# Impact of Environmental Pollutants on Health in HIV Patients Who Consume Alcohol: A Case Study of Vwang District

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## Abstract

This study looked at how people in Vwang District of Jos South Local Government Area of Plateau State, Nigeria, drank alcohol, were exposed to the environment, and had health problems. 399 individuals from a variety of socio-demographic groups participated in a cross-sectional survey. The results showed that 53.5 percent of respondents were female and 46.5% were male. The majority of respondents (39%) were between the ages of 36 and 45, most were married (52.5 percent), and most were traders who worked for themselves. The majority (32.5%) had a National Certificate of Education, with a fairly even distribution of educational attainment. Surprisingly, 97.1% of respondents reported having consumed alcohol recently. Beer was consumed by 55.1 percent of respondents, followed by palm wine (26.2 percent) and spirits (18.7%). Consumption patterns varied, with 25.6% drinking daily and an equal percentage occasionally. 85.3% of HIV-positive respondents reported drinking within the first year of diagnosis, indicating that they continued to engage in risky behavior despite being vulnerable to health risks. Environmental challenges identified included industrial and vehicle emissions (26.4%), household cooking smoke (56.7%), contaminated water (19.5%), and poor waste disposal (14.9%). 61.8 percent of participants concurred that these exposures and alcohol use were perceived to worsen health outcomes. Reported health complications included fatigue (56.7%), breathing difficulties (16.7%), and frequent infections (8.2%). Encouragingly, 84.9% of respondents had received medical advice on avoiding alcohol and pollutants, and 51.5% demonstrated very high awareness of the associated risks. Preventive measures such as mask use (56.7%) and water filtration (31%) were adopted by many respondents, although persistent alcohol use limited their effectiveness.

The findings highlight the complex link between socio-demographics, alcohol consumption, environmental exposures, and health vulnerability. Reduce the compounded risks that Jos South residents face by implementing specific interventions that focus on health education, behavior modification, and policy enforcement.

## Keywords

Alcohol Consumption, Environmental Pollutants, HIV, Health Risks, Jos South, Nigeria, Preventive Measures

## 1. Introduction

Environmental pollutants interrelate with alcohol used and HIV infection to create a complex multifaceted risk to health that is only commencement to be understood. Persons that leaves with HIV (PLWH) already have knowledge of immune dysregulation and advance rate of comorbidities, alcohol Additional fades mucosal and complete immunity, degenerate ART devotion and hastens gastrointestinal and hepatic injury alleyways that escalate this exposure to pollutant driven risk [1].

Nevertheless air and Domestics pollutant (PM2.5, $NO_2$, CO and similar emissions) have been associated to advanced HIV related death and poorer respiratory and cardiovascular consequences in HIV affected inhabitant, demonstrating that pitiable air eminence can enlarge the medical load for PLWH [2].Toxic metals and foodborne toxins, such as lead, cadmium, mercury and aflatoxins have been dignified at high levels in some Nigerian PLWH cohort and are links with oxidative anxiety DNA damage and inflammatory indicators that reasonably relate with HIV pathophysiology [3,4].

Developing evidence also advocates that routine factors like alcohol used strengthen the biological toxicity of environmental chemicals. Alcohol can alter metabolism, rise gut penetrability and potentiate inflammatory replies so that joint exposure yield poorer consequences than single exposure alone [5,4]. Locally Vwang district faces documented worries about excess taken alcohol consumptions and environmental pressure from mining and associated activities, nonetheless there are no published studies directly examining how environmental pollutant affect health result exactly among HIV positives drinkers in Vwang [6,7].

Both the present and existing literature of this research topic is highly underlines the entangled effect of environmental exposure and alcohol consumptions on HIV related consequences predominantly in low resources area.

Previous studies have acknowledged how pollutant from air, water, soil and food such as heavy metals, mycotoxins and insistent organic pollutant can compromise immune functions hasten disease development and high comorbidities in people living with HIV [8,9]. Current investigations highlight that alcohol used among PLWH remains an important contest with strong association to pitiable ART devotion, advance viral load, and greater susceptibility to unscrupulous infections [10,11]. Developing evidence advocates that joint load of environmental contaminant and risky alcohol use could have synergistic effect on immune destruction disease consequences, yet combined research on these overlapping risk remains scarce scarce [12]. Currently there is rising call for multidisciplinary studies that combined environmental monitoring and biomarkers analysis to notify targeted interferences mostly communities like Vwang where socio-environmental and behavioral harm converge. Therefore future research should adopt longitudinal and interventions based designs to examine causal pathways, evaluate the effectiveness of combined environmental and behavioral risk reduction strategies, and develop locally adaptable models for improving HIV care outcomes in environmentally challenged and high-alcohol-use populations.

