

# Quality Of Life And Stigma Among People Living With HIV/AIDS In Iran

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Mohammad Ebrahimi Kalan<sup>1</sup>  
Jian Han<sup>2</sup>  
Ziyad Ben Taleb<sup>3</sup>  
Kristopher P Fennie<sup>1</sup>  
Mohammad Asghari  
Jafarabadi<sup>4,5</sup>  
Maryam Dastoorpoor<sup>6</sup>  
Nima Hajhashemi<sup>7</sup>  
Mitra Naseh<sup>8</sup>  
Shahnaz Rimaz<sup>9</sup>

<sup>1</sup>Department of Epidemiology, Robert Stempel College of Public Health and Social Work, Florida International University, Miami, FL, USA; <sup>2</sup>Department of Biology, North Carolina Agricultural and Technical State University, Greensboro, NC, USA; <sup>3</sup>Department of Kinesiology, College of Nursing and Health Innovation, University of Texas at Arlington, Arlington, TX, USA; <sup>4</sup>Road Traffic Injury Research Center, Tabriz University of Medical Sciences, Tabriz, Iran; <sup>5</sup>Department of Statistics and Epidemiology, Faculty of Health, Tabriz University of Medical Sciences, Tabriz, Iran; <sup>6</sup>Department of Biostatistics and Epidemiology, Menopause Andropause Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran; <sup>7</sup>Department of Biology, University of North Carolina at Greensboro, Greensboro, NC, USA; <sup>8</sup>School of Social Work, Robert Stempel College of Public Health and Social Work, Florida International University, Miami, FL, USA; <sup>9</sup>Radiation Biology Research Center, Department of Epidemiology, School of Public Health, Iran University of Medical Sciences, Tehran, Iran

Correspondence: Shahnaz Rimaz  
Radiation Biology Research Center,  
Department of Epidemiology, School of  
Public Health, Iran University of  
Medical Sciences, Shahid Hemmat  
Highway, Tehran 1449614535, Iran  
Tel +98- 21 86704645  
Email rimaz.sh@iums.ac.ir

**Background:** Stigma against HIV profoundly affects the quality of life (QOL) of people living with HIV/AIDS (PLWHA). We aimed to assess the factors associated with QOL in PLWHA in Iran, specifically HIV-related stigma, sociodemographic and clinical characteristics.

**Methods:** Two hundred PLWHA participated in this cross-sectional study. Data were collected using sociodemographic, stigma, and WHO-QOL-BREF questionnaires. Correlations, ANOVAs, and Student's *t*-distribution tests were performed as bivariate analyses. We employed stepwise multiple linear regression analysis to explore the main factors associated with QOL domains.

**Results:** Six domains of QOL were negatively correlated with three domains of stigma ( $p < 0.001$  for all). Stepwise multiple linear regression revealed that, after adjusting for confounders, lack of healthcare insurance, having no basic knowledge of HIV/AIDS prior to diagnosis, low monthly income of participants and family, and stigma (blaming and distancing, discrimination, and fear) were associated with low mean score of different domains of QOL.

**Conclusion:** Our findings indicated that increasing HIV/AIDS-related stigma decreases QOL in PLWHA in Iran. Attention toward decreasing stigma, improving healthcare plan, and cultivating economic condition should be given high priority to ensure improvement in total QOL and corresponding domains in PLWHA's life.

**Keywords:** HIV, AIDS, quality of life, stigma, Iran

## Introduction

Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) continues to affect millions of people globally.<sup>1</sup> Assessment of quality of life (QOL) is the key measurement in understanding the effect of HIV/AIDS on people living with HIV/AIDS (PLWHA)'s lives.<sup>2</sup> Widespread HIV-related stigma has led to serious public health repercussions including, but not limited to, avoiding HIV testing and disclosing test results to their partners, poor adherence to medication, enhanced risk for the emergence of drug resistance, limited access to healthcare services, and reduced QOL.<sup>3-6</sup> Despite numerous efforts to reduce the negative effects of HIV-related stigma on QOL among PLWHA, patients are still facing stigma as a common phenomenon in a variety of contexts, including family, society, workplace, and healthcare settings.<sup>3,4,7</sup> PLWHA are stigmatized by virtue of their serostatus, risk factors associated with the mode of transmission (e.g., injection drug use or sex work), and other personal characteristics (e.g., ethnicity, education, religion, gender, job, and disability).<sup>8-10</sup> Understanding the factors associated with QOL and influence of stigma on QOL in PLWHA are fundamental components of a successful national and international HIV/AIDS programs.

Drawing on the last report from the UNAIDS in 2016, Iran had 5000 (1400–13,000) new HIV infections and 4000 (2500–6200) AIDS-related deaths<sup>11</sup> There were 66,000 (37,000–120,000) PLWHA in 2016, of whom 14% (7%–26%) were accessing antiretroviral therapy.<sup>11</sup> While the most common mode of HIV transmission, globally, is through having sex without using a condom, the most common mode of transmission in Iran is through sharing needle and syringe among intravenous drug users (IVDUs)<sup>12</sup>

HIV/AIDS-related stigma remains a main public health concern in Iran.<sup>13–15</sup> For example, epidemiological studies from 2010 to 2019 indicate that stigma and discrimination among Iranian PLWHA cause various problems for the patients by hindering them from accessing the healthcare services including antiretroviral therapy (ART).<sup>15–18</sup>

Literature shows a number of factors associated with a low mean score of QOL in PLWHA including older age, low income, unemployment, low education, hospitalization due to HIV, and a CD4+ cell count <200 mm<sup>3</sup>.<sup>19–21</sup> However, little is known about the link between other sociodemographic variables such as the history of incarceration, drug abuse, and stigma. A recent systematic review prioritizing research about the experience, perception, and behavior of HIV/AIDS patients in Iran, which is mostly associated with stigma and discrimination, found the lowest proportion of conducted studies in this area (only 0.83%).<sup>22</sup> The severe HIV-related stigma among Iranian PLWHA hinder access to this— in some way hidden population – and consequently can elucidate the lack of studies evaluating their QOL and associated factors.<sup>23</sup> Therefore, this study aims to explore the main sociodemographic and clinical characteristics and stigma as associated factors with QOL in PLWHA in Iran.

