Nutritional Status and Individual Dietary Diversity among Peoples Living with HIV in Dhaka, Bangladesh

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Abstract

Background: The human immunodeficiency virus (HIV) progression is correlated with nutritional status and dietary diversity. At all phases of HIV, nutrition is a significant factor. The goal of this study was to assess the nutritional status and individual dietary diversity among people living with HIV in Dhaka, Bangladesh. ***Methods***: A cross-sectional study was performed between July 2020 and December 2020 included 338 HIV positive patients. All of the drop-in centers of CARE Bangladesh were chosen on purpose for this study. A semi-structured questionnaire was used to get the information. Descriptive statistics were used to introduce the background variables by frequency and percentage. The Chi-square test and bivariate logistic regression were used to measure the association. ***Results***: According to the findings, only 3% of the 338 HIV patients in this study had low individual dietary diversity (IDS), while 82% had high IDDS and 16% had medium. All of the people we surveyed ate cereals and starchy roots, while the least consumed food was consumed organ meat (38.5%). According to the data, 22.5% of people were underweight, 6.5% were overweight, and 71% were in the normal range of weights. Nutritional nourishment were found to be statistically significant at age (p=0.011), education (p <0.001), Sex (p=0.008), monthly income (p <0.001), marital status (p <0.001), and family type (p =0.014). The probability of malnutrition was 1.32 times higher in the 31–40 age group than in the 18–30 age group. ***Conclusion***: People living with HIV consume a wide variety of foods. The majority of the people who took part in the survey were of average weight and had a healthy nutritional status index. Even though non-governmental organizations (NGOs) and government partnerships made things more accessible than before, some respondents were still underweight and malnourished.

Keywords: AIDS; HIV; Individual Dietary Diversity-IDDS; People living with HIV-PLHIV.

Abbreviations: AIDS, Acquired Immune Deficiency Syndrome; AOR, Adjusted Odds Ratio; ART, Antiretroviral Therapy; BMI, Body Mass Index; DIC, Drop in Center; GoB, Government of Bangladesh; HIV, Human Immunodeficiency Virus; IEAC, Institutional Ethical Approval Committee; IDDS, Individual Dietary diversity Score; NAC, National AIDS Committee; NGOs, Non-Government Organizations; OI, Opportunistic Infections; OR, Odds Ratio; PLHIVA, People living with HIV AIDS; QOL, Quality of Life; STD, Sexually Transmitted Disease; SPSS, Statistical Package for Social Science; WHO, World Health Organization.

Significance | Influence of dietary diversity on HIV patients

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Introduction

Acquired immune deficiency syndrome (AIDS) is a group of chronic diseases caused due to the infection with the human immunodeficiency virus (HIV) and this disease has a big impact on society and needs ongoing medical care for the patients (Krämer et al., 2010). About 38 million people around the world are living with HIV right now, and tens of millions or more have died from AIDS-related illnesses since the epidemic began (*2020 Global AIDS Update—Seizing the Moment— Tackling Entrenched Inequalities to End Epidemics*, n.d.). This disease is primarily linked to sexual and socially disgraced behaviors, such as using illegal drugs and being sexually promiscuous (Gordillo et al., 2009). Most HIV infections spread through unprotected sex, infected blood transfusions, hypodermic needles, and mother-to-child transmission during pregnancy, childbirth, or breastfeeding, among other ways (Rom & Markowitz, 2007). In Bangladesh, the first HIV infection was found in 1989. Even though the government of Bangladesh (GoB) had taken steps to prepare for an epidemic before this first case, the National AIDS Committee (NAC) was set up in 1985 to play a more active role in preparing for a possible outbreak (Daniel et al., 2013).

