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Trends in People Living with HIV in the Face of Economic Recession Caused by COVID-19

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Abstract: ***Background: AIDS remains a public health problem. Soon after outbreak of COVID-19 scientists rapidly investigated different dimensions of the pandemic. However, little has been done to screen People Living with HIV (PLHIV) in rural and urban areas vis-à-vis the economic shock. Material and Methods: We conducted cross-sectional research to explore this knowledge gap through a comparative analysis of status quo of patients enrolled in antiretroviral services. Ten healthcare professionals were interviewed and 477 patients inquired in Nampula. Results: Before COVID-19 23.7% (n=154) patients were unemployed, 40% (n=191) self-employed with low-income, and 20.2% (n=96) employed. The situation prevails as it was before the pandemic for 67.7% (n=317) patients. Overall income drop is fixed in 73.8% (n=352) with 51.7% (n=182) for rural patients. Significant difference was found in eating difficulties in patients by gender (p. <0.05). Extremely in-need patients receive support from relatives (70.8%, n=119) or neighbour (3.6%, n=6) being female more vulnerable (78.4%, n=98). Conclusion: COVID-19 slowed down patients' income and worsened food insecurity. In light of this evidence, we predict that achievement of UNAIDS 90-90-90 targets by 2030 may also be slowed down, calling for actions to reverse the scenario.***

Keywords: PLHIV, Antiretroviral therapy, COVID-19, Economic shock, Rural and Urban areas.

1. Introduction

As of mid-December 2019, the outbreak of coronavirus disease 2019 (COVID-19) caused by SARS-COV-2 in Wuhan, China evolved overtime and triggered worldwide humanitarian crisis [1]. The pathogenicity and rapid spread of SARS-COV-2 has caused rupture of sanitary systems [2] and economies in the world [2, 3]. Recession of the most robust economies have increased susceptibility of chronic patients such as people living with HIV (PLHIV) [4]. People infected by HIV have suppression of immune system and increased HIV plasma viral load [5] due to increment of viral replication rate. Immunosuppression lead to higher risk of developing both AIDS-related and non-AIDS-related clinical events [6, 7].

As of 2015, the World Health Organization (WHO) recommends that HIV-infected adults should receive antiretroviral therapy (ART) right away irrespective of their CD4 count in order to enhance immunity recovery and prevent deleterious effect of opportunistic diseases. After commencing ART, the expected outcome is immunological recovery by durably suppressing viral replication [8]. With regard to recovering events, ART acts blocking key biochemical pathways of HIV replication mechanisms enabling immunity recovery. Meanwhile, several factors can be associated with immunological recovery [6] including food quality and lifestyle. While suppressing virus replication, both cellular and antibody-mediated immune mechanisms are activated to control the virus and other infectious agents. The efficiency of this process relies on the availability of substrates provided by the food. Nutrients play key roles on cell division and protein synthesis which are necessary for the immune mechanisms. However, COVID-19 outbreak has affected world economies in a cascade-like mechanism depleting family's food purchasing power, mainly in developing countries. Literature shows that severe pandemic causing more than a 25% reduction in labour availability could generate significant food shortages across the globe [9]. Food shortage either in quantity or quality may curtail patients' immunity recovery and increase morbidity, mortality, as well as transmission of the virus.

Although, high active antiretroviral treatment (HAART) decreases significantly viral load [10, 11] there are still side-effects such as occurrence of malnutrition among patients, and cytotoxicity of the antiretroviral agents delaying immune recovery [12]. Remarkably, patients have for long reported poverty as one of the reasons for ART dropout, though recent reduction of daily pills burden may probably minimize the problem. It is against the above background that we sought to understand the trends in patients enrolled in ART services during the course of COVID-19 pandemic in rural and urban areas in Nampula, northern Mozambique.

