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# A GENDER BASED COMPARATIVE STUDY OF THE QUALITY OF LIFE OF PEOPLE LIVING WITH HUMAN IMMUNODEFICIENCY VIRUS (PLHIV) ON ANTIRETROVIRAL THERAPY (ART)

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**Background:** Quality of life of people living with Human Immunodeficiency Virus (HIV)is considered an important component of HIV care particularly in settings like Pakistan where treatment access and gender disparities continue to determine the health outcomes despite advancements in treatment regimens. This study aims to compare Health Related-QoL (HR-QOL) among male, female, and transgender individuals living with HIV on Antiretroviral Therapy (ART) **Methods:** A cross-sectional study was conducted at the HIV/AIDS treatment center of Mayo Hospital, Lahore, between February and July 2024. A sample of 384 participants (221 males, 151 females, and 12 transgender individuals) was selected using non-probability consecutive sampling. Data was collected using the HIV/AIDS-Targeted Quality of Life (HAT-QOL) and SF-36 surveys. Statistical analysis included Chi-square tests for categorical variables and ANOVA for continuous variables, with significance set at $p<0.05$. **Results:** Out of 384 participants, 57.55% were male, 39.32% female, and 3.13% transgender. A significant difference in social status was observed across gender groups ($p=0.020$). HRQoL domains differed significantly by gender; transgender individuals reported better overall function (76.11±23.78) compared to females (69.47±22.62) and males (74.1±23.5), $p=0.001$. Multivariate regression showed that health worries had the strongest association with HRQoL among transgender individuals (standardized β = 0.567, 95% CI: 0.09–0.30), compared to males (β = 0.432) and females (β = 0.527), emphasizing the differential impact on quality of life. **Conclusion:** Gender-specific differences in HRQOL among People Living with Human Immunodeficiency Virus (PLHIV) needs considerations for gender-sensitive healthcare approaches to improve overall well-being and quality of life for all individuals living with HIV.

**Keywords**: Quality of Life; HAT-QOL; SF-36, Gender; HIV, Antiretroviral Therapy and ART

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## INTRODUCTION

HIV/AIDS remains a significant public health concern, particularly in low and middle-income countries (LMICs) like Pakistan, where there are other emerging infections that continue to be relatively high despite advancements in treatment and preventions.[1] Recently, it is reported that Pakistan continues to struggle to meet the UNAIDS 90-90-90 targets, which aims that 90% of people living with HIV (PLHIV) must know their status, moreover, 90% to receive antiretroviral therapy (ART), and 90% must achieve viral load suppression by the year 2020.[2] Unfortunately, only 21% of PLHIV in Pakistan are aware of their status for HIV, and approximately 10% are receiving treatment, and data on viral load suppression remains unavailable in Pakistan.[3] The lack of progress is a biggest challenge for ongoing frequent outbreaks or epidemic and emphasizes the need for a investigation of HIV and its treatment, particularly in terms of the health-related quality of life (HRQoL) of those living with the virus.

Antiretroviral therapy (ART) has significantly changed the treatment scenario for HIV, converting a fatal disease into a treatable chronic condition. Highly Active Antiretroviral Therapy (HAART) has been effective in reduction of the viral load count and boosting immune function, allowing people living with HIV to live longer and healthier lives.[4] Despite the mentioned advancements, many PLHIV have their quality of life compromised either due to the side effects of medications, societal stigma or the psychosocial challenges associated with living with HIV, a stigmatized disease. This ultimately results in viral load suppression, which is an important goal, there is increasing recognition of the need to focus on improving HRQoL as part of a broader beyond viral suppression approach, proposed by UNAIDS.[5]

HRQoL is a broad term that includes the physical, social, and psychological impacts of living with ailment and undergoing treatment. In the HIV context, HRQoL is usually influenced either by the direct effects of the virus and its treatment and also by

other factors such as stigma, discrimination, and access to healthcare.[6]

ART has been proven effective in terms of improving the physical health and its impact on psychological well-being also remains a significant concern. Studies have shown that PLHIV may experience high rates of depression, anxiety, and social isolation even their viral load count is suppressed. Moreover, individuals may still face stigma and discrimination, which significantly effect the quality of life.[7]

