College of Medicine and Health Sciences School of Public Health

Master of Sciences of Epidemiology

PREVALENCE AND FACTORS ASSOCIATED WITH UNDERNUTRITION AMONG PREGNANT WOMEN IN THE CATCHMENT AREA OF RUTONGO DISTRICT HOSPITAL/ NORTHERN PROVINCE-RWANDA 2023.

CROSS-SECTIONAL STUDY.

A thesis submitted for Award of Master of Science in Epidemiology,

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DECLARATION

I hereby declare that this dissertation is my original work and has not been presented for degree to any other institution or for any other award.

MUKANKURANGA Petronille

DEDICATION

I dedicate this work to the Almighty God for guidance, my beloved husband NSABIMANA Aimable, children INEZA Aimee Christelle, ISHEMA Aime Chris, IGABA Aimable Kevin, late beloved mother MUKARUBAYIZA Annonciata, my brother, sisters as all as my classmates.

May God Bless You.

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ABSTRACT

Undernutrition is a worldwide crisis that pushes millions of mothers and their children to wait for the end of hunger and severe malnutrition. The main objective of this study was to determine the prevalence and the factors associated with undernutrition among pregnant women.

The specific one was to evaluate the magnitude of undernutrition among pregnant women in Rutongo District Hospital, and to identify the factors associated with undernutrition among pregnant women. To assess all objectives, a cross sectional study was conducted. In this study,a sample of 402 pregnant women who visited Rutongo District Hospital in its catchment area were used to determine the prevalence and the factors associated with undernutrition among pregnant women.

The study revealed that the malnutrition prevalence rate was at 20.1% among the pregnant women in Rutongo District Hospital. This prevalence rate is not far from the rate revealed by Rwanda DHS where the overall prevalence rate of malnutrition among pregnant women stands at 19%, as indicated. The factors that are mainly associated with malnutrition are the education level and abortions experience.

Conclusion

Considering the high prevalence of malnutrition among pregnant women in the catchment area of Rutongo District Hospital, malnutrition should be taken as priority among the district activities. A particular attention should be paid in the health and nutrition communication for the pregnant women. And for women who had abortion they should continue taking a balanced diet during pregnancy.

Key words: Malnutrition, undernutrition, pregnant women, Rutongo District Hospital

ACRONYMS AND ABBREVIATION

CTB: Belgian Technical Cooperation

MUAC: Mid -Upper Arm Circumference

UN: United Nations

UNICEF: United Nations Children's Fund

WASH: Water, Sanitation and Hygiene

WHO: World Health Organization

OR: Odds Ration

CI: Confidence interval

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CHAPTER I

INTRODUCTION

1.1. Definition of key concepts

Malnutrition: According to WHO (April,2020), malnutrition is defined as deficiency, excess or imbalance in intake of energy and/or nutrients. Malnutrition includes undernutrition which refers to stunting: low height for age; wasting: low weight for height; underweight: low weight for age, and micronutrient deficiencies or insufficiencies indicating a lack of vitamins and minerals. The other form of malnutrition includes over nutrition that predicts overweight, and obesity.

Undernutrition: Protein –Energy Malnutrition: lack or shortage of proteins and energy intake resulting from not enough food or food of poor nutrition quality.

Overnutrition: Overweight – obesity. It is the consumption of too many calories and limited physical activities.

1.2. Background

Malnutrition is one of the major health issues among pregnant woman in most of developing countries, including Rwanda. This lack of sufficient and adequate nutritional diet may result into health and pregnancy outcomes. Pregnancy women usually need to have a well-balanced food not only to cater themselves but also provide the sources of macro and micronutrients to meet the bodies demands for the new-born (Asha, K., & Salil, S. 1998).

The prevalence of malnutrition among pregnancy women is usually associated with limited economic situation, poor personal and environmental hygiene. Pregnancy is such a critical phase in a women's life when the expecting mother needs optimal nutrients of superior quality to support the developing foetus Müller, & Krawinkel, 2005). An adequate food diet is equally important for effective working of the body system, hence the latter considered as the key pillar of human life, health and development throughout the entire life span.

Undernutrition can be considered as the deficiencies in a person’s intake of energy and/or nutrients. It is mostly known that maternal and child nutrition play key roles in the proper human growth and development. And so, access to balanced nutrition has a fundamental function in human living, health, and development throughout the entire lifespan. However, its deficiency, especially among

pregnant women, remains a critical challenge in many developing countries (Boke, M, 2021; Black, R. et al, 2008)

Specifically, in such countries, maternal undernutrition related mortality and morbidity remain trending health challenge. It has been more often observed that undernutrition is the underlying cause of 20% of maternal death in many regions of the world. In most of these countries, the issue of maternal undernutrition is estimated to be between 10-19 percent (Black, R. et al, 2008). A very critical health issue of maternal undernutrition is commonly observed in most Sub-Saharan Africa countries, where two in every 10 women were undernourished (Lartey, A., 2008).

