# KNOWLEDGE AND PRACTICES ON PROPER NUTRITION AMONG PREGNANT WOMEN ATTENDING ANTENATAL CARE CLINIC AT SOROTI REGIONAL REFERRAL HOSPITAL, SOROTI CITY. A CROSS-SECTIONAL STUDY.

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## Abstract
### Background
There has been an increase in malnutrition among pregnant women attending the Antenatal Care Clinic at Soroti Regional Referral Hospital (SRRH). Therefore, this study aimed to assess the knowledge and practices of these women regarding proper nutrition.

### Methodology
The study adopted a descriptive cross-sectional design that included quantitative data. A simple random sampling method obtained a sample size of 35. Data was collected using a self-administered questionnaire. The results were analyzed using the Statistical Package for Social Sciences (SPSS) program version sixteen (16), and findings were presented in the form of tables, graphs, and pie charts.

### Results
35 respondents participated in this study, most of the respondents were between the ages of 26-35 years while a minority 2.9% were aged 45 and above, 57.1% were married 28.6% were single, 51.4% were Catholics and 5.7% were Muslim, the study revealed that 71.4% of the respondents knew about proper nutrition, 51.4% relied on healthcare for information. 57.1% reported that food should be kept in granaries/stores for a healthy pregnancy, and 51.4% took folic acid as a prenatal supplement.

### Conclusion
Although the respondents knew about proper nutrition, they had fair practices on adequate nutrition.

### Recommendation
The Ugandan government should train healthcare workers on nutrition counseling and support and integrate nutrition services into primary healthcare.

## Background of the study
World Health Organization (WHO) describes nutrition as a critical part of health and development and that better nutrition is related to improved infant, child, and maternal health; stronger immune systems; safer pregnancy and childbirth; and lower risk of non-communicable diseases such as diabetes.

Nutrition refers to the utilization of food materials by living organisms, which enables them to grow, maintain themselves, and reproduce. Malnutrition, on the other hand, refers to the taking in of dietary nutrients less than or greater than the body's requirements (Kalu and Etim, 2018). Malnutrition includes undernutrition (wasting, stunting, underweight, and mineral- and vitamin-related malnutrition) and overnutrition (overweight, obesity, and diet-related non-communicable diseases).

Healthful nutrition can be achieved by eating a variety of nutrients that consist of whole foods, fruits, vegetables, legumes, grains, whole grains, and healthy fats with omega-3 fatty acids that include nuts and seeds and fish. Women who report a health-conscious eating pattern before and/or during pregnancy are less likely to have pregnancy complications and unfavorable child health outcomes (Marshall et al., 2022).

Maternal ideal nutritional status is the most important non-genetic factor for the healthy development of the fetus and the welfare of mothers. Maternal malnutrition, both undernutrition and overnutrition (obesity), may lead to unfavorable pregnancy aftereffects and can have significant negative effects on growth and development during the early years of life and excess risk of developing chronic diseases during adulthood. Malnourished mothers are likely to give birth to low birth weight (LBW) babies (including preterm and small for gestational age babies) with excess risk of stunted growth (Imdad et al., 2017).

Globally, it was estimated that 38.9 million pregnant women were overweight and obese, with 14.6 million obese pregnant women, with India having the biggest number of overweight and obese pregnant women (4.3 million), which accounted for 11.1% in the world. In the United States of America, 1.1 million pregnant women are obese (Chen et al.,2018). Another study reveals that over half (50%) of pregnant women in the United States are overweight or obese, which may be associated with poor pregnancy outcomes, including hypertensive disorders, gestational diabetes, and cardiovascular diseases (Paredes et al., 2021).

In Japan, one of the developed countries, studies show that 2.7% of 92,260 singleton pregnant women had severe-moderate underweight, 12.9% mild underweight, and 24.5% had low-normal weight (Nakanishi et al., 2022).

In Africa, the overall magnitude of malnutrition among pregnant mothers was 23.5%.

In Ethiopia, one of the Sub-Saharan African countries, the average prevalence of malnutrition among pregnant mothers was 29.07% (Getaneh et al., 2021).

In Kenya, one of the East African countries, studies show that the prevalence of undernutrition and anemia among pregnant mothers was 27% and 39.7%, respectively (Okube et al.,2022).