2. Literature Survey

Acquired immunodeficiency syndrome (AIDS) caused by human Immunodeficiency virus (HIV) is a public health problem. About 37.7 million [30.2 million–45.1 million] people globally were living with HIV in 2020. Of this, 680 000 [480 000–1.0 million] people died from AIDS-related illnesses. In the same year, 1.5 million [1.0 million–2.0 million] people became newly infected with HIV [13]. In this regard, 28.2 million people were accessing antiretroviral therapy as of 30 June 2021. Overall, 79.3 million [55.9 million–110 million] people became infected with HIV since the start of the epidemic, while 36.3 million [27.2 million–47.8 million] people have died from AIDS-related illnesses [14]. Patients with poor immune recovery have a higher risk of developing both AIDS-related and non-AIDS-related clinical events [6]. HAART is increasingly efficient at reducing HIV-1 load. Currently, even with salvage therapy, up to 90% of treated HIV-1–infected adults are “aviremic”. ART reduces mortality and morbidity among HIV positive individuals as well as the onward transmission of HIV [10]. Despite advances on this domain, studies are stressing that HIV-positive individuals tend to develop malnutrition and low levels of serum selenium [15]. Selenium is reported to reduce significantly cellular oxidative stress [16]. Additionally, ART is also associated to an increase in malnutrition [17].

While efforts are in hand to grapple with HIV, COVID-19 caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) turned an unprecedented threat to global health, challenging the robustness of health systems [2, 3] and overall economy as a whole [3, 18]. COVID-19 is also a public health problem potential to exacerbate worldwide food insecurity [19] and malnutrition [20] due to its economic impact. Although a huge number of literature state that strong social distancing measures reduced cases of COVID-19 [21], global economic shock has widely been predicted. BisongBA, Ahairwe PE, Njoroge E, 2020 [22] cite various international organisations’ prediction of a loss in output for African countries. For instance, they state that United Nation Economic Commission for Africa (UNECA) forecasted Africa’s Gross Domestic Product (GDP) growth to fall from 3.2% in 2019 to 1.8% in 2020. The World Bank (WB), as cited by Zeufack and co-workers, 2020, predicted sub–Saharan Africa’s real GDP growth to sharply decline from 2.4% in 2019 to-2.1% in 2020, while the International Monetary Fund (IMF) expected a decline from 3.1% in 2019 to-1.6% in 2020 [23]. The authors explain different times at which they have been made and the different methodologies used to make them as the main reasons for variation of these forecasts. They further point that with the prevailing uncertainty on when the pandemic will end, the actual loss in GDP growth could really be higher than estimated. Globally, according to the WB remittances are expected to decline by about 20%, while in sub-Saharan Africa alone, are projected to decline by 23.1%. The International Labour Organization (ILO) announced that between 5.3 million and 24.7 million jobs will be lost because of the economic crisis caused by COVID-19, and this deterioration in employment also means a large loss of income between $860 billion to $3.4 trillion by the end of 2020 [24, 25].

Economic shock has direct impact on family income particularly in developing countries, as it drives toward loss of employment, and reduction of purchasing power of basic food stuff [25, 26]. The situation may worsen when it comes to an individual with additional food intake needs such as PLHIV. As reported, balanced food intake during the progression and recovery from any illness is important for improvement in health outcomes [27]. Malnutrition dampens the immune system, increases mortality, hospital length of stays, and the risk of unplanned hospital readmission [20].

Unemployment or having an unstable job has been positively associated to health care dropout [28]. The majority of dropouts are due to loss to follow-up [12]. High rates of loss to follow-up is an important threat to the success of HIV treatment programs, as patients that are lost can interrupt their treatment, resulting in further disease progression, continued HIV transmission, and death [14]. Likewise, high rates of loss to follow-up complicate program evaluation by biasing mortality estimates [29]. This scenario may counteract the UNAIDS90–90–90 targets, which include 90% of the people living with HIV know their HIV status, 90% of the people who know their HIV status receiving ART and 90% of the people receiving ART having suppressed viral loads by 2030 [7].

3. Methodology

3.1 Study Design and Sampling Procedure

We performed cross-sectional research with quantitative approach in ten healthcare services based in rural and urban areas in Nampula, northern Mozambique. We analyzed records relating to patients on ART, conducted interviews with healthcare professionals in charge of ART services and applied questionnaires to 477 patients during their regular medical consultations. Data were collected in the second half of 2021 by research assistants previously trained on ethical principles and relevant issues related to data collection. The applicability of the questionnaire was assessed through a pretest conducted with fifteen PLHIV at Hospital Geral de Marrere, Nampula.