## Methods

### Study Design, Setting, And Recruitment

A cross-sectional study was conducted in two HIV/AIDS care clinics from May 15 to December 30, 2012, in Tehran and Tabriz, two major cities in Iran. These clinics were affiliated with Tehran University of Medical Sciences – Consulting Clinic of Imam Khomeini Hospital (CCIKH) - and Tabriz University of Medical Sciences – Consulting Clinic of Tabriz (CCT)-, respectively. Participants were selected through convenience sampling due to limited access to the study population.<sup>24</sup> Therefore, we recruited those PLWHA attending both clinics and willing to participate in this study. The inclusion criteria were being over

18 years old, diagnosed as HIV positive through Western blotting test (confirmed by the center’s nurse practitioner), and consent to participate in the study. We excluded those participants who had reported any psychiatric condition and/or with severe physical and mental disabilities as well as those who did not consent to participate in the study. Institutional Review Board at Iran University of Medical Sciences approved the present study and written informed consent was obtained from all participants prior to the study. This study was conducted in accordance with the Declaration of Helsinki.<sup>25</sup>

## Instruments

### Sociodemographic And Clinical Characteristics

The sociodemographic characteristics were age, gender, education, and marital status. Clinical characteristics were included the date of diagnosis, antiretroviral therapy (ART), CD4 Cell Count/mm<sup>3</sup> cell count, and comorbidities. The patient’s latest blood test results were reviewed by the study staff. Those patients with CD4 cell counts of <200 cells/mm<sup>3</sup> were considered as AIDS stage.<sup>26</sup>

### WHOQOL-HIV-BREF Scale

The WHO QOL questionnaire for HIV brief version (WHOQOL-HIV BREF) was employed. The WHOQOL-HIV BREF is a multidimensional, conceptualized, generic, 31-item instrument, which assesses QOL in the past 2 weeks.<sup>27</sup> Its items cover the respondent’s perception of QOL among 6 broad domains (i.e., physical, psychological, level of independence, social relationship, environment, and Spirituality/Religion/Personal Beliefs[hereafter, SRPB]) and a series of subdomains (facets).<sup>28</sup>

Each domain scores theoretically range between 4 and 20 and overall QOL scores range between 31 and 155. Each item was rated on a 5-point Likert scale, where 1 represented very poor and negative impression and 5 represented a very good and positive impression. For negative perception items, the scores were inverted [recode Q3, Q4, Q5, Q8, Q9, Q10 and Q31 (1 = 5) (2 = 4) (3 = 3) (4 = 2) (5 = 1)] to higher score. Based on WHOQOL-HIV-BREF guideline, since the numbers of items were different for each domain, the domain scores were calculated by multiplying the average of the scores of all items in the domain by 4 to standardize all domain scores and make it comparable with each other.<sup>29–31</sup>

The content validity and reliability of WHOQOL-HIV-BREF scale were acceptable among Iranian PLWHA.<sup>32,33</sup> In addition, this tool was pilot tested with 30 PLWHA, who

were excluded from the current study. Internal consistency analysis of the Iranian version of WHOQOL-HIV-BREF instrument showed a reasonable reliability range for domains (Cronbach's alpha: 0.51–0.83). The reliability coefficient for the physical domain was 0.51, psychological 0.71, level of independence 0.67, social relationship 0.77, environment 0.83, and the SRPB domain 0.64.

### HIV/AIDS Stigma Instrument (HASI)

A 16-item instrument was applied to assess the range of stigma in PLWHA.<sup>34</sup> Our team evaluated the reliability and content validity of this scale among the same population previously.<sup>34</sup> The internal consistency of the instrument regarding the total score was  $\alpha=0.89$ . The three stigma subscales were distancing and blaming (8 items,  $\alpha=0.87$ ), fear (3 items,  $\alpha=0.82$ ), and discrimination (5 items,  $\alpha=0.83$ ). This scale addresses stigma in the past 2 weeks among PLWHA using a 4-point Likert scale, ranging from 1 to 4, evaluating thoughts and feelings of being stigmatized or trapped in hazardous situations because of the illness. The response choices were 1= not at all, 2= rarely, 3= sometimes, and 4= often. Each domain scores range between 4 and 16, and the tool uses a summated scale with total scores ranging from 16 (low) to 64 (high), with higher scores representing greater stigma.

### Data Analysis

Descriptive univariate analyses are presented as frequencies and percentages for categorical variables and means and standard deviation (SD) for continuous variables. One-sample Kolmogorov–Smirnov test was applied for examining the normality.<sup>35</sup> To assess the level of association between six QOL domains and three stigma domains, Pearson's correlation coefficient was used. Student's t-distribution test and Mann–Whitney U (if applicable) were performed to assess the association between the mean score of QOL and dichotomous variables. One-way ANOVA was used for the variables with multiple categories (e.g., marital status, residential setting, and CD4 cell count), with post hoc Bonferroni-corrected test between-group comparison in case of significant overall F-value. Stepwise multiple linear regression was performed to control the confounding effects of covariates. Data analysis was performed using SPSS (version 21.0; SPSS, Inc., Chicago, IL, USA), and  $p<0.05$  was considered as statistically significant.