In Uganda, malnutrition is still common among pregnant women, with 12% of them being undernourished, 64% of pregnant women and 53% of lactating women being anemic, and 18.6% of pregnant women and 17.3% of lactating mothers having Vitamin A deficiency (Zawedde, F., 2015). In a study carried out in Northern Uganda, it was found that the prevalence of undernutrition among pregnant adolescents and young women attending university teaching hospitals was 12.7%, (Musinguzi et al.,2024) However, there are no updated statistics or numbers that are specific to Soroti Regional Referral Hospital showing the number of pregnant women suffering with malnutrition.

## Methodology
### Study Design and Rationale
This study adopted a descriptive cross-sectional study design and used both quantitative and qualitative techniques for data collection and analysis. This study design was preferred because it was cheap, data was collected in a short time without follow-up, and it enabled respondents to describe their feelings and experiences from their point of view.

### Study Setting and Rationale
This study was conducted in Soroti Regional Referral Hospital at the Antenatal care clinic. Located in Soroti city. The hospital is located along the Lira-Mbale highway in Soroti city, which is found in Eastern Uganda in the Teso sub-region, and it is 358km by road from Kampala city, which is the capital city of Uganda. It offers various specialized health services and operates 24 hours a day, from Monday to Sunday, serving a population of approximately 20,000 people. Soroti Regional Referral Hospital was selected for the study because it was easily accessible to the researcher, and there were many clients to make a sample space.

### Study Population
The study targeted pregnant women attending antenatal care clinic services in the Antenatal care clinic unit at Soroti Regional Referral Hospital.

### Sample Size Determination
A sample size of 35 respondents was used in the study. This was based on the rule of Roscoe (1975), which states that a sample size larger than 30 and smaller than 500 is appropriate for most studies. This number was thought to be large enough to ensure that the researcher obtained data that fulfilled the study objectives and gave valid results.

### Sampling Procedure
The researcher used Simple Random Sampling (SRS) to select the required number of participants. The researcher collected data for 5 working days and on each day 7 respondents were selected, she established the number of pregnant women attending ANC at Soroti Regional Referral Hospital from the in charge and then cut 10 small equally sized pieces of paper, labeled them, and 5 out of the total carried "Yes" and then the balance carried "No", folded them and mixed them thoroughly, she then invited participants to pick one at a time. Respondents who picked "Yes" qualified to participate, while those who picked "No" did not participate in the study. The process was repeated for seven consecutive days until the required sample size of 35 was reached.

### Inclusion Criteria
The study included only pregnant women who attended antenatal care services at Soroti Regional Referral Hospital during the time of data collection, those of sound mind, and those who were freely willing to consent and participate in the study.

### Exclusion Criteria
The study excluded those who did not consent and those of unsound mind.

### Definition of Variables

A variable is a characteristic that varies or any item of interest that, when manipulated, can have more than one possible value.

### Independent Variable

This easily manipulates or changes and is assumed to directly affect the dependent variables. They included knowledge and practices of pregnant women.

### Dependent Variables

This acts as the effect of cause factors; it changes as a result of being influenced by an independent variable. Therefore, in this study, proper nutrition

### Research Instruments

These were tools the researcher used for collecting data. A standardized structured and semi-structured questionnaire was developed with both closed and open-ended questions. The questionnaire consisted of the following sub-sections: Social- social-demographic data of respondents, knowledge of pregnant women towards proper nutrition, and practices of pregnant women towards proper nutrition.

The questionnaire was pretested on respondents in the Mbale Regional Referral Hospital. This was done to eliminate vague, ambiguous questions and check for the validity and reliability of the data collected. It was written in simple and clear English and was both self and researcher-administered. The tool was used because it had a high response rate, it was simple and less expensive, and it collected data from various respondents irrespective of their differences.

### Data Collection Procedure

The researcher presented the research proposal to the Research Committee of Soroti School of Registered Comprehensive Nursing for approval.

The researcher was given an introductory letter from the Soroti School of Registered Comprehensive Nursing that was taken to the study setting of Soroti Regional Referral Hospital.

The researcher presented the introductory letter to the authorities in the study setting who, in writing, permitted the study to be conducted.

Pre-visiting was undertaken together with the area authorities to make arrangements for data collection.

The researcher introduced themself and explained the purpose of the study to the respondents to obtain consent. The questionnaires were distributed to the respondents who consented, and data was collected.