3.2 Eligibility Criteria

Of the health centres included in this study, five are located in the urban area and five in a rural area, Nampula city and Memba respectively. The urban area is a point of convergence, as it encompasses people from various parts of the country, while the rural area concentrates people from the coast. To come up with the sample, we included PLHIV

enrolled on ART service for at least six months from the date of data collection period. Subjects who could not respond the questionnaire by themselves were not included.

3.3 Ethical Considerations

The study was approved by the Lúrio University Human Research Ethics Committee. Ethical procedures were observed based on the World Medical Association Declaration of Helsinki Ethical, Principles for Medical Research Involving Human Subjects, 2013. In addition, COVID-19 prevention measures were strictly observed during the data collection.

3.4 Data Analysis

Data were treated through descriptive and inferential statistics. Frequencies were calculated and graphs constructed using a statistical package, Jamovi version 1.6.23. A confidence level of 95% was set, and a cut-off value of 0.05 for the p-value. For inference, we performed Shapiro-Wilk normality test and ANOVA.

4. Results and Discussion

In this study, we sought to understand the trends in patients enrolled in ART services vis-à-vis the economic shock caused by COVID-19. Ten healthcare professionals in urban and rural areas were interviewed to evaluate consultation frequency per day of patients before and during COVID-19 pandemic. The average number of patients attending ART services before the pandemic was 40 [Urban Area=56 (min.0 max.100); Rural Area=26 (min.0 max.60)] and during the pandemic 26 [Urban Area=44 (min.0 max.60)]; Rural area=12 (min.0 max.25)]. Absences in treatment was mostly reported for females compared to males in an overall ratio of 5: 3. Beyond broadly known reasons, safety measures due to COVID-19 such as quarterly ART dispensation, staff rescheduling and fear to go to the hospital due to panic were also pointed.

There are Differences in HIV Prevalence by Age Group in Rural and Urban Areas

In total, we included 477 patients, 46.1% (n=220; 109 males and 111 females) from rural and 53.9% (n=257; 74 males and 183 females) from urban area. The overall age group mostly affected is between 31 and 35 years old, in line with the age range reported by Qiao and co-workers, 2019 [30] in a study carried out in China. However, an analysis by area, showed that in rural area 26 to 30 years old is the age group mostly affected, while in urban area age is fixed between 31 and 35 (Figure 1). Data suggests that the differences in infection by age group may be associated with different periods when young people start active sexual activity. Generally, active sexual activity in rural areas starts earlier than in urban areas. Other important factors are difference of information on safe sex, and deficiency of communication about sex with parents as described in a study by Muhwezi and co-workers, 2015 [31].

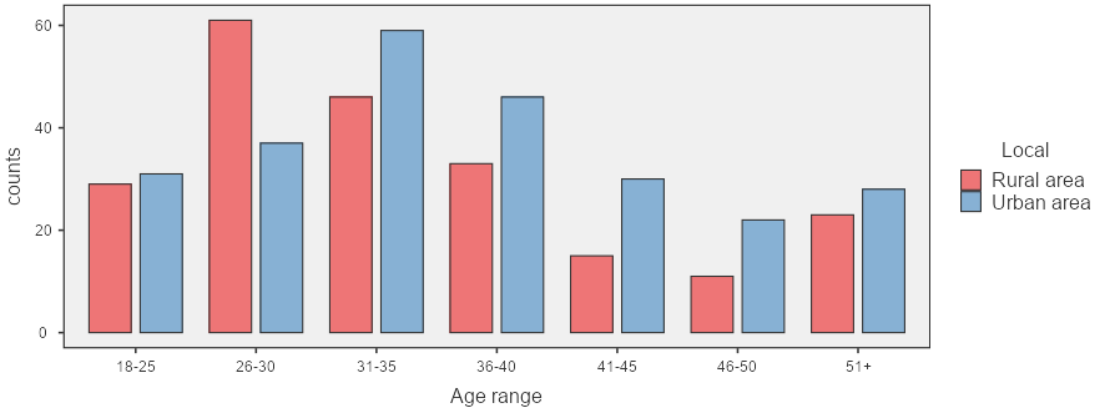

Figure 1: Age range by sex of individuals enrolled on ART services in rural and urban areas. Data show that individuals of 26-30 and 32 to 35 age group are the most affected.

