHIV. Asset-based approach and principal component analysis were used to assess the socio-economic status (SES) of participants. Finally, concentration indices and 95% CI (confidence interval) were calculated to evaluate inequality among PLHIV.

Results: A total of 123 PLHIV older than 18 years participated in the study. The mean age of participants was 41.1 (SD = 10.2) years, 66% of whom were males. The results of the study revealed that concentration indices were 0.03 (95% CI: 0.01-0.04%; $p = 0.001$) for perceived stigma, -0.21 (95% CI: -0.34 to -0.07%; $p = 0.002$) for mental disorders, and 0.07 (95% CI: 0.06-0.09%; $p = 0.001$) for QoL.

Conclusions: The findings indicated that SES inequalities resulting from perceived stigma, QoL, and mental disorders are high among PLHIV. It was observed that, although perceived stigma was a critical issue among PLHIV with higher SES, low QoL and mental disorders were important factors among those with lower SES. Therefore, policy-makers in public health should be informed to plan and implement HIV-related strategies to decrease these inequalities.

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Key words: socio-economic inequality, HIV, perceived stigma, mental health, quality of life.

Introduction

Over 39 million human immunodeficiency virus (HIV)-related deaths occur worldwide, and more than 36 million people living with HIV (PLHIV) have been diagnosed and

received treatment [1]. Despite great attempts to implement antiretroviral therapy, approximately 2 million newly infected HIV-positive individuals have been recorded annually [1]. In Iran, between 2010 and 2022, the level of new HIV infec-

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tions decreased by 21%, while the number of adults and children living with HIV in 2022 was 46,000 [2]. Inequality is a major problem in the process of health system planning, and is one of the most important issues in public health [3, 4]. One of the main purposes of health systems is to reduce inequalities among a population [5]. Nonetheless, it has been reported that socio-economic inequality plays a key role in HIV transmission, a factor that is even more important than absolute poverty or wealth measures [6]. Moreover, to deal with socio-economic inequalities, health-related information must be complemented based on living standards or socio-economic status (SES) of a population.

There are different approaches for measuring living standards, including direct approaches (e.g., income, expenditure, or consumption) and proxy measures, such as asset index [7]. However, the collection of valid direct data is problematic [8].

These considerations were all emphasized in the current study. It was a pioneering research, focusing on the evaluation of asset-based inequality in perceived stigma, mental disorders, and quality of life (QoL) among PLHIV in Iran. A study conducted in Vietnam reported monthly income as the main factor, whereas self-reported income is highly susceptible for reporting bias, affecting validity of results. There is limited research on inequalities in terms of perceived stigma, QoL, and mental disorders in Iranian PLHIV. In addition, by promoting socio-economic equality, HIV prevention could be more effective [9]. Despite the importance of SES in providing access to health services, e.g., receiving antiretroviral drugs [10], on the one hand, and the assessment of socio-economic inequalities in illicit drug users [11] and risky sexual behaviors among people injecting drugs [12] in Iran, on the other hand, no study has been conducted to assess perceived stigma, QoL, and mental health inequalities among PLHIV. Therefore, this study aimed to evaluate socio-economic inequalities resulting from HIV-related perceived stigma, mental health, and QoL among PLHIV in Markazi Province, Iran, in 2019.

Material and methods

Participants

Markazi Province is located in the center of Iran. According to the national census conducted in 2016, the population of this province is about 1,430,000 people. In Markazi Province, the process of identifying PLHIV was similar to the rest of the country, and done via inactive surveillance. Generally, people with high-risk behaviors, blood donors, and volunteers are referred to laboratories for HIV diagnosis, but not all receive routine care.

This cross-sectional study included all PLHIV, who were referred to the surveillance system of Arak University of Medical Sciences and Saveh Universities of Medical Sciences, and received routine care. A total of 126 PLHIV were identified; three cases were younger than 18 years old, therefore, they were excluded from the study.

Data collection was implemented in HIV clinics from January to May 2019 by three interviewers (educated in the fields of psychology, medicine, and public health), who worked at the surveillance system and routinely cared for these patients. For consistent and homogenous data collection, the three interviewers were trained according to interview guidelines. Interviews were performed personally in HIV clinics where patients were referred to receive HIV-related health services.