Between the human immunodeficiency virus (HIV), infection, and immunological function, there is a complex relationship, with the HIV infection having the greatest impact on the nutritional status of any factor studied. It was shown that poor nutrition led to problems with the immune system (Friis, 2006) and HIV influences the nutritional status negatively because it makes people need more energy, makes them eat less, and makes it harder for nutrients to be absorbed and burned off. People who don't eat enough calories to meet their nutritional needs may have a weaker immune system and be more likely to get opportunistic infections (OIs). Both of these things can make malnutrition worse. By taking more of certain foods, the body absorbs more nutrition and gains better tolerance against viral diseases. People with HIV can benefit from good nutrition, which can help improve their quality of life as a whole (QoL). Poor nutritional status in HIV-positive individuals accelerates the progression of the disease, increases morbidity, and shortens their lifespan (Abas et al., 2014; *Pcaab509.Pdf*, n.d.; Thapa et al., 2015). So, nutritional support should be thought of as a key part of any comprehensive approach to preventing and treating HIV and AIDS (*Pcaab509.Pdf*, n.d.). The World Health Organization (WHO) says that people with micronutrient deficiencies should have easier access to a variety of foods, foods with added nutrients, and vitamin supplements. This is especially important in places where micronutrient shortages are common. Aside from that, HIV and AIDS are linked to food insecurity, making a cycle that can't be broken. Each condition has the trait of making the other more likely to happen and making it worse (Abas et al., 2014).

The individual Dietary Diversity Score (IDDS) is a proxy for the nutritional quality of an individual's dietary composition. One aspect of dietary quality that is affected by IDDS is the number of dietary intakes. Other aspects of dietary quality that are affected by the IDDS include the satisfaction of nutrient requirements and anthropometric measurements, among other things. The social, cultural, medical, and behavioral aspects that affect each individual's nutritional quality have been shown to influence nutritional quality (Raguram et al., 1996). Individual dietary diversity (IDDS), or eating a wide range of foods, is a sign of a good diet and can be used as a measure of whether or not a person is getting enough nutrition overall (Mpontshane et al., 2008; Woldemariam, 2015). In Africa, where resources are limited, the proportion of PLHIV who eat a varied diet is still low. For example, studies done in Kenya, Rwanda, Nigeria, and Uganda showed that 43–62.3% of PLHIV didn't eat different kinds of foods. Diversity scores are attractive to use because of their ease of measurement and interpretation. However, there is no international consensus on the number and type of food groups to include in the IDDS, and there are no consistent cutoffs to determine the adequacy of dietary diversity.

According to research, adult diets with greater dietary diversity had higher mean micronutrient density adequacy of complementary foods (Swindale & Bilinksy, n.d.) as well as higher mean micronutrient density adequacy of the diet (Foote et al., 2004) (*Ethiopia Demographic and Health Survey 2011*, n.d.). Even under the best of circumstances, the relationship between dietary diversity and intake, immune function, HIV/AIDS, and malnutrition is complicated. Currently, only a few nations throughout the world are conducting research on this vital public health topic, with no research being conducted in Bangladesh. Consequently, the goal of this study was to measure the nutritional status of people living with HIV in Bangladesh based on the specific dietary diversity of the country.

Methodology

From July to December of 2020, a cross-sectional institution-based study of Peaople living with HIV AIDS (PLWHA) in Bangladesh was conducted. Considering a population prevalence of 67.3% (Rai & Verma, 2015), a margin of error of 5%, and a confidence interval of 95%, the sample size was 338. This study was conducted at all CARE Bangladesh drop-in centers (DIC) in the Dhaka neighborhoods of Chankharpul, Swamibag, Dholpur, Hazaribagh, Noya Bajar, and Tongi. We recruited adult males, females, and transgender who were referred to those centers for routine checkups. Patients with HIV who declined to participate in this study were excluded. Questionnaires were written in English first, then translated into Bangla, and finally back-translated into English to confirm the accuracy of the Bangla translation. Our study sample consisted of HIV-affected adults (males, females, and transgender) aged 18 years and above and who were willing to participate in the study. Exclusion criteria filtered out HIV-positive patients who declined to participate and those who had other STDs rather than HIV/AIDS. Based on the aims and variables, data were collected utilizing a written, structured questionnaire.