### Data Management

After data was collected, questionnaires were checked for completeness, accuracy, and logical flow, and any gaps were attended to immediately before the respondent left the researcher. The filled questionnaires were kept in opaque envelopes under strict supervision and then kept in the double-locked cupboard waiting for data analysis. The data folder was given a name that was only known to the researcher, and computer passwords were put in place to avoid data alteration.

### Data Analysis and Presentation

The data collected was then categorized into different groups, tallied into frequencies, and then converted into percentages, which were presented in tables, pie-charts, bar- -graphs, and statements. The data was processed into meaningful information; the process involved data entry, assembling, editing, and coding after data was collected. Microsoft Excel was used in analysis and to generate tables, pie charts, and graphs.

### Ethical Considerations

The research committee of Soroti School of Comprehensive Nursing approved the research topic and proposal.

The researcher obtained an introductory letter from the school before proceeding to the study area.

The researcher obtained informed consent from all willing participants by first explaining the objectives, significance, benefits, and risks of the study.

Confidentiality and privacy were ensured by allowing the respondents to withhold their names and asking them to use codes instead.

The researcher explained to respondents that there would be no incentives given to them by the researcher after they participated in the study.

The researcher assured respondents that there were no legal implications or prosecution in participating in the study.

### Results

All 35 respondents sampled correctly filled and returned their questionnaires under guidance, giving a response rate of 100%.

**Table 1: Distribution table representing respondents according to socio-demographic characteristics (n=35)**

| Variable | Frequency (f) | Percentage (%) |
|---|---|---|
| **Age** | | |
| 18-25 | 9 | 25.7 |
| 26-35 | 20 | 57.1 |
| 36-44 | 5 | 14.3 |
| 45 and above | 1 | 2.9 |
| **Total** | **35** | **100** |
| **Marital status** | | |
| Single | 10 | 28.6 |
| Cohabiting | 5 | 14.3 |
| Married | 20 | 57.1 |
| **Total** | **35** | **100** |
| **Religion** | | |
| Catholic | 18 | 51.4 |
| Anglican | 10 | 28.6 |
| Muslim | 2 | 5.7 |
| SDA | 5 | 14.3 |
| **Total** | **35** | **100** |
| **Education level** | | |
| Nonformal | 3 | 8.6 |
| Primary | 11 | 31.4 |
| Secondary | 4 | 11.4 |
| Tertiary | 17 | 48.6 |
| **Total** | **35** | **100** |
| **Place of residence** | | |
| Rural | 13 | 37.1 |
| Urban | 15 | 42.9 |
| Peri-urban | 7 | 20 |
| **Total** | **35** | **100** |
| **Employment status** | | |
| Employed | 10 | 28.6 |
| Unemployed | 25 | 71.4 |
| **Total** | **35** | **100** |

*N= 30, Primary data (2024)*

Most of the respondents were between the age of 26-35 years while the minority 2.9% were aged 45 and above, 57.1% were married while 28.6% were single, 51.4% were Catholics and 5.7% were Muslim, less than half of the respondents lived in urban areas and the least lived in urban areas. 71.4% of the respondent were unemployed, and 48.6% of their level of education was tertiary.

## Knowledge of proper nutrition among pregnant women

In this study, pregnant women were asked about their knowledge of proper nutrition. This was to establish their level of knowledge on proper nutrition, which greatly determines their practices on nutrition.