Variables of the study

Stigma

To measure the perceived stigma among PLHIV, a questionnaire developed by Reinius *et al.* [13] was employed. This questionnaire was standardized among a Swedish population, but it was cross-culturally validated and standardized in the Iranian HIV context by Moradzadeh *et al.* [14, 15]. The details of translation and standardization of the questionnaire were discussed elsewhere [15]. In brief, it has 12 items in 4 sub-scales, including personalized perceived stigma, negative self-image, disclosure concerns, and public attitudes towards HIV patients. The items are scored on a Likert's scale from 1 to 4, with higher scores indicating higher perceived stigma. In this study, total perceived stigma scores were applied for analysis; for each HIV-positive individual, the total score was calculated by the sum of scores for 12 items (ranging from 12 to 48). The obtained item-level content validity index (I-CVI) ranged from 0.9 to 1. Additionally, scale-level content validity index (S-CVI) has an acceptable validity. Regarding reliability, Cronbach's α of the questionnaire was 0.84, and intra-class correlation coefficient (ICC) in test re-test for all questionnaires was 0.88 [15].

Mental disorders

Mental health was assessed using a 12-item general health questionnaire (GHQ-12), standardized by Montazeri *et al.* [16] in Persian language. GHQ-12 is a screening instrument to identify depression and general non-psychiatric morbidities. Each item of this questionnaire has four choices, and items are divided into 2 categories, i.e., negative and positive. The scoring method for GHQ-12 was based on Shelton *et al.* [17], and scoring for each item was 0, 0, 1 and 1. The sum of acquired scores was calculated, and the mean of all scores was obtained in this study. If the scores of participants were higher than the obtained mean, the participants were considered as having a mental disorder.

QoL

Summarized quality of life questionnaire of the World Health Organization for HIV (WHOQOL-HIV BREF) was utilized to determine QoL among PLHIV. The WHOQOL-HIV BREF questionnaire was cross-culturally adapted, standardized, and validated in the Iranian context with Persian

language by Salehi *et al.* [18]. Items of this questionnaire were based on a 5-point Likert's scale, and comprised 6 subscales and 31 items. The calculation of QoL total score in this study was based on the WHOQOL-HIV BREF questionnaire developed by the WHO [19], i.e., a 1-to-5 score given to each item, plus the sum of scores calculated, indicating the total QoL score for each participant: the higher score, the higher QoL.

SES

SES of participants was obtained based on asset indices: owner of an usual refrigerator, side-by-side refrigerator, color TV, LCD TV, LED TV, cell phone, washing machine, dishwasher, microwave, vacuum cleaner, motorcycle, laptop, having access to Internet at home, car, home, number of bedrooms, access to sanitation facilities, bathroom, cooling equipment, heating devices, cooking equipment, and cooking place at home [8, 20, 21]. For each asset variable, a binary code of 1 or 0 was defined to show if a participant is/is not an owner of a facility [21, 22]. Finally, based on the below-mentioned statistical analysis, SES of participants was categorized as the poorest, poor, intermediate, rich, and the richest.

Other variables

Other variables of the study included age (years), sex (female, male), education level (illiterate/elementary, middle school, diploma, academic), transmission methods (marital sex, intravenous drug use, maternal transmission, extramarital sex, unknown), duration of disease (months), alcohol consumption (yes/no), hookah consumption (yes/no), and cigarette smoking (yes/no).

Ethical considerations

This study was conducted with the supervision and approval of the Ethics Committee of Arak University of Medical Sciences (ethic code: IR.ARAKMU.REC.1401.124). Informed consent was obtained from all participants before the onset of the study. The questionnaires completed by the staff of the High-Risk Behaviors Center were given to the authors, without mentioning the identities and recognizable personal details of participants.

Statistical analyses

Frequencies, means, and standard deviations were calculated for the qualitative and quantitative variables of the study. Analysis of variance (ANOVA) and χ^2 tests were used to determine the significance of difference among perceived stigma, mental disorders, QoL, and SES categories.