In analysis, the BMI was differentiated into three sub-categories according to the WHO BMI guideline (Zierle-Ghosh & Jan 2021). However, we converted those three BMI categories into two, namely undernourished and well-nourished, following relevant research conducted in Nepal in 2015 (Thapa et al., 2015). The data for this study was compiled and analyzed using the Statistical Package for Social Science (SPPS) version 25. A Chi-square test was employed to examine the association between categorical background variables and nutritional status categories, adjusted odds ratios with 95% confidence intervals. In the bivariate logistic model, variables with a "*p*-value" of less than 0.05 were considered to be significant.

We received support from CARE Bangladesh before data collection. and each respondent was informed priorly of the purpose of the study (HIV-positive patients) and required to sign a consent form. Each respondent was allowed to decline participation in the study, and all collected information was kept confidential. At each stage, this study was conducted following the Helsinki Declaration.

This study was approved by the Institutional Ethical Approval Committee (IEAC) at Primeasia University in Dhaka, Bangladesh. It is documented as PAU/IEAC/22/103. Also, each person who took part in the study knew what it was for and signed a written informed consent before providing information.

Results

Age range of those who tested positive for HIV was 18 to 50 years. The overall number of HIV-positive respondents in the study is shown in (Table 01). The ages of the study participants ranged from 18 to 30 years in this particular study (35.8%). Although just 8.0% of respondents were over the age of 50, this was the lowest number among the various age groups studied in this study. Males were the vast majority of those who answered the survey questions (87.9%). Females and transgender individuals accounted for 5.9% and 6.2% of the population, respectively, with a mean age of 35.6 (9.9) years. According to the findings of the study, respondents with a below secondary level (51.2%), 14.5% with a bachelor's degree or higher, and 34.4 percent with no education were the most illiterate. Even though the majority of them were employed (79.5%), unemployed, and student respondents (14.8% and 5.6%, respectively). Participants who were predominantly of the Muslim religion were (93.5%). A significant proportion (76.3%) originates from nuclear families, on the other hand, with two to five family members (68.6%). The percentage of married people was high (57.7%), while the percentages of unmarried people and divorced people were 34.9% and 7.4%, respectively.

Dietary diversity was determined using a food frequency questionnaire that contains 16 food groups and uses numerical codes to represent the food groups (Fig. 01). This coding system is maintained by various food groups and is evident in the food menus of people living with HIV, who express their preferences and dislikes based on their eating habits. The questionnaire defines frequency as "daily," "1-3 days," "4-6 days," and "never." The frequency of IDDS was determined according to FAO guidelines (2011) by examining the consumption of nine different food groups over the preceding 24 hours. There was a value assigned to having the food and a value assigned to not having the food. Individual Dietary Diversity Scores (IDDS) were classified into three categories based on their sum: low (score 0-3), medium (score 4-5), and high (score 6-9). The IDDS (individual dietary diversity score) was high in the majority of r espondents in **Fig. 1** (277 people or 82%), as represented by the green bar, followed by 51 people (15%) in the blue bar, and the lowest IDDS score was observed among 10 people (3%) as indicated by a red bar which fell into the low IDDS category.

In the study, it was discovered that 100% (338) respondents of all age groups consumed starchy staples (cereals, white tubers, and roots), followed by dark green leafy vegetable consumption by 94% (318). Consumption of vitamin-A-rich fruits and vegetables was observed at 80.5% (272), whereas other fruits and vegetable consumption was 81.4%(275). Milk and milk product consumed by only 39.60% of participanats, similar to the organ meats consumptions (38.5%) (**Fig. 02**).

Among the respondents, the consumption of organ meat (38.60%) and milk (39.50%) was infrequent. Surprisingly, their intake of fish, eggs, and other meat products was satisfactory, owing to adequate nutrition education provided by NGOs and the availability of fish, eggs, and poultry in Dhaka city. **Fig 03** shows that the study found 76 people (22% of the participants) were underweight and 22 people (6.5%) were overweight, although the majority of the participants had a diverse diet and there was still a problem with malnutrition. On the other hand, 71% of the participants were reported to be of normal weight. The demographic and socioeconomic status of the study participants is shown in **Table 2.** Pearson's chi-squared test was used to assess interrelations between sociodemographic variables and nutritional status. Between the age groups, there was a statistically significant difference in nutritional status as the *p*-value was 0.011 ($p < 0.05$). Gender was another variable that was statistically significant along with the underweight and well-nourished group as the *p*-value was 0.008. Other variables like marital status, family type, and monthly income showed noticeable and significant differences. These factors were found to be strongly linked to undernutrition and well-nourished groups. However, with the *p*-value estimated above 0.05, factors like occupation, religion, and the number of family members were not statistically significant in this case (Table 02). The association between the various independent variables and nutritional status was assessed through binary logistic regression. The statistical significance was tested at a 95% confidence interval or *p*-value <0.05. Age played a significant role in measuring nutritional status. This table shows that the age group (31-40) was 1.32 times more likely to be compared to