**Figure 1: Distribution of respondents according to knowledge of proper nutrition (n=35)**
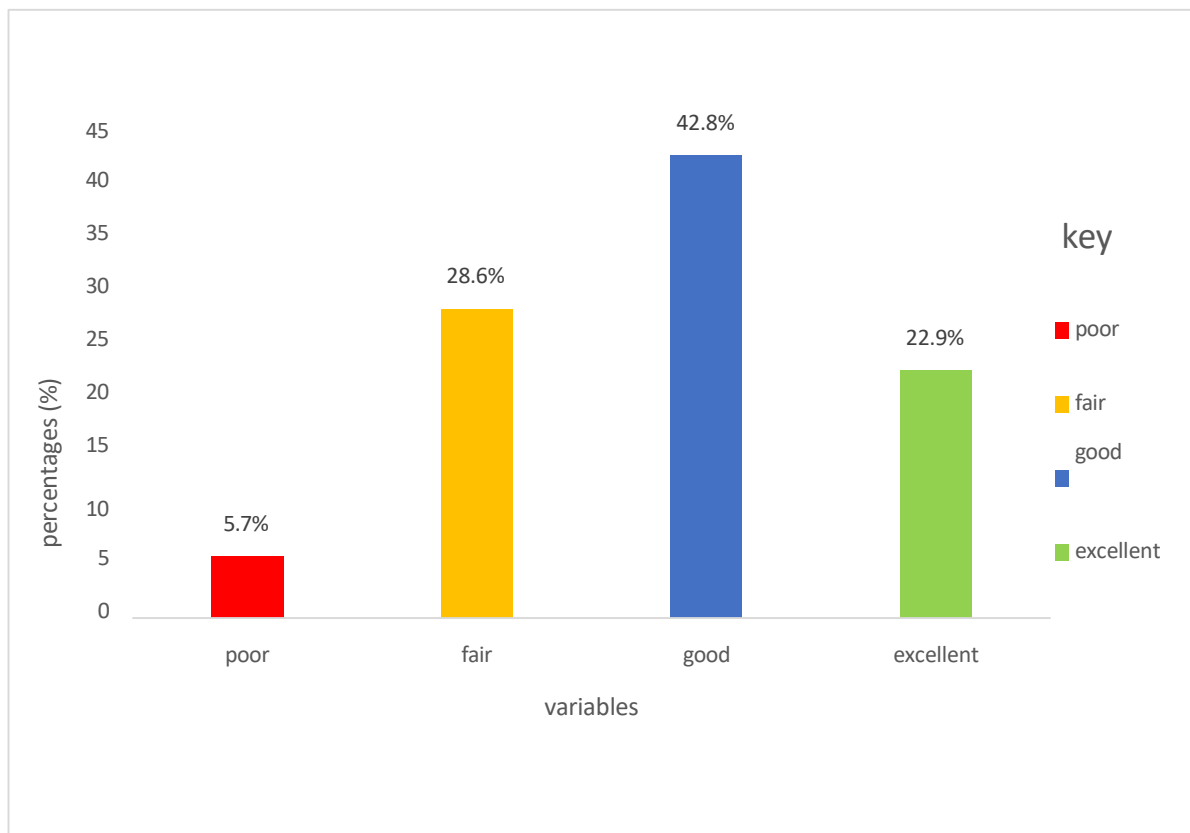
Most of the respondents had a good understanding of proper nutrition, while the minority had a poor understanding of proper nutrition.

**Figure 2: Distribution of respondents according to the importance of proper nutrition during pregnancy (n=35)**
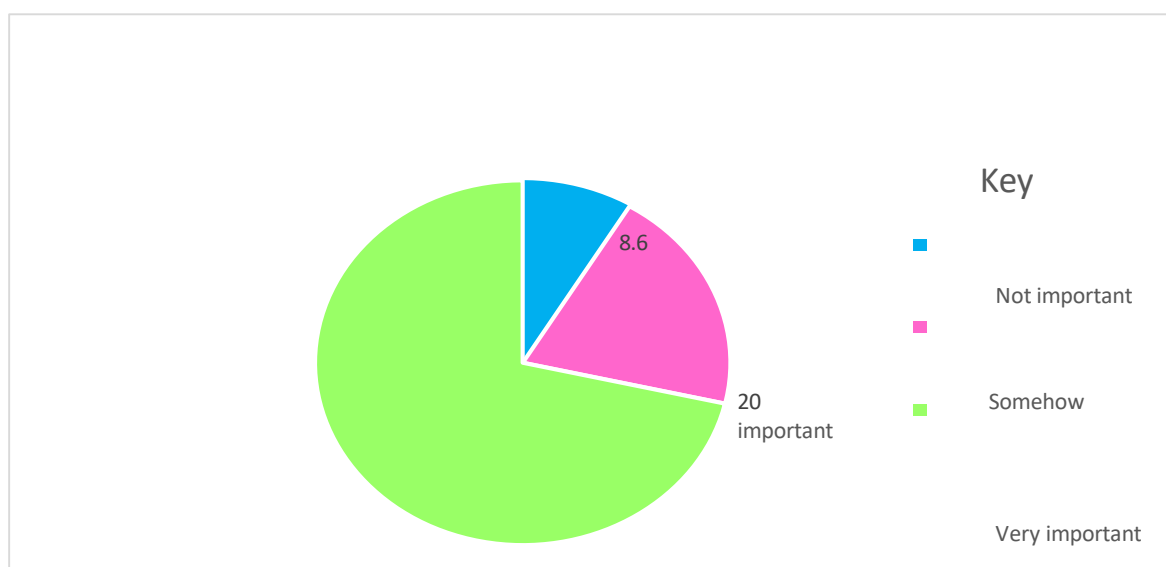


71.4% of the respondents reported that proper nutrition is very important during pregnancy, while the least 6% said it was not important.