Patient's Level of Education in Rural Area is Lower Than in Urban Area

Most patients (34.6%, n=165) are illiterate, 29.8% (n=142) have primary school, 17.4% (n=83) basic level, 14.3% (n=68) high school, and only 4% (n=19) have university level (Figure 2). On average, females are the most illiterate (64.8%, n=107) than males are (35.2%, n=58). Participants from rural area are the most illiterate (62.4%, n=103). Low level of female literacy may be explained by the assumption that females are prone to premature unions and home care, what often halts their school attendance. Education is an important factor for compliance with treatment for any disease. High rate of illiteracy hints the risk of increased treatment dropouts. In fact, illiteracy has been associated to high-rate ART dropout, and, thus, loss to follow up [31, 32].

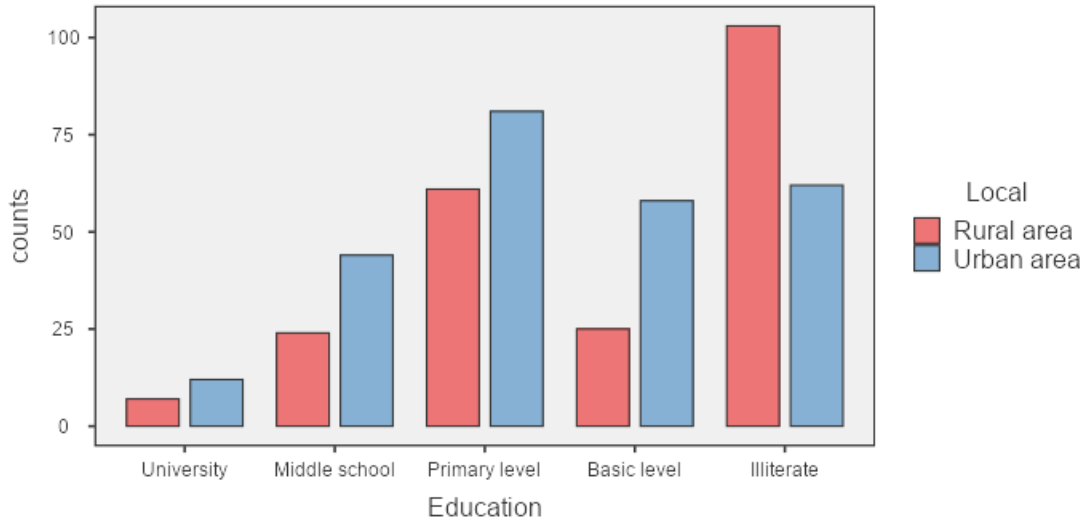

Figure 2: Patients' education. Most patients from rural area are illiterate compared to urban area

Unemployment and Low-income Commerce are Dominant among PLHIV

Most patients were self-employed (40%, n=191) before COVID-19 outbreak. Other 23.7% (n=154) were unemployed, 8.6% (n=41) domestics, 10.3% (n=49) public employee, 9.9% (n=47) private employee, and 7.5% (n=36) peasant. Unemployment is frequent among females (76.9%, n=87) than males (23%, n=26) in line with a study carried out by Mafuro (2018) [33] in Botswana. Similarly, self-employment is high among females (53.9%, n=103) than males (46.1%, n=88) (Figure 3). Regarding to the area, unemployment is slightly high in urban area (53.1%, n= 60) than in rural (46.9%, n=53), as is self-employment in urban area (59.7%, n=114) than in rural area (40.3%, n=77) (Figure 4). We explored source of food acquisition for those who indicated that had not a profitable activity (n=168). We found that the majority receive help from a relative (70.8%, n=119) or a neighbour (3.6%, n=6), while others said have no help at all (25.6%, n=43). An analysis by area indicated that patients from urban area receive more help from relatives (64%, n=80) than those from rural area (36%, n=45). Likewise, patients from the urban area who do not receive help at all represent the majority (60.5%, n=26) against 39.5% (n=17) from rural area. Of those receiving a kind of help, females represent 78.4% (n=98). Similarly, females who receive no help are the majority (67.4%, n=29).