Gender play an important role in experiences of people living with HIV, affecting their vulnerability to infection as well as their ability to access and adhere to treatment.[8] Gender disparities among male, female and transgender in healthcare accessibility and treatment outcomes are well-documented, each facing unique challenges with the disease of HIV. Women living with HIV often encounter barriers like limited access to healthcare services and social inequality, which can negatively affect their quality of life. Furthermore, men experience stigmatization related to societal expectations surrounding masculinity, which can delay treatment-seeking attitude and lead to poor ART adherence. Transgenders also face additional discrimination based on both gender identity and HIV status, often resulting in significant barriers to accessing appropriate healthcare and deteriorating health outcomes.[9]

This research focuses on comparative analysis of HRQoL among male, female, and transgender individuals living with HIV on ART, focusing on identifying the gender specific factors that influence their quality of life especially the domains of overall health, social support, life satisfaction, mental health via validated tools such as the HIV/AIDS-Targeted Quality of Life (HAT-QOL) and the SF-36 (36-Item Short Form Health Survey), The findings from this study will contribute in understanding of gender differences in HRQoL and the well-being of PLHIV across different genders. Since, Pakistan is ahead to meet global HIV targets and enhance the lives of those living with the virus, understanding how gender influences HRQoL will be essential for creating more inclusive and effective healthcare policies and practices.

The objective of the study is to conduct a comparative analysis of quality of life among male, female, and transgender individuals living with HIV on antiretroviral therapy (ART) and also to identify gender-specific factors that influence the QOL of individuals living with HIV, including stigma, treatment adherence, mental health, and social support.

## MATERIAL AND METHODS

This cross-sectional study was conducted at the HIV/AIDS treatment center in Mayo Hospital, Lahore, over a period of six months, from February 2024 to July 2024. Ethical approval for the study was obtained from the University of Lahore (UIPH/UOL/786/2024). Additionally, formal permission to conduct the research at Mayo Hospital was granted by the Punjab AIDS Control Program (PACP), under letter no. PACP/Admin/30388. This permission allowed access to the HIV/AIDS treatment center, specifically OPD Room #6 at Mayo Hospital, Lahore.

Given the sensitive nature of HIV-related data, strict management of participant access and site permissions was ensured through the PACP. All data collection procedures adhered to confidentiality agreements and complied with data protection protocols to safeguard patient information.

The sample size for the study was calculated to be 384 participants based on, confidence level 95%, error margin = 5%. The study used a non-probability; consecutive sampling technique was used to select participants. The inclusion criteria included individuals who were diagnosed with HIV/AIDS of either gender or were receiving ART. Not willing to participate were excluded.

Data collection in this study utilized two validated instruments: the HAT-QOL and the SF-36. The HAT-QOL, a disease-specific tool, includes domains such as Overall Function, Life Satisfaction, Health Worries, Financial Worries, Medication Concerns, HIV Mastery, Disclosure Worries, Provider Trust, and Sexual Function. The SF-36, a generic health survey, evaluates eight dimensions: Physical Functioning, Role-Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role-Emotional, and Mental Health.

Data analysis for this study utilized Chi-square tests for categorical variables and ANOVA for continuous variables to compare differences across male, female, and transgender groups. Chi-square tests assessed variables such as gender, marital status, and comorbidities, while ANOVA compared age, education, monthly income, and quality of life (QoL) scores across the gender groups. Moreover, multivariate analysis of health-related quality of life among genders living with HIV on ART.

## RESULTS

There were 221 (57.55%) males, 151 (39.32%) females and 12 (3.13%) transgenders. The association of gender with sociodemographic show no significant association among three groups except difference in social status (assessed by Kupposwamy scale) with p=0.020 across male, female, and transgender

participants in upper, middle, and lower class. Males and females have highest proportion in lower middle class whereas, transgender is more in low class revealing greater socio-economic challenge.

Whereas demographic and health-related variables revealed significant differences in duration of ART (p = 0.036). Among those on ART for ≤ 2 years: Male (72, 18.8%), Female (67, 44.4%), Transgender (3, 25%); and for > 2 years: Male (149, 67.4%), Female (84, 55.6%), Transgender (9, 75%), with transgender individuals having a higher proportion on ART for > 2 years. However, there were no significant differences in age, education, monthly income, occupation, comorbidities, CD4 count, disease duration, or access to healthcare, with p-values greater than 0.05, indicating no notable variation (Table-1) across the gender groups for these variables. These findings tell gender-based disparities in healthcare access and ART use duration, as well as socio-economic class distribution.