**Figure 3: Primary source of information on proper nutrition (n=35)**
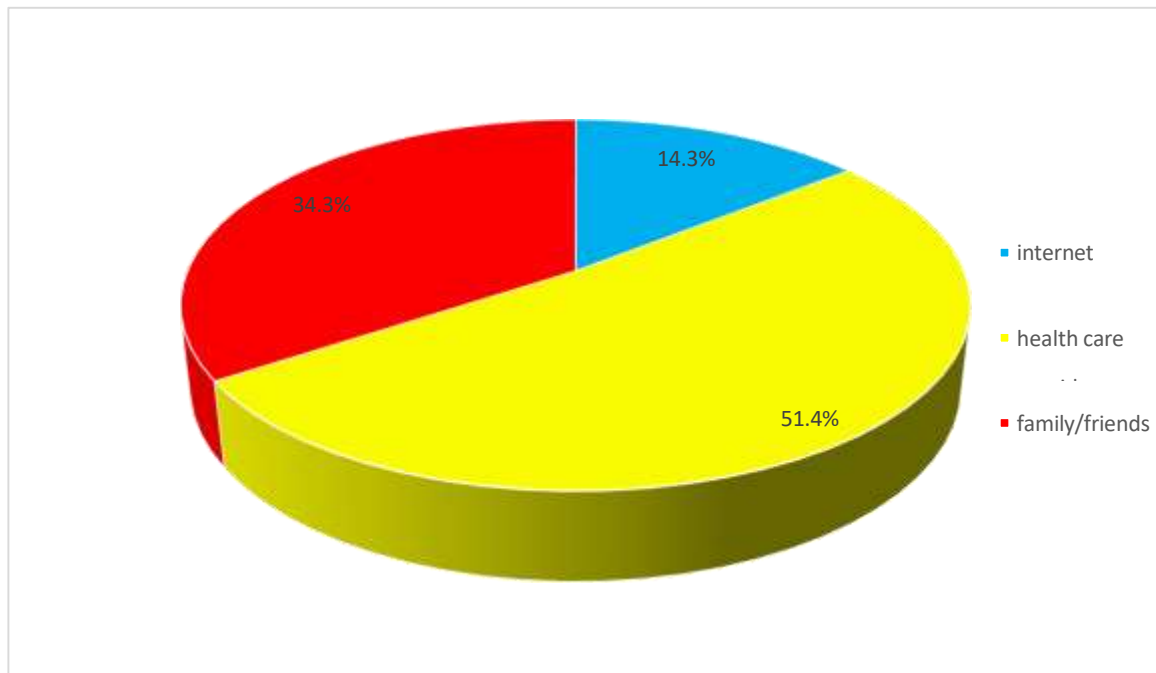
The majority heard about proper nutrition from healthcare providers, while only 14.3% heard from the internet.

**Table 2: Essential food storage for a healthy pregnancy and the effects of eating an unbalanced diet during pregnancy (n=35)**

| Variables | Frequency (f) | Percentage (%) |
|---|---|---|
| **Where food should be kept** | | |
| Kitchen | 5 | 14.3 |
| Granary/Store | 20 | 57.1 |
| Main house | 10 | 28.6 |
| **Effects of Eating an Unbalanced Diet During Pregnancy** | | |
| Fatigue and weakness | 5 | 14.3 |
| Poor fetal growth and development | 17 | 48.5 |
| Weight gain and loss issues | 10 | 28.6 |
| Increased risk of preeclampsia | 3 | 8.6 |
| **Total** | **35** | **100** |

The majority of the respondents stated that food should be kept in the granary/store. The majority of the respondents reported that poor fetal growth and development was an effect of eating an unbalanced diet during pregnancy.