When the pregnant women are undernourished, this would result in negative pregnancy outcomes, hence making the women more exposed to various health consequences such as miscarriages and potentially give birth to low weight baby whose survival is at risk. It is also very important to note that nutritional level during pregnancy is directly associated to intrauterine growth retardation and underweight at child birth.

Normally, the main source of undernutrition is when people do not consume enough nutrients to gain their needs for energy and growth, or to maintain a healthy immune system. This involves the micronutrient deficiencies which are eventually the sub-category of undernutrition and usually takes place when the body lacks one or more micronutrients such as iodine (Burgess, A. 2008). Such deficiencies in most cases impact the human growth and immunity and at the same time, it can lead to specific clinical conditions including anaemia and hypothyroidism or xerophthalmia.

Sometimes, the issue of undernutrition is not only associated to lack of food access. For instance, we may have undernutrition which is associated with unequal food distribution due to different cultural set up, hence, restricting food intake of women (Kusin, J. A et al 1993). Therefore, as the later are usually engaged in productive activities which entail a substantial energy expenditure (McGuire & Popkin, 1989), it is likely that the majority of undernourished adults in such poor countries be the women.

Furthermore, it has also been found that more than 50 percent of anaemia worldwide is resulted from iron deficiency. The latter is predominantly induced by limited dietary iron; increased iron demands such as during pregnancy (Roba, K. T., et al 2015; Demissie, T et al, 2003; Asha, K., & Salil, S, 1998). It is also observed that a high demand of the iron during menstrual blood loss, pregnancy, lactation, and due to nutritional deficiencies are the most prominent indicators of the iron deficiency in reproductive-aged women (Demissie, T et al, 2003; Asha, K., & Salil, S, 1998).

Globally, undernutrition is a crisis that pushes millions of mothers and their children into hunger and severe malnutrition. Specifically, the United Nations report indicates that the number of pregnant women suffering from acute malnutrition has increased from 5.5 million to 6.9 million, representing a 25 percent surge since 2020 to 2023 (UN Report, 2023). However, the prevalence of undernutrition in different regions have various degree of undernutrition among pregnant women. In Asia, specifically in Bangladesh, the undernutrition among pregnant women reaches 38 percent among women 15-49 years (Bangladesh, 2011). In Latin America, the level of undernutrition among pregnant women reached around 26 percent in 2016 (Galicia et al, 2016). This highlights the sustained health nutrition issues among pregnant women, which eventually affects also the newborn and children.

Further, in other developing nations, the prevalence of under nutrition among pregnant women ranges from 13 percent to 38 percent (Ramachandran and Ravishankar,2013; Devgun et al, 2014). The situation is worse in Africa, where the burden of malnutrition among pregnant women is about 23 percent (Demelash and Dadi,2019). Specifically, in Ethiopia, one of African countries with high level of undernutrition, from 30 percent in 2000 to 22 percent in 2016.The country is still among the countries with a high burden of maternal undernutrition (Desyibelew and Dadi,2019

Under nutrition reported in Rwanda among pregnant women is 19.8% by using mid- upper arm circumference (MUAC) less than 23 cm.

Generally, the main factors associated with undernutrition include limited access to a balanced diet, poverty, limited income, conflict among households, poor hygienic, water sanitation among others (Nsereko et al., 2020).

1.3. Problem statement

Over the last two decades, Rwanda has recorded important steps in reducing malnutrition among its citizens, including pregnant woman, and children. Under nutrition reported in Rwanda among pregnant women is 19.8% by using mid-upper arm circumference (MUAC) less than 23 cm (Nsereko et al., 2020). Moreover, pregnant women' s undernutrition remains a persistent problem in developing countries, such as Rwanda, as results of various multiple causes (6). The country has implemented different programs for five years aimed at reducing the malnutrition among pregnant women and children.

Those programs include:

National nutrition policy, national emergency plan to eliminate malnutrition, national protocol on malnutrition management at health facilities and community level,

National multi-sectoral strategy to eliminate malnutrition, scaling up of nutrition alliance, Gikuriro program, Shisha Kibondo, Ongera intungamubiri.

Despite those interventions, the robust evidence related to pregnant women, undernutrition remains unanswered. Thus, the research question of this study is as follows:

Research question of the study:

1. What is the prevalence of undernutrition among pregnant women in Rutongo District Hospital?
2. What are the associated factors with undernutrition among pregnant women?

1.4. Study objectives

General objective

The overall objective of this study was to determine the prevalence and the factors associated with undernutrition among pregnant women.