**Table-1: Association of gender with different sociodemographic and clinical characteristics.**

| Variable | | Male (n = 221) | Female (n = 151) | Transgender (n = 12) | *p*-value |
|---|---|---|---|---|---|
| Age (Mean ± SD) | | 36.4±8.3 | 35.6±8.4 | 37.8±7.9 | 0.474 |
| Education (Mean ± SD) | | 9.3±2.4 | 9.0±2.2 | 8.8±2.5 | 0.359 |
| Monthly Income (PKR) | | 75,000±15,200 | 35,000±14,800 | 50,100±16,300 | 0.342 |
| Marital Status | Married/Stable Relationship | 58 (26.2%) | 24 (29.3%) | 0 (0%) | 0.010* |
| | Single | 163 (73.8%) | 127 (70.7%) | 12 (100%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |
| Occupation | Employed | 165 (73.7%) | 59 (26.3%) | 12 (3.1%) | 0.250 |
| | Unemployed | 56 (25.3%) | 92 (42.4%) | 0 (0%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |
| Comorbidities | Yes | 91 (70.0%) | 61 (30.0%) | 5 (41.7%) | 0.673 |
| | No | 130 (59.2%) | 90 (32.8%) | 7 (58.3%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |
| CD4+ Count | ≤ 200 copies | 60 (15.6%) | 40 (10.4%) | 5 (41.7%) | 0.350 |
| | > 200 copies | 324 (84.4%) | 111 (73.3%) | 7 (58.3%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |
| Disease Duration | ≤ 2 years | 129 (58.4%) | 59 (39%) | 10 (83.3%) | 0.350 |
| | > 2 years | 92 (41.6%) | 92 (60.9%) | 2 (16.7%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |
| Duration of ART | ≤ 2 years | 72 (18.8%) | 67 (44.4%) | 3 (25%) | 0.036* |
| | > 2 years | 149 (67.4%) | 84 (55.6%) | 9 (75%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |
| Social Status (Kuppuswamy) | Upper Class | 34 (15.3%) | 13 (8.6%) | 1 (8.3%) | 0.020* |
| | Upper Middle | 67 (30.3%) | 39 (25.8%) | 0 (0%) | |
| | Lower Middle | 74 (33%) | 84 (55.6%) | 5 (41.7%) | |
| | Lower Class | 46 (20.8%) | 15 (9.9%) | 6 (50%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |
| Access to Healthcare | Yes | 207 (93.7%) | 143 (94.7%) | 10 (83.3%) | 0.831 |
| | No | 14 (6.3%) | 8 (5.3%) | 2 (16.7%) | |
| | Total | 221 (100%) | 151 (100%) | 12 (100%) | |

The association between the variables was assessed using the Chi-square test, and for cells with expected frequencies less than 5, Fisher's Exact Test was applied. *Indicates significant

HRQoL scores across male, female, and transgender individuals living with HIV on ART. The results highlight notable gender differences in several key domains. Transgender individuals reported significantly higher scores in several areas, including overall function (76.11±23.78 vs. 74.1±23.5) for males and 69.47±22.62 for females, p = 0.001), life satisfaction (66.31±25.11 vs. 63.91±24.82 for males and 58.73±23.47 for females, *p*=0.006), and health worries (77.95±25.48 vs. 75.67±26.04 for males and 70.73±26.67 for females, *p*=0.014), suggesting they experience better health perceptions and fewer concerns compared to their male and female counterparts. In contrast, financial worries and medication concerns were similar across all groups, indicating these factors affect everyone similarly regardless of gender. Furthermore, the HIV mastery scores were not significantly different, reinforcing that these factors may be less sensitive to gender identity in this context.

The SF-36 domains also demonstrate significant differences, particularly in physical functioning 52.17±8.10 for transgender vs. 51.64±8.13 for males and 50.47±8.08 for females, *p*=0.002) and bodily pain (53.59±10.80 for transgender vs. 52.52±11.32 for males and 50.19±12.09 for females, *p*=0.014), where transgender individuals reported higher quality of life. Additionally, transgender individuals showed greater vitality (54.49±11.06 vs. 53.48±11.39 for males and 51.30±11.84 for females, *p*=0.025) and mental health

(49.53±12.38 vs. 48.14±12.52 for males and 45.11±12.32 for females, $p<0.001$), suggesting a more positive mental and emotional health. However, some domains like role physical and role emotional did not show significant differences, indicating that certain aspects of social and emotional roles remain consistent across gender groups. Comparison of mean score of both questionnaires are also seen in Figure 1 among different genders.