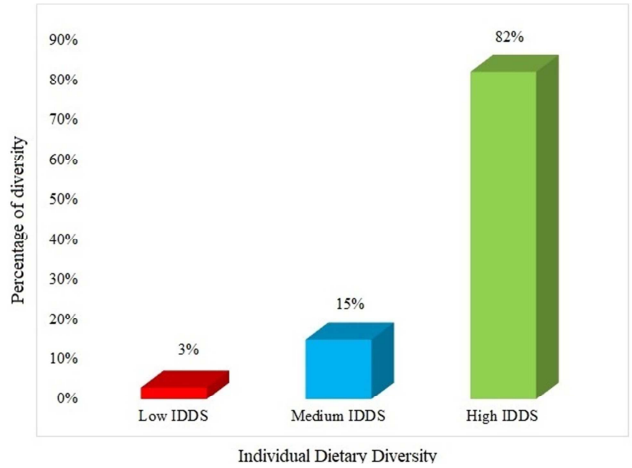

Figure 1| **Percentage of IDDS of the respondents**

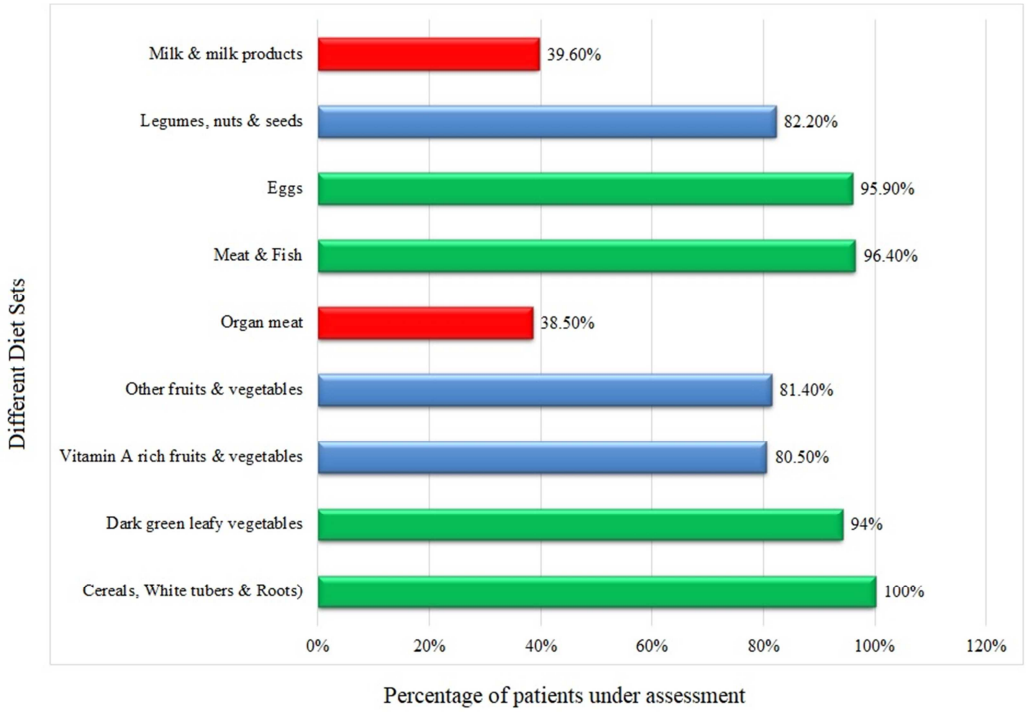

Figure 2| **Percentage of food groups consumed by HIV positive respondents**

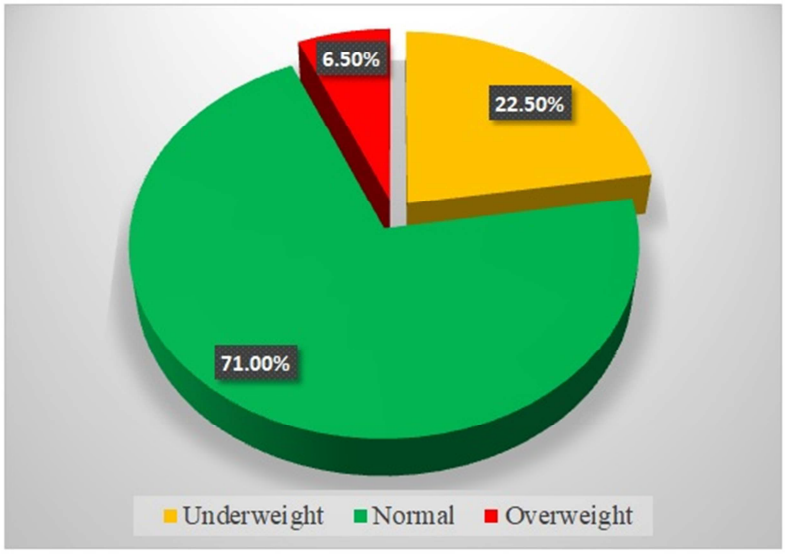

Figure 3| **Distribution of Different categories of BMI among the respondents.**

Table 1| **Prevalence of different level of Nutritional Status among the participants according to their Demographic and Socio-economic status**

Variables	Categories	Underweight N (%) n= 76	Well-nourished N (%) n= 262	N (%)	Chi-square	*p*-Value
Age	18 to 30 years	19 (15.7%)	102 (84.3%)	121 (35.8%)	11.17	**0.011**
	31 to 40 years	27 (22.3%)	94 (77.7%)	121 (35.8%)		
	41 to 50 years	18 (26.1%)	51 (73.9%)	69 (20.4%)		
	Above 50 years	12 (44.4%)	15 (55.6%)	27 (8.0%)		
Sex	Male	68 (22.9%)	229 (77.1%)	297 (87.9%)	9.64	**0.008**
	Female	8 (40.0%)	12 (60.0%)	20 (5.9%)		
	Transgender	0 (0.0%)	21 (100%)	21 (6.2%)		
Education	Illiterate	40 (34.5%)	76 (65.5%)	116 (34.3%)	19.89	**0.000**