## 2. Statement of the Problem

HIV remains the main public health contest worldwide and in Nigeria with a lot of infected persons facing numerous health intimidations due to immune defeat and links with comorbidities [13]. In tallying to the physiological load of HIV, alcohol consumptions is dominant among persons living with HIV (PLWH) in so many societies today, including those in plateau state, and it is known in compromising antiretroviral therapy (ART) devotions, fade immune functions hasten organ damage [1]. At a moment / period environmental pollutant like airborne particulate matter, toxic metals and foodborne contaminant are highly predominate in rural and peri-urban areas like Vwang district due to mining activities , pitiable waste management and unfettered industrial release [2,7]. Sign indicate that both alcohol and environmental toxins can independently degenerate health consequences in PLWH, with investigation associated with heavy metals exposure and aflatoxins contamination to oxidative anxiety immune dysregulation and amplified viral replication [3,4].

Moreover, there is a shortage of empirical investigation in Vwang District scrutinizing immediate exposure to environmental pollutants and alcohol use exactly affect the health of HIV positives persons. Furthmore existing studies have addressed either environmental health harms or alcohol related problems in HIV distinctly, without assimilating both factors in a local context [6].

## 3. Material and Method

### 3.1 Research Design

Cutting-edge opinion of the essential for an inclusive and however humble investigation effort, the investigation approved a descriptive investigations techniques. A descriptive investigations techniques is commonly used where the theme problem of the learning such as the one selected in this investigations exertion necessitate a detailed descriptive of occasion variables singularity and noticeable feature. The approved questionnaire structure for this learning in order to refuge of the people.

### 3.2 Study Setting

The vwang district of Jos South Local Government Area of Plateau state was the place where this research was carried out. The district has protruding adminstratives and cultural region inside the Jos South Local Government area of Plateau state Nigeria(Figure 1). The state is been cited in the north geopolitical central region, Vwang is illustrious by it diverse communities, rich cultural heritage, and geography environment. The location of Vwang district situated at about $9.68572^0$ north latitude and $8.73985^0$ east Longitude, with a height of about 1,301 meters (4,268ft) above sea level. This high topography adds to it temperate weather and scenic landscapes distinctive of Jos plateau region. While the total people of Vwang District is about 458,100 by 2022. There several villages under Vwang District of Plateau state Nigera which include: Barikin, Turu, Changwi Tawo, Chugwi, Dagai, Daggshet, Danchugwi, Dandyes, Fwil Vwang Kogot, Gott, Hwen, Kaduna Vom, Kogom, Lo Ngeng, Lo-Kun, Rawuk, Tunu Gozok, Tura Chwe, Turu Gweh, Turu Lah These communities contribute to the district's cultural diversity and social fabric.

Vwang District is a home for Mupun people but dominate by Birom people and this district is a center for cultural event that celebrated mupun heritage including festivals that showcase traditional music, dance and attire they temperature of the area is relatives cool due to annual rainfall ranges between 1,347.5 mm and 1,460 mm. Vegetation in Vwang District is characterized by grassland and guinea savannah trees, with species such as olive, acacia, eucalyptus, and cactus. The fertile soil supports the cultivation of crops like Irish potatoes, maize, acha, millet, and sweet potatoes.

Healthcare in Vwang is supported by facilities like the Vom Christian Hospital, a tertiary healthcare center located within the district. The hospital offers various medical services, including medical, surgical, pediatric, obstetrics, and gynecology services.