The Cronbach's alpha for the HAT-QOL domain ranged from 0.69 to 0.84, indicating high reliability for most domains. These results underline the distinct gender-specific experiences of HRQoL in PLHIV on ART illustrated in table 2. Overall, the findings suggest that transgender individuals living with HIV on ART report better HRQoL outcomes in key areas compared to males and females, highlighting the importance of considering gender identity in health interventions. The reliability of these measures is reflected in the Cronbach's alpha values, which are consistently above 0.7, ensuring the validity of the findings across different domains.

**Table-2: Comparison of Health-Related Quality of Life (HRQoL) Scores Across Male, Female, and Transgender Individuals Living with HIV on ART**

| Domain | Cumulative Mean±SD | Male (n=221) | Female (n=151) | Transgender (n=12) | Cronbach's alpha | *p*-value |
|---|---|---|---|---|---|---|
| **HAT-QOL** | | | | | | |
| Overall Function | 74.1±23.5 | 74.1±23.5 | 69.47±22.62 | 76.11±23.78 | 0.8 | 0.001* |
| Life Satisfaction | 63.91±24.82 | 63.91±24.82 | 58.73±23.47 | 66.31±25.11 | 0.77 | 0.006* |
| Health Worries | 75.67±26.04 | 75.67±26.04 | 70.73±26.67 | 77.95±25.48 | 0.77 | 0.014* |
| Financial Worries | 48.2±33.53 | 48.2±33.53 | 46.12±34.37 | 49.16±33.17 | 0.84 | 0.441 |
| Medication Concerns | 83.35±21.02 | 83.35±21.02 | 79.75±24.12 | 85.00±19.28 | 0.69 | 0.057 |
| HIV Mastery | 71.12±33.00 | 71.12±33.00 | 66.96±33.43 | 73.05±32.69 | 0.76 | 0.083 |
| **SF-36** | | | | | | |
| Physical Functioning | 51.64±8.13 | 51.64±8.13 | 50.47±8.08 | 52.17±8.10 | 0.9 | 0.002* |
| Role Physical | 50.94±9.55 | 50.94±9.55 | 50.04±9.71 | 51.34±9.46 | 0.91 | 0.061 |
| Bodily Pain | 52.52±11.32 | 52.52±11.32 | 50.19±12.09 | 53.59±10.80 | 0.9 | 0.014* |
| General Health- | 47.88±9.15 | 47.88±9.15 | 46.14±9.70 | 46.88±8.78 | 0.76 | 0.036* |
| Vitality | 53.48±11.39 | 53.48±11.39 | 51.30±11.84 | 54.49±11.06 | 0.73 | 0.025* |
| Social Functioning | 48.01±10.48 | 48.01±10.48 | 46.81±9.93 | 48.55±10.70 | 0.84 | 0.058 |
| Role Emotional | 48.79±11.12 | 48.79±11.12 | 47.89±11.65 | 49.20±10.86 | 0.86 | 0.384 |
| Mental Health | 48.14±12.52 | 48.14±12.52 | 45.11±12.32 | 49.53±12.38 | 0.83 | <0.001* |

*Indicates significant

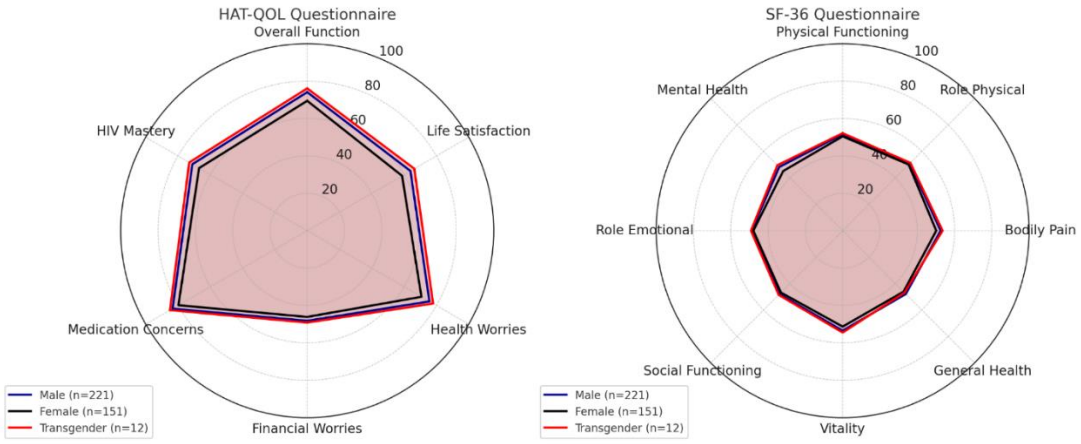


**Figure-1: Comparison of mean values for different domains of Quality of life using two questionnaires HAT-QoL and SF-36 using radar chart among different genders.**

