

*Full Length Research Paper*

## **Quality of life of HIV patients on highly active antiretroviral therapy: A scoping review**

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**Human immunodeficiency virus (HIV) infection is one of the life-threatening conditions that affect various domains of patients' life. The quality of life (QoL) of HIV patients has emerged as a major public health concern. People living with HIV (PLHIV) experience numerous problems that range from discrimination, changes in the patterns of relationships (intimacy), loss of social status, role, jobs and financial resources. Determinants of QoL and their impact on PLHIV have been highly documented. The objective of this review was to highlight different determinants of QoL and their impact on PLHIV. An extensive literature review was performed. Articles were identified from search engines such as PubMed, EMBASE, Google scholar and MEDLINE. Relevant keywords were used to guide searches from appropriate sources. We reviewed studies carried out worldwide with special focus on those done in Africa. From the results obtained, it showed that out of 42 articles reviewed, twenty (20) were quantitative (mostly cross sectional studies), twenty-two (22) were qualitative among which 8 were review articles. The study population was mostly made up of adults greater than 18 years old. Studies reviewed were mostly carried out in urban settings with an overall sample size of about 6,500 participants. Majority of HIV patients struggle with numerous social, psychological, physical and environmental problems. HIV patients are experiencing a devastating effect of this disease on their QoL, and a paradigm shift is required in thinking about this life-threatening condition. Practitioners should be aware of the struggles faced by HIV patients and provide them multidimensional support.**

**Key words:** Africa, highly active antiretroviral therapy (HAART), HIV, quality of Life.

### **INTRODUCTION**

The World Health Organization (WHO) has defined health as not just the absence of a disease but a state of complete physical, mental, and social well-being (WHO).

Quality of life (QoL) is a term that is popularly used to convey an overall sense of well-being and includes aspects such as happiness and satisfaction with life as a

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whole. According to WHO, QoL is also defined as “individuals” perceptions of their position in life in the context of the culture and value systems in which they live and in relation to their goals, standards, expectations and concerns (WHOQOL-BREF, 2019a). A lot of social ills such as stigma, poverty, depression, substance abuse, and cultural beliefs have been reported to affect the QoL of People living with HIV (PLHIV), from the physical health aspect to the mental and social health point of view, and cause numerous problems in useful activities and interests of the patients (Basavaraj et al., 2010). The QoL of HIV patients is a major public health concern and has emerged as one of the indicators used to measure adherence of patients to highly active antiretroviral therapy (HAART). Health related quality of life (HR-QoL) has been an important measurable outcome of treatment in the era of HAART, rather than the traditional outcomes of mortality, number of survival, occurrence of opportunistic infections, CD4+ T cell count and viral load ( Hays et al, 2000; Call et al, 2000; Brechtl et al., 2001). The QoL of HIV patients on HAART is of great socio-medical concern. These social groups are usually prone to stigmatization, negative feelings, and financial difficulties. Several factors associated with better QoL among HIV patients have been documented, and the impact of HIV on QoL falls under four major domains as shown in Figure 1 (Basavaraj et al., 2010). This review was aimed at highlighting the impact of these domains on the QoL of HIV patients and the QoL of HIV patients on HAART.

## METHODOLOGY

### Search strategy

An extensive literature review was carried out to highlight the different domains that determine the QoL of HIV patients. Major articles were search in different search engines such as PubMed, EMBASE, Google scholar and MEDLINE. Relevant keywords such as HIV and QoL and combination of QoL with social, environmental, physical and psychological impact on PLHIV were used to guide search for appropriate resources.

### Study selection

#### *Inclusion and exclusion criteria*

Studies carried out worldwide with special focus on those done in Africa were reviewed. No starting date was specified. However, we excluded studies whose titles and contents were not in line with our objectives. The selection process of articles was done using the PRISMA flow diagram as shown in Figure 2.

In this review, we presented major findings from landmark studies, as well as from meta-analyses, systematic reviews and reports, to demonstrate the different domains that determine the QoL of patients. Information gathered from different articles are presented and discussed.