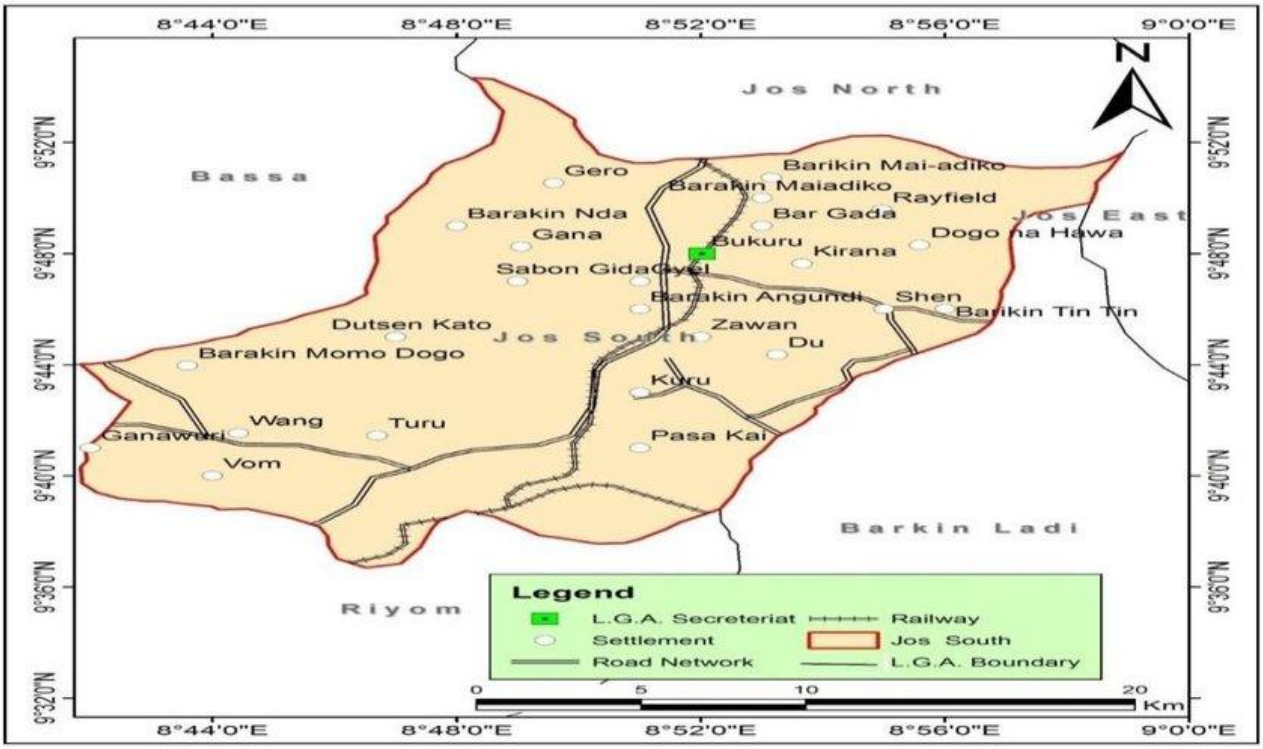


**Figure 1.** Map of Jos South Local Government Area of Plateau State, Nigeria

### 3.3 Study Population

In these study population the investigator used Vwang District of Jos South Local Government area of Plateau state.

### 3.4 Sampling Size and Sampling Techniques

A total of 399 respondents, include residents, business owners, and local government officials are selected for the study. The sample size will determined using the Taro Yamane formula:

$$n = \frac{N}{1+N\,€^2}$$

Where;

n = sample sizes

N = population sizes ( 458,100 people)

e = margin of error (0.05)

$$n = \frac{458{,}100}{1 + 458{,}100\ (0.05)^2} = \frac{458{,}100}{1 + 458{,}100\ (0.0025)} = \frac{458{,}100}{1145.2525} = 399$$

The sampling technique involves a stratified random sampling method, where resident, business owners, local government officials and community members serve as strata. A proportionate random sampling method was used within each stratum to ensure fair representation of participants from different areas.

### 3.5 Instruments Design

A questionnaire was used by the researcher to obtain the needed information.

These instruments will enable the researcher to collect the necessary information from the respondents.

### 3.6 Method of Validating Instrument

The instrument was validated by the Head of the Department of Environmental Health, with corrections and input incorporated into the final draft of the questionnaire.

### 3.7 Method of Data Collection

The data was collected through the help of a structure questionnaires that was design by the researcher during the research work.

### 3.8 Method of Data Analysis

The primary data collected was subjected to descriptive statistical tools for analysis such as frequency distribution table, percentages and charts.

### 3.9 Limitation of the Study

**Financial constraint:** The scope of the research required extensive data collection, including visits to various communities within the district, interviews, and the procurement of relevant materials. However, the limited budget available significantly restricted the ability to reach all intended areas. Transportation costs, especially in a geographically spread-out of Jos South, were substantial, and due to funding limitations, some communities could not be fully covered. Additionally, costs related to printing, communication, and logistics also posed a challenge.

**Time constraint** also served as a notable limitation. The timeframe allocated for this study was not sufficient to carry out an exhaustive and in-depth investigation of all the communities within the district. Fieldwork and data analysis are time-intensive, and the pressure to meet deadlines meant that some data had to be summarized rather than explored in more detail. This time pressure also limited the number of follow-up interviews or validation exercises that could have been conducted to ensure the accuracy of the findings.

Language and communication barriers were also encountered, especially in communities where local dialects dominate communication. In some instances, interpreters were needed, which may have influenced how questions were translated and responses interpreted, potentially affecting the authenticity of the information collected.

## 4. Result and Discussion

### 4.1 Data Presentation

This chapter present and analyze the data collected from the field survey. A total of 399 questionnaires were administered to the respondents out of which 390 were successfully retrieved while 4 questionnaires were not properly filled and 5 were not retrieved. This gives a response rate of 97.7% which formed the basis for data analysis in this chapter. From the final analysis the researcher uses 390 successful retrieve questionnaire for the analysis.