We, then, questioned whether or not their relative has a job. Of 119, 81.5% (n=97) responded affirmatively, while other 18.5% (n=22) was negatively. Of those who are working, 52.9% (n=63) are in urban area, while 28.6% (n=34) in rural area, similar to what was reported by Mueller and co-workers, 2020 [34] in a study with rural population. Regarding the nature of activity, 73.5% (n=72) represents self-employment, 15.3% (n=15) private employment, 9.2% (n=9) public employment, and 2.0% (n=2) domestics.

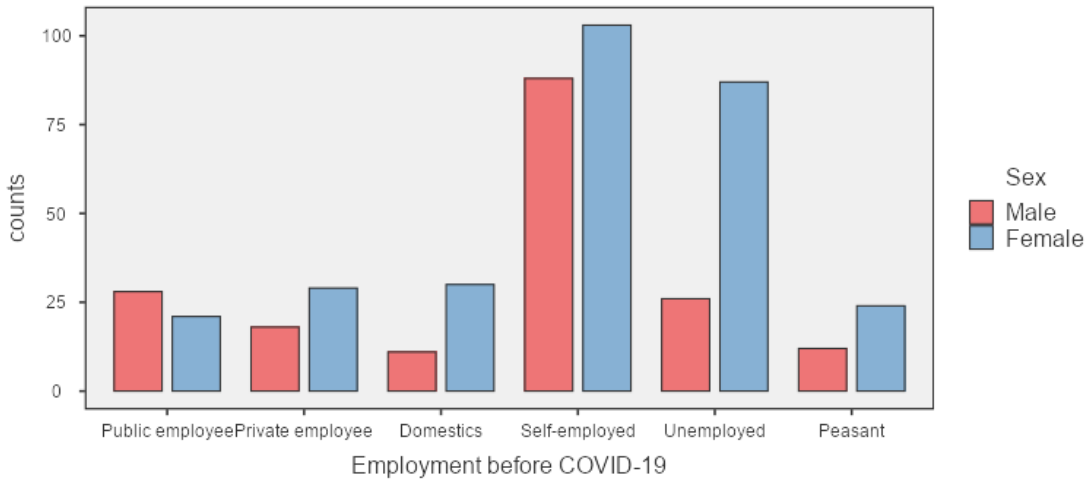

Figure 3: Employment of PLHIV before COVID-19 pandemicby sex. In this category females are those with high rate of unemployment and self-employment