In various studies, in order to better understand large datasets, statistical methods were needed to reduce their dimensionality. Principal component analysis (PCA) is one of the most widely used methods. With PCA, some new variables related to SES were found, so that they can be in a linear function with asset data [23]. In other words, PCA

was used to reduce asset-related variables, including asset variables (i.e., the owner of an usual refrigerator, side-by-side refrigerator, color TV, LCD TV, LED TV, cell phone, washing machine, dishwasher, microwave, vacuum cleaner, motorcycle, laptop, having access to internet at home, a car, a home, number of bedrooms, access to sanitation facilities, bathroom, cooling equipment, heating devices, cooking equipment, and cooking place at home). PCA merge correlated variables into a set of uncorrelated variables. In PCA, SES was a linear weighted combination of the initial asset variables. In this study, the weights of asset variables were determined by the eigenvectors of the correlation matrix. Next, the categorical asset variables were re-coded into binary variables. The created SES scores obtained by PCA analysis were then categorized into 5 levels, such as the poorest, poor, intermediate, rich, and the richest.

The basic function for PCA was a dataset with observations on p numerical variables in this study; it was asset variables for each of n participants. P was defined as n -dimensional vectors x_1, \dots, x_p , whose j th column was the vector x_j of observations on the j th variable. These were given by

$$\sum_{j=1}^p a_j x_j = Xa,$$

where a is a vector of constants a_1, a_2, \dots, a_p [23].

Concentration curve was drawn for the studied variables. Components of the concentration curve included health-related outcomes (perceived stigma, mental disorder, and QoL) and SES categories. The concentration curve plotted the cumulative percentage of perceived stigma, mental disorder, and QoL status (y-axis) against the cumulative percentage of PLHIV, ranked by SES categories from the poorest to the richest (x-axis). The line of equality was a 45-degree line in the concentration curve, running from the bottom left-hand corner to the top right-hand corner [7, 21]. If perceived stigma, mental disorder, or QoL had a higher (lower) values among poorer PLHIV, the calculated concentration curve laid above (below) the line of equality [7]. In the next step, the concentration index was calculated for perceived stigma, mental disorder, and QoL by the categorized SES variable. The concentration index is a method to conclude inequality among the studied participants [21], ranging from -1 to 1 , with zero indicating no socio-economic-related inequality. Negative values indicate the disproportionate concentration of perceived stigma, mental disorder, and QoL among the poor (lower SES categories) PLHIV, where the curve lied above the line of equality. On the other hand, a positive value showed the disproportionate concentration of the perceived stigma, mental disorder, and QoL among the rich (higher SES categories) PLHIV [7].

The concentration index was determined as:

$$C = 1 - 2 \int_0^1 L_h(p) dp$$

And for an asset variable, it was characterized as:

$$C = \frac{2}{N\mu} \sum_{i=1}^n h_i r_i - 1 - \frac{1}{N}$$

where h_i is perceived stigma, mental disorder or QoL variable, μ is its mean, and $r_i = i/N$ is the rank of a participant i in asset variables, so that $i = 1$ is for the lower SES category, and $i = N$ for the higher SES category [5, 7].

Significance level was assigned at 0.05. Stata version 12.0 was employed for statistical analyses.

Results

A total of 123 PLHIV older than 18 years participated in the current study; 66% were males and 44.7% had illiterate or

Table 1. Descriptive characteristics of demographic variables among people living with HIV ($n = 123$) in Markazi Province, Iran

Variables	<i>n</i> (%)
Sex	
Female	42 (34.0)
Male	81 (66.0)
Age	
Mean (SD)	41.1 (8.9)
Socio-economic status	
Poorest	26 (21.14)
Poor	24 (19.51)
Intermediate	24 (19.51)
Rich	25 (20.33)
Richest	24 (19.51)
Transmission methods	
Extramarital sex	18 (14.6)
Marital sex	32 (26.0)
Intravenous drug use	63 (51.2)
Unknown	10 (8.2)
Education level	
Illiterate/elementary	55 (44.7)
Guidance school	46 (37.4)
Diploma	13 (10.6)
Academic	9 (7.3)
Duration of disease (months)	
Mean (SD)	79.95 (56.2)
Alcohol consumption	
Yes	65 (52.9)
No	58 (47.1)
Hookah consumption	
Yes	68 (55.3)
No	55 (44.7)
Cigarette smoking	
Yes	81 (65.9)
No	42 (34.1)

