Quality of life of HIV-positive people: relationship between socioeconomic status and viral stage

Qualidade de vida de pessoas soropositivas: relação entre situação socioeconômica e estágio viral

Calidad de vida de personas seropositivas: relación entre la situación socioeconómica y el estado viral

João Ferreira Silva Junior (iD)
Federal University of Maranhão (*Universidade Federal do Maranhão*) - São Luís - (MA) - Brazil

Carlos Martins Neto (iD)
Federal University of Maranhão (*Universidade Federal do Maranhão*) - São Luís - (MA) - Brazil

Bruno Luiz Avelino Cardoso (iD)
Federal University of São Carlos (*Universidade Federal de São Carlos*) - São Carlos (SP) - Brazil

Elisa Miranda Costa (iD)
Federal University of Maranhão (*Universidade Federal do Maranhão*) - São Luís - (MA) - Brazil

Olga Lorena Maluf Guará Beserra (iD)
Santa Terezinha College (*Faculdade Santa Terezinha*) - São Luís - (MA) - Brazil

Verônica Silva Carneiro (iD)
Ceuma University (*Universidade Ceuma*) - São Luís - (MA) - Brazil

ABSTRACT

Objective: To analyze the influence of socioeconomic status and human immunodeficiency virus stage on the quality of life of HIV-positive people. **Methods:** This quantitative cross-sectional study was conducted between 2016 and 2017 at a reference center for the treatment of people with human immunodeficiency virus in São Luís (Maranhão, Brazil). The sample comprised 122 HIV-positive people undergoing treatment and follow-up at the reference center. We used an instrument to collect socioeconomic data and the WHOQol-HIV-bref. Data analysis was performed using structural equation modeling. Two latent variables were constructed – socioeconomic status and quality of life – using confirmatory factor analysis followed by path analysis. **Results:** All factor loadings of the latent variables described converge. With regard to the structural part of the model, for each variation of one standard deviation in the socioeconomic status there was an increase of 0.601 standard deviation in the quality of life of the participants. The clinical stage of the virus had no significant direct effect on quality of life (p=0.165). Also, socioeconomic status had no significant effect on the clinical stage of the virus (p=0.610). Additionally, socioeconomic situation did not have any indirect effect on quality of life mediated by clinical stage (p=0.654). **Conclusion:** The clinical stage was not associated with quality of life and did not have a mediating effect on socioeconomic status and quality of life. The socioeconomic status directly influenced the participants' quality of life.

Descriptors: Social Class; Acquired Immunodeficiency Syndrome; HIV Seropositivity; Quality of Life; Statistical Analysis.

RESUMO

Objetivo: Analisar a influência da situação socioeconômica e do estágio do vírus da imunodeficiência humana na qualidade de vida de pessoas soropositivas. Métodos: Trata-se de um estudo quantitativo e transversal, realizado entre 2016 e 2017, desenvolvido em um centro de referência no tratamento de pessoas com o vírus da imunodeficiência humana em São Luís (Maranhão, Brasil). A amostra compôs-se de 122 pessoas soropositivas que realizavam tratamento e acompanhamento nesse centro de referência. Utilizou-se um instrumento para coleta de dados socioeconômicos e o questionário de qualidade de vida WHOQol-HIV-bref. A análise dos dados ocorreu por meio da modelagem com equações estruturais. Construíram-se duas variáveis latentes, situação socioeconômica e qualidade de vida, utilizando análise fatorial confirmatória e, em seguida, a análise de caminhos. Resultados: Todas as cargas fatoriais das variáveis latentes apresentaram-se convergentes. Em relação à parte estrutural do modelo, para

cada variação de um desvio padrão na situação socioeconômica, há um aumento de 0,601 desvio padrão na qualidade de vida dos participantes. Não houve efeito direto significante do estágio clínico do vírus na qualidade de vida (p=0,165), nem da situação socioeconômica no estágio clínico (p=0,610), bem como não houve efeito indireto da situação socioeconômica na qualidade de vida quando mediado pelo estágio clínico (p=0,654). **Conclusão:** O estágio clínico não se associou à qualidade de vida e não apresentou efeito mediador entre a situação socioeconômica e a qualidade de vida. A situação socioeconômica influenciou diretamente a qualidade de vida dos participantes.

Descritores: Classe Social; Síndrome da Imunodeficiência Adquirida; Soropositividade para HIV; Qualidade de Vida; Análise Estatística.

RESUMEN

*Objetivo: Analizar la influencia de la situación socioeconómica y del estado del virus de la inmunodeficiencia humana en la calidad de vida de personas seropositivas. **Métodos:** Se trata de un estudio cuantitativo y transversal realizado entre 2016 y 2017 desarrollado en un centro de referencia para el tratamiento de personas con el virus de la inmunodeficiencia humana de São Luís (Maranhão, Brasil). La muestra ha sido de 122 personas seropositivas que realizaban el tratamiento y el seguimiento en ese centro de referencia. Se utilizó un instrumento para la recogida de datos socioeconómicos y el cuestionario de calidad de vida WHOQol-VIH-bref. El análisis de los datos se dio a través de ecuaciones estructurales. Se ha construido dos variables latentes, la situación socioeconómica y la calidad de vida, utilizándose el análisis factorial confirmatorio y después el análisis de caminos. **Resultados:** Todas las cargas factoriales de las variables latentes se presentaron convergentes. Respecto la parte estructural del modelo para cada variación de una desviación típica de la condición socioeconómica hay un aumento de 0,601 desviación típica de la calidad de vida de los participantes. No hubo el efecto directo significativo del estado clínico del virus para la calidad de vida (p=0,165) ni de la situación socioeconómica del estado clínico (p=0,610) así como no hubo el efecto indirecto de la situación socioeconómica en la calidad de vida cuando mediado por el estado clínico (p=0,654). **Conclusión:** El estado clínico no se asoció con la calidad de vida y no presentó el efecto mediador entre la situación socioeconómica y la calidad de vida. La situación socioeconómica ha influenciado directamente en la calidad de vida de los participantes.*