Specific objectives

The specific objectives were:

1. To evaluate the magnitude of the undernutrition status among pregnant women in Rutongo District Hospital.

2. To identify the factors associated with undernutrition among pregnant women.

1.5. Literature review

Globally, undernutrition is sensitive health concern among under-five children and pregnant women. The World Health Organization (WHO) considers under nutrition as high problem to the public health that everyone needs to prevent and improve mother health status. Many countries of south-central and south-eastern Asia and Sub-Saharan Africa face significant challenges of the high prevalence of the maternal undernutrition (Kuche et al, 2015).

It has been reported that in these developing countries around 3.5 million women deaths and disabilities are due to poor dietary intake in the earliest months of life (Arero. 2022).

Furthermore, the rate of undernutrition among pregnant women in these developing countries is estimated to be between 13%-38% while the Africa continent represents the prevalence at 23% (Desyibelew et al, 2019). Specifically, for the African continent, the maternal undernutrition is among the priorities health related issues, where most of the women suffer from chronic energy deficiency, inadequate weight gain during pregnancy, and poor micronutrient status resulting from limited food intake and micronutrient (Idowu et al, 2005).

Also, existing evidence indicated that in 2013, there were more than 289,000 women deaths during and following pregnancy and childbirth. Among women deaths in Africa, twenty per cent of maternal deaths have been attributed to anemia as a result of limited micronutrients such as iron and folate during pregnancy.

And among such African countries with high death incidence among pregnant women, there is Ethiopia which accounts more than 22% of maternal undernutrition; and the study conducted in the Amhara region found that undernutrition is between 16-29,8% among pregnant women in the country (Desyibelew et al, 2019). Having pregnant women with such undernutrition incidence poses a serious concern on prospectus newborns as well. This is because the status of undernutrition of pregnant women induces the low birth weight, unsuccessful birth outcome and eventually the underdevelopment of newborn. Therefore, such repercussions of undernutrition among pregnant women and other associated implications remain the public health problem, especially in African countries (Hasnat et al. 2010).

In Rwanda, a number of studies have tackled on malnutrition and undernutrition among children and pregnant woman. For instance, (Habtu et al, 2023) using the qualitative method on

25 Community Health Officers, 27 nutritionists and 80 beneficiaries in 10 focus group discussions found that numerous positive effects of an integrated nutrition- intervention program among pregnant women in Rwanda. They specifically found that the impact includesimproved knowledge and skills on nutrition, a positive mindset toward a balanced diet, perceived improved nutrition, and economic independence among these women (Habtu et al, 2023). Further another study also evaluated the impact of integrated nutrition specific program on maternal malnutrition among pregnant women in Rwanda using evidence from Kicukiro and Kayonza districts. Its findings showed that the specific integrated nutritional program is strongly relatedto the low maternal undernutrition in the country (Habtu et al, 2022).

1.6. Conceptual framework for malnutrition

According to UNICEF Nutrition Strategy 2020-2030 builds on UNCEF'1990 conceptual work-revelated the increasing of three form of malnutrition: undernutrition, micronutrient deficiencies, and overweight, there they highlight the role of diets and care like immediate determinants of maternal and child nutrition.

Figure 1summarizes the relationship between the independent(predictors)variables and dependent (outcome) variables. The independent variables which were considered as determinants or factors associated with undernutrition among pregnant women were socio-demographic characteristics: age of mother between15-49, marital status: married, single mother, education: no education, primary, secondary and above, religion: catholic, protestant socio-economic: welfare index (categorie1,2,3), pregnancy, abortion experience and employment pregnant women.