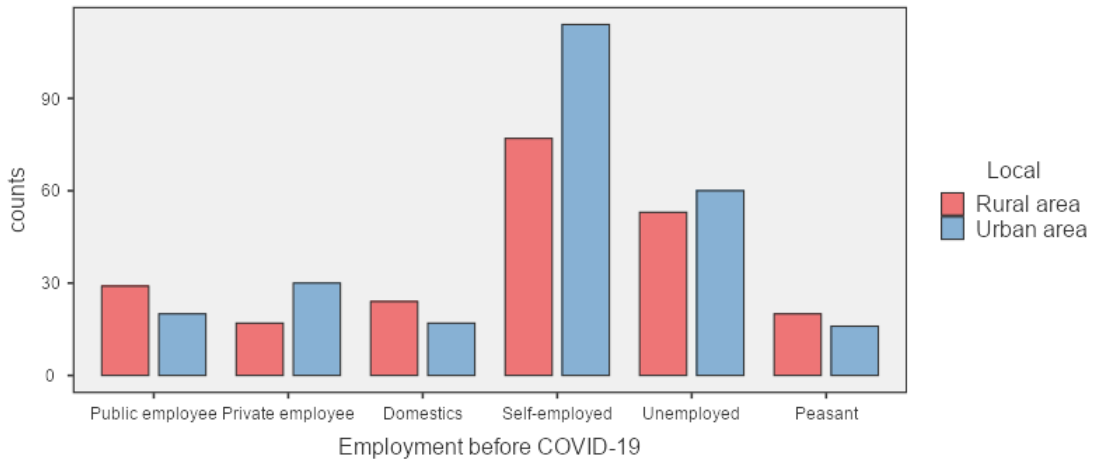

Figure 4: Employment of PLHIV before COVID-19 pandemic by area. Data show that self-employment is higher in urban area

COVID-19 Pandemic has Impacted Patients Enrolled on Antiretroviral Services

Prior to COVID-19 pandemic, rural households already struggled economically compared to their metropolitan counterparts [34]. Thus, we explored whether or not personal or family income was affected by the COVID-19 outbreak. The majority (73.8%, n=352) stated their income was negatively impacted, 21.6% (n=103) reported no change, while only 4.2% (n=22) referred an increment of income. Patients in rural area had slightly more income drop (51.7%, n=182) than those in urban area (48.3%, n=170). We asked whether drop on personal or relative's income have directly affected the quality and quantity of daily food (n=388). The income drop affected the quality or quantity of food for 65.2% (n=253) patients, 16.2% (n=63) said was not affected and 18.6% (n=72) said more or less.

As stated by Mueller and co-workers, 2020 the ongoing COVID-19 pandemic has generated worldwide social and economic upheaval [34]. Thus, we explored whether or not patients still carry out same activity as before the pandemic. Of 468 patients who answered to this question, 67.7% (n=317) stated still carrying out same activity, 21.6% (n=101) have dropped the activity, while 10.7% (n=50) sometimes practice the activity (Figure 5). Investigating the maintenance of activity by gender, females were the most active during COVID-19 (58%, n=184) than males (42%, n=133). Patients from urban area have maintained their activities (56.2%, n=178) than those from rural area (43.8%, n=139). Others from the urban area have not maintained their activities (59.4%, n=60) against 40.6% (n=41) in rural area. We conducted an ANOVA test and found no significant difference in the development of activities during COVID-19 between males and females (p. >0.05), but significant difference was found between rural and urban areas (p. <0.05).

Difficulties in buying food was mentioned by 57.7% (n=116) patients in rural area and 42.3% (n=85) in urban area being females, on average, most affected (59.9%, n=211) (Figure 6). No matter if patients report still carrying out same activity as before COVID-19 outbreak, it should be noted that mostly it is low-income self-employment, what stresses their vulnerability for food insecurity. Although COVID-19 has impacted PLHIV both in rural and urban areas, in general, there is no significant differences on income drop by gender (p. >0.05).