Descriptores: Clase Social; Síndrome de Inmunodeficiencia Adquirida; Seropositividad para VIH; Calidad de Vida; Análisis Estadístico.

INTRODUCTION

The Brazilian epidemic of the human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) constitutes a tangle of regional and local outbreaks of different characteristics that is in its fourth decade[1]. As a result of deep inequalities in the Brazilian society, the spread of HIV infection in Brazil reveals a scourge of multiple dimensions that has undergone significant epidemiological changes over time[2].

In 2017, 42,420 cases of HIV were reported, with 9,706 (22.9%) cases in the Northeast region. In Maranhão, there was a 69% increase in the rate of AIDS detection per 100 thousand inhabitants between 2007 (12.6%) and 2017 (21.3%), which put it in the 10th position in the Brazilian ranking[3]. AIDS mortality has also increased by 27% in these 10 years. Even without a cure, HIV infection is treatable and is considered a manageable chronic condition for many individuals[4].

Continuous HIV care can be understood as the process of caring for people living with HIV/AIDS (PLWHA). This method consists of the following moments: timely diagnosis; allocation of HIV-positive individuals to a health service; their follow-up through monitoring and periodic examinations; initiation of antiretroviral therapy (ART) and its promotion for good adherence to treatment. All of this is done to achieve the ultimate goals of care and suppression of viral load with a quality of life (QoL) comparable to that of people who do not have HIV[5].

For continuous care, standardized measures of health status reported by the patient are used. These include assessment of symptoms, functional status and QoL, thus offering a valid, sensitive and reproducible approach to manage health outcomes from the patient's point of view[6].

HIV infection has a wide spectrum of clinical presentations from the acute phase to the advanced stage of the disease. In untreated people, the estimated average time between infection and onset of the disease is around ten years and comprises the stages of acute infection, clinical latency and AIDS[1].

Patients' knowledge about their serological status and clinical staging is a predictor of success in the treatment and prevention of complications after infection. Currently, the most effective treatment for PLWHA is the association of ART and the development of healthy lifestyle habits, such as good nutrition, daily physical exercise, safe sex, use of condoms, among other things[7].

Given the new discoveries related to HIV/AIDS, the epidemiological configuration of the disease, as well as its characteristics and the characteristics of those infected, have undergone changes. A PLWHA coexists with particularities due to the HIV infection process and needs help to remain stable, both in terms of health and life routines[8].

HIV stage was, back in the days, a risk factor for worse QoL among HIV-positive people[9]. However, new treatment options have been developed and have increased the survival of those infected and improved their QoL[10]. A set of actions through conjugated medications (3 in 1) with fewer side effects included in the clinical protocols – which facilitated adherence to treatment[11] – and better user embracement in health care centers[12] have led to important results in the face of the global pandemic[13].

Given the considerations outlined above, the present study aimed to analyze the influence of socioeconomic status and human immunodeficiency virus stage on the quality of life of HIV-positive people.

METHODS

This quantitative cross-sectional study was carried out between October 2016 and April 2017 at the Fátima Health Center, a facility in which the specialized HIV/AIDS Care Service operates in the city of São Luís (Maranhão, Brazil). São Luís is a city located in Northeastern Brazil and features a wide network of HIV/AIDS prevention, diagnosis, and treatment.

The study participants were service users receiving medical care and followed by the Nursing team at the health center. A non-probability convenience sample of 122 HIV-positive participants was assessed. The study included people of both sexes aged between 18 and 59 years with a confirmed medical diagnosis of HIV who were being followed up at the health center and who accepted to participate voluntarily in the study by signing an Informed Consent Form. The study did not include individuals with chronic and degenerative diseases, pregnant women, people under 18 years of age and people who refused to participate in the study.

The data were collected by two researchers previously trained and accompanied by the social worker at the health center. There were no significant differences between the data collected between the two researchers ($p > 0.05$).

The data were collected through two questionnaires. The first included questions on the socioeconomic and demographic profile of the participants and questions about the participants' level of satisfaction with their health. Of the variables assessed in this questionnaire, only monthly income and education of individuals were submitted to analysis. No pilot study was conducted for this questionnaire.

