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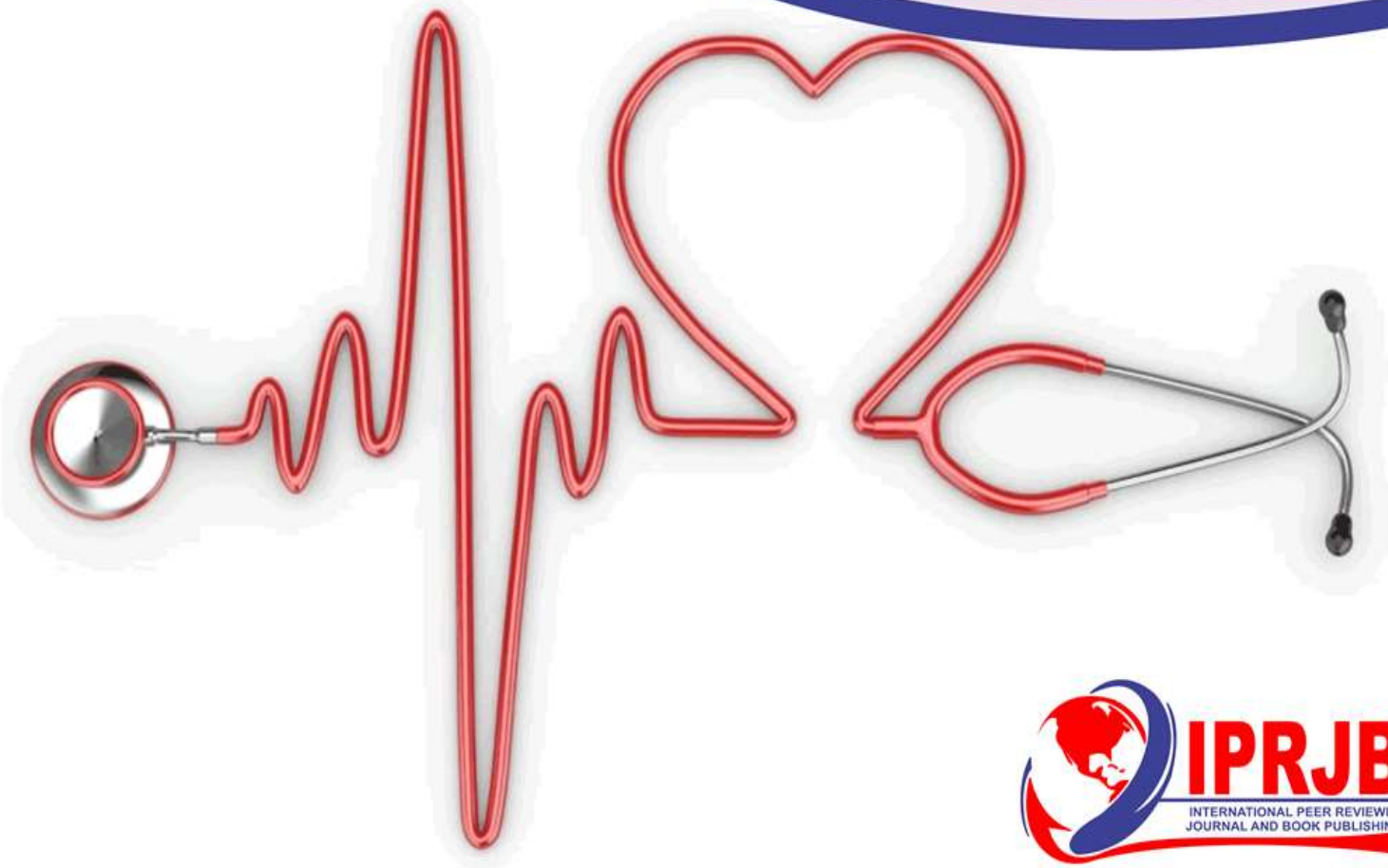

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Factors Associated With Undernutrition among Persons Living With HIV in Kiziguro Catchment Area, Rwanda

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Abstract

Purpose: HIV infection is really a serious problem as it accompanied by undernutrition in most of the cases. Many study was done in Rwanda about undernutrition but they didn't focus on undernutrition among HIV infected persons, therefore the study is aimed to determine the factors associated with malnutrition among persons living with HIV in Rwanda with case study of KIZIGURO area.

Methodology: The study was used quantitative approach for cross –sectional design to get data from persons living with HIV in each health facilities in Kiziguro District Hospital. A simple random sampling was used. Yamen formula was used to estimate to get a sample size for participants for this study. The adult infected persons of 15 years old and above in in Kiziguro area is 5036 by hmis data of April 2024 and to sample data to be used , the formula used is Yamen which is approximately 371 participants to be sampled for using in this study. And to sample for each health facility stratified random sampling is used A questionnaire was used as data collection instrument. SPSS (Statistical Package in Social Science) was used for data analysis. A study used a primary data collected from medical records such as BMI, CD4,Viral loads even the clients experience TB, Diarrhea, social economic and demographic factors about the clients living with HIV. Data was presented inform of table and figures.