Multivariate Linear regression analysis tells the relationship between various health-related quality of life (HRQoL) variables and gender (male, female and transgenders) among individuals living with HIV on ART. The unstandardized and standardized coefficients and their respective confidence intervals at 95% are provided for each quality-of-life tool of HAT-QOL and SF-36 scales.

The standardized coefficient for females 0.496 which is higher than males as 0.387, which indicates the influence of factors affecting overall function is stronger for females compared to males or transgenders. The coefficient for transgender individuals is the same as for males as 0.387 which tells similar impact on overall functioning on both groups. Similarly, females have the highest

unstandardized and standardized coefficient of (0.191, 0.563), suggesting that life satisfaction is more strongly associated with HRQoL for females than for males having standardized coefficient of (0.16,0.478) or transgender individuals (0.097, 0.352). The larger beta coefficient for females also tells that 0.191 is indication for strong influence.

Health worries are another domain of HAT-QOL among which transgender individuals have the highest standardized coefficient of 0.567, indicating that health worries have a more significant effect on HRQoL for this group compared to males having standardized coefficient 0.432 and females of 0.527. The unstandardized coefficients also show that transgender individuals report higher health worries (0.215).

Moreover, in SF-36 physical functioning among females has higher standardized coefficient (0.496) but for male and transgender it is 0.387 saying that it is more strongly influenced by gender-specific factors for females, whereas males and transgender individuals are similarly impacted. In domain of role physical for SF-36, females have the highest standardized coefficient (0.452), indicating that gender plays a larger role in determining Role Physical for females compared to males (0.356) and transgender individuals (0.311). Bodily Pain and General Health reveal varying effects, with transgender individuals reporting a stronger positive impact on General Health (0.198, 95% CI: 0.03-0.11), compared to males (0.183, 95% CI: 0.01-0.04) and females (-0.105, 95% CI: -0.05-0.02). In contrast, Mental Health shows that transgender individuals report more positive associations (0.195, 95% CI: 0.02-0.09) compared to males (0.232, 95% CI: 0.01-0.08) and females (-0.137, 95% CI: -0.08-0.01). Other domains are illustrated in table 3.

Overall, these findings emphasize that the HRQoL outcomes for transgender individuals may be more influenced by specific domains such as mental health and general health, while females show stronger associations with life satisfaction and physical functioning. The results suggest that gender identity plays a crucial role in determining the health outcomes of individuals living with HIV. Moreover, the standardized coefficients confirm that while gender identity does influence HRQoL outcomes, the magnitude of this impact varies by domain and gender group.

**Table-3: Multivariate analysis of Health-Related Quality of Life (HRQoL) variables across male, female, and transgender individuals living with HIV on ART**