## Results

### Descriptive Analyses

In total, 200 PLWHA with the mean age of 35.4 years (SD=8.4; range=18–60) participated in this study. Among all participants, 76.4% were male, 60.5% had more than middle school education, 53.5% never married, and 50.2% were employed. Ninety-two (46.0%) of PLWHA reported a history of incarceration, 75 (81.5%) of whom had been incarcerated more than once. About half (46%) of the PLWHA had a history of substance use, 60.4% of whom started illicit drug use at or under 18 years old (Table 1). Over half of participants were diagnosed as HIV positive after 2005 and 67% were on ART at the time of the study. Only 31.5% of the study population had less than or equal to 200 CD4 cell count/mm<sup>3</sup>. The highest comorbidity in PLWHA was related to hepatitis C virus (HCV) (43.5%). Most of PLWHA were infected by HIV through IVDUS (41%) and nonprotected sexual contact (42%) (Table 2).

### Quality Of Life And Sociodemographic Characteristics

Participants reported a QOL score mean ( $\pm$ SD) of 13.28  $\pm$ 3.88 for the physical domain, 13.01  $\pm$ 3.97 for the psychological domain, 12.86  $\pm$ 3.73 for the level of independence domain, 13.14  $\pm$ 3.58 for the social relationship domain, 13.07  $\pm$ 3.13 for the environment domain, 13.30  $\pm$ 4.05 for the SRPB domain, and 3.11  $\pm$ 3.26 for total QOL. Mean scores in different domains were highest in the SRPB domain and lowest in the level of independence domain. Having health insurance led to significantly better mean scores in all domains (all  $p<0.01$ ) except SRPB ( $p>0.05$ ). Substance use and incarceration history were significant factors associated with lower mean scores of all domains of QOL (all  $p<0.001$ ) except SRPB ( $p>0.05$ ) (Table 1).

### Quality Of Life And Clinical Characteristics

The participants who had basic knowledge of HIV/AIDS prior to their diagnosis reported significantly better mean scores in all domains of QOL except SRPB. Those who were in AIDS stage had significantly lower mean scores in all domains of QOL (all  $p<0.05$ ) except social relationships and SRPB. Those participants with TB as comorbidity reported significantly lower mean scores in only the physical domain ( $p=0.033$ ). Participants with HCV as comorbidity had significantly lower mean scores in all domains of QOL except SRPB (Table 1).