The World Health Organization Quality of Life (WHOQOL) developed an international cross-culturally comparable quality of life

assessment instrument. This instrument assesses the individual's perceptions in the context of their culture and value systems, and their personal goals, standards and concerns (WHOQOL-BREF 2019b). The WHOQOL-BREF instrument comprises 26 items, which measure the following broad domains: physical health, psychological health, social relationships, and environment. It is a shorter version of the original instrument and it is also used to assess the quality of life in HIV patients. The articles reviewed highlighted the impact of the different domains on the QoL of HIV patients.

## RESULTS AND DISCUSSION

Out of 42 articles reviewed, twenty (20) were quantitative (mostly cross-sectional studies), twenty-two (22) were qualitative among which 8 were review articles. The study population was mostly made up of adults greater 18 years old. Studies reviewed were mostly carried out in urban settings with an overall sample size of about 6,500 participants. Qualitative studies conducted a total of about 59 focus group discussions and 10 in-depth interviews. From these articles reviewed, we underlined different domains that affected the QoL of PLHIV as well as the impact of HAART on their QoL. Fifteen (15) articles and 1 report highlighted the social impact of HIV on the QoL, 10 articles demonstrated the impact of psychology on QoL and 11 articles reviewed established the physical and environmental effects of the disease on QoL as shown in Table 1 (Appendix I). Five (5) articles demonstrated the impact of HAART on QoL among PLHIV.

### Quality of life and social domain

PLHIV are discredited, considering their lives so diminished that they think that life is no longer worth living. Thus, the ethical task is to figure out how to approach this growing socio-medical issue (Kontomanolis et al., 2017). HIV affects different domains in the health of PLHIV. Based on the views and opinions from a qualitative study carried out by Dejman and colleagues, PLHIV suffer from social isolation, relationship problems, lack of family support, economic hardships inhibiting marriage, and social rejection of patient's families and fear due to the social stigma (Dejman et al., 2015). Studies have shown that stress associated with social and family problems arising from the diseases such as social stigma and exclusion especially by support groups is very intensely and uniquely threatening PLHIV (Forouzan et al., 2013). Dominant social believes and social stigma has risen due to HIV. In addition to the physiological effects of the disease, PLHIV encounter numerous problems such as discrimination, losing social status and role, changes in the patterns of relationships (intimacy), losing jobs and financial resources, and facing problems to provide required medicines (Forouzan et al.,

**Table 1.** Articles reviewed with respect to the different domains affecting the quality life of HIV patients.

Author	Title
Dejman et al. (2015)	Psychological, social, and familiar problems of people living with HIV/AIDS in Iran: A qualitative study
<b>Social domain</b>	
Kontomanolis et al. (2017)	The social stigma of HIV–AIDS: society’s role
Forouzan et al. (2013)	Social support network among people living with HIV/AIDS in Iran
Kalichman et al. (2003)	Stress, social support, and HIV-status disclosure to family and friends among HIV-positive men and women
Gerbert et al. (1991)	The impact of who you know and where you live on opinions about AIDS and health care. <i>Social Science and Medicine</i>
Goldin (1994)	Stigmatization and AIDS: critical issues in public health
Greeff et al. (2008)	Disclosure of HIV status: experiences and perceptions of persons living with HIV/AIDS and nurses involved in their care in Africa.
Herek and Glunt (1988)	An epidemic of stigma. Public reactions to AIDS
William et al. (2005)	The Stigma of Being HIV-Positive in Africa
Campbell et al. (2007)	Dying Twice’: A multi-level model of the roots of AIDS stigma in Two South African communities
Neville Miller and Rubin (2007)	Factors leading to self-disclosure of a positive HIV diagnosis in Nairobi, Kenya: people living with HIV/AIDS in the Sub-Sahara
Akinboro et al. (2014)	Quality of life of Nigerians living with human immunodeficiency virus
Dessie and Deresa (2012)	Sexual practices of HIV-positive individuals attending antiretroviral treatment (art) in Addis Ababa public hospitals: findings from in-depth interview
Hankins et al. (1997)	Sexuality in Montreal women living with HIV
Shamspour et al. (2010)	Relation Between Sexuality and Health-Related Quality of Life
<b>Psychological domain</b>	
Abas et al. (2014)	Depression in people living with HIV in sub-Saharan Africa: time to act
Akena et al. (2010)	A comparison of the clinical features of depression in HIV-positive and HIV-negative patients in Uganda
Gaynes et al. (2012)	Prevalence and predictors of major depression in HIV-Infected patients on antiretroviral therapy in Bamenda, a Semi-Urban center in Cameroon
Kingori et al. (2015)	Depression symptoms, social support and overall health among HIV-positive individuals in Kenya.
Kinyanda et al. (2012)	The prevalence and characteristics of suicidality in HIV/AIDS as seen in an African population in Entebbe district, Uganda.
Memiah et al. (2014)	The effect of depressive symptoms and CD4 count on adherence to highly active antiretroviral therapy in sub-Saharan Africa
Nel and Kagee (2013)	The relationship between depression, anxiety and medication adherence among patients receiving antiretroviral treatment in South Africa.
Remien and Rabkin (2001)	Psychological aspects of living with HIV disease
Sana (2015)	HIV and Psychological Issues
Wroe et al. (2015)	Depression and patterns of self-reported adherence to antiretroviral therapy in Rwanda
<b>Physical and environmental domain</b>	
Azagew et al. (2017)	High prevalence of pain among adult HIV-infected patients at University of Gondar Hospital, Northwest Ethiopia
Lori et al. (2011)	Adult mortality and natural resource use in rural South Africa: Evidence from the agincourt health and demographic surveillance site. <i>Society and natural resources</i>
Kaler et al. (2010)	“Living by the hoe” in the age of treatment: perceptions of household well-being after antiretroviral treatment among family members of persons with AIDS
Talman et al. (2013)	Interactions Between HIV/AIDS and the Environment: Toward a Syndemic Framework