Findings: The results from the study demonstrated that 9.2% with95% CI (6.3%- 12.1%)of the adults persons with HIV positive were under nourished while 90.8% with 95%CI(87.9%-93.7%)of adults with HIV positive were not under nourished. In addition to this result The result from this study found that there is an odd of malnutrition within person living with HIV who screened positive for TB 13.682 times higher than an odd of not malnourished person living with HIV who didn't screened positive for TB(AOR=3.682,95%CI:[3.618-51.745], p-value < .0001). Also there is an odd of malnutrition (under nutrition) within persons living with HIV who diagnosed for diarrhea is 13.036 times higher than the group of persons without malnutrition (under nutrition) who don't diagnosed for diarrhea AOR=13.036,95%CI:(4.239- 40.086). And an odd of malnutrition (under nutrition) within persons living with HIV who have no level of education is 0.088 times less than the odd of group of all persons who has level of education who don't have malnutrition(undernutrition) but living with HIV, AOR=0.088,95%CI (0.1-0.786) P value 0.03. Additionally educational level, means of transport to health facility to take anti retro therapy, place of residence, ever screened positive for TB, ever diagnosed for diarrhea were found to be significantly associated with undernutrition among persons living with HIV. These findings are found to be underscore to association between them and undernutrition situation, such as age, gender, marital status, house hold size, employment status, type of health facility, time spending in taking anti retro viral treatment, WHO clinical stage, recent viral load count, recent CD4 count.

Unique Contribution to Theory, Practice and Policy: The results from the study are going to be used by decision makers such as Ministry of health to enhance living of HIV-infected peoples.

Keywords: *Undernutrition, HIV-Positive Adults, Rwanda, Associated Factors*

INTRODUCTION

Malnutrition is a problem for HIV/AIDS patients because it impairs immunity and raises the risk of opportunistic infection. Losing weight is typically in people having HIV due to decreased dietary intake, malnutrition, aberrant metabolism, and antiretroviral medication. Food therapy is currently regarded as a crucial adjuvant in the care of people with HIV since Sufficient nutrition is essential for optimal immunological function (Fathima et al., 2022a).

Nutrition and micro nutrient deficiency are likely occur in HIV+ persons and this imply a great function in diseases positively trend and slowly growing and physical development of children. It combine with health conditions like malnutrition‘s associated diseases to affect inadequate well - being among family as well as nation (Abate et al., 2020).

Actually, to maintain nutrition status help to construct the system of immunization that enables the body to combat for any contamination. Persons living with HIV should consume a balanced diets that contains proteins, energetic foods that provide body’s energy and must consume micro nutrients(Vitamins) from fruits and legumes so as to acquire the immune (CD4) which are responsible for fighting against virus(HIV/AIDS: A Guide For Nutrition, Care and Support, 2001).Under nutrition is most commonly to occur in adults with HIV infection who are in advanced sickness stage, such as lack of blood, having diarrhea, this accompanied by the shift of CD4 to less than 200 cells/m3 and who mostly live in rural area(Alebel et al., 2020)

At 23.2% of its population, The world's greatest rate of undernourishment is seen in Sub Saharan Africa. Similarly, 69% of the estimated 36.7 million individuals living with HIV reside in the region, which has the highest burden of HIV infection worldwide in 2015.Further advancement of HIV illnesses is caused by inadequate food intake, either alone or in combination with malabsorption(Takarinda et al., 2017).

Where the prevalence of underweight, shifting down of weight and stunting among children with HIV+ in East Africa was discovered to be 41.63%, 24.65% and 49.68% respectively and the country which has more prevalence for underweight to children with HIV+ is Ethiopia with 49.67% the 2ndone of more underweight children is Rwanda with 42%. The latest updated research about low weight within children with HIV positive was discovered to be 40.88%(Oumer et al., 2019). HIV/AIDS prevalence in low- and middle-income countries, especially in Africa, is still intolerably high. resources settings, many infected HIV positive persons lack access to enough amounts of nutrient-dense food and create further obstacles to antiretroviral therapy's effectiveness. There is evidence that a lower survival probability is linked to even relatively minor weight losses of 5% (Gebremichael et al., 2018).

In Rwanda many effort to control human immune deficiency virus epidemic have been achieving the success over the year, while this is the case but there is other long run of facing the nutrition challenges. Thus, poor nutrition has been associated with poor successful of antiretroviral treatment (ART) leading to avoidable morbidity and death(Theogene Uwizeyimana et al., 2021).

The infectious diseases caused by immune impairment also reduce the ability of food intake, raising losses and this result a deficit of micro nutrients into the body, a body of a person with HIV begin to develop mental impairment, stunted growth and create an exposure of infectious, also a deficit of micronutrients cause the intrusive with utilization by exchanging metabolic pathways (Fathima et al., 2022b)

So, as i have just said, the cascade of status of malnutrition from world wide to the country especially, in Rwanda there is an emphasis of talking about the situation of malnutrition in form of prevalence in different forms such as malnutrition's dimensions (Body Mass Index) that can yield underweight, overweight from general category of the population as children, women and men the situation of Anemia among women and situation about micronutrients among women of age group of 15-49(NISR,MOH et al., 2021).

Although, that research are very useful but they should have some other in puts such that they should be saying the status of Anemia within women living with HIV, the status of underweight and overweigh within HIV infected persons the percentage of women that receive micronutrients within HIV infected persons.

Most of the reviewed studies in Africa have found that 70% of person living with HIV were not food secured and are under nourishment. Therefore there was a still gap as the status of malnutrition for this category of person that circumstance are within our country Rwanda. And this study will reveal the prevalence of undernutrition among persons living with HIV.

Some other research in Rwanda, discovered that in 2015, 19% of women have some frightened level of anemia while children with anemia are 37% and this linked to the shortage of their Body Mass Index (BMI). And thereafter a gap is still existing in this research where there is a need to identify the level of anemia in women with HIV infection as well as the anemia in children with HIV infection and also to identify other kind of malnutrition in all other category of person living with HIV.