elementary education level. Around 44% were married, and 51.2% reported having intravenous injection at least once in their lifetime. The mean age of the participants was 41.1 (SD = 10.2) years. History of alcohol drinking, cigarette smoking, or hookah consumption was observed in 51.2%, 65.9%, and 55.3% of the participants, respectively. The mean duration of morbidity was 79.95 (SD = 56.20) months (Table 1). The maximum mean score of perceived stigma was found in the fourth quintile of SES, and there was a significant difference among the levels of SES ($p = 0.03$) (Table 2). Most participants with mental disorders were in the first quintile of SES (34.04%), and there was a significant difference among the categories of SES ($p = 0.02$) (Table 2). The minimum mean score of QoL was found in the first quintile of SES, and there was a significant difference among the levels of SES in HIV-positive participants ($p = 0.001$) (Table 2). The findings of concentration indices of SES in HIV-related perceived stigma, mental health, and QoL were obtained as follows: the concentration index of perceived stigma was 0.03 (95% CI: 0.01-0.04%; $p = 0.001$), indicating a statistically significant disproportionate concentration of HIV-related perceived stigma among rich HIV-positive participants. Therefore, there was a socio-economic inequality in perceived stigma among PLHIV (Table 3 and Figure 1).

The concentration index for mental disorders was -0.21 (95% CI: -0.34 to -0.07% ; $p = 0.002$), indicating a disproportionate concentration of HIV-related mental disorders among poor HIV-positive participants. Therefore, there was a socio-economic inequality in mental disorders among HIV-positive participants (Table 3 and Figure 2).

Finally, the concentration index for QoL was 0.07 (95% CI: 0.06-0.09%; $p = 0.001$), indicating a concentration of higher HIV-related QoL score among rich HIV-positive participants. Hence, there was a socio-economic inequality regarding QoL among HIV-positive participants (Table 3 and Figure 3).

Discussion

The findings of this study revealed important and noticeable perceived stigma, mental disorders, and QoL-related inequalities among PLHIV in Markazi Province, Iran. HIV-related perceived stigma was higher among PLHIV with higher SES categories. However, HIV-related mental disorders and lower QoL were higher among PLHIV with lower SES. Issues, such as perceived stigma, mental disorders, and QoL-related inequalities were selected in the current study because they are very important factors for PLHIV. Rasooli-najad *et al.* [24] and Moradzadeh *et al.* [14, 25, 26] reported that each of these issues can play an important role in lives of PLHIV; therefore, the current study aimed to assess the inequality in these issues.

There are few similar studies, with findings similar to those of this study. To the best of the researchers' knowledge, no study in Iran had measured inequality regarding perceived stigma, mental disorders, or QoL among PLHIV. Lim *et al.* [27] conducted a study based on measured correlation coefficients in Vietnam, and observed that there was

Table 2. Descriptive statistics of socio-economic status (SES) of participants by studied variables

Variables	SES					p-value*
	First quintile	Second quintile	Third quintile	Fourth quintile	Fifth quintile	
Stigma (mean, SD)	36.96 (5.14)	34.33 (6.05)	37.5 (4.95)	38.50 (4.43)	37.87 (2.82)	0.030
Mental disorders						
No	9 (12.33)	13 (17.81)	16 (21.92)	16 (21.92)	19 (26.03)	0.020
Yes	16 (34.04)	11 (23.40)	8 (17.02)	8 (17.02)	4 (8.51)	
Quality of life (mean, SD)	9.84 (1.93)	11.51 (2.04)	12.30 (1.80)	13.09 (2.16)	14.89 (2.32)	0.001