**Table 1.** Contd.

Torell et al. (2006)	Examining the linkages between AIDS and biodiversity
Nonhlanhla et al. (2005)	HIV/AIDS symptom management in Southern Africa
Silvana (2017)	Effects of HIV: What happens to the body
Moskowitz	Living with HIV Therapy: Effects of HIV infection and treatment on physical appearance and body image
Parker et al. (2009)	A qualitative study of the impact of HIV/AIDS on agricultural households in Southeastern Uganda.
Murphy et al. (2005)	How do we know what we know about the Impact of AIDS on food and livelihood Insecurity? A Review of empirical research from rural sub Saharan Africa

2013). Community and social network members may fear to be infected with HIV and they are frightened to take care of HIV patients. This fear in people has prepared the ground for which people withdraw more patients from the support needed and thus, they are deprived from the benefits of social support (IRN report, 2015). Failure to notice and concentrate on patients' problems may lead to lower levels of accountability and increase infected persons' pessimism toward society, and thus cause the spread of the virus in broader levels (Kalichman et al., 2003). Due to lack of adequate information about the transmission of HIV from person to person, some communities and social network members may fear to be infected with HIV disease and therefore limit their association with HIV patients.

Stigma has emerged as a barrier for the prevention and control of HIV. This is because, HIV stigma negatively affects seeking HIV testing, seeking care after diagnosis, quality of care given to HIV patients, and finally the negative perception and treatment of PLHIV by their communities and families, including partners (Gerbert et al., 1991; Herek and Glunt, 1988). Research has shown that stigma isolates people from the community and thus affects the overall QoL of HIV patients (Greeff et al., 2008; William et al., 2005; Campbell et al., 2007; Neville and Rubin, 2007; Akinboro et al., 2014). Currently, there is an increasing number of researches on HIV-related stigma in