**Table 3: The number of meals eaten per day and the prenatal supplements taken (n=35)**

| Variables | Frequency (*f*) | Percentages (%) |
|---|---|---|
| **Number of meals per day** | | |
| Once | 5 | 14.3 |
| Twice | 19 | 54.3 |
| Thrice | 9 | 25.7 |
| Whenever necessary | 2 | 5.7 |
| **Total** | **35** | **100** |
| **Prenatal supplements taken** | | |

| Prenatal vitamins | 4 | 11.4 |
|---|---|---|
| Folic acid | 18 | 51.4 |
| Iron | 12 | 34.3 |
| Dewormers | 1 | 2.9 |
| **Total** | **35** | **100** |

*N= 30, Primary data (2024)*

54.3% of the respondents had 2 meals in a day, while 5.7% of the respondents had another specific number of meals in a day. Most of the respondents took folic acid as a prenatal supplement, whereas the least took dewormers.

**Figure 4: Frequency of eating protein diet (n=35)**
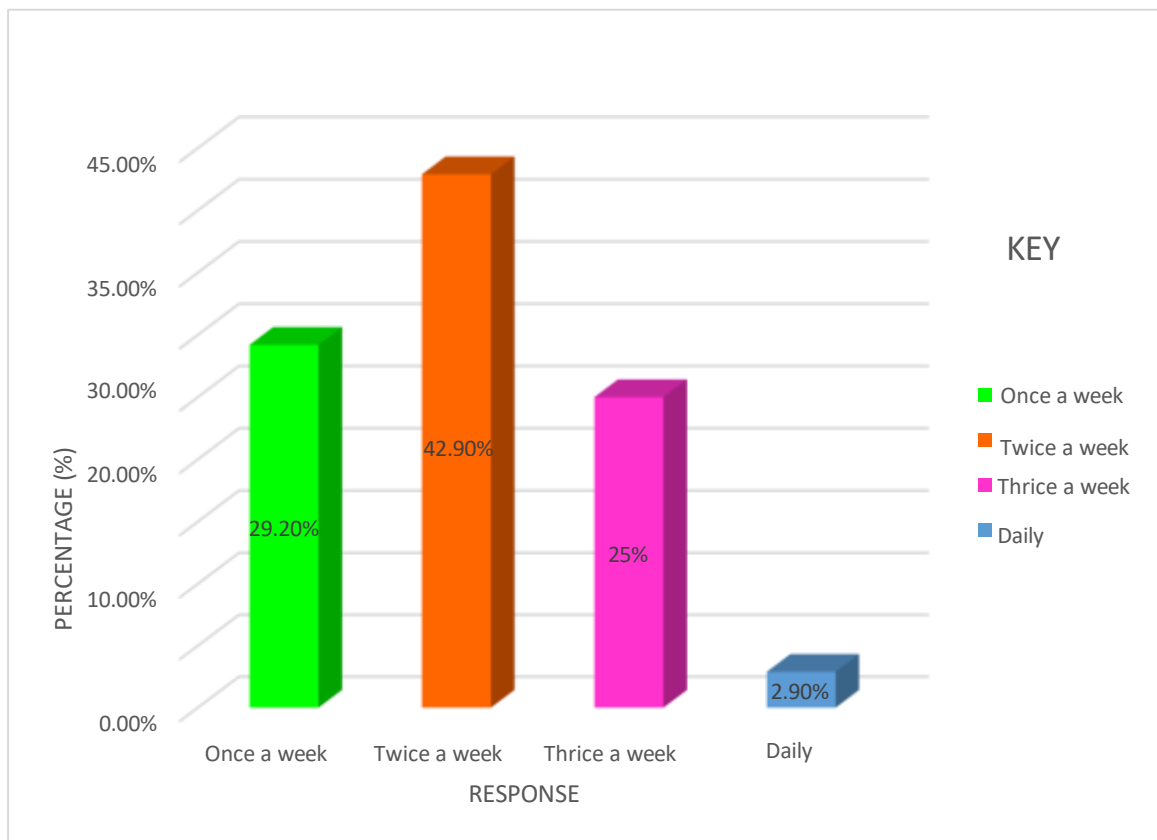


Most of the respondents reported that they ate a high-protein diet twice a week, whereas the minority ate a high-protein diet daily.