**Table 1.** Socio Demographic Characteristics of the Respondents

| **Sex** | **Frequency** | **Percentage** |
|---|---|---|
| Male | 283 | 72.6 |
| Females | 107 | 27.4 |
| **Total** | **390** | **100** |

From table 1: 93 respondent represent (46.5%) were male and 107 respondent represent (53.5%) are females.

**Tables 2.** Employment status of the respondent

| **Employment status** | **Frequency** | **Percentage** |
|---|---|---|
| **Self-Employ** | 120 | 30.8 |
| **Employed** | 200 | 51.3 |
| **Unemployed** | 70 | 17.9 |
| **Total** | **390** | **100** |

Table 2: reveals that 84 respondent represent (42%) of them were self-employed, while 78 respondent represent (39%) were employed, and only 38 respondent represent (19%) were unemployed. This means that a majority of the respondents were self-employed, making life easier for them.

**Tables 3.** Aged Distribution

| **Age distribution** | **Frequency** | **Percentage** |
|---|---|---|
| **16-25** | 79 | 20.5 |
| **26-35** | 98 | 25.1 |
| **36-45** | 114 | 29.2 |
| **46 and above** | 99 | 25.4 |
| **Total** | **390** | **100** |

Tables 3 reveals that 34 respondent represent (17%) were in between they aged of 16-25, 23 respondent represent (22.5%) were in between the ages of 26-35 while 78 respondent represent (39 %) were between the ages of 36-45 and 46 and above had 26 respondent which represent ( 21.5% )

**Tables 4.** Marital status

| Marital status | Frequency | percentage |
|---|---|---|
| **Single** | 100 | 25.6 |
| **Married** | 285 | 73.1 |
| **Divorce** | 5 | 1.3 |
| **Total** | **390** | **100** |

Table 4 reveals that 65 respondent represent (32.5%) of them were singles, while 105 respondent represent (52.5%) were married, and only 30 respondents represent (15%) were Divorce. This means that a majority of the respondents were married.

**Table 5.** Educational Qualification

| Educational Qualification | Frequency | Percentage |
|---|---|---|
| **SSCE** | 56 | 14.4 |
| **National Diploma** | 88 | 22.6 |
| **NCE** | 65 | 16.7 |
| **Degree** | 181 | 46.4 |
| **Total** | **390** | **100** |

Tables 5 reveals that 47 respondent represent (23.5% ) were SSCE, while 53 respondent represent (26.5% ) were National Diploma while 65 respondent represent (32.5 %) are NCE and 35 respondent represent (17.5%) were Degree.

**Tables 6.** Occupations

| Occupations | Frequency | Percentage |
|---|---|---|
| **Student** | 75 | 19.2 |
| **Farmer** | 95 | 24.4 |
| **Trader** | 121 | 31.0 |
| **Civil servant** | 99 | 25.4 |
| **Total** | **390** | **100** |

Tables 6 reveals that 23 respondent represent (11.5 %) were Student, while 33 respondent represent (16.5 %) were Farmers while 124 respondent represent (62 %) were Traders and 20 respondent represent (10%) were civil Servant.

**Table 7.** The consumption of alcohol currently

| Options | Frequency | Percentage |
|---|---|---|
| Yes | 300 | 76.9 |
| No | 90 | 23.1 |
| **Total** | **390** | **100** |

From table 7: 165 respondent represent (97.1%) indicate yes that they currently consume alcohol while 5 respondent representing (2.9%) indicate No from the above state.

**Table 8.** If yes, how often do you consume alcohol

| Options | Frequency | Percentage |
|---|---|---|
| Daily | 100 | 25.6 |
| 2-4 times a week | 40 | 10.3 |
| Once a week | 100 | 25.6 |
| Occasionally | 100 | 25.6 |
| **Total** | **390** | **100** |

From table 8: 100 respondent represent (25.6%) indicate daily that they often consume alcohol while 40 respondent represent (10.3%) indicate once a week that they often consume alcohol while 100 respondent representing (25.6%) indicate occasionally that they often consume alcoho

**Table 9.** Type of alcoholic drinks you consume most often

| Options | Frequency | Percentage |
|---|---|---|
| Beer | 215 | 55.1 |
| Spirit (gin, Vodka) | 73 | 18.7 |
| Palm wine | 102 | 26.2 |
| Others | 0 | 0.0 |
| **Total** | **390** | **100** |

From table 9: it reveals that 215 respondents representing (55.1%) indicate that thy drink beer while 73 respondent representing (18.7%) indicate that they consume spirit (gin, Vodka) while 102 respondent representing (26.2%) indicate that they consume palm wine and 0 respondent representing (0.0%) indicate others.