The second questionnaire used was the WHOQol-HIV-bref, which has been translated and validated for Brazil[14]. The World Health Organization (WHO) developed this questionnaire in order to assess QoL from an international perspective. The WHOQol-HIV-bref questionnaire is divided into six domains and their facets: domain I - physical (pain, discomfort, energy, quality of sleep and rest); domain II - psychological (positive and negative feelings, quality of learning, ability to memorize, self-esteem and appearance); domain III - level of independence (activities of daily living, mobility, dependence on medical treatment and medications and work capacity); domain IV - social relationships (personal relationships, sexual activity, support and social inclusion); domain V - environment (home environment, physical security, financial resources, leisure and physical environment); domain VI - spirituality/religion/personal beliefs (spirituality, religiosity, personal beliefs, concerns about the future and fear of death). Each of these instruments added to the particular domain of QoL in which the individual is inserted.

The variables for the socioeconomic status and QoL constructs were selected after confirmatory factor analysis based on their factor loadings. The latent variable QoL is composed of the following domains of the WHOQol-HIV-bref questionnaire: physical, psychological, functional independence, social relationships, environment and spirituality. Each domain is composed of specific questions and the score values ranged from 4 to 20. Higher scores designated better QoL[14].

The latent variable socioeconomic situation was composed of income in wages considering the value of 2017 (less than one salary; 1; 1 to 2; 2 to 3; 3 to 4; 4 or more) and education (incomplete primary education; complete primary education; incomplete secondary education; complete secondary education; incomplete higher education; complete higher education and graduate education), as recommended by a Brazilian study[15].

For the analyses, absolute and percentage frequencies and 95% confidence intervals (95%CI) were estimated for categorical variables. Means (±standard deviations) or medians (±interquartile deviations) were respectively measured for numerical variables with symmetrical and asymmetrical distribution. Stata version 14.0 (Stata Corp., College Station, United States) was used.

Structural equation modeling (SEM) is a technique for dealing with multiple dependence relationships simultaneously and being able to represent concepts not observed in these relationships, thereby reducing the measurement error in the estimation process. This statistical analysis estimates a series of multiple regression equations. The model is

a supposed pattern of direct and indirect linear relationships between a set of observed variables and constructs. This consists of two sub-models: the measurement model, which establishes how constructs are measured, and the structural model, which analyzes the theoretical model as a whole, in which the associations between variables are estimated by standardized factor loadings (SFL). The SFL of the structural model was interpreted as follows: coefficients with values close to 0.10 indicate a small effect; values close to 0.30 indicate medium effect; values greater than 0.50 indicate a strong effect. Negative factor loadings indicate an inverse association and positive loadings indicate a direct association[16].

The development of a latent variable is done in the measurement model, in which the latent variable indicators are specified. A good latent variable has convergent validity, which is verified by standardized factor loadings with high values (above 0.50). In addition, it was verified whether the correlation between two constructs would not be greater than 0.90 (discriminant validity), that is, whether the two constructs should measure different aspects. Negative factor loadings indicate an inverse association and positive loadings indicate a direct association[17].

The study model was assessed using the adjustment indexes, including the RMSEA (Root Mean Square Error of Aproximation), the CFI (Comparative Fit Index), the TLI (Tucker-Lewis Index) and the WRMR (Weighted Root Mean Square Residual). Acceptable adjustment index values for the models were: RMSEA<0.05; upper limits of the CI at 90% of the RMSEA<0.08; CFI and TLI values>0.95; and WRMR<1.00. Given the non-normality of the data distribution, the robust MLM method (mean-adjusted maximum likelihood method) was used. An alpha of 5% was estimated through SFL. The proposed model was estimated using the Mplus 8 software (Inc., Los Angeles, United States).

The study complied with the ethical and legal aspects that approve guidelines and standards for the development of research with human beings according to Resolution No. 466/12 of the National Health Council and was approved by the Research Ethics Committee of the São Domingos Hospital under Approval No. 1.094.120.

RESULTS

The mean age of the study participants was 37.5 years (±9.93) and their age ranged from 18 to 58 years. In all, 64 (52.46%) participants were women and 58 (47.54%) were men.

As for their origin, 56 (45.9%) participants were from the capital São Luís and 66 (54.1%) were from the state's countryside (Table I).

Table I - Characterization of the HIV stage, education, income and quality of life domains. São Luís, Maranhão, Brazil, 2016-2017.

Variable	Description	Coding	Frequency (%)
Stage	HIV stage	1: Asymptomatic HIV-positive	57 (46.72)
		2: Symptomatic HIV-positive	15 (12.30)
		3: AIDS (related diseases)	10 (8.20)
		4: HIV-negative (undetectable)	40 (32.78)
Edu	Education	1: Incomplete primary	45 (36.88)
		2: Complete primary	9 (7.38)
		3: Incomplete secondary	10 (8.20)
		4: Complete secondary	41 (33.60)
		5: Incomplete higher	5 (4.10)
		6: Complete higher	10 (8.20)
		7: Graduate	2 (1.64)
Income	Income	1: below 1 wage	42 (34.43)
		2: 1 wage	39 (31.97)
		3: 1-2 wages	24 (19.66)
		4: 2-3 wages	6 (4.92)
		5: 3-4 wages	7 (5.74)
		6: above 4 wages	4 (3.28)
Dom1	Physical domain	Continuous, from 4 to 20, according to the Whoqol HIV bref scale	14.82 (± 3.40)*
Dom2	Psychological domain	Continuous, from 4 to 20, according to the Whoqol HIV bref scale	14.79 (± 2.66)*
Dom3	Functional independence	Continuous, from 4 to 20, according to the Whoqol HIV bref scale	13.40 (± 2.93)*
Dom4	Social relations	Continuous, from 4 to 20, according to the Whoqol HIV bref scale	14.22 (± 3.55)*
Dom5	Environment	Continuous, from 4 to 20, according to the Whoqol HIV bref scale	12.84 (± 2.74)*
Dom6	Spirituality	Continuous, from 4 to 20, according to the Whoqol HIV bref scale	15.00 (± 3.70)*