**Table 1** Sociodemographic Characteristics And Mean Scores Of Six Domains Of QOL Among PLWHA

Variables	N (%)	QOL Domains						Total QOL Mean $\pm$ SD
		Physical Mean $\pm$ SD	Psychological Mean $\pm$ SD	Level Of Independence Mean $\pm$ SD	Social Relationship Mean $\pm$ SD	Environment Mean $\pm$ SD	SRBP Mean $\pm$ SD	
Gender								
Male	153 (76.5)	13.07 $\pm$ 3.83	12.95 $\pm$ 3.93	12.84 $\pm$ 3.67	13.13 $\pm$ 3.50	13.10 $\pm$ 3.07	13.61 $\pm$ 3.81	13.12 $\pm$ 3.15
Female	47(23.5)	13.93 $\pm$ 4.00	13.22 $\pm$ 4.13	12.93 $\pm$ 3.99	13.19 $\pm$ 3.87	12.95 $\pm$ 3.35	12.29 $\pm$ 4.65	13.09 $\pm$ 3.63
p-value		0.186	0.680	0.882	0.919	0.775	0.051	0.956
Age								
$\leq$ 30	63 (31.5)	14.30 $\pm$ 3.87	14.05	13.88 $\pm$ 3.69	13.85 $\pm$ 3.58	13.96 $\pm$ 2.96	12.73 $\pm$ 4.20	13.80 $\pm$ 3.28
> 30	137 (68.5)	12.81 $\pm$ 3.81	12.53	12.39 $\pm$ 3.67	12.81 $\pm$ 3.54	12.66 $\pm$ 3.13	13.56 $\pm$ 3.97	12.79 $\pm$ 3.21
p-value		0.011	0.012	0.008	0.056	0.006	0.175	0.043
Education								
$\leq$ Middle school	79 (39.5)	12.84 $\pm$ 3.48	12.04 $\pm$ 3.59	12.07 $\pm$ 3.29	12.27 $\pm$ 3.49	12.14 $\pm$ 2.92	13.06 $\pm$ 3.64	12.40 $\pm$ 2.92
>Middle school	121(60.5)	13.56 $\pm$ 4.11	13.65 $\pm$ 4.09	13.38 $\pm$ 3.93	13.71 $\pm$ 3.53	13.67 $\pm$ 3.13	13.46 $\pm$ 4.31	13.57 $\pm$ 3.40
p-value		0.205	0.005	0.015	0.005	0.001	0.497	0.013
Marital status								
Never married	107(53.5)	13.68 $\pm$ 4.07	13.26 $\pm$ 4.19	13.23 $\pm$ 3.89	13.26 $\pm$ 3.65	13.60 $\pm$ 3.10	13.27 $\pm$ 3.96	13.27 $\pm$ 3.96
Married	67(33.5)	13.34 $\pm$ 3.60	13.18 $\pm$ 3.49	12.89 $\pm$ 3.48	13.38 $\pm$ 3.58	12.80 $\pm$ 3.02	13.56 $\pm$ 4.09	13.56 $\pm$ 4.09
Divorced	20(10.0)	11.05 $\pm$ 3.41	11.28 $\pm$ 4.23	11.05 $\pm$ 3.72	11.95 $\pm$ 3.36	11.42 $\pm$ 3.28	12.15 $\pm$ 4.64	12.15 $\pm$ 4.64
Widowed	6(3.0)	12.83 $\pm$ 2.92	12.53 $\pm$ 3.49	12.00 $\pm$ 2.19	12.33 $\pm$ 2.65	12.00 $\pm$ 2.44	14.83 $\pm$ 2.99	14.83 $\pm$ 2.99
p-value		0.048	0.218	0.108	0.401	0.019	0.432	0.119
Employment status								
Employed	103(50.2)	13.64 $\pm$ 3.69	13.66 $\pm$ 3.44	13.33 $\pm$ 3.38	13.76 $\pm$ 3.25	13.54 $\pm$ 2.96	13.74 $\pm$ 3.84	13.61 $\pm$ 2.96
Unemployed	97(49.8)	12.89 $\pm$ 4.05	12.32 $\pm$ 4.37	12.37 $\pm$ 4.03	12.48 $\pm$ 3.80	12.57 $\pm$ 3.24	12.83 $\pm$ 4.23	12.58 $\pm$ 3.49
p-value		0.177	0.017	0.070	0.011	0.028	0.112	0.025
Participant income								
$\leq$ 8M Rial <sup>a</sup>	167(83.5)	13.03 $\pm$ 3.88	12.57 $\pm$ 3.96	12.57 $\pm$ 3.81	12.76 $\pm$ 3.52	12.70 $\pm$ 3.04	13.03 $\pm$ 4.02	12.78 $\pm$ 3.23
>8M Rial	33(16.5)	14.51 $\pm$ 3.70	15.27 $\pm$ 3.20	14.33 $\pm$ 2.98	15.06 $\pm$ 3.27	14.93 $\pm$ 2.94	14.66 $\pm$ 4.01	14.79 $\pm$ 2.91
p-value		0.045	0.001	0.013	0.001	0.001	0.034	0.001
Family income <sup>b</sup>								
$\leq$ 8M Rial	127 (69.8)	12.82 $\pm$ 3.91	12.44 $\pm$ 4.01	12.30 $\pm$ 3.87	12.62 $\pm$ 3.52	12.35 $\pm$ 3.06	13.36 $\pm$ 4.08	12.65 $\pm$ 3.31
>8M Rial	55 (30.2)	13.87 $\pm$ 3.79	14.00 $\pm$ 3.83	13.67 $\pm$ 3.33	14.23 $\pm$ 3.57	14.63 $\pm$ 2.79	12.69 $\pm$ 4.05	13.85 $\pm$ 3.07
p-value		0.095	0.016	0.024	0.005	0.001	0.309	0.023
Health insurance coverage								
Yes	131(65.8)	13.96 $\pm$ 3.85	13.95 $\pm$ 3.90	13.64 $\pm$ 3.64	14.00 $\pm$ 3.23	14.10 $\pm$ 2.72	13.54 $\pm$ 4.18	13.86 $\pm$ 3.17
No	69(34.2)	11.97 $\pm$ 3.62	11.23 $\pm$ 3.48	11.39 $\pm$ 3.49	11.50 $\pm$ 3.65	11.11 $\pm$ 2.94	12.85 $\pm$ 3.78	11.67 $\pm$ 2.96
p-value		0.001	0.001	0.001	0.001	0.001	0.242	0.001
Incarceration history								
Yes	92(46.0)	12.20 $\pm$ 3.63	11.67 $\pm$ 3.65	11.67 $\pm$ 3.44	11.94 $\pm$ 3.49	11.83 $\pm$ 2.77	13.40 $\pm$ 3.80	12.12 $\pm$ 2.96
No	108(54.0)	14.19 $\pm$ 3.86	14.15 $\pm$ 3.89	13.87 $\pm$ 3.69	14.16 $\pm$ 3.34	14.12 $\pm$ 3.04	13.22 $\pm$ 4.26	13.95 $\pm$ 3.28
p-value		0.001	0.001	0.001	0.001	0.001	0.753	0.001
Substance use history								
Yes	101(49.7)	12.05 $\pm$ 3.54	11.69 $\pm$ 3.52	11.73 $\pm$ 3.35	12.11 $\pm$ 3.35	11.97 $\pm$ 2.75	13.11 $\pm$ 3.79	12.11 $\pm$ 2.82
No	99(50.3)	14.52 $\pm$ 3.83	14.36 $\pm$ 3.95	14.02 $\pm$ 3.77	14.19 $\pm$ 3.51	14.19 $\pm$ 3.12	13.49 $\pm$ 4.31	14.13 $\pm$ 3.38
p-value		0.001	0.001	0.001	0.001	0.001	0.513	0.001

(Continued)

Table 1 (Continued).