	Below secondary	34 (19.7%)	139 (80.3%)	173 (51.2%)		
	Undergraduate & above	2 (4.1%)	47 (95.9%)	49 (14.5%)		
Occupation	Unemployed	11 (22.0%)	39 (78.0%)	50 (14.8%)	3.50	0.173
	Employed	64 (23.8%)	205 (76.2%)	269 (79.6%)		
	Student	1 (5.3%)	18 (94.7%)	19 (5.6%)		
Religion	Muslim	73 (23.1%)	243 (76.9%)	316 (93.5%)	1.05	0.304
	Hindu	3 (13.6%)	19 (86.4%)	22 (6.5%)		
Marital status	Married	53 (27.2%)	142 (72.8%)	195 (57.7%)	15.77	**0.000**
	Unmarried	13 (11.0%)	105 (89.0%)	118 (34.9%)		
	Divorced or Separated	10 (40.0%)	15 (60.0%)	25 (7.4%)		
Types of family	Nuclear	66 (25.6%)	192 (74.4%)	258 (76.3%)	5.99	**0.014**
	Joint	10 (12.5%)	70 (87.5%)	80 (23.7%)		
Family members	Single	16 (19.3%)	67 (80.7%)	83 (24.6%)	0.74	0.689
	2 to 5 members	54 (23.3%)	178 (76.7%)	232 (68.6%)		
	6 and above	6 (26.1%)	17 (73.9%)	23 (6.8%		
Monthly income	Below 10000 Tk	69 (28.6%)	172 (71.4%)	241 (71.3%)	18.28	**0.000**
	11000 to 20000 Tk	7 (7.4%)	87 (92.6%)	94 (27.8%)		
	21000 and above	0 (0.0%)	3 (100%)	3 (0.9%)		

