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(RESEARCH ARTICLE)

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# Health risks of under-five children with protein- energy malnutrition at a health Centre in Ngor-Okpala L.G.A of Imo State

Amarachi Grace Melah [1], Eloho Mathilda Aghworo [2], Favour Chinemerem Nwachukwu [3], Adaora Chiamaka Ekekwe [4], Covenant Mosetoluwa Popoola [5], Mautin Oluwatosin Salako [6], Mark Akinola Ige [7], Mary Adebimpe Adewoye [8], Olubukola Sarah Ale [9] and Patricia Okwuchi Nneji [10,*]

[1] *Department of Nursing, School of Nursing, University of Bamenda, Cameron.*
[2] *Department of Environmental Science,College of the Coast and Environment, Louisiana State University, United States.*
[3] *Department of Food Science and Technology, College of Applied Food Science and Tourism, Michael Okpara University of Agriculture Umudike, Nigeria.*
[4] *Department of Public Health (Epidemiology), Community Health and Primary Care, University of Lagos, Nigeria.*
[5] *Department of Pharmacy, Parul Institute of Pharmacy and Research, Parul University, India.*
[6] *Department of Pharmacy, Faculty of Pharmacy,Olabisi Onabanjo University, Nigeria.*
[7] *Department of Biochemistry, Basic Medical Sciences, University of Lagos, Nigeria.*
[8] *Department of Health Behavior and Nutritional Sciences, College of Health Sciences, University of Delaware, USA.*
[9] *Institute of Child Health, Faculty of Public Health, University of Ibadan, Nigeria.*
[10] *Department of Science Education (Biology), Niger Delta University, Nigeria.*

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## Abstract

**Background:** Protein-energy malnutrition (PEM) is an acute form of malnutrition caused by inadequate intake of calories and proteins and remains a leading cause of morbidity and mortality among children in Nigeria. This study assessed the health risks associated with protein-energy malnutrition among under-five children managed at a health centre in Ngor-Okpala Local Government Area, Imo State.

**Method:** The descriptive research design was adopted for the study, and a total of 350 respondents were sampled. The data were obtained through a structured questionnaire.

**Results:** The results indicated that 62.00% and 41.00% of the children were at health risk due to PEM. Parental education level, parity, poverty, and ignorance were some of the socio-demographic factors affecting PEM. ($X^2 = 3.357$, df = 2, p = 0.000) indicated that there was a significant relationship between PEM and parental socio-demographic background.

**Conclusion:** These findings point out that PEM poses serious health risks, while targeted health education programs focusing on nutrition by caregivers are of utmost urgency in the study area. Community-based interventions on proper nutrition can also greatly help to minimize the health risks of malnutrition in under-five children.

**Keywords:** Protein-Energy Malnutrition; Under-Five Children; Health Risks; Socio-Demographic Factors; Nutrition Education.

* Corresponding author: Patricia Okwuchi Nneji

## 1. Introduction

Good health during adulthood is heavily influenced by the nutritional foundation laid during infancy [1]. Deficiencies in essential nutrients during the critical developmental years (0–5 years) can result in serious public health concerns, such as kwashiorkor, marasmus, stunted growth, and even mortality [2]. Malnutrition appears in the form of stunting, wasting and being underweight, which are used to measure the nutritional imbalance in young children. Globally, there is an increase in malnutrition, recording 150 million stunted children, 50 million wasted children and 38 million represented for underweight children. Nigeria presents as one of the top 10 countries with malnutrition cases in children under five years [3], with a prevalence of 32% stunted for children under five years of age and a prevalence of 19.9% for underweight among the under-five age in 2018 [4]. Research conducted by John et al. [5] on the nutritional status and nutritional deficiencies from January 1, 2018, to January 31, 2023, on children from 0-5 years in Nigeria showed a high value for stunting ranging from 7.2%-61%, underweight shows value of 5.9% - 42.6% while wasting varied from 1% to 29% in different states.

Malnutrition has long been a global health issue, its prevalence in Nigeria is still alarming and most prevalent in rural areas, where under-five children are more vulnerable [5, 6]. Developmentally, the first five years of life are rather critical for every child's physical and cognitive development [7]. A child's weight doubles within six months and triples by their first year; therefore, a child requires enough nutrition at this stage [8]. Meanwhile, poor child nutrition is also exacerbated by reasons such as insufficient breastfeeding practices, inappropriate weaning, and limited dietary diversity; this has far-reaching health risks for children associated with malnutrition [9]. This is further compounded in rural areas, where a lack of knowledge about balanced diets and poverty often restricts access to most of the food items [10]. The most serious malnutrition condition refers to Protein Energy Malnutrition PEM, a situation where there is a critical shortage of protein and energy intake. PEM has devastating consequences for children under five, impairing physical growth, cognitive development, and immunity [11,12]. In many cases, subclinical deficiencies may go undetected, yet they significantly hinder a child's ability to function effectively, emphasizing the need for timely interventions [13]. WHO iterates that balanced nutrition is not just a matter of eating but calls for the right combination in portions of macronutrients-carbohydrates, proteins, and fats-and micronutrients-vitamins and minerals-to keep the human body functioning well and prevent ailments caused by malnutrition [14]. However, limited dietary diversity and economic instability pose significant barriers to adequate nutrition in Nigeria, particularly in rural regions like Ngor-Okpala, where high food prices and the depreciation of the naira have further restricted access to nutritious food [15].