Variables	N (%)	QOL Domains						Total QOL Mean $\pm$ SD
		Physical Mean $\pm$ SD	Psychological Mean $\pm$ SD	Level Of Independence Mean $\pm$ SD	Social Relationship Mean $\pm$ SD	Environment Mean $\pm$ SD	SRBP Mean $\pm$ SD	
Age of onset of drug use <sup>€</sup>								
≤18 y/old	61(60.4)	12.27 $\pm$ 3.66	11.98 $\pm$ 3.42	11.93 $\pm$ 3.48	12.19 $\pm$ 3.44	11.77 $\pm$ 2.81	13.47 $\pm$ 3.88	12.27 $\pm$ 2.89
>18y/old	40(39.6)	11.72 $\pm$ 3.38	11.24 $\pm$ 3.67	11.42 $\pm$ 3.16	12.00 $\pm$ 3.25	12.27 $\pm$ 2.66	12.57 $\pm$ 3.63	11.87 $\pm$ 2.72
p-value		0.446	0.301	0.458	0.775	0.378	0.246	0.497

Notes: <sup>a</sup>8 million Rial [Iranian currency]; <sup>b</sup>missing (n=18). <sup>€</sup>Any type of illegal drugs

Abbreviations: SRBP, Spirituality/Religion/Personal Beliefs; QOL, quality of life.

## Quality Of Life And Stigma

Table 3 displays the correlations between QOL domains, stigma domains, individual perception of QOL, and health. The significant negative correlations were found between SRPB, individual perception of health, and distancing and blaming ( $r = -0.56$ ,  $p < 0.001$ ), SRPB and discrimination ( $r = -0.56$ ,  $p < 0.001$ ), psychological and distancing and blaming ( $r = -0.55$ ,  $p < 0.001$ ), psychological and discrimination ( $r = -0.55$ ,  $p < 0.001$ ), physical and discrimination ( $r = -0.55$ ,  $p < 0.001$ ). The lowest but still significant correlation was observed between SRPB and fear ( $r = -0.35$ ,  $p < 0.001$ ).

## Multiple Stepwise Linear Regression

### Analysis

Table 4 illustrates nine distinct models for QOL. For the physical/domain of QOL, discrimination ( $\beta = -1.416$ ), participant income  $\leq 8$ MR ( $\beta = -1.887$ ), and fear ( $\beta = -0.947$ ) were associated factors. For psychological domains, discrimination ( $\beta = -1.760$ ), unemployed ( $\beta = -2.292$ ), participant monthly income  $\leq 8$ MR ( $\beta = -2.357$ ), and education  $>$ middle school ( $\beta = 1.426$ ) were associated factors. For the level of independence domain, discrimination ( $\beta = -1.493$ ), unemployed ( $\beta = -2.254$ ), and age  $> 30$  years old ( $\beta = -1.818$ ) were associated factors. For the social relationship domain, discrimination ( $\beta = -1.837$ ), unemployed ( $\beta = -1.975$ ), and participant income  $< 8$ MR ( $\beta = -1.925$ ) were associated factors. For the environmental domain, having no insurance ( $\beta = -2.037$ ), participant income ( $\beta = -1.359$ ), blaming and distancing ( $\beta = -1.377$ ), and family income  $\leq 8$ MR ( $\beta = -1.293$ ) were recognized as associated factors. For the SRPB domain, blaming and distancing ( $\beta = -2.694$ ) and males ( $\beta = 5.216$ ) were associated factors. For total QOL, unemployed ( $\beta = -0.982$ ), blaming and distancing

( $\beta = -1.047$ ), participant income  $\leq 8$ MR ( $\beta = -1.035$ ), and having no insurance ( $\beta = -1.606$ ) were associated factors. For the individual perception of QOL, discrimination ( $\beta = -0.426$ ), unemployed ( $\beta = -0.470$ ), age ( $\beta = -0.703$ ), no IVDUS ( $\beta = 0.556$ ), and participant income  $\leq 8$ MR ( $\beta = -0.487$ ) were associated factors. For the individual perception of health, discrimination ( $\beta = -0.467$ ) and education  $>$  middle school ( $\beta = 0.522$ ) were associated factors.

## Discussion

This study assessed the QOL using the WHOQOL-BREF instrument in PLWHA in Iran and attempted to identify the associated factors, particularly stigma with corresponding domains. Similar to the previous studies, we found that the factors independently associated with a low mean score of total QOL were older age,<sup>36</sup> low education,<sup>37</sup> unemployment,<sup>38</sup> low income,<sup>38</sup> no insurance coverage,<sup>39</sup> lack of basic knowledge about HIV prior to diagnosis,<sup>40</sup> history of incarceration,<sup>41</sup> and history of illegal drug use.<sup>42</sup> We also found that being diagnosed as HIV positive on or before 2005 was negatively correlated with a mean score of total QOL. This finding may explain the recent advances in clinical tests and treatments for those suffering from HIV/AIDS.<sup>43</sup> It may also be the result of integrating methadone maintenance treatment (MMT) in 2005 into the HIV care and treatment services in Iran – particularly, triangular clinic as a harm reduction intervention in Iran's prisons – which was beneficial in injection-driven HIV epidemics and might improve QOL in PLWHA.<sup>44–46</sup>

The findings of this study revealed no significant relationship between gender and total QOL. This finding is similar to other studies in the USA<sup>38</sup> and Iran.<sup>47</sup> QOL has been previously associated with ART<sup>48</sup> and CD4 cell count.<sup>49</sup> However, in line with a similar study in Iran,<sup>47</sup> we did not find a significant relationship between being