Although, some of them focus similarly on the topic for instance, the study that was aimed to assess the rate of peoples with HIV infection at possibility of evolving undernourishment, where they show that the HIV contamination and linked to gastro intestinal signs that lead to malnourishment in this inhabitants, therefore, the gaps still exist in such way that this study didn't go in deep analysis of whole of the influence of under nourishment in such kind of peoples living with HIV.

And this study is being examining the factors associated with under nutrition among persons living with HIV. Briefly, most of the reviewed studies in Rwanda, that was related to malnutrition, Had concentrated on the status of malnutrition in some group of the population such as, children, women in reproductive age, males and among adults in general but they didn't review about undernourishment within persons with HIV infection in different category of persons.

The theory said that the patients with HIV/AIDS, malnutrition is hard to escape, since the symptoms like nausea, diarrhea, vomiting, lesions in esophagus and mouth cavity, decreased appetite, malabsorption and lipodystrophy are frequently encountered, that's why it is needed to detect malnutrition in early stage, treat it properly and control it routinely with the target of improving metabolic responses to successful therapy and minimize some effect of malnutrition (Stojanović et al., 2011).

HIV/AIDS nutrition care and support is basing on the guide that is developed in 2001 The purpose of this guide is to help development of programs and enables managers to make recommendations on food managements and nutritional issues for households with members who are HIV-infected or living with AIDS. It focus on dietary and care practice for adults during different stage of HIV, it is also designed for individuals, families and communities

that may be HIV infected or not but experiencing the social, economic and health consequences of the HIV/AIDS(virus)

This guide is supposed that it's use will improve the deliveryservices(HIV/AIDS: A Guide For Nutrition, Care and Support, 2001) . also this nutrition guide contain the gaps where it didn't focus on dietary and care practice to children with different stage of HIV.

The study is aimed to address some of the gaps that revealed in the reviewed literatures such that it will reveal the prevalence of under nutrition within persons living with HIV in Kiziguro catchment area , Rwanda.

It was reveals social, economic and demographic factors associated with undernutrition among persons living with HIV in Kiziguro catchment area, Rwanda. It was examining the clinical factors associated with undernutrition among persons living with HIV IN Kiziguro catchment area, Rwanda. Many decision makers for health such as Ministry of health that is in charge of health activities, the center which is responsible for implementing health activities (RBC) would benefit from results of the study which would enable them to enhance the living conditions of HIV –infected peoples. In addition, the districts, the catchment area are going to gain knowledge about malnutrition within HIV positive person living rather than considering malnutrition in general. In addition, it could be the standard for advance investigation on same matters

The Rajabium's relationship between HIV/AIDS and nutrition model was being adapted for this study. Concerning this model the clinical determinants of malnutrition among HIV infected are the cycle showing that principally HIV cause human body to become weak due to Immune impairment and this affect infectious diseases such as tuberculosis, diarrhea, Malaria and pneumonia where these health conditions lead to malnutrition in such way that ,the infected person his/her body become swollen and feet, pale skin , eye and hair, lack of blood ,underweight, thinness, muscles wasting. (Rajabiun, HIV/AIDS:A Guide For Nutrition,Care and Support, 2001)

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Conceptual Framework

Below is the schema that show how the variables interact up to the level being malnourished