| | Gender | Male (n = 221) | | | Female (n = 151) | | | Transgender (n = 12) | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Multivariate Analysis | Unstandardized coefficients | Standardized coefficients | | Unstandardized coefficients | Standardized coefficients | | Unstandardized coefficients | Standardized coefficients | |
| Scales | Variables | B | Beta | 95% CI | β | Beta | 95% CI | β | Beta | 95% CI |
| HAT QOL | Overall Function | 0.128 | 0.387 | (0.08-0.18) | 0.185 | 0.496 | (0.10-0.527) | 0.128 | 0.387 | (0.08-0.418) |
| | Life Satisfaction | 0.16 | 0.478 | (0.10-0.27) | 0.191 | 0.563 | (0.10-0.29) | 0.097 | 0.352 | (0.05-0.21) |
| | Health Worries | 0.134 | 0.432 | (0.10-0.24) | 0.209 | 0.527 | (0.15-0.29) | 0.215 | 0.567 | (0.09-0.30) |
| | Financial Worries | 0.12 | 0.391 | (0.05-0.19) | 0.124 | 0.404 | (0.05-0.19) | 0.145 | 0.432 | (0.07-0.22) |
| | Medication Concerns | 0.092 | 0.212 | (0.03-0.14) | 0.125 | 0.301 | (0.04-0.20) | 0.069 | 0.256 | (0.02-0.15) |
| | HIV Mastery | 0.032 | 0.111 | (-0.03-0.16) | -0.005 | -0.018 | (-0.05-0.004) | -0.023 | -0.134 | (-0.06-0.10) |
| SF- 36 | Physical Functioning | 0.387 | 0.387 | (0.08-0.18) | 0.496 | 0.496 | (0.10-0.27) | 0.387 | 0.387 | (0.08-0.18) |
| | Role Physical | 0.154 | 0.356 | (0.05-0.16) | 0.103 | 0.452 | (0.05-0.17) | 0.21 | 0.311 | (0.06-0.18) |
| | Bodily Pain | 0.033 | 0.122 | (0.005-0.06) | -0.034 | -0.137 | (-0.08-0.01) | 0.045 | 0.122 | (0.005-0.06) |
| | General Health | 0.024 | 0.183 | (0.01-0.04) | -0.016 | -0.105 | (-0.05-0.02) | 0.032 | 0.198 | (0.03-0.11) |
| | Vitality | 0.017 | 0.126 | (0.01-0.03) | 0.091 | 0.194 | (0.03-0.15) | 0.09 | 0.175 | (0.03-0.12) |
| | Social Functioning | 0.128 | 0.234 | (0.08-0.18) | 0.043 | 0.118 | (0.10-0.20) | 0.073 | 0.137 | (0.08-0.19) |
| | Role Emotional | 0.101 | 0.298 | (0.05-0.12) | 0.128 | 0.212 | (0.05-0.15) | 0.116 | 0.289 | (0.03-0.12) |
| | Mental Health | 0.045 | 0.232 | (0.01-0.08) | -0.034 | -0.137 | (-0.08-0.01) | 0.051 | 0.195 | (0.02-0.09) |

# DISCUSSION

This study on HRQoL among male, female, and transgender PLHIV on ART underscores significant gender-based disparities in various domains. The results show clear variations in HRQoL scores across gender groups, with important findings related to overall functioning, life satisfaction, health worries, and vitality.[10,11] However, some results, particularly in areas like comorbidities and CD4 count, did not demonstrate significant differences, indicating the need for deeper analysis and a wider perspective.

The significant differences observed in the Overall Function ($p$=0.001) and Life Satisfaction ($p$=0.006) domains between male and female participants like the findings from previous studies that suggest men living with HIV tend to report higher levels of functioning and life satisfaction.[12] Men's relative ease in accessing care and the lower burden of gender-based discrimination are

plausible explanations for this difference. This aligns with research by Castro *et al*., which indicated that social and economic barriers affecting women, such as unequal access to healthcare and caregiving responsibilities, contribute to lower life satisfaction.[13] Additionally, it is of concern that women experience more significant challenges related to stigma and violence, which can hinder their quality of life.[14]

Transgender individuals reported the highest scores in Health Worries ($p$=0.014) and Medication Concerns ($p$=0.057), indicating heightened anxiety regarding their health status and ART regimen(15). Khan et al., in recent study also demonstrated the perceived susceptibility, health concerns, and structural barriers significantly shape preventive behavior and health related QOL among vulnerable groups.[16] Logie *et al*. (2018) emphasized that transgender women often experience greater health concerns and poorer outcomes due to stigma and inadequate healthcare services tailored to their specific needs.[17] Moreover, transgender individuals frequently face obstacles in accessing HIV care that is both competent and affirming, which may contribute to higher medication concerns.[18]

Men scored significantly higher in Physical Functioning ($p$=0.002), while transgender participants reported the highest Vitality scores ($p$=0.025). The higher scores in Physical Functioning among men may be attributed to socio-economic factors, where men in this cohort had a higher income, as reflected in the demographic data. Conversely, the high vitality score among transgender individuals may point to resilience factors that allow them to maintain a sense of well-being despite adversities.[19] It is moreover suggested that while transgender individuals face challenges, their community's resilience in the face of adversity can result in higher levels of psychological vitality.[20]

Mental Health: Mental health differences between the groups were significant, with transgender individuals scoring the highest in the Mental Health domain ($p$<0.001). This suggests that while transgender individuals may face severe stigma and discrimination, they also show considerable resilience, which might buffer the negative impact of external stressors.[20,21] This finding resonates, which argued that despite the elevated risk for mental health disorders, transgender people may develop coping strategies that improve their mental health outcomes.[22]

Interestingly, the study found no significant differences in comorbidities, CD4 count, or disease duration across gender groups, which contrasts with other research that has found gender disparities in disease progression and comorbidities. For instance, it was highlighted that women with HIV are more likely to suffer from comorbidities, such as osteoporosis and cardiovascular diseases, partly due to hormonal influences and societal roles that exacerbate healthcare access disparities.[23,24] The lack of significant results in this study may be due to the relatively homogenous nature of the cohort in terms of disease duration and the use of ART, or it could reflect limitations in the sample size, particularly among transgender participants.