* Significant *p* value at $p<0.05$

Table 2| **Association of socioeconomic factors with Nutritional Status**

Variables	Categories	Underweight N (%) N= 76	Well-nourished N (%) N= 262	Crude OR (95% C.I.)	*p*-Value	Adjusted OR[1] (95% C.I.)	*p*-Value
Age	18 to 30	19 (15.7%)	102 (84.3%)	Ref.		Ref.	
	31 to 40	27 (22.3%)	94 (77.7%)	0.64 (0.38–1.24)	0.192	1.32 (0.60–2.90)	0.488
	41 to 50	18 (26.1%)	51 (73.9%)	0.52 (0.25–1.09)	0.085	0.99 (0.42–2.37)	0.997
	Above 50	12 (44.4%)	15 (55.6%)	0.23 (0.09–0.57)	0.002*	0.29 (0.09–0.87)	0.028*
Sex	Male	68 (22.9%)	229 (77.1%)	Ref.			
	Female	8 (40.0%)	12 (60.0%)	0.44 (0.17–1.13)	0.090		
	Transgender	0 (0.0%)	21 (100%)	4.79 (0.00–0.00)	0.998		
Religion	Muslim	73 (23.1%)	243 (76.9%)	Ref.			
	Hindu	3 (13.6%)	19 (86.4%)	1.90 (0.54–6.61)	0.311		
Occupation	Unemployed	11 (22.0%)	39 (78.0%)	Ref.			
	Employed	64 (23.8%)	205 (76.2%)	0.90 (0.43–1.86)	0.784		
	Student	1 (5.3%)	18 (94.7%)	5.07 (0.60–42.37)	0.133		
Marital status	Married	53 (27.2%)	142 (72.8%)	Ref.		Ref.	
	Unmarried	13 (11.0%)	105 (89.0%)	3.01 (1.56–5.81)	**0.001***	**2.56 (1.17–5.60)**	**0.019***
	Div. or Sep.	10 (40.0%)	15 (60.0%)	0.56 (0.23–1.32)	0.186	0.65 (0.26–1.66)	0.379
Types of family	Nuclear	66 (25.6%)	192 (74.4%)	Ref.		Ref.	
	Joint	10 (12.5%)	70 (87.5%)	2.40 (1.17–4.93)	**0.017***	2.09 (0.94–4.66)	0.069
Family members	Single	16 (19.3%)	67 (80.7%)	Ref.			
	2 to 5	54 (23.3%)	178 (76.7%)	0.78 (0.42–1.47)	0.453		
	6 and above	6 (26.1%)	17 (73.9%)	0.67 (0.23–1.99)	0.478		

* Significant *p* value at $p<0.05$

lower risk of being underweight compared to the youngest respondents. In the marital status category, unmarried respondents were 2.56 times more prone to be undernourished than married respondents (AOR=2.56; 95% CI: 1.17-5.60). Participants living with a joint family were found to be 2.09 times more prone to be undernourished compared to the participant belonging to a nuclear family.