**Table 2** Clinical Characteristics And Mean Scores Of Six Domains Of QOL Among PLWHA

Variables	N (%)	QOL Domains						Total QOL Mean $\pm$ SD	
		Physical Mean $\pm$ SD	Psychological Mean $\pm$ SD	Level Of Independence Mean $\pm$ SD	Social Relationship Mean $\pm$ SD	Environment Mean $\pm$ SD	SRBP Mean $\pm$ SD		
Diagnosis Date									
On or before 2005	92 (46.0)	12.50 $\pm$ 3.82	12.13 $\pm$ 4.07	11.97 $\pm$ 3.78	12.51 $\pm$ 3.73	12.34 $\pm$ 3.20	12.97 $\pm$ 4.01	12.40 $\pm$ 3.30	
After 2005 to 2012	108 (54.0)	13.94 $\pm$ 3.82	13.76 $\pm$ 3.74	13.62 $\pm$ 3.54	13.68 $\pm$ 3.37	13.68 $\pm$ 2.95	13.58 $\pm$ 4.08	13.71 $\pm$ 3.12	
p-value		0.008	0.004	0.002	0.020	0.022	0.294	0.005	
Knowledge of HIV/AIDS before diagnosis									
Yes	131 (65.5)	13.71	13.52	13.39	13.63	13.58	13.67	13.58	
No	69 (34.5)	12.44	12.05	11.85	12.21	12.10	12.59	12.21	
p-value		0.028	0.013	0.005	0.008	0.001	0.072	0.004	
On ART									
Yes	134 (67.0)	13.41 $\pm$ 3.99	13.10 $\pm$ 4.10	12.79 $\pm$ 3.82	13.38 $\pm$ 3.52	13.23 $\pm$ 3.10	13.29 $\pm$ 4.21	13.20 $\pm$ 3.34	
No	66 (33.0)	13.01 $\pm$ 3.66	12.83 $\pm$ 3.71	13.00 $\pm$ 3.58	12.66 $\pm$ 3.68	12.73 $\pm$ 3.20	13.33 $\pm$ 3.74	12.93 $\pm$ 3.12	
p-value		0.500	0.655	0.721	0.186	0.287	0.945	0.580	
CD4 Cell Count/mm <sup>3</sup>									
$\leq$ 200	63 (31.5)	12.42 $\pm$ 3.83	12.06 $\pm$ 3.94	12.06 $\pm$ 3.61	12.44 $\pm$ 3.58	12.39 $\pm$ 3.04	13.07 $\pm$ 3.94	12.41 $\pm$ 3.15	
201–500	101 (50.5)	13.53 $\pm$ 4.02	13.47 $\pm$ 4.15	13.27 $\pm$ 3.86	13.35 $\pm$ 3.78	13.24 $\pm$ 3.37	13.36 $\pm$ 4.23	13.37 $\pm$ 3.48	
>500	36 (18.0)	14.05 $\pm$ 3.38	13.40 $\pm$ 3.25	13.11 $\pm$ 3.45	13.77 $\pm$ 2.77	13.76 $\pm$ 2.37	13.52 $\pm$ 3.82	13.60 $\pm$ 2.65	
AIDS stage		0.086	0.070	0.117	0.143	0.082	0.851	0.112	
Yes	63 (31.5)	12.42 $\pm$ 3.83	12.06 $\pm$ 3.94	12.06 $\pm$ 3.61	12.44 $\pm$ 3.58	12.39 $\pm$ 3.04	13.07 $\pm$ 3.94	12.41 $\pm$ 3.15	
No	137(68.5)	13.67 $\pm$ 3.85	13.45 $\pm$ 3.92	13.23 $\pm$ 3.74	13.46 $\pm$ 3.54	13.38 $\pm$ 3.13	13.40 $\pm$ 4.11	13.43 $\pm$ 3.27	
p-value		0.035	0.021	0.039	0.061	0.039	0.595	0.039	
Comorbidity									
TB	Yes	26 (13.0)	11.76 $\pm$ 3.01	12.40 $\pm$ 3.59	12.11 $\pm$ 3.17	12.30 $\pm$ 3.44	12.84 $\pm$ 2.92	13.00 $\pm$ 4.26	12.40 $\pm$ 3.06
	No	174 (87.0)	13.50 $\pm$ 3.95	13.10 $\pm$ 4.02	12.97 $\pm$ 3.81	13.27 $\pm$ 3.59	13.10 $\pm$ 3.17	13.35 $\pm$ 4.03	13.21 $\pm$ 3.29
	p-value		0.033	0.398	0.274	0.202	0.694	0.682	0.237
HCV	Yes	87 (43.5)	12.39 $\pm$ 3.78	12.12 $\pm$ 3.83	11.95 $\pm$ 3.73	12.41 $\pm$ 3.73	12.36 $\pm$ 2.89	13.36 $\pm$ 3.69	12.43 $\pm$ 3.14
	No	113 (56.5)	13.96 $\pm$ 3.83	13.69 $\pm$ 3.95	13.56 $\pm$ 3.60	13.70 $\pm$ 3.36	13.61 $\pm$ 3.21	13.25 $\pm$ 4.32	13.63 $\pm$ 3.27
	p-value		0.004	0.005	0.002	0.011	0.005	0.848	0.010
Mode of infection									
IVDUS	82 (41.0)	12.35 $\pm$ 3.53	11.72 $\pm$ 3.59	11.63 $\pm$ 3.51	11.95 $\pm$ 3.50	11.95 $\pm$ 2.76	13.39 $\pm$ 3.81	12.16 $\pm$ 2.94	
Sexual	84 (42.0)	13.79 $\pm$ 3.85	13.84 $\pm$ 3.87	13.61 $\pm$ 3.54	13.82 $\pm$ 3.45	13.86 $\pm$ 2.92	13.09 $\pm$ 4.16	13.67 $\pm$ 3.20	
Others	34 (17.0)	14.23 $\pm$ 4.37	14.07 $\pm$ 4.31	13.97 $\pm$ 3.98	14.35 $\pm$ 3.31	13.80 $\pm$ 3.71	13.61 $\pm$ 4.40	14.00 $\pm$ 3.64	
p-value		0.016	0.001	<0.001	<0.001	<0.001	0.795	0.002	