**Table 10.** Duration of alcohol consumption since HIV diagnosis

| Options | Frequency | Percentage |
|---|---|---|
| Less than 1 year | 89 | 22.8 |
| 1-5 years | 112 | 28.7 |
| 6-10 years | 56 | 14.4 |
| More than 10 years | 133 | 34.1 |
| **Total** | **390** | **100** |

From table 10: 145 respondent represent (85.3%) indicate that less than 1 year they consumed alcohol since HIV diagnosis while 112 respondent representing (28.7%) indicate 1 -5 years that they consumed alcohol since HIV diagnosis while 56 respondent representing ( 14.4%) indicate 6 -10 years they consumed alcohol since HIV diagnosis and 133 respondent representing (34.1%) indicate that they consumed alcohol since HIV diagnosis the above state.

**Table 11.** Environmental conditions common in your area

| Options | Frequency | Percentage |
|---|---|---|
| Air pollution (smoke, dust, fumes) | 102 | 26.2 |
| Contaminated drinking water | 76 | 19.5 |
| Poor waste disposal | 58 | 14.9 |
| Industrial or vehicle emissions | 103 | 26.4 |
| Agricultural chemicals (pesticides, herbicides) | 51 | 13.1 |
| **Total** | **390** | **100** |

From table 11: it reveals that 102 respondent representing (26.2%) indicating that they environmental conditions that are found in their community/area is Air pollution (smoke, dust, fumes while 76 respondent representing (19.5%) indicating that they environmental conditions found in their area is Contaminated drinking water while 58 respondent representing (14.9%) indicating that environmental conditions found in their area is poor waste disposal while 103

respondent representing (26.4%) indicating that they environmental conditions found in their area is Industrial or vehicle emissions and 51 respondent representing (13.1%) indicating that they environmental conditions found in their area is Agricultural chemicals (pesticides, herbicides).

**Table 12.** Sources of environmental pollutants in your area

| Options | Frequency | Percentage |
|---|---|---|
| Household cooking smoke | 221 | 56.7 |
| Waste dumpsites | 34 | 8.7 |
| Traffic emissions | 59 | 15.1 |
| Industrial activities | 76 | 19.5 |
| **Total** | **390** | **100** |

From table 12: this shows that 221 respondent representing (56.7%) indicating that they sources of environmental pollutant in their area is household cooking smoke while 34 respondent representing (8.7%) indicating that they sources of environmental pollutant in their area is waste dumpsite while 59 respondent representing (15.1%) indicating that they sources of environmental pollutant in their area is traffic emissions and 76 respondent representing (19.5%) indicating that they sources of environmental pollutant in their area is industrial activities.

**Table 13.** Experienced any of the following symptoms more frequently after alcohol consumption when diagnose with HIV

| Options | Frequency | Percentage |
|---|---|---|
| Fatigue | 221 | 56.7 |
| Frequent infections | 32 | 8.2 |
| Breathing difficulties | 65 | 16.7 |
| Headaches | 61 | 15.6 |
| **Total** | **390** | **100** |

From table 13: these reveals that 221 respondent representing (56.7%) experience frequent fatigue as a symptoms of HIV when diagnose after drinking alcohol while 32 respondent representing (8.2%) indicating that they experiences frequent infections as a symptoms of HIV when diagnose after drinking alcohol while 65 respondent representing (16.7%) indicating that they experiences breathing difficulties as a symptoms of HIV when they have been diagnose after drinking alcohol and 61 respondent representing (15.6%) indicating that they experiences headaches as a symptoms of HIV when diagnose after drinking alcohol.

**Table 14.** Environmental pollutants make your health condition worse when combined with alcohol use

| Options | Frequency | Percentage |
|---|---|---|
| **Yes** | 241 | 61.8 |
| **No** | 97 | 24.9 |
| **Not sure** | 52 | 13.3 |
| **Total** | **390** | **100** |

From table 14: it shows that 241 respondent representing (61.8%) indicating yes that environmental pollutant make their health condition worse when combined with alcohol while 97 respondent representing (24.9%) indicating that environmental pollutants make their health condition worse combined with alcohol used and 52 respondent representing (13.3%) indicating that environmental pollutant make their health conditions worse combined with alcohol used.