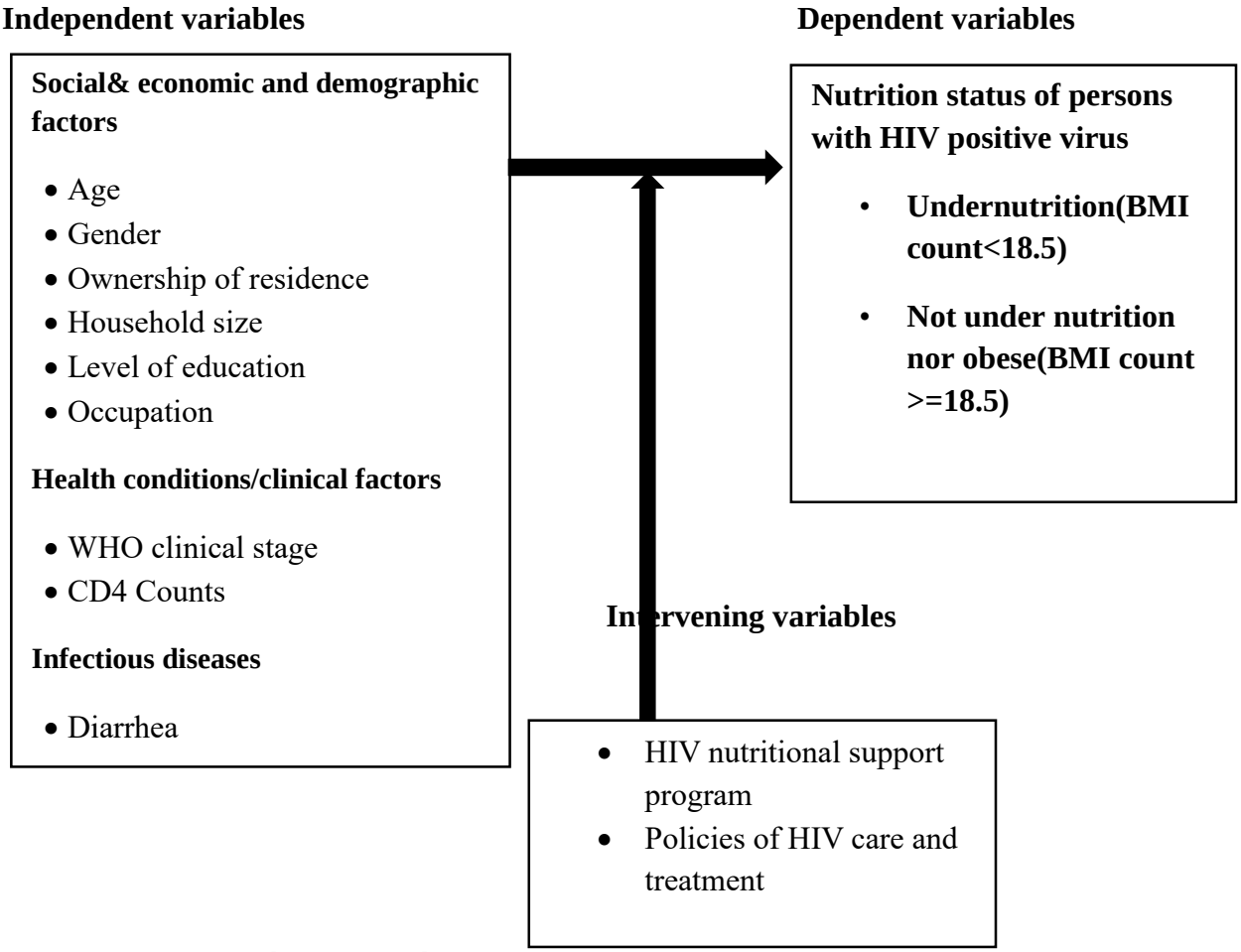

Figure 1: Conceptual Framework

METHODOLOGY

Research Design

In this study, the researcher used a cross-sectional research design with quantitative research approach (Setia, 2016).

Study Population

The study encompasses all adults persons of 15+ years old living with HIV in Kiziguro catchment area in Gatsibo district, Eastern province, Rwanda. These are 5036 individuals who currently on Anti Retro viral treatment, according to health management information system report in the catchment area of Kiziguro (Gatsibo District HMIS, April 2024).

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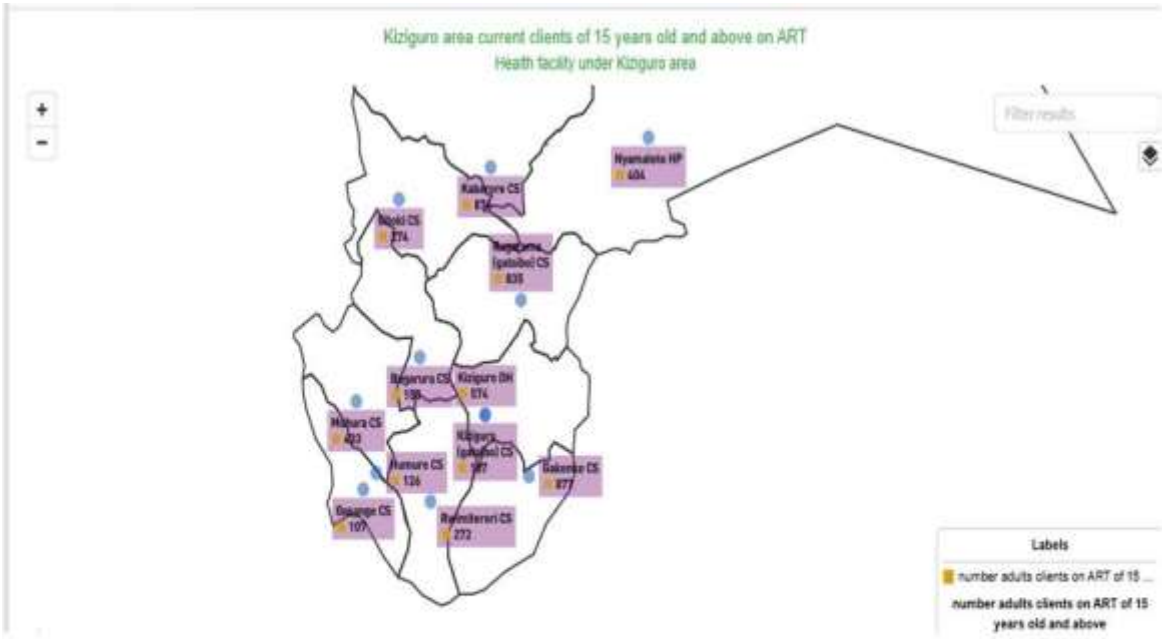

Figure 3. 1 Geo-mapping show health facility under Kiziguro catchment area /Gatsibo district

Source: Rwanda Health Analysis Platform filtered on 28 may 2024

Sample size

The sample size was calculated based on the formula that was developed by Yamane (Adam, 2020). According to this formula, Sample size n is:

$$n = \frac{N}{1\ N(e)^2}$$

Where:

n is the minimum sample size

N is the population from which the sample was drawn, and it is estimated at 5036 adults persons living with HIV currently taking anti retro viral treatment. (Gatsibo District HMIS, April 2024

e is the margin of error, estimated at 5%. Substituting,

$$n = \frac{5036}{1+5036(0.05)^2} =$$

$$n = 370.56 = 371$$

Therefore, the sample is composed of 371 adults persons living with HIV who spend at least one year taking anti retro viral treatment in Kiziguro catchment area.