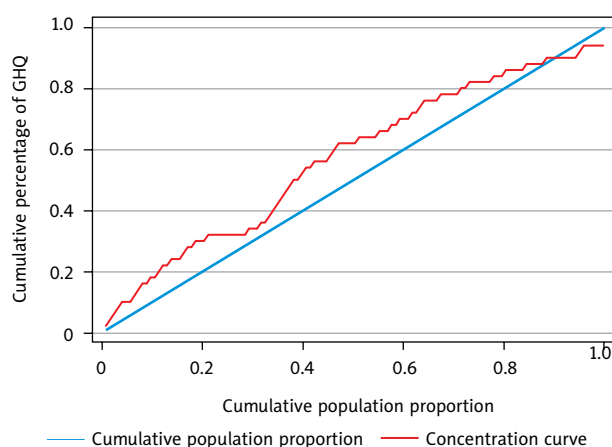
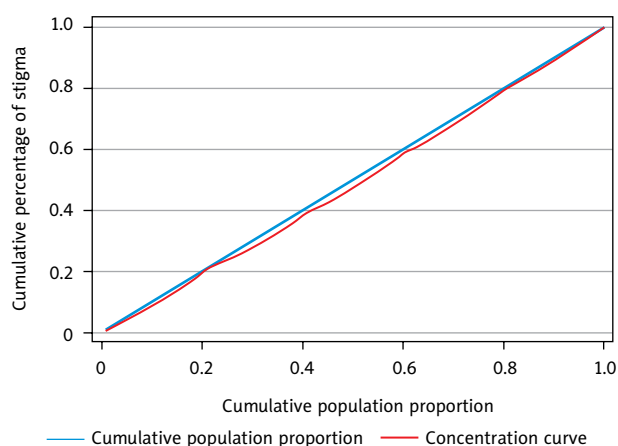
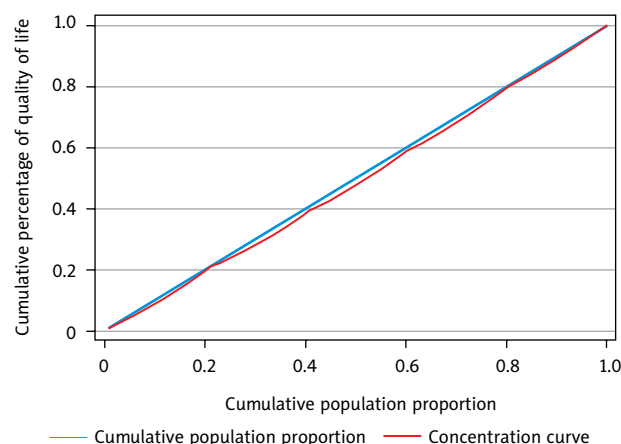
*p-values were obtained based on analysis of variance and χ^2 tests

Table 3. Coefficients of concentration index among people living with HIV in Iran

Variables	Concentration index	Standard error	p-value	Confidence interval 95%
Stigma	0.03	0.007	0.001	0.01-0.04%
Mental disorders	-0.21	0.07	0.002	-0.34 to -0.07%
Quality of life	0.07	0.01	0.001	0.06-0.09%

a poor negative correlation between HIV-related perceived stigma and monthly income among individuals who injected drugs. Moreover, their results indicated that HIV-related perceived stigma was non-significantly higher among poor PLHIV, which disagree with the findings of the present study. One of the reasons for such a difference may be different approach used to measure SES in Lim *et al.*'s [27] study, which was based on self-reported income (not asset-based). Additionally, their population was a different group: only individuals who injected drugs. On the other hand, perceived stigma is a function of cultural characteristics that can be different in Iranian and Vietnamese populations.

Wabiri *et al.* [28] investigated the relationship between socio-economic inequality and HIV in South Africa. Statistical analysis in their study was not based on PCA and concentration index, but similarly, the authors derived the socio-

**Figure 2.** Concentration index for mental disorders was -0.21 (95% CI: -0.34 – -0.07%; $p = 0.002$), indicating disproportionate concentration of HIV-related mental disorders among poor PLHIV**Figure 1.** Concentration index was 0.03 (95% CI: 0.01-0.04%; $p = 0.001$), indicating statistically significant value of disproportionate concentration of HIV-related stigma among PLHIV**Figure 3.** Concentration index for QoL was 0.07 (95% CI: 0.06-0.09%; $p = 0.001$), indicating higher concentration of HIV-related QoL among rich PLHIV