*Mean ±: Standard deviation; %: Frequency; stage: HIV stage; edu: education; income: monthly income; Dom1: Domain 1 of the Whoqol HIV bref scale; Dom2: Domain 2 of the Whoqol HIV bref scale; Dom3: Domain 3 of the Whoqol HIV bref scale; Dom4: Domain 4 of the Whoqol HIV bref scale; Dom5: Domain 5 of the Whoqol HIV bref scale; Dom6: Domain 6 of the Whoqol HIV bref scale

All the variables showed good convergence for the construction of latent variables – except income, as shown in Figure 1.

The WRMR indicator was satisfactory for the proposed model. The CFI, TLI and Chi-squared indices were slightly below expectations, whereas the RMSEA and the 90% confidence interval of the RMSEA remained above satisfactory values, as shown in Table II.
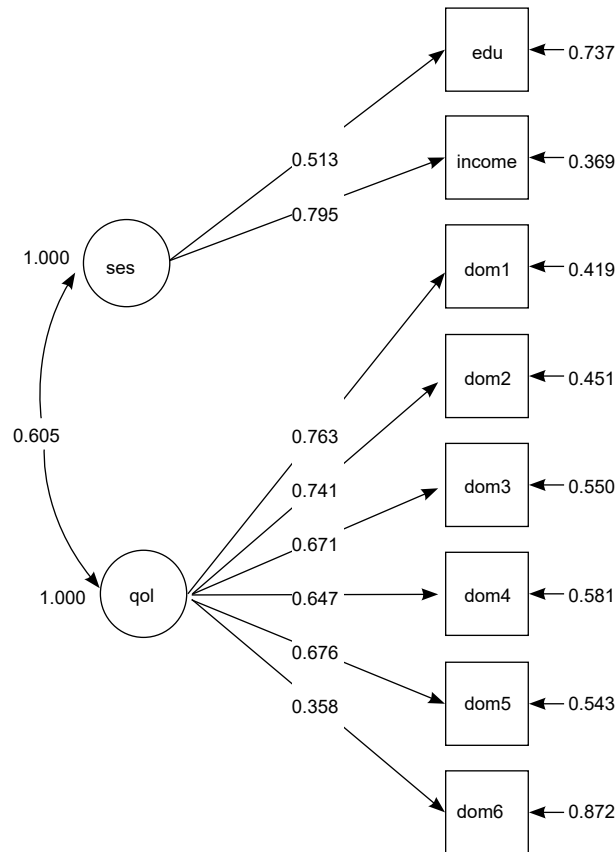

Figure 1 - Confirmatory factor analysis of latent variables and divergent validity. São Luís, Maranhão, Brazil, 2016-2017.
Acronyms: SES: socioeconomic status; QoL: quality of life; edu: education; income: monthly income; dom1 to dom7: domains of the WooQol-Bref-HIV scale

Table II - Expected and found results of the adjustment indices. São Luís, Maranhão, Brazil, 2016-2017.

Adjustment índices	Expected values	Found values
Chi-squared/ p value	*p* value > 0.05	< 0.001
RMSEA	< 0.05	0.117
90%CI of the RMSEA	Upper limit < 0.08	0.084 – 0.153
CFI	> 0.95	0.858
TLI	> 0.95	0.795
WRMR	> 0.95	**0.989**

RMSEA (Root Mean Square Error of Approximation); CFI (Comparative Fit Index); TLI (Tucker-Lewis Index); WRMR (Weighted Root Mean Square Residual)

All the factor loadings of the latent variables for the indicators were significant (<0.05). The highest factor loading for the socioeconomic status (SES) construct was observed in income (0.812). The highest factor loading for the QoL construct was observed in the physical domain (0.765). The effect of spirituality on the QoL of HIV-positive individuals was median (0.358).

By evaluating the coefficients of determination (R^2) we found that 65.9% of income is explained by socioeconomic status and only 12.8% of spirituality is explained by QoL (Figure 2).