Sampling Technique

Probability, The method of stratified random sampling was used to group all of the health centers under Kiziguro area and these groups of health centers were called strata and within each stratum the researcher was using simple random sampling to select a participants. The best samples are probability samples since they guarantee accuracy and representativeness. A total sample size in each stratum (health center) were selected by respecting all of the settled criteria as sampling framework show sample size to be select(Gearald Keller, 2018)

The strata with the smallest sample size were Gasange HC and Kiziguro HC which had 8 individuals each and the greatest one was Gakenke HC with sample of 65 individuals.

Research Instruments

A well designed questionnaire comprising of close ended questions was used to collect data from HIV- infected client on ART. It specifically evaluate nutritional status, offering standardized measures of under nutrition.

Reliability

The tool's reliability was evaluated by administering the same questionnaire to the same group of respondents at two separate time points and examining the correlation between their responses to determine consistency. Additionally, the study employed Split-Half Reliability by dividing the questionnaire into two parts and comparing the results to assess the internal consistency of the items. To ensure both validity and reliability, the study first clearly defined its objectives and the constructs it intended to measure. It incorporated established, validated questions where possible, conducted a pilot test to identify and address potential issues, and refined the questionnaire accordingly. Participants were selected using appropriate sampling methods, and the questionnaire was administered under standardized conditions. Finally, statistical techniques were used to analyze the data and evaluate the validity and reliability of the instrument (Trochim & Trochim, 2006).

Validity

Questionnaire was organized basing on the study objectives, to get the most accurate data. A questionnaire was checked for completeness. An adjustment was made accordingly, with the guidance of the supervisor The validity of the tool was assessed by determining whether the questionnaire items effectively covered the full scope of the construct being measured. Experts in the field typically evaluate content validity to ensure that the questions are both relevant and representative of the intended construct. Construct validity was considered by examining how well the questionnaire aligns with related theories or constructs, thereby establishing connections between the measured concept and associated ideas. Criterion validity involved evaluating the correlation between the questionnaire results and an external benchmark presumed to be related to the construct. In this study, face validity will be used (Daytner, 2006).

Data Analysis Procedure

Data analysis was carried out using version 21 of the Statistical Package for Social Sciences (SPSS). For every goal, descriptive statistics were calculated. To examine the relationship between the dependent and independent variables, chi-square and logistic regression were employed. The adjusted odd ratios (AOR) and their 95% Confidence Interval (CI) were employed as association metrics in logistic regression. 5% was chosen as the analysis's significance level. Variables with a p-value less than 0.05 were considered significant (Zhang

et al., 2018).

Ethical Consideration

Ethical clearance and The Mount Kenya University Institute of Postgraduate Studies and Research supplied the data collecting letter. Selected medical facilities in Kiziguro catchment area granted permission to proceed with the project data collecting and the researcher explained that the data will remain confidential after receiving the letter which explains our objective and interest. In this letter it was very clear that all information received from there would be kept confidential and would be used only as explained. Following a thorough explanation of the goal of the study, respondents were asked for their consent. All participants was assured their options of declining to answer any of the questions before distributing the questionnaires. Furthermore, respondents were conscious of the fact that they could leave the study at any moment. Additionally, non- disclosure of replies was guaranteed. There was no incentive for the participants, and participation was entirely voluntary.

FINDINGS

Table 1. Demographic Characteristics of Respondents

Variables	Frequency	Percent/%
Age group in years Mean year 47,year15,Max year 99, mode group(35-54),Median age 47,SD 12.529		
15-24	11	3.0
25-34	46	12.4
35-44	105	28.3
45-54	105	28.3
55-64	71	19.1
65+	33	8.9
Gender		
Female	228	61.5
Male	143	38.5
Level of education		
No education	68	18.3
Primary education	272	73.3
Secondary education	27	7.3
University or high level	4	1.1
Household size		
>=4	197	53.1
3	71	19.1
2	55	14.8
1	48	12.9
Type of residence		
Permanent residence	349	94.1
Temporary residence	22	5.9
Employment status		
Employed by other	69	18.6
Self employed	244	65.8
Unemployment	58	15.6
How long been on anti retoviral		
One year	24	6.5
Greater than one year	347	93.5

Source: Primary Data from Patients' Files Collected on September 2024

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The Table 1 above summarize the characteristics of the respondents in such way that their mean age are 47 years old and the standard deviation of their ages are 12.529. and the demographic characteristics showed that the majority of the respondents are relying in the age group of 35-44,45-54 ,105(28.3%). Most of the respondent were females who are 229(61.5%) while the males are 143(38.5%). and most of the respondents have the primary education where they capture 272 that correspond to 73.3% and other remaining respondents' level of education share 24.3%. The house hold of the respondents are mostly constituted by 4 or more person where 195(53.1%) reported to be 4 or more in house hold and other 46.9% reported to be 1,2, and 3 in the house hold. Also most of the respondents are permanently resident where 349(94.1%) are reported to be permanent and other 5.9% are reported to be temporary resident and also most of the respondents are self employed where 244(65.8%) and other 34.2% are shared to unemployment and employed by other. And most of the respondent spend more than one year in taking anti retro viral treatment 374(93.5%).