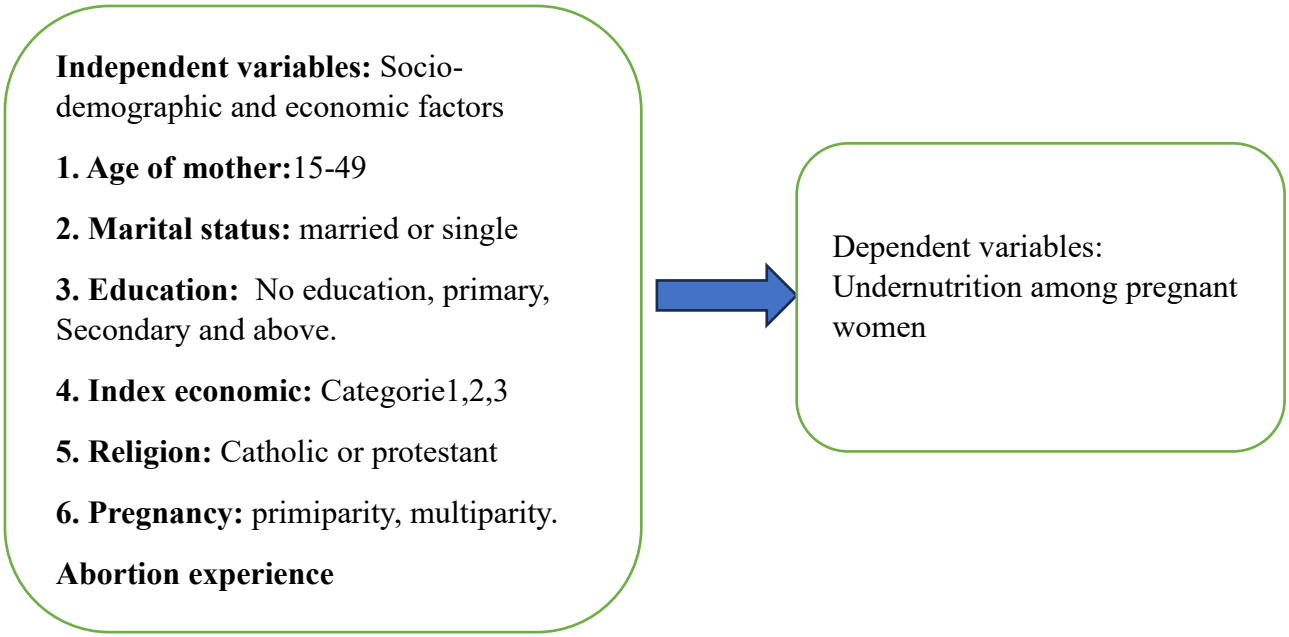

Figure 1: Conceptual framework of associated factors with undernutrition among pregnant women adapted from UNICEF Nutrition Strategy 2020-2030 builds on UNCEF'1990.

CHAPTER II

METHODS AND MATERIALS

2.1. Study area

This study was conducted in Rwanda, specifically, in Rutongo District Hospital. Rutongo District Hospital was located in the Northern Province, Rulindo District, Masoro Sector, Shengampuli Cell, 2015, when the government decided to relocate it in Rulindo District, Ngoma Sector, Mugote Cell. The hospital is located at 21 km from Karuruma.

It was constructed in 1938 by SOMUKI (Société d' Exploitation des Mines) for its personnel. In 1982, the hospital had an extension considering the number of clients. In 1998, the District Hospital benefited from the financial support from the Belgian Technical Cooperation (CTB) which contributed until today, in the functioning of the mentioned hospital. Rutongo District Hospital serves a population of 192,092 inhabitants from 10 Sectors of Rulindo District. It encounters 13 Health Centers, 7 Health Posts and 4 Secondary Health Postslocated in its catchment area including Health Centers such as Masoro, Kajevuba, Murambi, Kiyanza, Shyorongi, Rutonde, Rwahi Remera-Mbogo, Bubangu, Burega, Muyanza, Rulindo, and Kinini.

2.2. Study design

A cross- sectional study with analytical component was used.

2.3.1 Specific objectives achievement

-To determine the prevalence of undernutrition among pregnant women, the weight, weight gain, MUAC were measured. In this respect, the following indicators were used to identify the undernourished pregnant women: weight under 45kg, weight gain under 10kg: trim 1=1.5kg, trim 2= 4.5kg trim 3=6kg, MUAC under 23cm.Then after the percentage of undernourished women among the study population was specified as prevalence rate of undernutrition.

-To identify the factors associated with undernutrition among pregnant women, bivariate analysis and multivariate analysis were performed.

2.2.1. Study variables

The dependent variable

The outcome variable of a study was the undernutrition among pregnant women. The mid- upper arm circumference values were used, the measure less or equal to 23cm was considered as undernutrition.

The independent variables

The independent variables of study were all socio demographic characteristics: age of mother between 15-49; marital status: married, widowed, divorced, separated, single mother.

Mother's education (illiterate, primary level, high school, others.); women occupation (employed, unemployed), husband employment (unemployed, government employee, private employee, household income among others, inadequate food intake, diseases, poor access to health facilities, lack of comprehensive information on WASH issues, lack of comprehensive information on diseases prevention.

For further analysis, other factors led to undernutrition were: number of pregnancies, number of abortions, number of children born, weight

Inclusion criteria

- All women who consulted health centres seeking health pre and postnatal care duringthe period of the study.
- All pregnant women who are shoulding to participate to the current study.

Exclusion criteria

- Pregnant women who consulted the selected health centres critically ill within theperiod of the study.

2.2.2. Analysis plan

The data were collected from health centers' clients, put in excel then was exported into Stata version 15 for analysis.

Univariate analysis: The data were collected using questionnaire and put into Stata version 15, to describe the frequency and the percentage.

Bivariate analysis: to identify the significance of independent variables to the outcome variable

Multivariate analysis: Logistic regression model was conducted to identify the main contributing factors of malnutrition among pregnant women. The significance level for the associations was considered at the level $p < 0.05$.