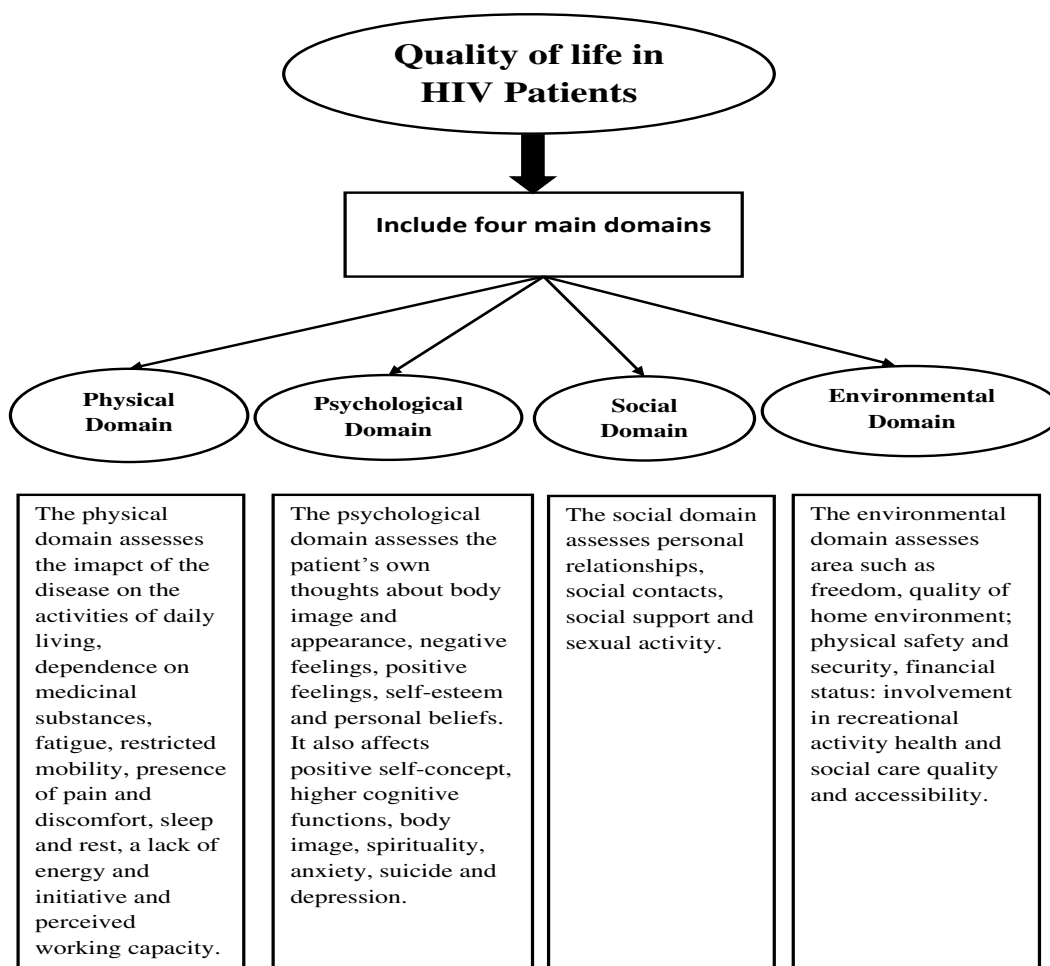
sub-Saharan Africa (SSA). It is being increasingly acknowledged, however, that effective treatment and care strategies require an understanding of the cultural context (Campbell et al., 2007; Goldin, 1994) in which stigma exists. To effectively manage the social problems faced by these patients, the health care sector needs to understand the challenges and social problems confronting PLHIV.

It has been observed that, HIV- positive individuals remain sexually active, but they experience the sexual adjustment period during which they have less comfortable feeling with sex lives (Hankins et al., 1997). In a study carried out by Dessie and colleague (Dessie and Deresa, 2012), the study participants revealed that they had a decline in sexual desire promptly after testing positives and had sexual intercourse only for sake of their partners need in order to maintain their relationship. Research has shown that, normal sexual functioning and health-related quality of life (HR-QoL) are implacably interwoven phenomena (Shamspour et al., 2010). Poor sexual orientation and fear of sexual relationship is known to affect HRQOL of HIV patients.

#### **Quality of life and psychological domain**

PLHIV do not just suffer from the physiological effect of the virus but are faced with a lot of

psychological problem which range from fear, loss, grief, guilt, denial, anger, anxiety, low self-esteem, depression to suicidal behavior and thinking. Therefore psychological problems are those thoughts, feelings, emotions that affect the mental state and well-being of an individual. The psychological or internal challenges a person with HIV faces vary from individual to individual (Sana, 2015). It has been noted that not everyone infected with HIV have the same psychological problems. Each HIV situation is as unique as the people involved. There are individuals who might face catastrophic changes not only in their personal and job relationships, but in their physical bodies and in their self-images and self-esteem. Most patients confronted a range of psychological challenges, including the prospect of real and anticipated losses, worsening QoL, the fear of physical decline and death, and coping with uncertainty (Remien and Rabkin, 2001). HIV brings challenges due to the rapidly changing treatment developments and outlook. In addition, this disease is unusual in the extent of stigma associated with it and the fact that HIV is both infectious and potentially fatal. Because of the risk of transmission, major and permanent changes are called for in sexual behavior and/or management of substance use, neither of which may be easily modifiable (Remien and Rabkin, 2001). Most people infected with HIV struggle with issues of disclosure to others, particularly