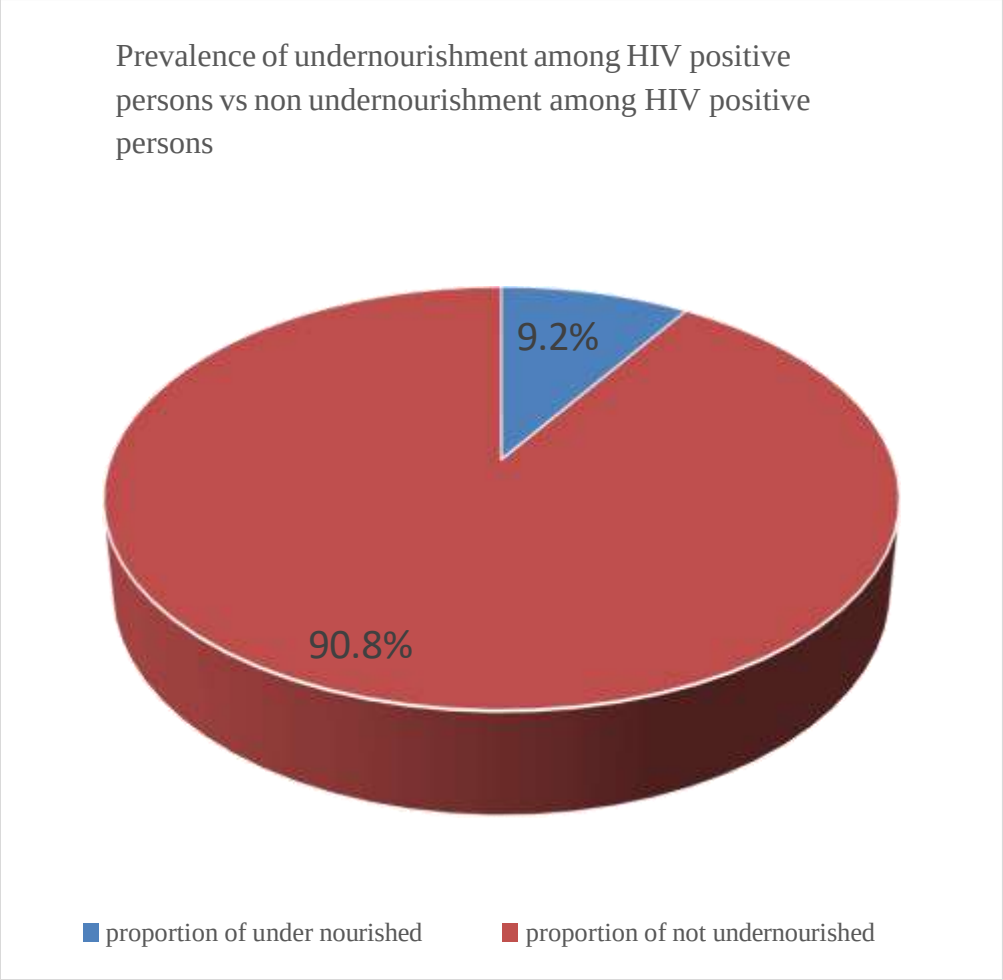

Figure 1: Prevalence of Undernutrition among Adults Person Living with HIV in Kiziguro Catchment Area, Rwanda

The findings of this study on the prevalence of malnutrition (Under nutrition) among adults persons living with HIV of 15 years old and above in Kiziguro Catchment area, Rwanda, demonstrated that 9.2% with95% CI (6.3%-12.1%) of the adults persons with HIV positive were under nutrition while 90.8% with 95%CI (87.9%-93.7%) of adults with HIV positive were

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not under nutrition.

Table 1: Bivariate Analysis of Socio-Economic Characteristics Associated With Under Nutrition among Persons Living with HIV

	Variable	The recent BMI count				Total		
		<18.5		>= 18.5				
		n	%	n	%		Chi-square value	P-value
Age group							4.003	0.549
	15-24	0	0%	11	100%	11		
	25-34	3	7%	43	93%	46		
	35-44	9	9%	96	91%	105		
	45-54	10	10%	95	90%	105		
	55-64	10	14%	61	86%	71		
	65+	2	6%	31	94%	33		
Gender							0.606	0.436
	Females	23	10%	205	90%	228		
	Males	11	8%	132	92%	143		
Marital status							1.482	0.686
	Cohabitant	3	5%	52	95%	55		
	Mrried	24	10%	227	90%	251		
	Separated	4	13%	27	87%	31		
	Single	3	9%	31	91%	34		
Educational level							60.882	0.000
	No education	23	34%	45	66%	68		
	Primary level	10	4%	262	96%	272		
	Secondary	1	4%	26	96%	27		
	University	0	0%	4	100%	4		
Household size							1.095	0.778
	1	5	10%	43	90%	48		
	2	3	5%	52	95%	55		
	3	7	10%	64	90%	71		
	>=4	19	10%	178	90%	197		
Means of transport to Health facility to take therapy							14.106	0.003
	by public transport	7	7%	94	93%	101		
	on foot	27	11%	215	89%	242		
	by own transport	0	0%	28	100%	28		
Employment status							0.697	0.706
	Employed by other	6	9%	63	91%	69		
	self employed	21	9%	223	91%	244		
	unemployed	7	12%	51	88%	58		

Source: Primary Data from Patients' Files by September 2024

The results in Table 2 of bi-variable chi-square of association between socio-economic factors and the recent BMI counts indicated that the following variables: age, Gender, Marital status.

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Household size, were not associated with undernutrition among person living with HIV with p- value greater than 5% . Bivariate analysis for association between socio-demographic factors and undernutrition among person living with HIV as depicted in table 4.3 indicated that, there was a significant association between level of education ($p < 0.000$), the means of transport of taking anti retro viral therapy($p<0.003$) and undernutrition among persons living with HIV. As result, all others were significantly associated and were being analysed in multivariate.