**Figure 5: Frequency of including a fruit in the diet (n=35)**
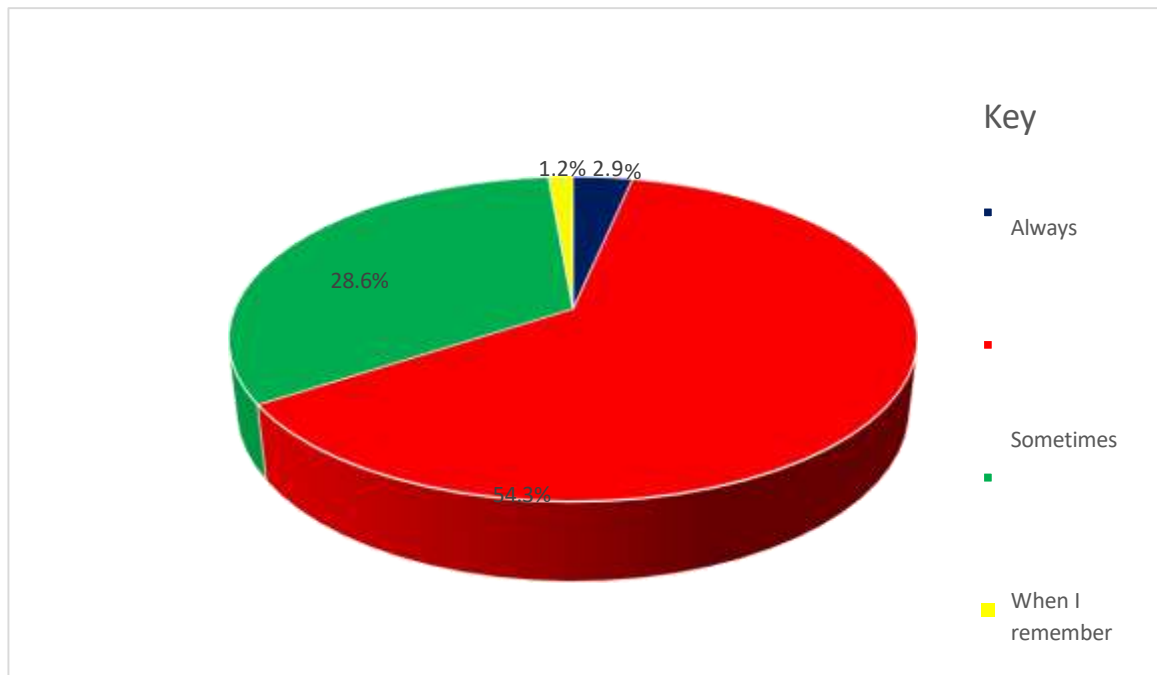
54.3% of the respondents said they sometimes include fruit in their diet, while a minority 2.9% always include fruit in their diet.

**Table 4: Distribution of respondents according to where they got food (n=35)**

| Variables | Frequency (f) | Percentage (%) |
|---|---|---|
| Garden | 10 | 28.6 |
| Market | 8 | 22.9 |
| Both garden and market | 14 | 40 |
| Friends and relatives | 3 | 8.5 |
| **Total** | **35** | **100** |

*N= 30, Primary data (2024)*

Most of the respondents reported they got food from both the market and the garden, while only 8.5% said they got it from friends and relatives.

**Table 5: Foods frequently added to respondents' diet (n=35)**

| Variables | Frequency (f) | Percentage (%) |
|---|---|---|
| Legumes | 15 | 42.9 |
| Nuts and seeds | 11 | 31.4 |
| Starch staples | 9 | 25.7 |
| **Total** | **35** | **100** |

*N= 30, Primary data (2024)*

The majority of the respondents reported adding legumes to their diet, whereas the minority added starch staples.

**Discussion**

The majority of the respondents were unemployed. Unemployment can limit the ability of a pregnant woman to attend prenatal classes or workshops and decrease social interaction, reducing opportunities for information sharing. Lim et al. (2018) argued that 63.6% of antenatal mothers with advanced employment status and monthly household earnings had exceptional knowledge of nutrition.

High educational status promotes good nutrition among pregnant women by increasing their awareness of healthy eating habits and greater ability to access and evaluate nutritional information. Most of the respondents had

attained tertiary education. The study finding is consistent with Oluluke et al. (2016), who revealed that 75.5% of pregnant women with higher education had good knowledge of nutrition compared to those with low education.