Additionally, although previous research has pointed to gender differences in immune response to HIV and ART, it was found that women generally have lower CD4 counts and delayed responses to ART compared to men[25], this study did not observe such differences. This discrepancy may be explained by the relatively stable ART adherence in the study population, where participants have likely achieved viral suppression, thus minimizing variations in CD4 count across genders.

Psychologically, HIV is associated with increased levels of depression, anxiety, and stress, often exacerbated by stigma and discrimination. Fauk *et al*. (2023) highlighted that these mental health challenges, driven by the chronic nature of HIV and societal stigma, contribute to a lower QoL.[26]

Furthermore, stigma and discrimination, particularly in older HIV-positive individuals[27,28], further hinder access to healthcare and social support, leading to worsened health outcomes.

## CONCLUSIONS

The study found significant gender-based differences in HRQoL among PLHIV on ART, with males reporting higher scores in overall functioning and life satisfaction, while transgender individuals experienced greater health worries and higher mental health scores. The findings from this study tell the need for gender-sensitive HIV care to address specific challenges faced by each group. Tailored interventions focusing on stigma, mental health, and social support are essential to improving HRQoL for all genders.

**Recommendations:**

Future studies should focus on larger, more diverse transgender samples to improve generalizability and explore longitudinal data to better understand the causal relationships between gender, ART adherence, and HRQoL. Additionally, healthcare interventions like having a psychologist at ART center to specifically counsel the mental health and stigma-related issues faced by each gender group to enhance their quality of life.

**Ethical Approval:**

The study was approved by University Institute of Public Health- The University of Lahore under the ethical letter was obtained vide letter UIPH/UOL/786/2024.

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## AUTHORS' CONTRIBUTION

IHK: Conceptualize the idea and drafting of manuscript. JSK: Analysis & Review. SKD: Critical comments & review. AG: Drafting, data analysis.