Table 3: Bivariate Analysis of Socio-Demographic Characteristics Associated with Undernutrition among Persons Living with HIV in Kiziguro Catchment Area, Rwanda

	Variable	The recent BMI count				Total		
		<18.5		>= 18.5				
		n	%	n	%		Chi-square value	P-value
Type of health facility							2.17	0.116
	Health center	33	10%	300	90%	333		
	Hospital	1	3%	37	97%	38		
Place of residence							21.052	0.000
	Gatsibo	32	9%	325	91%	357		
	Gicumbi	2	100%	0	0%	2		
	Kayonza	0	0%	10	100%	10		
	Nyagatare	0	0%	2	100%	2		

Source: Primary Data from Patients' Files September 2024

The results in Table 3 of bi-variable chi-square of association between demographic factors and the recent BMI counts indicated that the following variables: place of residence by district (p-value<0.000) was associated with undernutrition among person living with HIV, while other health facility identification with(p-value=0.116) was not associated with undernutrition among person living with HIV.

Referring to the frequencies and the percentage the variable which is at high risk of having malnutrition is place of residence of Gicumbi which is 2(100%) where the 2 sampled patient files files were all found to be undernourished. And among the patients' files selected whose clients comes from Nyagatare district there is no cases of malnutrition found which is 0 (0%).

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Table 4: Bivariate analysis of Clinical Factors Associated with Malnutrition

	Variable	The recent BMI count				Total		
		<18.5		>= 18.5				
		n	%	n	%		Chi-square value	P-value
Time spend in taking anti retroviral therapy							1.735	0.167
	greater than one year	30	9%	317	91%	347		
	one year or less	4	17%	20	83%	24		
WHO clinical stage							5.856	0.119
	I	30	8%	325	92%	355		
	II	3	27%	8	73%	11		
	III	1	25%	3	75%	4		
	IV	0	0%	1	100%	1		
Recent viral load count							0.599	0.291
	<200	27	10%	247	90%	274		
	>=200	7	7%	90	93%	97		
Ever screened positive for TB							68.451	0.000
	NO	19	6%	323	94%	342		
	YES	15	52%	14	48%	29		
Ever diagnosed for diarrhea							111.673	0.000
	NO	14	4%	325	96%	339		
	YES	20	91%	12	9%	32		
Recent CD4 count							0.001	0.57
	<200	11	9%	110	91%	121		
	>=200	23	9%	227	91%	250		

Source: Primary Data on Patients Files

The Table 4 show the Clinical characteristics included time spend on anti retroviral treatment, WHO clinical stage, recent viral load count, the recent Viral load count, whether the clients screened positive for TB, Whether the clients diagnosed for diarrhea ,The recent CD4 count.

The results in Table 4 of bi-variable chi-square of association between Clinical factors and malnutrition among person living with HIV indicated that the following variables: Screening positive on TB (p=0.0001), The diagnosed for diarrhea (p=0001) were significantly associated with undernutrition among person living with HIV other variables like time spend on antiretroviral therapy, WHO clinical stage ,the recent viral load, the recent CD4 count and were not associated with malnutrition among person living with HIV with p-value greater than 5%.

Table 5: Multivariate Analysis of Factors Associated with Malnutrition among Persons Living with HIV

Variables	Exp(B)or AOR	95% C.I.for EXP(B)		Sig.
		Lower	Upper	
Ever screened positive for TB	13.682	3.618	51.745	.000
Ever diagnosed for diarrhea	13.036	4.239	40.089	.000
Level of eduction				.000
Level of education (no education)	0.088	0.1	0.786	0.03
Level of education(primary education)	1.117	0.116	10.754	0.924
Means of transport	.000			0.999
Place of residence(Gicumbi district)	.000			0.999

AOR(Adjusted Odd Ratio)

Logistic regression analysis depicted in Table 5, revealed that ever screened for TB, ever diagnosed for diarrhea, level of education especially those who have no level of education remained statistically significant. The following variables: the level of education of primary, Means of transport and place of residence as Gicumbi lost their significance in logistic regression analysis. Means that they have a lowest strengths of effect on predictor variables which is malnutrition (under nutrition) within person living with HIV. The result from this study found that there is an odd of malnutrition within person living with HIV who screened positive for TB 13.682 times higher than an odd of not malnourished person living with HIV who didn't screened positive for TB.(AOR=3.682,95%CI:[3.618-51.745] ,p-value < .000). an odd of malnutrition(under nutrition) within persons living with HIV who diagnosed for diarrhea is 13.036 times higher than the group of person without malnutrition(under nutrition) who don't diagnosed for diarrhea AOR=13.036,95%CI:(4.239-40.086). And an odd of malnutrition(under nutrition) within persons living with HIV who have no level of education is 0.088 times less than the odd of group of all persons who has level of education who don't have malnutrition(undernutrition) but living with HIV,AOR=0.088,95%CI(0.1-0.786) P value 0.03.

Discussion

Prevalence of Undernutrition among Persons Living with HIV

The findings of this study revealed that the malnutrition among adults person living with HIV was 9.2%. This prevalence is lower than what reported by MS Nnyepi that conducted in 6 support group in Botswana by year 2009 which was revealed 28.5% who were under nourished(M.S., 2009),Gebrechael that conducted in public hospital of west of Shewa in Ethiopia by year 2018 and revealed 23.6% who were undernourished(Gebremichael et al., 2018) , and also my research results is differ from the results that is revealed by Gitego who conducted the study in 2022 at NGARAMA District Hospital ,Rwanda, and revealed the prevalence of under nutrition within adults with HIV was 22.0%(Gitego et al., 2022).