Regarding the structural part of the model, the greatest effect observed was that of SES on QoL: for each variation of a standard deviation in SES, there was an increase of 0.601 standard deviations in the QoL of HIV-positive individuals. There was no significant direct effect of the HIV stage on QoL ($p=0.165$), or of the SES on the stage ($p=0.610$). There was also no indirect effect of SES on QoL when mediated by the HIV stage ($p=0.654$).
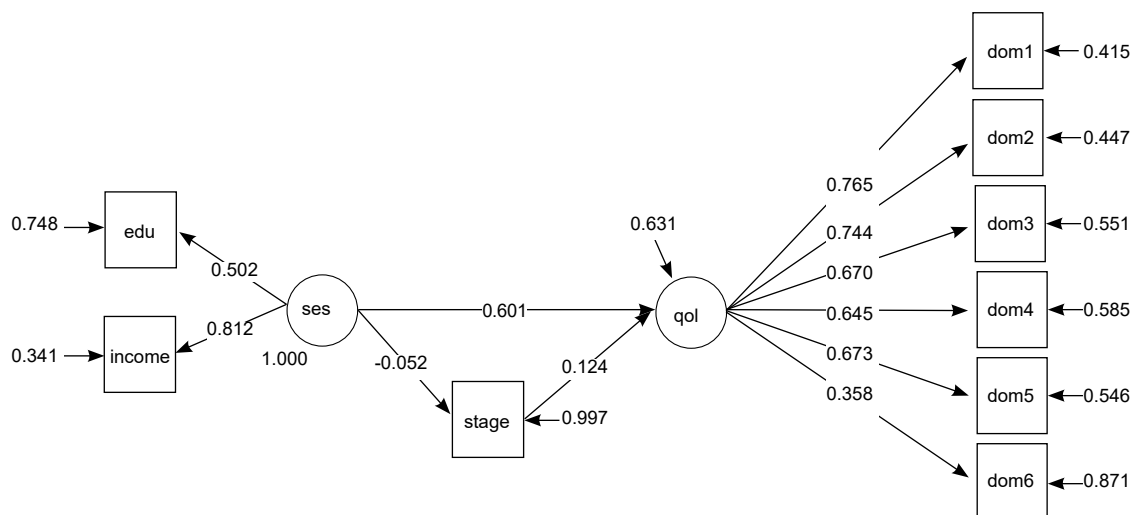

Figure 2 - Structural model with its factor loadings and coefficients of association between socioeconomic status (SES), HIV stage (Stage) and quality of life (QoL). São Luís, Maranhão, Brazil, 2016-2017.
Acronyms: stage: HIV stage; edu: education; income: monthly income; Dom1: Domain 1 of the Whoqol HIV bref scale; Dom2: Domain 2 of the Whoqol HIV bref scale; Dom3: Domain 3 of the Whoqol HIV bref scale; Dom4: Domain 4 of the Whoqol HIV bref scale; Dom5: Domain 5 of the Whoqol HIV bref scale; Dom6: Domain 6 of the Whoqol HIV bref scale

Table III - Standardized and non-standardized coefficients of the structural equation model. São Luís, Maranhão, Brazil, 2016-2017.

Effects	Standardized coefficients / p value	Non-standardized coefficients / p value
Quality of life ← Socioeconomic status	0.601 / *< 0.001*	1.781 / *< 0.001*
Quality of life ← Stage	0.124 / *0.165*	0.241 / *0.189*
Stage ← Socioeconomic status	-0.052 / *0.610*	-0.079 / *0.616*
Education ← Socioeconomic status	0.502 / *< 0.001*	1 / ---
Income ← Socioeconomic status	0.812 / *< 0.001*	1.214 / *0.001*
Physical domain ← Quality of life	0.765 / *< 0.001*	1 / ---
Psychological domain ← Quality of life	0.744 / *< 0.001*	0.760 / *< 0.001*
Independence domain ← Quality of life	0.670 / *< 0.001*	0.755 / *< 0.001*
Social relations domain ← Quality of life	0.645 / *< 0.001*	0.879 / *< 0.001*
Environment domain ← Quality of life	0.673 / *< 0.001*	0.709 / *< 0.001*
Spirituality domain ← Quality of life	0.358 / *< 0.001*	0.510 / *< 0.001*

DISCUSSION

In the present study, the HIV stage did not directly influence the QoL of HIV-positive individuals and the total effect of the HIV stage on QoL was not significant. Thus, the stage was not associated with differences in the QoL of these individuals. ART provided by the Unified Health System (*Sistema Único de Saúde - SUS*) to this population has contributed to a better QoL even in cases diagnosed late, which may explain this absence of association[18].

A comparative study conducted with Nigerian military personnel found that overall QoL is lower among HIV-positive people compared to HIV-negative military personnel. People living with HIV reported a greater number of negative life events and symptoms of trauma (post-traumatic stress disorder), and these symptoms were a significant contributor to QoL[19]. In addition, South African HIV-positive miners scored significantly lower on QoL compared to HIV-negative workers[20].

A study that analyzed the QoL of PLWHA found a relationship between greater satisfaction with health and QoL as well as statistically significant differences between their domains and the time of diagnosis, pointing out that the time of diagnosis of HIV infection can redefine the perception of QoL[21].

It should be noted that the findings of the present study showed that low socioeconomic status was associated with low QoL among the participants. This result is in line with those presented by another study that found an association between low QoL among PLWHA and low levels of education[22]. When the researchers analyzed the domains separately, there were statistically significant associations between lower levels of education and low QoL in the psychological and environmental domains, as well as between the diagnosis of HIV infection in the last five years and low scores in the social relationships domain[22].

Another study[23] found that QoL scores did not differ significantly between PLWHA who had started ART more than 5 years ago and HIV-negative individuals in Zambia and South Africa. However, there was a difference in QoL between PLWHA who had started ART in less than 5 years and HIV-negative individuals in Zambia, which again points to the impact of ART on improving the QoL of these individuals.

A recent study found higher levels of QoL in PLWHA with an income above two minimum wages, longer time of HIV diagnosis, receiving ART and who reported side effects resulting from it, and in clinically asymptomatic individuals[24].