**Table 15.** Medical advice on avoiding pollutants and alcohol together

| Options | Frequency | Percentage |
|---|---|---|
| **Yes** | 331 | 84.9 |
| **No** | 59 | 15.1 |
| **Total** | **390** | **100** |

From table 15: it reveals that 331 respondent representing (84.9%) indicating that they received medical advices on avoiding pollutants and alcohol together and 59 respondent representing (15.1%) indicating that they received medical advices on avoiding pollutant and alcohol

**Table 16.** Awareness of the health risks of combining alcohol use with pollutant exposure as an HIV patient

| Options | Frequency | Percentage |
|---|---|---|
| Very high | 201 | 51.5 |
| High | 100 | 25.6 |
| Moderate | 80 | 20.5 |
| Low | 0 | 0.0 |
| No awareness | 9 | 2.3 |
| **Total** | **390** | **100** |

From table 16: The table shows that 201 respondent representing (51.5%) indicating very high that they are aware of the health risks of combining alcohol use with pollutant exposure as an HIV patient while 100 respondent representing (25.6%) indicating high that they are aware of the health risks of combining alcohol use with pollutant exposure as an HIV patient while 80 respondent representing (20.5%) indicating moderate that they are aware of the health risks of combining alcohol use with pollutant exposure as an HIV patient and 9 respondent representing (2.3%) indicating no awareness that they are aware of the health risks of combining alcohol use with pollutant exposure as an HIV patient.

**Table 17.** Source of your knowledge about these risks

| Options | Frequency | Percentage |
|---|---|---|
| Healthcare workers | 111 | 28.5 |
| Friends/ family | 89 | 22.8 |
| Media | 109 | 27.9 |
| Community outreach | 81 | 20.8 |
| **Total** | **390** | **100** |

From table 17: it reveals that 111 respondent representing (28.5%) indicating that healthcare workers are they Source of their knowledge about these risks, while 89 respondent representing (22.8%) indicating that friends/family are they Source of their knowledge about these risks while 109 respondent representing (27.9%) indicating that media are they Source of their knowledge about these risks and 81 respondent representing (20.8%) indicating that community outreach are they Source of their knowledge about these risks.

**Table 18.** Preventive measures in reducing exposure to environmental pollutants

| Options | Frequency | Percentage |
|---|---|---|
| Used of mask | 221 | 56.7 |
| Filtering water | 121 | 31.0 |
| Avoiding smoking | 40 | 10.3 |
| Avoid dusty areas | 8 | 2.1 |
| **Total** | **390** | **100** |

From table 18: it shows that 221 respondent representing (56.7%) signifying that they used of mask is one of the way of preventive measures in reducing exposure to environmental pollutant while 121 respondent representing (31.0%) signifying that they filtering water is one of the way of preventive measures in reducing exposure to environmental pollutants while 40 respondent representing(10.3%) signifying that avoiding smoking is one of the way of preventive measures in reducing exposure to environmental pollutants and 8 respondent representing (2.1%) signifying that avoid dusty areas is one of the way of preventive measures in reducing exposure to environmental pollutants.

## 5. Discussion of Findings

Females (53.5%) outnumbered males (46.5%) in the demographic profile of respondents, indicating that both genders were adequately involved in the study. Due to gender differences influencing alcohol consumption patterns, risk perception, and susceptibility to environmental exposures, this balance is essential. Despite the fact that men still dominate heavy drinking trends, previous studies have shown that women in some Nigerian communities are increasingly engaging in alcohol use due to urbanization and social influence [11,2]. The distribution of respondents' ages revealed that those over the age of 46 were followed by those between the ages of 36 and 45 (21.5%), representing the majority of respondents. This suggests that middle-aged and older people are significantly more likely than young people to drink alcohol. Studies by Osei-Bonsu et al. (2021) reported that adults in this age bracket often use alcohol as a coping mechanism for stress, work fatigue, or chronic illness, which aligns with our findings.

The majority of respondents (42%) worked as traders or self-employed individuals. High levels of alcohol consumption may be a result of the dominance of trading as a career, as marketplaces and business centers frequently facilitate easy access to commercial alcohol brands and locally brewed beverages. Self-employed people's economic independence could also make things more affordable and easier to get to. In line with this, Eze et al. (2020) highlighted that socio-economic factors strongly influence alcohol consumption, with traders and artisans in Nigerian markets reporting higher intake compared to civil servants.

The majority, 52.5 percent, were married, followed by 32.5% who were single. Married respondents' higher consumption may be connected to social obligations, family stress, and cultural acceptance of alcohol in communal gatherings. However, previous works argue that singles are more prone to risky drinking due to peer pressure, though this was not strongly reflected in the present study.

There was a fair distribution of educational background, with NCE holders (32.5 percent) leading the way, followed by diploma holders (26.5 percent). This suggests that people of all educational levels drink alcohol. Interestingly, even those with higher education such as degree holders (17.5%) engaged in alcohol use, indicating that awareness alone does not necessarily translate into reduced consumption, a point emphasized by Grittner et al. (2019).