2.3. Study population

According to Salant and Dillman (1994), population refers to an entire group of individuals, events or objects having common observable characteristics.

The targeted population in this study was all pregnant women who had attended health centers of Rutongo District Hospital during the study. According to Rwanda National Institute of Statistics (NISR,2016), the population in the catchment area of Rutongo district hospital is approximately 192,092.

2.3.1. Sample size calculation

Population refers to an entire group of individuals, events or objects having common observable characteristics. The targeted population in this study were all pregnant women located in 6 Health Centers among 13 Health Centers of Rutongo District Hospital. The following six Health Centers Bubangu, Kajevuba, Masoro, Kinini, Shyorongi and Rulindo have been randomly selected to represent the other Health Centers in Rutongo District Hospital.

Using the following formula; the sample size with two stages among these population was showed by design effect.

n= Design effect*Z2 (P) (1 - P) / D2

Where n is the corrected sample size. In this context, we estimate a population proportion with 95 confidence intervals that the survey estimate lies within 5 percentage points of the true population.

Design effect=1.5

Z: Z-score corresponding to the level of confidence intervals1.96
D=5% or 0.05: Precision

P=Prevalence of undernutrition in Rwanda among pregnant women to be19.8% (Nsereko et al.2020).

Using this formula, the sample size should be calculated in this manner:

n= 1.5*(1.96)2 (0.198) (1-0.198) / (.05)2

= 1.5*(3.8416) (0.158796)/ (0.05)2

=1.5* (0.610030713)/ (0.05)2

=1.5*244

= 366

The sample size calculated among study population was 366 women.10% from respondents was added:366*10%=36.6. The total should be 366+36=402 women.

2.3.2. Sampling techniques

The probability sampling was used to target all pregnant women who came to the Health Centres for the appropriate services. A list of all pregnant women who were attended those health centers during the period of study was considered as participants among 402 pregnantwomen.

2.3.3. Data collection procedures

Before data collection, ethical clearance from Institutional Review Board, was given. All information of pregnant women from records and registers of health centers was taken and the data collected was recorded and entered in the computer. The data were collected from April-June /2023.The following steps are highly considered in the data collection procedures:

(i) Visiting the sample catchment areas: The first thing to do when the ethical clearance is provided was to visit the catchment area of the selected (sampled) health centers. The visit of the catchment areas gave me a good understanding of the current situation of the households, health and socio-economic conditions in given area.

(ii) Visit the Health Centers: Second, I was then visiting the local health centers and meeting with the health center managers, introduce myself and explain the purpose of the study. This was very important step in achieving study goals and objectives. Visiting the health centers gave an opportunity and understand more about specific attributes of each health centre under consideration.

(iii) Meeting focal person: The health center visits and meeting with relevant managers was followed by the planning data collection procedures. At each health center, I was organizing a meeting with focal person (assigned by the management of health centers) and I was explainedto him/her how and why I am planning to collect the data. With the focal person, I was able toknow which days to collect data, which office to use and how to proceed.

(iv) Data collection using excel: From there, I was used my questionnaire, designed into excel format to start data collection. I was ensured that the time is fully respected.

2.3.4. Study tools

The standardized guideline was developed and used to ensure the reliability and quality of collected data. The health center data records on the pregnant women were used to gather different relevant information regarding the antenatal care service delivered under the study period.

Policy implications

The study could help the policy makers to plan for prevention of undernutrition among pregnant women.

The results from this study provide evidence on undernutrition prevalence among women, especially pregnant. This was of significant relevance to both health policy makers and community in Rwanda and other developing countries, particularly on the channels through which undernutrition can affect pregnant women in various communities. Further, the results of this study were giving insight on main attributed that characterize the pregnant woman in Rwandan communities. Finally, the findings from this study could be useful to bring out some relevant policies for the general public health services, especially ones that which account for undernutrition among women in the country.

The findings of this study could be presented in School of Public Health at College of Medicine and Health Sciences, University of Rwanda. Furthermore, the results should be shared with Rutongo District Hospital for further policy engagement. In case authorization is given, the findings could be presented in national and international conferences for dissemination, sharing evidence and publication.

Ethical considerations.

The ethical clearance was obtained from Institutional Review Board (IRB) of the University of Rwanda College of Medicine and Health Sciences (CMHS).The access of the data from health centers 'records was obtained from the managers of the selected health centers after presentation of ethical clearance.

Confidentiality

The data obtained from health center records and through guideline form were considered as anonymous and was only serve for the research purposes. It was fully protected and only the researcher had access to it. Additionally, these data were treated confidentially, and no effort was made to trackback individual participants.

Human subject

The informed consent letter was not required, the data collection was done through the health centers records.

Funding

This study was funded by the researcher herself.