**Abbreviations:** TB, tuberculosis; HCV, hepatitis C virus; IVDUS, intravenous drug users; QOL, quality of life; SD, standard deviation; SRBP, Spirituality/Religion/Personal Beliefs.

under ART, the number of CD4 cell count, and QOL. This result could be possibly due to low ART adherence<sup>6</sup> malnutrition,<sup>50</sup> educational level,<sup>51</sup> illicit drug use.<sup>52</sup> and alarmingly high frequency of multiple HIV drug class resistance in Iran.<sup>53</sup> Additionally, some recent studies

have suggested that ART may not affect QOL early in the course of therapy.<sup>54,55</sup>

Similar to other studies showing poor physical QOL is associated with stigma<sup>56</sup> and low income,<sup>2</sup>our analysis revealed that two domains of stigma (discrimination and

**Table 3** Correlations Among QOL Domains, Stigma Domains, Individual Perception of QOL And Health

QOL And Stigma Domains	Physical	Psychological	Psychological	Social Relationship	Environment	Spirituality	Distancing And Blaming	Discrimination	Fear	Individual Perception of QOL	Individual Perception Of Health
QOL domains	Physical	I									
	Psychological	0.83*									
	Level of independence	0.86*	I								
	Social relationship	0.71*	0.76*	I							
Stigma domains	Environment	0.70*	0.70*	0.76*	I						
	SRBP	0.61*	0.57*	0.57*	0.49*	I					
	Distancing and blaming	-0.54*	-0.43*	-0.49*	-0.38*	-0.56*	I				
Individual perception of QOL	Discrimination	-0.55*	-0.53*	-0.53*	-0.46*	-0.56*	0.67*	I			
	Fear	-0.48*	-0.42*	-0.43*	-0.42*	-0.38*	0.64*	0.60*	I		
	Individual perception of Health	0.73*	0.70*	0.76*	0.71*	0.60*	-0.52*	-0.52*	-0.43*	I	
Individual perception of Health	0.67*	0.70*	0.67*	0.66*	0.55*	0.64*	-0.56*	-0.54*	-0.37*	0.68*	I

**Note:** Asterisk sign (\*) indicates p<0.001. Abbreviation: SRBP, Spirituality/Religion/Personal Beliefs.

**Table 4** Stepwise Multiple Linear Regression Of QOL Domains In PLWHA

QOL Domain	Variables	Unstandardized Coefficients B SE		Standardized Coefficients	t	p-value	95% Confidence Interval Lower Upper	
		B	SE				Lower	Upper
Physical	Discrimination	-1.416	0.407	-0.367	-3.481	0.001	-2.225	-0.607
	Participant income (<8MR)	-1.887	0.782	-0.209	-2.414	0.018	-3.441	-0.333
	Fear	-0.947	0.402	-0.250	-2.356	0.021	-1.747	-0.148
Psychological	Discrimination	-1.760	0.305	-0.448	-5.764	<0.001	-2.367	-1.153
	Unemployed	-2.292	0.598	-0.324	-3.836	<0.001	-3.481	-1.104
	Participant income (<8 MR)	-2.357	0.777	-0.256	-3.031	0.003	-3.903	-0.811
	Education. (>middle school)	1.426	0.551	0.201	2.588	0.011	0.330	2.522
Level of independence	Discrimination	-1.493	0.329	-0.407	-4.543	<0.001	-2.146	-0.839
	Unemployed	-2.254	0.595	-0.341	-3.786	<0.001	-3.437	-1.070
	Age	-1.818	0.843	-0.194	-2.157	0.034	-3.494	-0.142
Social relationship	Discrimination	-1.837	0.302	-0.490	-6.076	<0.001	-2.438	-1.236
	Unemployed	-1.975	0.590	-0.292	-3.348	0.001	-3.147	-0.802
	Participant income (<8 MR)	-1.925	0.771	-0.219	-2.496	0.014	-3.458	-0.392
Environment	No insurance	-2.037	0.437	-0.364	-4.665	<0.001	-2.906	-1.169
	Participant income (<8 MR)	-1.359	0.655	-0.187	-2.074	0.041	-2.663	-0.056
	Blaming and distancing	-1.377	0.260	-0.405	-5.289	<0.001	-1.895	-0.859
	Family income	-1.293	0.590	-0.200	-2.191	0.031	-2.466	-0.119
SRPB	Blaming and distancing	-2.694	0.387	-0.572	-6.956	<0.001	-3.464	-1.924
	Males	5.216	1.531	0.280	3.407	0.001	2.173	8.260
Total QOL	Unemployed	-0.982	0.317	-0.314	-3.098	0.003	-1.613	-0.352
	Blaming and distancing	-1.047	0.453	-0.186	-2.312	0.023	-1.947	-0.146
	Participant income (<8 MR)	-1.035	0.342	-0.301	-3.024	0.003	-1.716	-0.354
	No insurance	-1.606	0.571	-0.219	-2.814	0.006	-2.742	-0.471