One striking result was that 97.1% of respondents admitted to drinking alcohol at the moment, indicating its widespread prevalence. This is in line with WHO's report from 2022, which stated that despite awareness of health risks, alcohol consumption was rising in sub-Saharan Africa. Regarding frequency, daily and occasional consumption were each reported by 25.6% of respondents, reflecting both habitual and social drinking patterns.

Beer was the most commonly consumed type of alcohol (55.1%), followed by palm wine (26.2%) and spirits (18.7%). Beer is the most commercially available beverage in Plateau State, while palm wine retains its cultural significance. This pattern reflects affordability and cultural acceptance. This is in line with what Olanrewaju et al. (2021) found, which said that because it's cheap and easy to get, palm wine is still popular in rural Nigerian communities. Additionally, the study demonstrated a link between HIV diagnosis and alcohol consumption. Since being diagnosed, approximately 85.3% had drank alcohol for less than a year, while others had done so for more than five years. Alcohol use by HIV patients worsens immune suppression and makes it harder for them to take their antiretroviral medication (Parsons et al., 2020), which backs up the concerns that this study raises. There was also exposure to the environment. Pollutants most frequently mentioned by respondents included contaminated water (19.5%), industrial/vehicle emissions (26.4%), and air pollution (26.2%). According to WHO (2021) reports on Nigerian indoor air pollution, household cooking smoke was the most frequently cited source (56.7%). According to 61.8% of respondents who confirmed worsening of symptoms, the overlap between alcohol consumption and exposure to pollutants exacerbates health conditions. Fatigue (56.7%), infections (8.2%), and difficulties breathing were among the health effects linked to the interaction of alcohol and pollutants. These results corroborate the findings of Bagby et al. (2019), who observed that alcohol accelerates HIV patients' immune deterioration, making them more susceptible to environmental dangers. 515 percent of respondents had very high awareness of the risks, and 84.9% reported receiving advice on how to avoid alcohol and pollutants. However, there are still gaps because some respondents indicated either a moderate or lack of awareness. Media (27.9%) and healthcare professionals (28.5%) were the primary sources of knowledge, highlighting the importance of mass communication in health promotion (Ekezie et al., 2022). Mask use (56.7%) and water filtration were two of the preventative measures taken. Despite the widespread prevalence of risky behaviors like persistent drinking, this demonstrates some behavioral adaptation. As a result, community-based risk-reduction interventions are urgently required. In summary, the findings underscore the complex interplay of socio-demographics, alcohol consumption, HIV status, and environmental exposures in shaping health outcomes in Jos South. They align with global and national reports that emphasize the urgent need for integrated strategies involving health education, policy regulation, and community outreach to mitigate risks.

## 6. Summary

There is growing concern regarding the potential for a combination of alcohol consumption and environmental pollutants to significantly deteriorate HIV-positive individuals' health. In areas with limited resources, like the Vwang District in Nigeria's Plateau State, this is a particularly pressing issue. HIV-infected individuals already have compromised immune systems, making them more vulnerable to infections and organ damage. When you add alcohol to the mix, their immunity is further compromised. Alcohol can also hinder the effectiveness of HIV medication (ART), decrease treatment adherence, and speed up the progression of the disease. Additionally, it strains organs like the liver, which are essential for processing both medications and environmental toxins, resulting in an increase in adverse effects. Residents of Vwang District are exposed to a variety of pollutants, including smoke from cooking, vehicle emissions, contaminated water, and inadequate waste management. This results in a potentially harmful double whammy for HIV patients who also consume alcohol. Pollutants introduce harmful substances like heavy metals and toxic fumes, while alcohol weakens the body's defenses. As a result, respiratory issues, heart conditions, and metabolic issues may become more likely. HIV patients may experience fatigue, frequent infections, breathing difficulties, and headaches as a result of the combination of alcohol and environmental toxins, all of which significantly lower their quality of life. The challenges in Vwang District are compounded by poverty and a lack of health resources and awareness, which often leads to people continuing harmful drinking habits despite medical advice.

A comprehensive approach is required to address this issue. This includes providing HIV patients with specialized counseling services, enhancing environmental regulations, promoting cleaner cooking practices, and educating the community about health risks. In the end, improving the well-being of these disadvantaged communities requires a multifaceted approach that combines environmental health, substance abuse prevention, and HIV care.