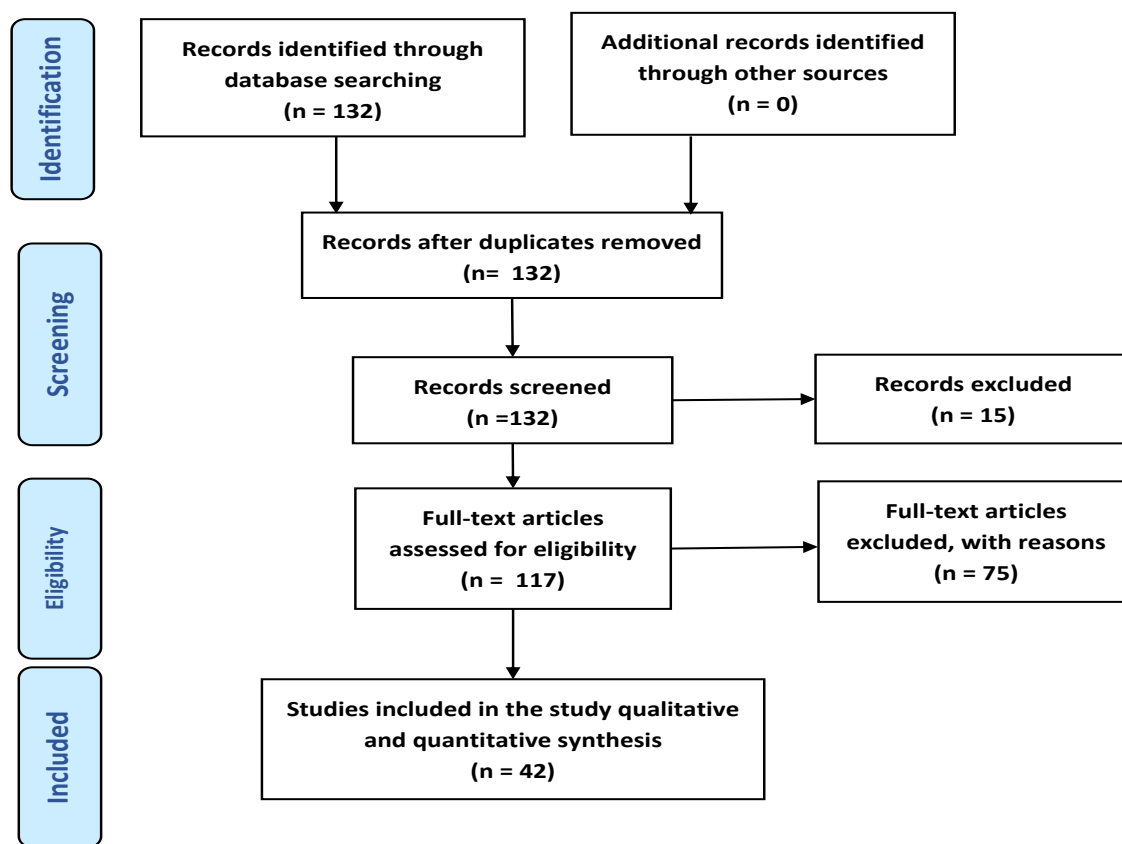
**Figure 1.** Different domains of quality of life in HIV patients (Basavaraj et al., 2010)

when first diagnosed. Typically, when someone is first diagnosed with HIV infection or AIDS, there is a significant decline in sexual interest and activity. Some people however, may want to engage in sexual activity and the process of reengaging in sexual activity and romantic relationships can be difficult because of anxiety over disclosure and fear of rejection from potential partners, fear of infecting others, and negotiating safer sex (Remien and Rabkin, 2001). During specific times in the course of HIV disease, patients are particularly vulnerable to acute distress, such as when first notified of a positive HIV status, the initial onset of physical symptoms, a sudden decline in the number of CD4+ cells, the first opportunistic infection, or the first hospitalization. Continuing to maintain hope in the context of illness progression is a great psychological challenge for patients and care providers.