Resilience appears to be a strong component of QoL and well-being and is related to improvements in physical and mental health in addition to being believed to improve with age[25]. However, a study[26] of PLWHA found that individuals exhibited lower resilience levels as they aged. Another study[27] also found that older adults with HIV had low QoL when compared to young people living with HIV.

Although the present study was not intended to assess differences in QoL between sexes, HIV-positive women seemed to have lower QoL. However, a study[28] that analyzed the influence of biological sex on the QoL of individuals with HIV concluded that HIV-positive women with better support reported better overall QoL. Potentially modifiable factors, such as social support and self-care behaviors, were strongly associated with QoL, thus suggesting an opportunity to improve the lives of PLWHA[28].

From a socioeconomic point of view, a study pointed out low levels of education and income as factors directly associated with higher rates of HIV infection[29]. With regard to QoL, some studies have shown the psychological domain as the most affected after infection[18,30,31]. These findings differ from the findings of the present study as the environmental domain strongly affected the participants' QoL.

Previous research suggested a negative association of symptoms and side effects with QoL and health status of PLWHA[32]. However, a careful assessment of the participation of side effects in the variation of health status had not been conducted until then. Another study[24] found some contributions of these effects to health status, such as low productivity at work and the use of health resources due to irregular menstrual cycle, jaundice, pancreatitis, seizures and kidney stones[33].

Although these differences have not been observed in this study, it is important to emphasize that even after being treated and having their health conditions improved by the antiretroviral therapy, symptomatic people may have more complications, discomfort and physical weakness when compared to asymptomatic people[34].

Other studies have suggested that PLWHA experience a wide range of side effects due to ART and, consequently, low QoL[35,36]. In the present study, SES affected the QoL of PLWHA more than the HIV stage itself.

Agreeing with the results of the present study, recent research found that symptomatic PLWHA do not necessarily have less QoL, which is due to universal access to treatment and multiprofessional follow-up[9]. This can be explained by the new drugs included in the protocol in recent years, which have drastically reduced side effects[37].

The present study has some limitations, but they do not diminish its contribution. The main limitation is that the results cannot be generalized as the studied universe comprised a population of only one health care center. However, it should be noted that the facility is a reference center for the treatment of patients with HIV/AIDS.

The cross-sectional design and the convenience sample may have contributed to the absence of an association between the HIV stage and QoL. However, this study has strengths, such as the application of a validated questionnaire to measure QoL and the construction of latent variables for the QoL and the socioeconomic status, which reduced possible measurement bias, and the mediation analysis using SEM.

CONCLUSION

The clinical stage was not associated with quality of life and did not have a mediating effect on the association between socioeconomic status and quality of life. The socioeconomic status directly influenced the quality of life of the HIV-positive people analyzed.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

CONTRIBUTIONS

João Ferreira Silva Junior contributed to the study conception and design; acquisition, analysis and interpretation of data; and manuscript writing. **Carlos Martins Neto** and **Elisa Miranda Costa** contributed to the acquisition, analysis and interpretation of data; and manuscript writing. **Bruno Luiz Avelino Cardoso** contributed to the study conception and design; and manuscript writing. **Olga Lorena Maluf Guará Beserra** contributed to the study conception and design and acquisition, analysis and interpretation of data.

FUNDING

REFERENCES

1. Abati PAM, Segurado AC. HIV testing and clinical status upon admission to a specialized health care unit in Pará, Brazil. Rev Saúde Pública [Internet]. 2015 [accessed on 2019 Aug 20];49:16. doi: 10.1590/S0034-8910.2015049004625

2. Melo EA, Maksud I, Agostini R. Cuidado, HIV/SIDA e atenção primária no Brasil: desafio para a atenção no Sistema Único de Saúde? Rev Panam Salud Publica [Internet]. 2018 [accessed on 2019 Aug 20];42:e151. doi: 10.26633/RPSP.2018.151

3. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde. Boletim Epidemiológico - HIV SIDA 2018 [Internet]. 2018 [accessed on 2019 Aug 20];49(53). Available from: http://www.SIDA.gov.br/system/tdf/pub/2016/66196/boletim_hiv_SIDA_12_2018.pdf?file=1&type=node&id=66196&force=1

4. Justice AC, Erlandson KM, Hunt PW, Landay A, Miotti P, Tracy RP. Can Biomarkers Advance HIV Research and Care in the Antiretroviral Therapy Era? J Infect Dis [Internet]. 2018 [accessed on 2019 Aug 20];217(4):521–8. doi: 10.1093/infdis/jix586

5. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde, Departamento de Vigilância, Prevenção e Controle das Infecções Sexualmente Transmissíveis, do HIV/SIDA e das Hepatites Virais. Manejo da infecção pelo HIV em adultos [Internet]. Brasília: Ministério da Saúde; 2018 [accessed on 2019 Aug 20]. Available from: http://www.SIDA.gov.br/system/tdf/pub/2016/64484/pcdt_adulto_12_2018_web.pdf?file=1&type=node&id=64484&force=1

6. Bradley SM, Rumsfeld JS, Ho PM. Incorporating Health Status in Routine Care to Improve Health Care Value. Jama [Internet]. 2016 [accessed on 2019 Nov 11];316(5):487-8. Available from: https://jamanetwork.com/journals/jama/article-abstract/2540409