## 7. Conclusion

People living with HIV face a serious health issue in the Vwang District of Plateau State. A recent study demonstrates how alcohol consumption and environmental pollution are putting them in danger. The findings show that alcohol does more than just weaken the immune systems of HIV-positive individuals and make them less likely to stick with their medication. It also makes them much more vulnerable to harmful environmental factors like cooking smoke, car exhaust, and contaminated water. When these pollutants and alcohol are combined, it can worsen health issues like constant fatigue, breathing issues, frequent infections, and a decrease in quality of life. It's clear that people with HIV who drink are facing a heightened risk from both their lifestyle and their surroundings. We require a two-pronged strategy if we are to truly assist them. We must simultaneously address their behavior and environment. This entails launching public health campaigns to reduce alcohol consumption, enhancing sanitation, and educating individuals about the dangers posed by pollutants. It also requires consistent medical counseling, community outreach, and new policies that promote cleaner energy and safer environments.

Ultimately, to improve the health and well-being of people with HIV in the Vwang District, we must tackle both the issue of alcohol use and environmental pollution. By taking a comprehensive approach that includes healthcare, environmental safety, and community involvement, we can reduce these combined risks and help people live longer, healthier lives.

## 8. Recommendations

- Community-based programs should emphasize the dangers of combining alcohol with HIV treatment and environmental exposures, while promoting healthier coping strategies.
- The government and non-governmental organizations should invest in environmental health interventions, such as improving waste management, ensuring safe drinking water, and promoting the use of clean cooking technologies to reduce household smoke exposure
- Healthcare providers should integrate routine counseling on alcohol reduction and environmental risk management into HIV care services.
- There should be policy-level interventions to regulate industrial emissions, vehicular pollution, and the uncontrolled use of agricultural chemicals in communities
- Community engagement and support networks should be strengthened.

## References

[1] Bagby, G. J., Zhang, P., Purcell, J. E., Didier, P. J., & Nelson, S. (2022). Alcohol abuse, immunosuppression, and the risk of infection in humans. Journal of Clinical and Translational Hepatology, 10(2), 204-214.

[2] World Health Organization. (2023). Ambient air pollution and health. WHO Fact Sheet. Retrieved from https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-airquality-and-health

[3] Olowe, O. A., Oladipo, E. K., Adekanmbi, A. O., Adefioye, O. A., & Bolaji, O. S. (2021). Heavy metal exposure and associated health risk in HIV-infected patients: A Nigerian study. Environmental Monitoring and Assessment, 193(3), 137.

[4] Wang, G., Wang, X., Huang, F., Ma, C., & Zhang, X. (2020). Aflatoxin exposure and its impacts on immune function and viral load among HIV-infected individuals. Frontiers in Immunology, 11, 604.

[5] Goullé, J. P., Mahieu, L., Castermant, J., Neveu, N., Bonneau, L., Lainé, G., Bouige, D., & Lacroix, C. (2021). Metal exposure, alcohol, and health: Interactions and risks. Environmental Research, 197, 111102.

[6] Bala, M. M., & Chingle, M. P. (2019). Environmental pollution and public health challenges in Nigeria: A review. Journal of Environmental Science and Public Health, 3(4), 321-333. https://doi.org/10.26502/jesph.96120067

[7] Iproject Research. (2020). Environmental impact of quarrying activities in Vwang District. Retrieved from https://www.iproject.com.ng

[8] Bala, P., & Chingle, M. P. (2019). Alcohol use patterns and associated socio-environmental factors in Vwang District, Jos South LGA. BW Journal of Health and Social Sciences, 4(2), 56-66.

[9] Obeng-Gyasi, E. (2020). Sources of lead exposure in various countries. Reviews on Environmental Health, 35(1), 65-74. https://doi.org/10.1515/reveh-2019-0037

[10] Bagby, G. J., Amedee, A. M., Siggins, R. W., Molina, P. E., & Nelson, S. (2022). Alcohol, HIV disease progression, and comorbidities: Interactions, mechanisms, and interventions. Current HIV Research, 20(1), 3-13. https://doi.org/10.2174/1570162X20666220128122120

[11] Agaba, P. A., Meloni, S. T., Sule, H. M., Agbaji, O. O., Ekeh, P. N., Job, G. C., ... & Kanki, P. J. (2017). Patterns of alcohol consumption and its association with HIV-related risk behaviors among people living with HIV/AIDS in Nigeria. AIDS Research and Treatment, 2017, Article ID 5938941. https://doi.org/10.1155/2017/5938941

[12] Mandal, J., Dinoi, A., Jani, S., & Jaykus, L. A. (2021). Environmental exposures, immune suppression, and health risks: Implications for HIV-infected populations. Environmental Health Perspectives, 129(6), 065001. https://doi.org/10.1289/EHP7894

[13] UNAIDS. (2023). Global HIV & AIDS statistics - Fact sheet. Joint United Nations Programme on HIV/AIDS. Retrieved from https://www.unaids.org/en/resources/fact-sheet