Depression in PLHIV emerges as a public health issue, the risk of burden on the health care systems and human

resources is significant, especially in SSA. Depression is the most common psychiatric disorder observed among HIV patients and it is one of the most common psychiatric disorders in PLHIV but is neglected in SSA (Abas et al., 2014). A recent editorial in AIDS journal reported evidence on the disability associated with HIV-related depression and insisted on the need to act (Abas et al., 2014). The reasons for this higher risk of depression are numerous, including antiretroviral therapy (ART) side effects, inflammatory processes (Abas et al., 2014), stigma/discrimination related to HIV/AIDS and fear of premature death (Akena et al., 2010). After carrying out a cross-sectional study in an urban setting in Cameroon, results showed that, the prevalence of Major Depressive Disorder (MDD) in Cameroon is as high as that of other HIV-associated conditions, such as tuberculosis and Hepatitis B virus (Gaynes et al., 2012).

Depression occurrence in PLHIV leads to alteration of economic productivity, decrease of working abilities,



**Figure 2.** PRISMA flow diagram showing selection process of articles.

social isolation, physical decline and difficulties in solving problems, again more severely in PLHIV (Abas et al., 2014). Depression has been shown to predict non-adherence to ART (Memiah et al., 2014; Wroe et al., 2015). A recent study reported that non-adherent patients had a 3-fold higher risk of presenting moderate to severe depressive symptoms in comparison to adherent patients (Nel and Kagee, 2013). Studies in Africa revealed that in PLHIV, depression is also associated with poorer health status overall, including low weight gain, low CD4+cell progression (Kingori et al., 2015), suicide (Kinyanda et al., 2012) but also with faster progression to AIDS and increased mortality (Abas et al., 2014).

### Quality of life and physical and environmental domain

Because HIV disproportionately affects individuals during their most productive wage-earning and reproductive period (between 18 and 45 years), its resultant illness and mortality often result in a labor shortage at the household and community levels. Livelihoods dependent on physical labor, such as agriculture, pastoralism, and

fisheries, may therefore be jeopardized when a family member becomes HIV infected (Talman et al., 2013). Studies have documented that families affected by HIV sell off household goods such as livestock as a buffer against lost wages or lower productive value from farm products and livestock as a result of diminished labor capacity (Murphy et al., 2005). The subsequent erosion of household assets leaves families more vulnerable to further economic and health deterioration (Torell et al., 2006) and has been described as resulting in a “downward spiral” of livelihood degradation (Lori et al., 2011; Parker et al., 2009). Even after starting ART and physical recovery, many families are unable to recover socially and economically from the devastating effects of lost labor because of HIV morbidity (Kaler et al., 2010).

Demographic projections of the impact of HIV on population structures reveal dramatic changes in the size, age and sex compositions. Not only will the total population be reduced, but the projected age and sex structure will change, resulting in a population dominated by the elderly and the youth. In many countries, HIV is erasing decades of progress made in improving mortality conditions and extending life expectancies. The average life expectancy in SSA is now 47 years, when it would

have been 62 years without HIV. However, the world bank report for 2016 showed that Botswana has a life expectancy at birth of 66.8 years (UNDP, 2018).

Physically, PLHIV suffer from pain which keeps them uncomfortable. According to the International Organization for Study of Pain (IASP), pain has been defined as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Many people report pain in the absence of tissue damage or any pathophysiological change”. In a cross-sectional study conducted among 422 adult HIV patients in Ethiopia (Azagew et al., 2017), the prevalence of pain was found to be 51.2%. The most common symptoms were headache (17.9%), abdominal pain (15.6%), and backache (13.3%). After carrying out a study in Southern Africa (Botswana, Lesotho, South Africa, and Swaziland) among 743 PLHIV in, pain was reported the most frequently ( $n = 268$ ) (Nonhlanhla et al, 2005). HIV infection usually begins to appear after 2 to 6 weeks in the form of flu-like symptoms accompanied by fever, skin rash, sore throat, swollen glands, joint or muscle pain (Silvana, 2017).