Discussion

Although excellent nutrition cannot cure HIV infection, it can help to maintain the immune system, reduce the course of the virus, prevent opportunistic infections, maintain physical activity, and achieve the maximum possible quality of life. It is recommended that people living with HIV take a well-balanced and diverse diet that includes basic foods, cooked legumes, nuts, and nut butter as well as animal foods, dairy products, fats, and oils, as well as fruits and vegetables, to maintain or improve their health. People who are infected with the virus can, as a result, enjoy a longer and more fulfilling life despite their infection (Akwiwu & Akinbile, 2017). People living with HIV have a wide variety of nutritional statuses, which can range from underweight to obese, depending on their body mass index, as demonstrated by the current study (BMI). Individuals were underweight in around 22.5% of the study, leaving 71% of them in the normal weight range; 6.5% were overweight, and there were no obese participants in our study. As we converted our BMI into two categories similar to this research in Nepal by Thapa et al. (2015), their findings revealed that 19.9% of individuals were underweight, 70.4% were of normal weight, and 9.7% were overweight (Khatri et al., 2020; Thapa et al., 2015). According to Khatri et al. (2020), 18.3% of the subjects were underweight, 42.6% were of normal weight, 31.1% were overweight, and 8% were obese (Khatri et al., 2020). The findings of another study conducted by Khatri et al. (2020) revealed that 18.3% of study individuals had underweight conditions, 42.6% had normal weight conditions, 31.1% had overweight conditions, and 8% had obese conditions (Khatri et al., 2020). Following the research's findings, we can see that 82% of people living with HIV have greater dietary diversity, 15% have medium diversity, and 3% have lesser diversity. Approximately 62.3% of the population in Kathmandu had lesser dietary diversity, whereas 37.7% had higher dietary diversity, according to a study conducted in the city (Thapa et al., 2015). Lower dietary diversity was much more widespread than higher dietary diversity in our study. The findings of Gebremichael and colleagues (2018), who researched food insecurity and nutritional status among HIV/AIDS patients, revealed that several contextual factors played a role in the development of malnutrition. When they conducted their research, they revealed that 23.6% of the population suffered from malnutrition and that 35.2% of the population had food insecurity in their families (Gebremichael et al., 2018). Researchers discovered that being unemployed was a significant risk factor for malnutrition in HIV/AIDS patients. In a separate study conducted in East Ethiopia by Weldegebreal et al. (2018), the researchers discovered that 28.7% of participants had lesser dietary diversity and 71.3% had more dietary diversity (Weldegebreal et al., 2018).

The participants' dietary diversity was also evaluated based on the proportion of foods from each food group that they ingested. Our findings revealed that the most frequently consumed food groups by the participants were starchy basics, fish, and meat (96.4%), whereas the least frequently consumed food groups were organ meat, milk, and dairy products (96.4%,38.5%, and 39.6%, respectively). The least consumed food groups by patients were organ meat (4.6%) and milk products (81.7%), according to another similar study (13.2%). Differences in socioeconomic status, study location, and periods, as well as differences in agriculture, could all be factors in the differences that were seen.

Conclusion

Furthermore, the nutritional status of the participants was examined with their dietary differences. In our study, we discovered that the majority of participants (71.0%) had a normal nutritional status, with 22.5% being underweight and 6.5% overweight. 82% had a high IDDS (Individual Dietary Diversity Score), with 15% having a medium IDDS and 3% having a low IDDS. The most consumed food groups by respondents were cereals and staple roots (100%), and the least consumed food groups were organ meats and fish (38.5%).

In addition to antiretroviral therapy (ART) and treatment of opportunistic infections, ensuring appropriate nutrition is a critical component of HIV infection control and should be implemented as early as possible. Nutritional evaluation, education, and counseling, as well as the administration of appetite stimulants or particular nutritional supplements, as needed. Because of this, increasing the educational attainment of patients while also increasing their income-generating activities is a highly recommended technique for increasing the dietary diversity of patients on antiretroviral therapy.

Major contributions have been made to HIV-related health and nutrition programs by donor agencies and non-governmental organizations (NGOs). Because of variability in the delivery of these funds, long-term planning for prevention, care, and support activities to maintain their outstanding health and well-being has been difficult. No matter how far things have come in the past few years, the government needs to keep helping to keep things going in a good direction.

Author Contribution

MNA, ABMNH, SK, RRS, MKEJ, MRR wrote the manuscript. MMC, NR, RA, PRS, MJHJ, AA, MAKP, MRA, and MSA performed the data collection and data entry. MNA analyzed the data. ABMNH, RRS, MKEJ, and MASM edited the manuscript. MRR came up with the concept, planned and supervised the research.

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Competing financial interests

Authors have declared that no competing interest exists.

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