## REFERENCES


1. Ismail SD, Pankrac J, Ndashimye E, Prodger JL, Abrahams MR, Mann JFS, *et al*. Addressing an HIV cure in LMIC. Retrovirology 2021;18(1):21.
2. Gasparro G, Trevisan S, Kiros ST, Malcontenti C, Trotta M, Barbiero A, *et al*. UNAIDS 90-90-90 target and retention in care of a cohort of migrants living with HIV in a tertiary referral hospital in Florence, Italy. AIDS Behav 2025;29(5):1642–54.
3. Hussain R. Knowledge and discriminatory attitudes towards HIV/AIDS among the women of reproductive age group of Pakistan using the Multiple Indicator Cluster. Public Health Pract 2024;5:100252.
4. Gholap AD, Khuspe PR, Pardeshi SR, Uddin J, Das U, Hatvate NT, *et al*. Cardiovascular challenges in the era of antiretroviral therapy for AIDS/HIV: A comprehensive review of research advancements, pathophysiological insights. Atherosclerosis 2024;383:1–12.
5. Lazarus JV, Safreed-Harmon K, Barton SE, Costagliola D, Dedes N, del Amo Valero J, *et al*. Beyond viral suppression of HIV–the new quality of life frontier. BMC Med 2016;14(1):94.
6. Costa DSJ, Mercieca-Bebber R, Rutherford C, Tait MA, King MT. How is quality of life defined and assessed in published research? Qual Life Res 2021;30(8):2109–21.
7. Chambers LA, Rueda S, Baker DN, Wilson MG, Deutsch R, Raeifar E, *et al*. Stigma, HIV and health: a qualitative synthesis. BMC Public Health 2015;15(1):848.
8. Lin C, Nguyen DB, Nguyen L, Nguyen TT, Li L, Minh Giang L. Navigating cultural and gender aspects of stigma among women living with HIV in Vietnam. Cult Health Sex 2024;26(3):311–25.
9. Magno L, Silva L. Stigma and discrimination related to gender identity and vulnerability to HIV/AIDS among transgender women: A systematic review. Cad Saude Publica 2019;35(5):e00112718.
10. Bayes-Marin I, Egea-Cortés L, Palacio-Vieira J, Bruguera A, Mesías-Gazmuri J, Llibre JM, *et al*. Determinants of depressive symptoms in people living with HIV: findings from a population-based study with a gender perspective. Int J Environ Res Public Health 2023;20(4):3687.
11. Naing T, Thavorncharoensap M, Riewpaiboon A, Oo HN, Aung MS. Factors affecting health-related quality of life of HIV-infected key population in Myanmar. AIDS Care 2022;34(8):974–81.
12. Hong C, Ochoa AM, Wilson BDM, Wu ESC, Thomas D, Holloway IW. The associations between HIV stigma and mental health symptoms, life satisfaction, and quality of life among Black sexual minority men with HIV. Qual Life Res 2023;32(6):1693–702.
13. Castro R, De Boni RB, Luz PM, Velasque L, Lopes LV, Medina-Lara A, *et al*. Health-related quality of life assessment among people living with HIV in Rio de Janeiro, Brazil: a cross-sectional study. Qual Life Res 2019;28(4):1035–45.
14. Herrmann S, McKinnon E, Hyland NB, Lalanne C, Mallal S, Nolan D, *et al*. HIV-related stigma and physical symptoms have a persistent influence on health-related quality of life in Australians with HIV infection. Health Qual Life Outcomes 2013;11(1):56.
15. Bouman WP, Claes L, Brewin N, Crawford JR, Millet N, Fernandez-Aranda F, *et al*. Transgender and anxiety: a comparative study between transgender people and the general population. Int J Transgend 2017;18(1):16–26.
16. Khan IH, Kanathasan DJ, Das DS, Khan DS, Arshad S, Jabeen S, Gohar DA, Faraz AA. Assessing burden of HIV and integrating health belief model (HBM) influencing preventive behavior among female sex workers of Bahawalpur, Pakistan. TPM–Testing, Psychometrics, Methodology in Applied Psychology 2025;32(S9):2037–46.
17. Logie CH, Abramovich A, Schott N, Levermore K, Jones N. Navigating stigma, survival, and sex in contexts of social inequity among young transgender women and sexually diverse men in Kingston, Jamaica. Reprod Health Matters 2018;26(54):72–83.
18. Sevelius JM, Patouhas E, Keatley JGW, Johnson MO. Barriers and facilitators to engagement and retention in care among transgender women living with human immunodeficiency virus. Ann Behav Med 2014;47(1):5–16.
19. Bush J. Factors associated with resilience and sense of coherence in adult transgender persons: identifying predictors to reduce health disparities in a vulnerable population [dissertation]. Orlando (FL): University of Central Florida: 2021; p.212.
20. Farah S, Rizk Y, Azar M. Transgender health in the Middle East region: what do we know so far? A literature review. Transgend Health 2023;8(5):270–6.
21. Gorman K, Shipherd J. Coping, resilience, and social support among transgender and gender diverse individuals experiencing gender-related stress. Psychol Sex Orientat Gend Divers 2022;9(1):37–47.
22. Tebbe E. Factors that drive mental health disparities and promote well-being in transgender and nonbinary people. Nat Rev Psychol 2022;1(12):689–704.
23. Batulan Z, Bhimla A, Higginbotham EJ, editors. Chronic conditions that predominantly impact or affect women differently: substance use disorder. In: Advancing Research on Chronic Conditions in Women. Washington (DC): National Academies Press: 2024; p.231–408.
24. Jamshaid M, Heidari A, Hassan A, Mital D. Bone loss and fractures in post-menopausal women living with HIV: a narrative review. Pathogens 2024;13(9):811.
25. Maskew M, Brennan AT, Westreich D, McNamara L, MacPhail AP, Fox MP. Gender differences in mortality and CD4 count response among virally suppressed HIV-positive patients. J Womens Health 2013;22(2):113–20.
26. Fauk N, Asa G, McLean C. "I was very shocked, I wanted it to be over": a qualitative exploration of suicidal ideation and attempts among women living with HIV in Indonesia. Int J Environ Res Public Health 2023;21(1):9.
27. Brown M. HIV and aging: double stigma. Curr HIV/AIDS Rep 2021;8(2):72–8.
28. Medicine MBIEG. Diversity, stigma, and social integration among older adults with HIV. J Cross Cult Gerontol 2019;10(2):239–46.



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