This discrepancy may due to study population that researcher wish to generalize the results some of reviewed study were basing on specific zone and that results should be generalized to that zone, and the zones were different also the samples sizes differ according to the population to be generalized. as the present study was conducted in only one district health catchment area while others were conducted countrywide such as whole zone. For the study conducted by Gitego, in Rwanda, she collected data to only one health facility which is Ngarama District Hospital while my study used all of 12 health facilities , so, for Gitego the results is generalized to Ngarama DH while my results is generalized to all Kiziguro catchment area.

Similarly, my study results is approximately the same as that conducted by Mugurungi Owen, that conducted a study in the clinic which enrolled HIV infected persons in Zimbabwe by year 2017 which was 10%(Takarinda et al., 2017).

Factors Associated With Undernutrion among Persons Living With HIV

The findings about socio-demographic factors indicated that Level of education was significant predictors of malnutrition among person living with HIV where p-value is equal 0.0001, which is less than 5% in such way that the peoples with no education have the risk of developing malnutrition(undernutrition) among person living with HIV,where they indicate an odd of 0.088 times less than an odd of not developing malnutrition in person living with HIV who

have other than no educational level with AOR of 0.088 and 95%CI AOR(0.1-0.786).

Similar findings were found in the study done by Foley&Taylor, in 2010) in South Australia and also those which conducted by Roger in 2007 in Uganda, they revealed that lower educational level is linked to food insecurity that lead to malnutrition in such way that the illiterate person have not knowledge of preparing of sufficient diets nor producing foods, in addition while a persons is infected with HIV he has many cost of acquiring ART drugs, including the means of transport and cost of treating the induced opportunistic infection and then all this slowing the economic status. Also my study found that the persons who have the highly educational levels these are free from malnutrition due to having the knowledge on how to produce their own jobs even their foods as well as for their families(C et al., 2007)

By contrast some other study revealed that socio economic and demographic such as age, marital status and residence were the factors associated with malnutrition among person living with HIV (Gebru et al., 2020). and that studies revealed other socio-economic factors such as household income, employment status, Household size and number of children while in my study all those variables show insignificant association between undernutrition within person living with HIV(Foley et al., 2010).

Findings about clinical factors associated with malnutrition among person living with HIV indicated that screed positive for TB and ever diagnosed for diarrhea have a significant effect on malnutrition (undernutrition)where it show an odd of 13.682 times higher than the HIV persons who have no malnutrition and not screened positive for TB and the p-value of 0.000 with AOR of 13.682 and 95% CI of AOR(3.618-51.745). and the ever diagnosed for diarrhea within person living with HIV show an odd of 13.036 times higher than an odd of not diagnosed diarrhea within person living with HIV who have not malnutrition(under nutrition) with AOR of 13.035 and 95%CI AOR(4.39-40.089).

The similar findings were found in The books written by Vangual 2002, Usaid 2014, Marry et al.., 2018) indicated that the long lasting diarrhea contribute to malnutrition (undernutrition) with HIV infected persons and one of the motors of HIV malnutrition is TB because it is the most opportunistic infection for HIV positive infection that lead to death ((Mary et al., 2018).

By contrast there was some other literature that stated that the clinical factors that contribute to the malnutrition (undernutrition) among persons living with HIV were the duration of HIV AIDS, advanced stage of WHO stage, low CD4 count, high viral loads count while all of those variables showed insignificant association between malnutrition (under nutrition) among person living with HIV in my study results (Abate et al., 2020).

Conclusion

It has been revealed by this study that there is a malnutrition (undernutrition) among adults living with HIV in Kiziguro catchment -Gatsibo district and it mostly appeared in age group of 55 to

64.and the screened positive for TB who have undernutrition covers 34%,and the ever diagnosed for diarrhea cover 91% of under nutrition and the level of education who mostly experience malnutrition were those who have no level of education and cover 91%

The study concluded that most socio-economic and clinical factors influence malnutrition Among persons living with HIV, the level of education, screening positive for TB and the diagnosed for diarrhea showed significant statistical effect with malnutrition among persons

living with HIV. Finally, all socio-demographic factors were not statistically significant.

As the theory said that you can not succeeding anti retro viral treatment therapy without managing malnutrition among persons living with HIV/AIDS, basing on my study results it is necessary to examine all of the influence of malnutrition(undernutrition) and always input health education to HIV clients about those influences include the way to prevent TB as HIV clients have risk of being infected than other non infected HIV positive, to prevent diarrhea by using clean water washing their hand before and after eating or feeding children after using toilets so as to prevent as early as possible.

The results showed that undernutrition start increasing from age group 25-34 to 7% and reach at the top to 14% for age group of 55-64 and decrease to 6% for age group of 65+ years old and for age group of 15-24 there is o% of undernutrition. so basing on the above results the nutrition guideline policy for adults I recommend to include the special management of undernutrition for those peoples that included in those category of age 55-64 either in deep counseling as the one who have high undernutrition compared to other age group.

And for further study wish to assess the factors associated with overnutrition within person living with HIV and also the factor associated with under nutrition among children living with HIV in Rwanda and also to assess the level of anemia especially assess the level of anemia within women in reproductive age living with HIV in Rwanda.

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