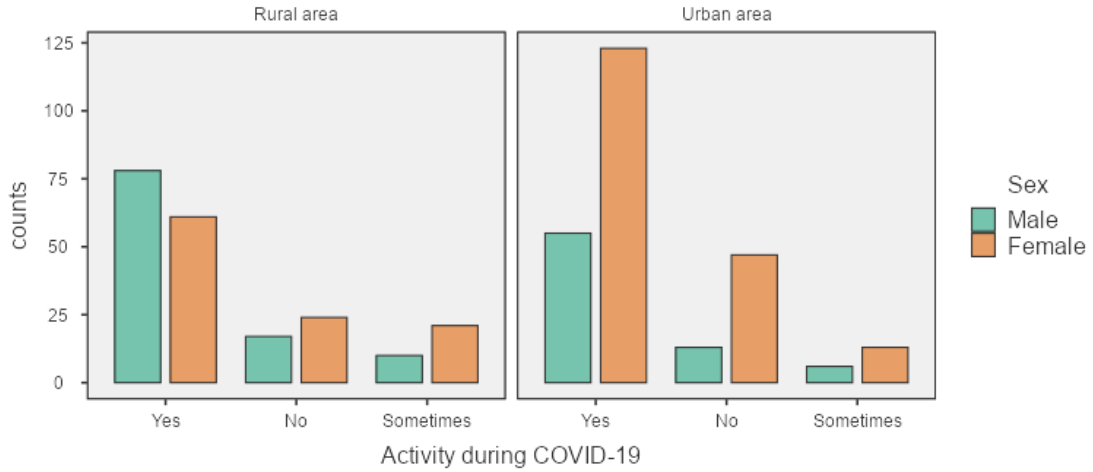

Figure 5: Patients' activity during COVID-19 pandemic by region and sex. Patients still carrying out the same activity as before COVID-19 are the majority. Activities mainly include low-income commerce.

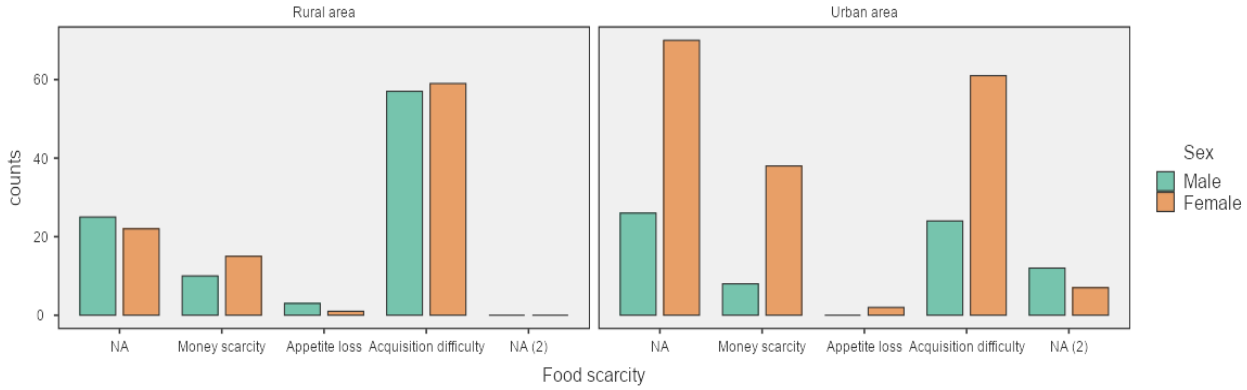

Figure 6: Reasons of food scarcity for PLHIV. Most patients from rural area reported to have difficulties in buying food compared to those from urban area. *NA=not applicable

Poverty is the Main Reason for Food Insecurity among PLHIV

We, then, explored the reasons of food shortage during COVID-19. Of 278 patients answering this question, 72.3% (n=201) pointed poverty as the main reason for food shortage [Rural area: 57.7% (n=116) and Urban area: 42.3% (n=85)]. More females pointed poverty (59.7%, n=120) than males (40.3%, n= 81). Similarly, a study carried out by Sharma and co-workers, 2010 [32] found poverty as the main reason for food scarcity when working with HIV patients in India. ANOVA test showed significant difference in eating difficulties between patients from rural and urban areas, and by gender (p. <0.05). Food insecurity is an important factor for the development of malnutrition. As also reported by Kurtz and co-workers, 2021 when addressing impact of COVID-19, malnutrition dampens the immune system, increases mortality [21]. Finally, non-COVID-19-related reason such as climate change was referred by 13.5% (n=5) patients.

5. Conclusion and Future Scope

Many patients enrolled on ART services were unemployed or self-employed with low-income commerce or practiced agriculture before COVID-19 outbreak. During the pandemic most of them stated still carrying out the same activity as before, and their income has decreased considerably. Difficulties in acquiring food are expressed in rural areas, with female being most affected. These findings suggest an increased risk of losing patient follow-up, what could threaten the achievement of the UNAIDS 90-90-90 targets by 2030. However, longitudinal study could help to understand in depth to what extent combination of lack of food and ART can worsen the impairment of immunity, and the rate of treatment dropout.

6. Conflict of interest

The authors declare no conflict of interest regarding the publication of this paper.

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