Limitation

The conduction of this study was limited by time and funds, it was not possible to attend all Health Centers of Rutongo District Hospital**.**

CHAPTER III

RESULTS DATA PRESENTATION, ANALYSIS AND INTERPRETATION

3.1. Social-demographic characteristics of the study population

As shown in Table 1 those aged [26-35] account for 42.8% as the highest age group, followed by [15-25] that account for 33.3% and those of 36+ for 23.9%. About the education of interviewed pregnant women, 69.9% have primary, followed by 20.1% that have secondary and above, and only 10.0% of them have no education. The wealth status among women was distributed according to the Ubudehe categorization where 89.1%, 10.0% and 1.0% are in category 3, category 2 and category 1.

Table 1: Socio-demographic characteristics of the study population

Variables		**Count**	**Percentage (%)**
Age group	[15-25]	134	33.3
	[26-35]	172	42.8
	36+	96	23.9
Health center	Bubangu	69	17.2
	Kajevuba	71	17.7
	Kinini	70	17.4
	Masoro	70	17.4
	Rulindo	70	17.4
	Shyorongi	52	12.9
Education	No education	40	10.0
	Primary	281	69.9
	Secondary and above	81	20.1
Religion	Catholic	317	78.9
	Protestant	85	21.1
Economic index	Cat 1	4	1.0
	Cat 2	40	10.0
	Cat 3	358	89.1
Marital Status	Married	332	82.6
	Single	70	17.4
Unemployment	No	10	2.5
	Yes	392	97.5

Source: Rutongo District Hospital, 2023

3.2. Prevalence of malnutrition among pregnant women

Table 2 indicates the prevalence rate of malnutrition among pregnant women in Rutongo District Hospital as it was aired out by the interviewed women during the study. The results show that the prevalence rate of malnutrition is 20% and satisfactory nutritional status is at 80% of the interviewed women.

Table 2: Prevalence of malnutrition among pregnant women

Nutrition status	*Frequency*	*Percentage*
Satisfactory	321	79.9
Undernutrition	81	20.1
Total	402	100

Source: Rutongo District Hospital, 2023

3.3. Bivariate analysis: Undernutrition and socio demographic characteristics of the study population

As shown in Table 3 the following variables were significant (p-value <0.05): education level, religion, abortion experience.

Table 3: Undernutrition and socio- demographic characteristics

The bivariate analysis for nutrition status							
Variables		**Nutrition status**				**Chi-square**	**Sig.**
		Nourished		**Undernourished**			
		Count	**Percentage**	**Count**	**Percentage**		
Age group	[15-25]	100	24.9	34	8.5	3.48	0.176
	[26-35]	141	35.1	31	7.7		
	36+	80	19.9	16	4.0		
Education	No Educ.	35	8.7	5	1.2	6.467	.039*
	Primary	215	53.5	66	16.4		
	Secondary and above	71	17.7	10	2.5		
Religion	Catholic	246	61.2	71	17.7	4.71	.030*
	Protestant	75	18.7	10	2.5		
Economic index	Cat 1	4	1.0	0	0.0	2.432	.296b,c
	Cat 2	29	7.2	11	2.7		
	Cat 3	288	71.6	70	17.4		
Pregnancy	No	2	0.5	2	0.5	2.238	.135b,c
	Yes	319	79.4	79	19.7		
# of Pregnancy	[1-5]	301	74.9	78	19.4	.766[a]	.382
	6+	20	5.0	3	0.7		
# of pregnancies born	[0-5]	316	78.6	81	20.1	1.278[a]	.258
	6+	5	1.2	0	0.0		
Abortion	No	283	70.4	64	15.9	4.585	.032*
	Yes	38	9.5	17	4.2		
Number of pregnancies aborted	[1-5]	40	10.0	15	3.7	2.235[a]	.327
	6+	1	0.2	0	0.0		
Unemployment	No	6	1.5	4	1.0	2.512	.113b
	Yes	315	78.4	77	19.2		

Source: Computed by the Author based on the data from Rutongo District Hospital, 2023

3.4. Multivariate analysis: Factors associated with undernutrition for pregnant women

The outcome variable in logistic regression is nutrition status. Education, religion, abortion experience are the explanatory variables. Those are the identified variables of malnutrition among pregnant women which were statistically significant from the bivariate analysis.

As indicated by the results in Table 4, those with primary education had 2.27 times more likely to have undernutrition (AOR:2.27, 95% CI:1.10-4.68) compared to those with secondary and above. The women who experienced the abortion during their pregnancy period are 2.03 times more likely to develop undernutrition (AOR:2.03,95%CI:1.07-3.86) compared to those who do not have abortion.