7. UNSIDA. Knowledge is power: Know your status, know your viral load. United Nations Program HIV/SIDA [Internet]. 2018 [accessed on 2019 Aug 20]. Available from: https://www.unSIDA.org/sites/default/files/media_asset/jc2940_knowledge-is-power-report_en.pdf

8. Silveira RCW, Lazzarotto AR. A qualidade de vida de pessoas vivendo com HIV/SIDA: Estudo transversal com as organizações não governamentais [Internet]. In: Anais da Semana Científica da Unilasalle; 2018 Out 22-27; Canoas, Brasil. Canoas: Universidade La Salle; 2018 [accessed on 2019 Sep 10]. Available from: https://anais.unilasalle.edu.br/index.php/sefic2018/article/download/948/891

9. Machado IK, Luz PM, Lake JE, Castro R, Velasque L, Clark JL, et al. Self-rated health and substance use among individuals in HIV care in Rio de Janeiro, Brazil: a cross-sectional study. Int J STD SIDA [Internet]. 2017 [accessed on 2019 Aug 02];28(12):1175-83. doi: 10.1177%2F0956462417692278

10. Teixeira PR, Teodorescu LL. Histórias da SIDA no Brasil 1983 – 2003 [Internet]. 2015 [accessed on 2019 Aug 02]. Available from: https://unesdoc.unesco.org/ark:/48223/pf0000235557

11. Lacerda JS, Paulo RG, Aoyama EA, Rodrigues GMM. Evolução medicamentosa do HIV no Brasil desde o AZT até o coquetel disponibilizado pelo Sistema Único de Saúde. Rev Bras Interdisciplin Saude [Internet]. 2019 [accessed on 2020 Mar 11];1(4):83-91. Available from: http://revista.rebis.com.br/index.php/rebis/article/view/247/87

12. Costa MAR, Teston EF, Spigolon DN, Dias LO, Soares CC. Qualidade de Vida sob a ótica de portadores de HIV/SIDA: perspectivas futuras nas práticas educativas. J Res Fundam Care [Internet]. 2019 [accessed on 2020 Mar 11];11(5):1326-32. doi: 10.9789/2175-5361.2019.v11i5.1326-1332

13. Ministério da Saúde (BR), Secretaria de Vigilância em Saúde, Departamento de Vigilância, Prevenção e Controle das Infecções Sexualmente Transmissíveis, do HIV/SIDA e das Hepatites Virais. Manejo da infecção pelo HIV na Atenção Básica [Internet]. 2015 [accessed on 2020 Mar 13]. Available from: http://www.SIDA.gov.br/pt-br/pub/2016/o-manejo-da-infeccao-pelo-hiv-na-atencao-basica-para-profissionais-medicos

14. Zimpel RR, Fleck MP. Quality of life in HIV-positive Brazilians: application and validation of the WHOQOL-HIV, Brazilian version. SIDA Care [Internet]. 2007 [accessed on 2019 Aug 02];19(7):923-30. doi: 10.1080/09540120701213765

15 Oliveira BLCA, Silva AM, Rodrigues LS, Rêgo AS. O uso da modelagem com equações estruturais na análise da influência da cor/raça e status socioeconômico na saúde de idosos brasileiros. Rev Bras Cienc Saúde [Internet]. 2016 [accessed on 2019 Sep 09];20(2):149-56. Available from: https://www.periodicos.ufpb.br/index.php/rbcs/article/view/23106

16. Keith TZ. Multiple Regression and Beyond: an introduction to multiple regression and structural equation modeling. 3th ed. [London]: Routledge; 2019.

17. Kline RB. Principles and practice of structural equation modeling. 4th ed. New York: Guilford Press; 2015.

18. Okuno MFP, Gomes AC, Belasco D Jr, Meazzini L, Scherrer G Jr, Belasco AGS. Qualidade de vida de pacientes idosos vivendo com HIV/SIDA. Cad Saude Publica [Internet]. 2014 [accessed on 2019 Sep 10];30(7):1551-9. doi: 0.1590/0102-311X00095613

19. Olley BO, Bolajoko AJ. Psychosocial determinants of HIV-related quality of life among HIV-positive military in Nigeria. Int J STD SIDA [Internet]. 2008 [accessed on 2019 Aug 19];19(2):94-8. doi: 10.1258/ijsa.2007.007134

20. Gow J, George G, Govender K. A comparison of quality of life between HIV positive and negative diamond miners in South Africa. Sahara J [Internet]. 2013 [accessed on 2019 Aug 13];10(2):89-95. doi: 10.1080/17290376.2013.870066

21. Hipolito RL, Oliveira DC, Costa TL, Marques SC, Pereira ER, Gomes AMT. Quality of life of people living with HIV/SIDA: temporal, socio-demographic and perceived health relationship. Rev Lat Am Enferm [Internet]. 2017 [accessed on 2019 Aug 11];25:e2874. doi: 10.1590/1518-8345.1258.2874

22. Silva J, Bunn K, Bertoni RF, Neves OA, Traebert J. Quality of life of people living with HIV. SIDA Care [Internet]. 2013 [accessed on 2019 Sep 29];25(1):71-6. doi: 10.1080/09540121.2012.686594