economic index based on ownership assets. They concluded that there was a higher HIV-related perceived stigma among poor patients. However, these results are in contrast with the findings of this study. The reason for this difference is that Wabiri *et al.*'s [28] study was conducted among household members, who could be HIV-free, whereas the participants of the present study were all HIV-positive individuals. Income inequalities in QoL and perceived stigma were also studied in rural communities of Georgia, USA, and it was demonstrated that there was a positive correlation between income inequality and QoL (income inequality was addressed by Gini index [29]). Illicit drug use disorders has been reported to be more prevalent in lower socio-economic groups in Iran [11]. Furthermore, the transmission mode of HIV was more common among drug users in Iran, and drug use disorders were associated with mental disorders [11]. This may be the reason why HIV-related mental disorders are more frequent among PLHIV with poor SES in Iran.

Since perceived stigma itself may be effective in late diagnosis of HIV [30], and income inequality has been associated with a higher rates of late HIV diagnosis [30], SES inequality in PLHIV can increase HIV-related perceived stigma. Consequently, late HIV diagnosis has negative outcomes, such as the lack of awareness of being HIV-positive and the risk of further transmission to healthy people. Because the distribution patterns of this study were influenced by cultural limitations of Iranian PLHIV, and because the cultural characteristics of Iranian population are considerably different from other countries [24], it is not reasonable to compare the results obtained from very diverse cultural contexts; thus, the resulting conclusions need to be interpreted with caution.

This study has its own strengths and limitations. As for the strengths, this was the first study among PLHIV in Markazi Province, shedding light on their HIV-related issues, and providing new and updated information for future planning. Despite difficulties in accessing PLHIV and persuading them to participate, this study included about 87% of the total population of PLHIV, which is a high response rate. This study was conducted based on accurate and credible data assembled by justified trained interviewers [31, 32]. The variables of individuals' and households' assets were appropriately collected according to the interviewers' perceptions of their livelihood status, leading to more accurate responses for the variables under study [32].

As for the limitations, since it was self-report data, the information bias in the data cannot be excluded; hence, there is a possibility of misclassification [31, 32]. Furthermore, because of the fear of disclosure of being HIV-positive, PLHIV may refuse to undergo any early diagnosis, or even seek medical care, which in turn can lead to non-identification by the HIV surveillance systems, and consequent exclusion from the present study, creating selection bias [33, 34]. Another limitation of this study may be the small sample size, in spite of the fact that according to the sample size formula, smaller sample size was needed for this study. However, this sample size may be small compared with other studies, but it was impossible to enroll more participants

because the sampled participants were all PLHIV identified in Markazi Province, with a population of 1,430,000 people.

Currently, the HIV/AIDS program was integrated with a broad and coherent structure in the health system of the Ministry of Health of Iran. After incorporating of HIV/AIDS into the program of care of communicable diseases in Iran, HIV/AIDS was included among mandatory reportable diseases, and the report of identified cases was made compulsory according to the national protocol on a monthly basis, from environmental levels to national level. In the current care system for HIV/AIDS in Iran, after reporting to higher levels, all HIV/AIDS positive cases are directed to behavioral disease counseling centers for treatment and prevention. Behavioral disease counseling centers have the ability to provide educational services, counseling, voluntary HIV testing, prevention, care, and treatment of patients and their families as well as education, counseling, and voluntary HIV testing for at-risk groups. Conducting HIV/AIDS care in referrals to behavioral disease counseling centers in Iran, is a coherent program [35].

Therefore, it is recommended to implement similar studies in other provinces of Iran to create a map of inequalities among PLHIV, based on geographical dispersions. Promoting HIV knowledge might be essential among PLHIV in higher SES categories to decrease inequalities in HIV-related perceived stigma as well as among PLHIV in lower SES categories to reduce the level of inequalities in mental disorders and lower QoL [36].

Conclusions

From the current study, SES inequalities resulting from perceived stigma, QoL, and mental disorders are high among PLHIV. Perceived stigma, QoL, and mental disorders are significant according to SES in PLHIV. Perceived stigma is a critical issue among PLHIV with high SES, while QoL and mental disorders are more important among PLHIV with lower SES. Therefore, public health policy-makers should be informed and plan strategies to decrease these issues among PLHIV.

Disclosures

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4. Conflict of interests: None.

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