Table 4: Factors associated to undernutrition

Variables		COR	95% C. I		p value	AOR	95% C. I		p value
			Lower	Upper			Lower	Upper	
Education	No education	1.01	0.32	3.20	0.981	1.10	0.35	3.50	0.868
	Primary educ.	2.18	1.06	4.47	**0.033**	2.27	1.10	4.68	**0.026**
	Second. & above	**Ref**				**Ref**			
Religion	Catholic	2.17	1.06	4.41	**0.033**	2.16	0.38	12.28	0.387
	Protestant	**Ref**				**Ref**			
Abortion	Yes	1.98	1.05	3.73	**0.035**	2.03	1.07	3.86	**0.031**
	No	**Ref**		**3.73**		**Ref**			

COR: Crude Odd Ratio, **AOR**: Adjusted Odd Ratio, **CI**: Confidence Interval

Source: Computed by the Author based on the data from Rutongo District Hospital, 2023

3.5. Discussion

The overall objective of this research project is to characterize the prevalence and the associated driving forces (factors) associated with undernutrition among pregnant women in the catchment areas of Rutongo District Hospital. Data were collected from six (6) Health Centers of the said District Hospital.

The findings from this study indicate that around 20.1% of the pregnant women in the catchment areas of Rutongo District Hospital are undernourished. This indicates that among pregnant women in Rutongo District Hospital, there were several pregnant women facing nutrition problems that may also affect their fetuses and cause other prenatal complications. These results were almost similar to the results from the Integrated Household Living Conditions Survey (EICV 5: 2016-2017) stating that 38.2% of the population were poor and undernourished. Therefore, poverty is

still affecting the living conditions of the people in societies, especially pregnant women in Rwanda.

The study further identified the main driving factors associated with undernutrition, and among others, education level and abortion experience play important and significant impacts. Specifically, the education plays much more important where those who had primary level or less have no enough information about diet modification during pregnancy which, therefore, expose them to nutrition problem.

Furthermore, the study also found that women who experienced the abortion develop malnutrition due to different factors including loss of weights, depression, and other faced problems during pregnancy. It has also been found that in developing countries, the health sector is home to several undernourished pregnant mothers, and malnutrition could be widespread, especially in rural areas (Nnunukwe, 2018). This is partly due to inadequate food and nutrient supply entailed by poverty and its associates. The annual estimate of 600,000 women aged 15-49 years die of pregnancy-related causes with 99 percent coming from the developing world (Addai, 2008; Population Reference Bureau, 2009; World Health Organization [WHO], 2010) and Almost 95% of all maternal deaths occurred in low and lower-middle-income countries in 2020 [WHO]. In Rwanda, undernutrition among pregnant women measured by mid-upper arm circumference (MUAC) less than 23 cm is accounted to 19.8% (Nsereko et al., 2020).

The prevalence of undernutrition among pregnant women in various catchment areas can vary significantly based on a variety of factors, including geographic location, socioeconomic status, access to healthcare, nutrition, geographical location, socio-economic status, access to health care, dietary habits, food security, education and awareness, maternal age and party, health conditions, culture and Societal factors, Interventions and Programs, Climate and Environmental Factors, and cultural practices. Understanding these factors is essential for addressing and mitigating undernutrition problem among pregnant women effectively.

It is seen that the prevalence of undernutrition among pregnant women can be higher in regions with limited access to nutritious food, clean water, and healthcare services. Rural areas, especially in low-income countries, often face higher rates of undernutrition due to these factors. Another important point to mention is that pregnant women from lower socioeconomic backgrounds are more likely to experience undernutrition due to limited resources to be able to afford the nutritional food contents. In most cases, they depend on subsistence farming with limited food options. Therefore, due to high incidence of poverty among households, the pregnant women can have

limited access to nutritious food and healthcare, hence, making it challenging to maintain a healthy diet during pregnancy.

On the factor of adequate prenatal care and cultural dietary practices play a crucial role in preventing undernutrition during pregnancy. Women with limited access to healthcare may not receive essential nutrients and guidance on proper nutrition during pregnancy. Cultural dietary practices can impact the nutritional status of pregnant women. In some regions, traditional diets may lack diversity and essential nutrients, contributing to undernutrition.

The food security and knowledge about proper nutrition is a significant factor to the nutrition of pregnant women. Pregnant women in households with food insecurity may not have consistent access to enough food or nutritious options, increasing the risk of undernutrition, and the knowledge about proper nutrition during pregnancy is essential. Women with limited education and awareness may not understand the importance of a balanced diet or may not have the information needed to make healthy choices.

About the age, parity and health conditions the key factors to pregnant women as younger and higher-parity (having multiple children) pregnant women may be at a higher risk of undernutrition, as their nutritional needs may be greater and they may face more challenges in meeting those needs. Pre-existing health conditions such as anemia, diabetes, or gastrointestinal disorders can exacerbate undernutrition during pregnancy, making it crucial to manage these conditions effectively. The cultural beliefs and societal norms it is not stands alone factor that can influence dietary choices and behaviors during pregnancy.