The QoL of HIV patients is affected by the unrelieved, untreated pain they feel due to the virus, side effects of the drugs and the associated psychological, social and environmental problems of the disease. In a study carried out by Brett Moskowitz, most patients who experience body changes do not see such dramatic improvement, and the fear of dying from AIDS is joined or replaced by a fear of becoming alienated from one’s own body (Moskowitz, 2003). Many patients today are more demanding about their treatment and some are really concerned about the way they look, especially with subcutaneous fat loss or lipoatrophy. According to one of the participants interviewed in this study “People are ousted by their faces,” says Vergel, a participant. “Men don’t mind the lipoatrophy as much as women, particularly African-American women”. “Patients stop their treatment because they are terrified of the way they look,” added Vergel. The patients were encouraged by doctors to remain happy and focus on having an undetectable viral loads and high T-cell counts. However, patients experiencing these changes are still very distressed.

### **Adherence to HAART and quality of life**

Access to ARV drugs is increasing among PLHIV in developing countries due to local, national, and international efforts (Oguntibeju, 2012). Adherence to ART has become the cornerstone of the clinical intervention that is available to prevent transmission and slow progression of HIV infection in individuals living with HIV (Oguntibeju, 2012). Interestingly, efforts have begun for a significant scaling up of the use of ART in developing countries, such as those SSA, where the

epidemic has had its most devastating impact. However, questions have been raised about the relationship between quality of life and ART and how this affects the QoL of PLHIV (Oguntibeju, 2012). Achieving a good QoL and a suppressed viral load requires that patients should adhere to their ARTs. This statement has been buttressed by a longitudinal study report that showed that adherence to ART is associated with improved QoL (Mannheimer et al., 2005) and a cross-sectional studies that identified associations between QoL and adherence to ART. A study carried out in Zimbabwe revealed that, Zimbabwean women on ART experience better overall QoL and lower depression (Patel et al., 2009). However, some patients are psychological depressed with the thought that ART is a life-long therapy and side effects associated with HAART such as kidney malfunction as shown in a study carried out by Nsagha et al. (2015). This is because the introduction of combination ART (cART) or HAART has shifted the perception of HIV from a fatal to a chronic and potentially manageable disease. After examining the relationship between structural barriers to ART and QoL among 291 ART users in a study in South Africa, it was shown that there is a significant relationship between structural barriers to clinical attendance and pill taking and various dimensions of QoL. Psychological distress was not found to be a mediator between structural barriers to clinic attendance and indicators of health-related quality of life (Kagee et al., 2014).

The use of ARV is indispensable in reducing the viral load of HIV patients. However, the need of an improved QoL among these patients is still a far fetch objective. QoL of HIV patients is not a luxury but a right to be enjoyed by all patients and should be taken into consideration when administering health care. Health education campaigns should be carried out to inform the general public about the negative impact of stigmatization. This can also be accompanied by counseling sessions among HIV patients. Health care providers at HIV treatment unit should carry out regular assessment of QoL of the patients so as to implement evidence-based strategies of improving QoL. Patients should be encouraged to enroll in HIV support groups. Consequently, improved QoL empowers patients to adhere to treatment, present results of undetectable viral loads and reduce transmission of the virus.

### **Conclusion**

HIV has been presented as a disease that affects the social, physical, psychological and environmental domain of patients thus, hurting their QoL. This review highlighted the need for creating a paradigm shift in thinking about HIV. More emphasis must be placed on the lives and stories of the PLHIV, rather than statistics which are

people and not just numbers. Health care providers need to carry out a close watch over patients to improve on their QoL; they should be aware of the struggles faced by those on HAART, and provide multidimensional support to assure maximum effectiveness of these treatments in light of the realities of their clients' lives.

## CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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**Appendix I****Table 1.** Articles Reviewed with respect to the Different Domains Affecting the Quality Life of HIV Patients

<b>Authors</b>	<b>Title</b>
<b>Social Domain</b>	
<u>Dejman.</u> , et al., 2015	Psychological, Social, and Familial Problems of People Living with HIV/AIDS in Iran: A Qualitative Study
Kontomanolis et al., 2017	The social stigma of HIV–AIDS: society’s role
Forouzan et al., 2013.	Social Support Network among People Living with HIV/AIDS in Iran
Kalichman et al., 2003	Stress, social support, and HIV-status disclosure to family and friends among HIV-positive men and women
Gerbert et al., 1991;	The impact of who you know and where you live on opinions about AIDS and health care. Social Science and Medicine
Goldin, 1994	Stigmatization and AIDS: critical issues in public health
Greeff et al., 2008	Disclosure of HIV status: experiences and perceptions of persons living with HIV/AIDS and nurses involved in their care in Africa.
Herek and Glunt, 1988	An epidemic of stigma. Public reactions to AIDS
William et al., 2005	The Stigma of Being HIV-Positive in Africa
Campbell et al., 2007	Dying Twice’: A Multi-level Model of the Roots of AIDS Stigma in Two South African Communities
Neville Miller and Rubin, 2007	Factors leading to self-disclosure of a positive HIV diagnosis in Nairobi, Kenya: people living with HIV/AIDS in the Sub-Sahara
<u>Akinboro et al.</u> , 2014	Quality of life of Nigerians living with human immunodeficiency virus
Dessie and Deresa, 2012	Sexual practices of HIV-positive individuals attending antiretroviral treatment (art) in Addis Ababa public hospitals: findings from in-depth interview
Hankins et al., 1997	Sexuality in Montreal women living with HIV
Shamspour et al., 2010	Relation Between Sexuality and Health-Related Quality of Life
<b>Psychological Domain</b>	
Abas et al., 2014	Depression in people living with HIV in sub-Saharan Africa: time to act
Akena et al., 2010	A comparison of the clinical features of depression in HIV-positive and HIV-negative patients in Uganda
Gaynes et al., 2012	Prevalence and Predictors of Major Depression in HIV-Infected Patients on Antiretroviral Therapy in Bamenda, a Semi-Urban Center in Cameroon
Kingori et al., 2015	Depression symptoms, social support and overall health among HIV-positive individuals in Kenya.
Kinyanda et al., 2012	The prevalence and characteristics of suicidality in HIV/AIDS as seen in an African population in Entebbe district, Uganda.
Memiah et al., 2014	The effect of depressive symptoms and CD4 count on adherence to highly active antiretroviral therapy in sub-Saharan Africa
Nel and Kagee, 2013	The relationship between depression, anxiety and medication adherence among patients receiving antiretroviral treatment in South Africa.
Remien and Rabkin, 2001	Psychological aspects of living with HIV disease
Sana A, 2015	HIV and Psychological Issues
Wroe et al., 2015	Depression and patterns of self-reported adherence to antiretroviral therapy in Rwanda
<b>Physical and Environmental Domain</b>	
Azagew et al., 2017	High prevalence of pain among adult HIV-infected patients at University of Gondar Hospital, Northwest Ethiopia
Lori et al.,	Adult Mortality and Natural Resource Use in Rural South Africa: Evidence From the Agincourt Health and Demographic Surveillance Site. Society & Natural Resources
Kaler et al., 2010	“Living by the hoe” in the age of treatment: perceptions of household well-being after antiretroviral treatment among family members of persons with AIDS
Talman et al., 2013	Interactions Between HIV/AIDS and the Environment: Toward a Syndemic Framework
Torell et al., 2006	Examining the linkages between AIDS and biodiversity

**Table 1.** Contd.

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Nonhlanhla., 2005	HIV/AIDS Symptom Management in Southern Africa
Silvana.2017)	Effects of HIV: What happens to the body
Moskowitz	Living with HIV Therapy: Effects of HIV Infection and Treatment on Physical Appearance and Body Image
Parker et al., 2009	A Qualitative Study of the Impact of HIV/AIDS on Agricultural Households in Southeastern Uganda.
Murphy., 2005	How Do We Know What We Know about the Impact of AIDS on Food and Livelihood Insecurity? A Review of Empirical Research from Rural Sub Saharan Africa

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