fear) and participant's monthly income <8MR were significantly associated with a low mean score in the physical domain of QOL. In line with the study by Wig et al,<sup>57</sup> a significant difference in QOL scores in the psychological domain was observed with respect to the educational status and PLWHA's monthly income. Discrimination, unemployment, and age >30 years were correlated with a low level of independence domain of QOL. A similar study in Iran found a negative and statistically significant relationship between the level of independence and unemployment, but they did not find a significant relationship between the level of independence and age.<sup>47</sup> In our study, being older than 30 years, discrimination, unemployment, and participant income <8MR were negatively associated with the social relationship domain of QOL. The positive effect of being employed on QOL has been well established in literature.<sup>58</sup> For example, for employed individuals, pay for work provides not only financial benefits but may also be a source of structure, social support, role identity, and meaning,<sup>38,43,59</sup> reflecting the

observed lower mean score of QOL among unemployed PLWHA in the current study in most of the QOL domains.

We found that having no insurance, participant's and family's monthly income <8MR, and blaming and distancing were negatively associated with the environmental domain of QOL. In a similar study in Iran, none of the above-mentioned factors were significantly correlated with the environmental domain.<sup>47</sup> Nevertheless, evidence shows that environmental factors can have a different negative or positive effect on QOL in PLWHA.<sup>60</sup>

As suggested by the previous study, spirituality is an important contributor to feelings of well-being and QOL in PLWHA.<sup>43</sup> We found a negative association between blaming and distancing and SRBP domain and a positive association between biological sex as male and SRBP. Our analysis did not show a significant difference between SRBP and sociodemographic and clinical characteristics. However, the only variable that showed a significant difference was the participants' monthly income.

In line with a previous study,<sup>61</sup> we found that total QOL was associated with unemployed status, blaming and distancing, participant income <8MR, and having no insurance. A substantial body of evidence worldwide supports the association between blaming and distancing, discrimination and total QOL.<sup>62–64</sup>

Consistent with the previous studies,<sup>65,66</sup> each domain of the stigma scale was significantly correlated with each domain of QOL in PLWHA, and the mean score of QOL domains was negatively correlated with the mean score of stigma domains. This suggests that the HIV-related stigma has a major influence on all QOL domains in PLWHA. However, in a similar study,<sup>56</sup> a high score of stigma was significantly associated with only low mean scores of two domains of QOL – environment and social relationships. This can explain that the relationship between stigma and QOL may vary in different populations and cultures; future studies are needed to explore the possible geographical/cultural differences with a larger sample size.

Our results demonstrated a significant association between having the history of incarceration, history of substance use, mode of HIV transmission, and all domains of QOL except SRBP. Since the first HIV epidemic in Iran occurred among prisoners, it is not surprising that most of the patients had a history of incarceration.<sup>67</sup> Moreover, a significant part of the HIV/AIDS epidemic in Iran is related to substance use and addiction, particularly IVDUs.<sup>68</sup> which may explain that the majority of PLWHA in Iran have had substance use and incarceration experiences. However, several issues such as poverty, depression, and high stigmatization are linked to IVDUs that have an influence on QOL apart from HIV/AIDS that need to be considered in interpreting our findings<sup>69</sup> and addressed in future studies.

Our findings showed that sexual transmission is a growing mode of HIV transmission among the Iranian population, assigning 42% of all modes of transmissions. This is not surprising because according to the latest reports from the Iranian Ministry of Health, the trend is shifting from transmission through drug addicts sharing syringes to the transmission through high-risk sexual activities. Injecting drug use (40%) and sexual transmission (40%) are the main HIV transmission routes in Iran.<sup>1</sup>

Although our study has elucidated, to some extent, the contributing factors associated with QOL among PLWHA in Iran, some limitations need to be noted. In the present cross-sectional study, the convenience sample is not representative of all PLWHA in the studied area; therefore, it is

hard to generalize the results to the HIV population in Iran. Furthermore, the cross-sectional nature of our study does not allow us to deduce causality or determine the direction of the observed associations, and for the same token, confounding could also mask the association. Iranian currency is losing its value since 2013 due to the economic sanctions; therefore, this issue must take into account the results related to the patient's and family's monthly income. Additionally, the data for the present study should be construed in light of the time of the study (i.e., 2012). However, according to United Nations Office on Drug and Crime,<sup>70</sup> Iran prioritized battling against HIV-related stigma and discrimination from 2015 to 2019, showing that this social phenomenon is enduring as a public health issue for the Iranian healthcare system. Finally, other aspects could contribute to the relationship between QOL and stigma in PLWHA that need to be addressed in future studies, for example, satisfaction with healthcare facilities, adherence to ART and viral load, being on MMT, and specific illicit drug use habits. Despite these limitations, our study has considerable strength such as using HIV/AIDS Stigma Instrument (HASI) with a validated and sufficient obtained power in the same HIV population<sup>34</sup> and validated WHO-QOL-BREF instrument for the Iranian population.<sup>71,72</sup>

## Conclusion

The present study documents that a number of factors such as insurance and employment status, monthly income, age, being male, and education level are significantly associated with different domains of QOL. Furthermore, our study demonstrated a significant negative relation between several domains of stigma (blaming and distancing discrimination, and fear) and QOL domains. Such findings are examples that should be addressed in comprehensive psychological intervention either by governmental or nongovernmental organizations to increase QOL in PLWHA in Iran. Although more prospective research is needed to elucidate the effect of some of these variables, we believe the findings of our study provide an important tool to make progress in improving the QOL of PLWHA in Iran.

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## Disclosure

The authors declare that there are conflicts of interest regarding the publication of this paper.

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