The government initiatives and Climate and Environmental, non-governmental organizations (NGOs), and community-based programs can significantly impact the prevalence of undernutrition among pregnant women. These programs often focus on providing education, access to nutritious foods, and prenatal care. Climate and Environmental Extreme weather events, such as droughts or floods, can disrupt food production and availability, potentially leading to undernutrition among pregnant women in affected areas.

Addressing the issue of undernutrition among pregnant women requires a multi-faceted approach that considers these factors. It involves improving access to healthcare, promoting nutrition education, addressing food security issues, and culturally sensitive interventions. Collaboration between governments, healthcare providers, NGOs, and communities are vital to reduce the prevalence of undernutrition and ensure healthier outcomes for pregnant women and their infants.

CHAPTER IV

CONCLUSION AND RECOMMENDATIONS.

4.1. Conclusion

The objectives of the study were to determine the prevalence of undernutrition and to identify the associate factors among pregnant women in Rutongo District Hospital. The data for this study were collected from 6 health centers in the Rutongo District Hospital. The prevalence of malnutrition was 20.1%.

This prevalence rate is not far from the rate revealed by NISR DHS report 2019-2020, where the overall prevalence rate of malnutrition among pregnant women stands at 19%, as indicated. The factors associated with malnutrition were education and abortions experience.

4.2 Recommendations

Considering the high prevalence of malnutrition among pregnant women in the catchment area of Rutongo District Hospital, malnutrition should be taken as priority among the district activities. Reducing the prevalence of malnutrition among pregnant women is crucial for the health of both mothers and their conceived children. Some recommendations to address and mitigate malnutrition among pregnant women are identified here below:

To the women of Rulindo district

- To use be aware of the use food fortification programs to enhance the nutritional content of commonly consumed foods. This can include fortifying staple foods like rice, wheat, or salt with essential nutrients.
- To find the improved and cleaned drinking water and sanitation facilities, as these are essential for preventing waterborne diseases that can contribute to malnutrition.
- To breastfeed the children for the first six months of a child's life. Breast milk provides essential nutrients and antibodies that can help prevent malnutrition in both infants and mothers.
- The pregnant women to seek early and regular antenatal care. Healthcare providers can monitor the nutritional status of pregnant women and provide appropriate guidance and supplements when needed.

To the community of Rulindo District

- The community engagement in planning and implementing nutrition interventions. Local knowledge and community participation are vital for the success of such programs.

To health care facility and hospital in Rulindo district

- To Provide iron and folic acid supplements to pregnant women to prevent anemia and neural tube defects. Additionally, in areas with a high prevalence of vitamin deficiencies, vitamin supplements may be necessary.
- Screen for and manage health conditions such as anemia, gestational diabetes, and hypertension during pregnancy to prevent complications that can exacerbate malnutrition.
- Continuously collect data on malnutrition rates among pregnant women to monitor progress and identify areas in need of intervention.
- A particular attention should be paid in the health and nutrition communication for the pregnant women and for women who had abortion they should continue taking a balanced diet during pregnancy.

To the government of Rwanda

- To implement the comprehensive nutrition education programs for pregnant women and their families. These programs should emphasize the importance of a balanced diet, including a variety of foods rich in essential nutrients like vitamins, minerals, and proteins.
- To improve access to nutrient-rich foods through food distribution programs, subsidies, or community gardens. Efforts should be made to ensure that pregnant women have access to fresh fruits, vegetables, dairy products, and lean proteins.
- To implement measures to reduce food insecurity, such as social safety nets, income-generation programs, and community-based initiatives that provide food assistance to vulnerable populations.
- To encourage the family planning and adequate spacing between pregnancies to allow mothers to recover their nutritional status before becoming pregnant again.

- To advocate for and implement policies that prioritize maternal nutrition and healthcare, allocating resources and creating an enabling environment for these efforts.
- To tailor interventions to the cultural practices and preferences of the target population to ensure they are accepted and sustainable.
- To collaborate with government agencies, non-governmental organizations, healthcare providers, and community leaders to create a coordinated approach to combat malnutrition among pregnant women.

To the researchers

- Farther research should be conducted to identify other factors influencing undernutrition among pregnant women in the catchment area of Rutongo District Hospital.

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APPENDICES

Guideline for data collection

Order number	First_name	name	District	Sector	Cell	Village	Age	Health_center	Education	M_Status	Pregrancy	Nber_pregnancies	Matured_preg	Nber_pregn_born	Abortion	Nber_aborted	Died	Nber_death	Weight	Height	MUAC	Nutrition_status	Weight_gain