Most of the respondents were aware of proper nutrition and correctly defined it as eating a balanced diet. Good knowledge of proper nutrition promotes nutritionally healthy behaviors like consuming a balanced diet and staying hydrated. This is in line with the study done by Ikhsan et al. (2018) that revealed that the participants had quality knowledge of nutrition.

The study found that 51.4% of the respondents obtained nutritional information from healthcare providers. Regular healthcare visits provide opportunities for nutrition discussions. This is in agreement with the study done by Chiazo and Nkechi (2024), which showed that the majority of the respondents had sources of nutritional knowledge from ANC classes (95.2%) and midwives (94.2%).

The majority of the respondents stored their food in granaries/stores. Storing food in granaries prevents bacterial and fungal growth and reduces the risk of food contamination. Rizk et al. (2024) argued that most of the respondents knew how to store food safely and 45.9% were aware of listeriosis risks.

Most of the respondents reported poor fetal growth and development as an effect of eating an unbalanced diet. Folic acid, iron, protein, calcium, and vitamin D deficiencies lead to fetal growth restriction. The finding concurred with a study done by Abd et al. (2021) that revealed a remarkable enhancement in pregnant women's understanding of nutritional challenges, including Iron deficiency anemia, underweight, gestational diabetes, overweight, and obesity, following a health promotion program, bridging an initial significant knowledge deficit.

The study found that 51.4% of the respondents took folic acid. The researcher attributed this to the awareness campaigns by health care providers, which increased knowledge about folic acid's importance, and every pregnant woman attending ANC is provided with folic acid hence its high consumption.

The majority of the respondents stated that they had 2 meals a day. Limited food availability, financial constraints, and personal preference are some of the reasons pregnant women eat 2 meals a day. The finding disagrees with a study done by Mugyia et al. (2016), which revealed that mothers knew that they should eat 3 main meals a day, but only a few practiced it.

The majority of the respondents stated that they sometimes included a fruit in their diet. Most fruits are seasonal and may be expensive and not always available. This is in line with a study done by Książek et al, (2014) that revealed that only 31% of the respondents took in fruits in necessary quantities but in disagreement with a study done by Skreden et al, (2017) that showed that there was an improvement in dietary habits among pregnant women, especially regarding fruit and vegetable intake,

the percentage of women consuming vegetables with dinner daily also remained consistent.

The majority of the respondents frequently added legumes to their diet. Legumes contain numerous essential nutrients (proteins, iron, folate, calcium and vitamin D, potassium, magnesium, and so on) that support fetal growth, promote good digestion, and promote healthy weight gain. This is in line with a study carried out by Yeneabat et al. (2019), which revealed that pregnant women's diets frequently included legumes, nuts, and seeds, followed by starchy staples.

## Conclusion
This study found employment status and educational level to be the demographic factors affecting knowledge and practices on proper nutrition among pregnant women. On knowledge, the majority had adequate knowledge, more than half had proper nutrition, and on practices, more than half had two meals a day, and the majority had folic acid supplements.

## Recommendations
Health workers should educate and intensify community awareness about proper nutrition as more knowledge about proper nutrition increases health-seeking behavior and decreases health risks related to malnutrition.

The Ugandan government should train healthcare workers on nutrition counseling and support and integrate nutrition services into primary healthcare.

The Ministry of Health should consider intensifying proper nutrition awareness programs by extending them to deeper villages during primary health care activities and supervising health centers to ensure that mothers attending ANC clinic attendance are taught about proper nutrition. This approach helps mothers get a good opportunity to raise their awareness of the dangers of improper nutrition through key emphasis, which would improve their healthcare practices regarding proper nutrition.

## List of Abbreviations
**AGHE** Australian Guide to Healthy Eating
**ANC** Antenatal Care
**BMI** Basal Metabolic Index
**HMIS** Health Management Information System
**LBW** Low Birth Weight
**MoH** Ministry of Health
**PHC** Primary Health Care
**SDG** Sustainable Development Goal
**SRRH** Soroti Regional Referral Hospital
**WHO** World Health Organization

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## Conflict of interest
The author declares no conflict of interest.

## Author contributions

AAA, DA, JA, and JL analyzed the data as well as data cleaning, DM, and RA supported the manuscript development, and HA, JMO, and ACF did data collection and entry.

## Data availability

Data is available upon request.

## Informed consent

All the respondents consented to this study.

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