23. Thomas R, Burger R, Harper A, Kanema S, Mwenge L, Vanqa N, et al. Differences in health-related quality of life between HIV-positive and HIV-negative people in Zambia and South Africa: a cross-sectional baseline survey of the HPTN 071 (PopART) trial. Lancet Glob Health [Internet]. 2017 [accessed on 2019 Aug 28];5(11):e1133-41. doi: 10.1016/S2214-109X(17)30367-4

24. Cecilio HPM, Oliveira DC, Oliveira DS, Domingues JP, Marques SC. Quality of life of people living with HIV. Cienc Cuid Saude [Internet]. 2018 [accessed on 2019 Mar 10];17(4):1-8. doi: 10.4025/cienccuidsaude.v17i4.45032

25. Araújo LF, Leal BS, Santos JVO, Sampaio AVC. Análise da resiliência entre pessoas que vivem com HIV/SIDA: um estudo psicossocial. Psicol Teor Pesqui [Internet]. 2019 [accessed on 2020 Mar 13];35:e35416. doi: 10.1590/0102.3772e35416

26. McGowan JA, Brown J, Lampe FC, Lipman M, Smith C, Rodger A. Resilience and Physical and Mental Well-Being in Adults with and Without HIV. SIDA Behav [Internet]. 2018 [accessed on 2019 Mar 05];22(5):1688-98. doi: 10.1007/s10461-017-1980-6

27. Moore RC, Fazeli PL, Jeste D V, Moore DJ, Grant I, Woods SP. Successful Cognitive Aging and Health-Related Quality of Life in Younger and Older Adults Infected with HIV. SIDA Behav [Internet]. 2014 [accessed on 2019 Mar 05];18(6):1186-97. doi: 10.1007/s10461-014-0743-x

28. Gielen AC, McDonnell KA, Wu AW, O'Campo P, Faden R. Quality of life among women living with HIV: the importance violence, social support, and self care behaviors. Soc Sci Med [Internet]. 2001 [accessed on 2019 Mar 05];52(2):315-22. doi: 10.1016/S0277-9536(00)00135-0

29. Masquillier C, Wouters E, Loos J, Nöstlinger C. Measuring health-related quality of life of HIV-positive adolescents in resource-constrained settings. PLoS One [Internet]. 2012 [accessed on 2019 Mar 05];7(7):e40628. doi: 10.1371/journal.pone.0040628

30. Shan D, Ge Z, Ming S, Wang L, Sante M, He W, et al. Quality of life and related factors among HIV-positive spouses from serodiscordant couples under antiretroviral therapy in Henan Province, China. PLoS One [Internet]. 2011 [accessed on 2019 Aug 02];6(6):e21839. doi: 10.1371/journal.pone.0021839

31. Desrosiers A, Blokhina E, Krupitsky E, Zvartau E, Schottenfeld R, Chawarski M. Psychiatric symptoms, quality of life, and HIV status among people using opioids in Saint Petersburg, Russia. Drug Alcohol Depend [Internet]. 2017 [accessed on 2019 Aug 02];1(172):60-5. doi: 10.1016/j.drugalcdep.2016.12.007

32. Lindayani L, Ibrahim K, Wang JD, Ko NY. Independent and synergistic effects of self- and public stigmas on quality of life of HIV-infected persons. SIDA Care [Internet]. 2018 [accessed on 2019 Aug 02];30(6):706-13. doi: 10.1080/09540121.2017.1396282

33. DiBonaventura MC, Guptaa S, Chob M, Mrus J. The association of HIV/SIDA treatment side effects with health status, work productivity, and resource use. SIDA Care [Internet]. 2012 [accessed on 2019 Aug 02];24(6):744-55. doi: 10.1080/09540121.2011.630363

34. Seidl EMF, Zannon CMLC, Tróccoli BT. Pessoas Vivendo com HIV/SIDA: Enfrentamento, Suporte Social e Qualidade de Vida. Psicol Reflex Crit [Internet]. 2005 [accessed on 2019 Aug 02];18(2):188-95. doi: 10.1590/S0102-79722005000200006

35. Ruiz-Pérez I, Olry de Labry A, López-Ruz MA, Del Arco-Jiménez A, Rodríguez-Baño J, Causse-Prados M, et al. Estado clínico, adherencia al TARGA y calidad de vida en pacientes con infección por VIH tratados con antirretrovirales. Enferm Infecc Microbiol Clin [Internet]. 2005 [accessed on 2019 Aug 02];23:581-5. Available from: https://www.elsevier.es/es-revista-enfermedades-infecciosas-microbiologia-clinica-28-pdf-13081565

36. Medeiros B, Saldanha A. Religiosidade e qualidade de vida em pessoas com HIV. Estud Psicol [Internet]. 2012 [accessed on 2019 Aug 02];29(1):53-61. doi: 10.1590/S0103-166X2012000100006

37. Lopes MIBF. Tratando HIV no futuro: novas drogas antirretrovirais. Brazilian J Infect Dis [Internet]. 2016 [accessed on 2019 Aug 02];2(3):91-5. Available from: https://www.bjid.org.br/en-pdf-X2177511716559704

Mailing address:
João Ferreira Silva Junior
Departamento de Saúde Pública da Universidade Federal do Maranhão
Rua Barão de Itapary, 155
Bairro: Centro
CEP: 65020-070 - São Luís - MA - Brasil
E-mail: jjunior39@yahoo.com.br