Ignorance and poverty have remained key determinants of nutrition since most care providers lack the knowledge on appropriate dietary feeding, hence depleting into poor feeding that culminates in chronic deficiency. According to Choge [16] and Akhtar [17], this nutritional gap opens a way to more frequent infectious diseases, slowed growth and development, and life-long poor health, which have continued to put pressure on targeted nutrition interventions and public health efforts by [18,19,20].

Malnutrition is a complicated issue that needs to be addressed as it cuts across the healthcare facility. Rather, it requires a holistic approach to manage malnutrition in infants and children under the age of five years. There are possible interventions that could be geared toward achieving better health, which involves community-based strategies where community health workers give counsel to manage malnutrition early, promoting exclusive feeding, distribution of ready-to-use therapeutic foods, and also creating awareness on the nutritional value of food for proper feeding practices, providing access to clean water and sanitation services, implementing feeding programs for children to meet the needs of those with medical complications and providing immunization to prevent diseases that can prevent malnutrition and regular monitoring and screening to check children's nutritional status [21, 22], this creates a positive effect on children as it helps to improve physical and motor growth, increases immune defences which invariably decreases the mortality rate and increases cognitive and learning abilities [23].

The study will estimate the health risk of protein-energy malnutrition among under-five children managed at the Ngor-Okpala Health Centre, Imo State, Nigeria. It will also contribute to the literature on childhood malnutrition in rural Nigeria and provide data for use in formulating policies toward improving the nutritional status of children for improved general health.

### 1.1. Research Questions

- What is the nutritional status of under five children in Health Centre Ngor-Okpala L.G.A?
- What is the incidence of protein-energy-malnutrition among under five at Ngor-Okpala health Centre.
- Does protein-energy- malnutrition of under-fives results in the incidence of health risks?

### 1.2. Research Hypothesis

- **HO1**: There is no relationship between health risk and protein-energy malnutrition of under-five.
- **HA1**: There is relationship between health risk and protein-energy malnutrition of under-five
- **HO2**: There is no relationship between protein-energy malnutrition and parental socio-demographic background of under-five.
- **HA2**: There is a relationship between protein-energy malnutrition and parental socio- demographic background of under-five.

## 2. Methodology

The research adopted a descriptive research design. This design allows the researcher to gather information from respondents. It is suitable for this study because it will help determine the health risk of under-five children managed of Protein-Energy-Malnutrition in Ngor-okpala health centre, Ngor-okpala local government area of Imo state and provide statistical outcomes. Similarly, it will provide a comprehensive understanding of the subject matter. The population of the study consists of mothers and children in Ngor-okpala local government area of Imo state. With the aid of a research advisor, a simple random sampling technique was used to select three hundred and fifty (350) respondents, which are the representatives of the entire population. A structured questionnaire, comprising both open-ended and closed-ended questions, was designed for data collection. Expert in the field validated the instrument. The data collected was analysed using descriptive statistics of frequency count and percentage and inferential statistics (Chi-Square). The chi-square is used to analyse the relationship between the two categorical variables in this study. Results were also presented in bar and pie charts.

## 3. Results

### 3.1. Section A

**Table 1** Age

| Age | Frequency | Percentage |
|---|---|---|
| 25-50yrs | - | - |
| 31-40yrs | 61 | 17.00 |
| 41-50yrs | 160 | 46.00 |
| 51-60yrs | 129 | 37.00 |
| TOTAL | 350 | 100 |

This showed the age distribution of the respondents, where (17.00%) are 31 – 40 years, (46.00%) are 41 – 50 years and (37.00%) are 51 – 60 years.

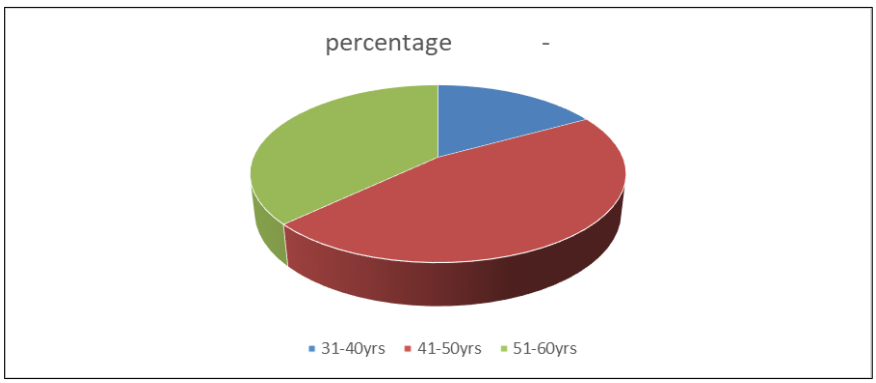


**Figure 1** Age distribution of the respondents

### 3.2. Section B

**Table 2** Health Status of the Children

| Health status | Frequency | Percentage |
|---|---|---|
| Poor | 40 | 11.00 |
| Good | 213 | 61.00 |
| Very Good | 97 | 28.00 |
| Very Poor | - | - |
| TOTAL | 350 | 100 |

This shows the health status of the children. (11.0%) 0f the respondents agreed that the health status of the children is poor, (61.00%) said its good, (28.00%) said its very good, while neither of the respondents said it was very poor.

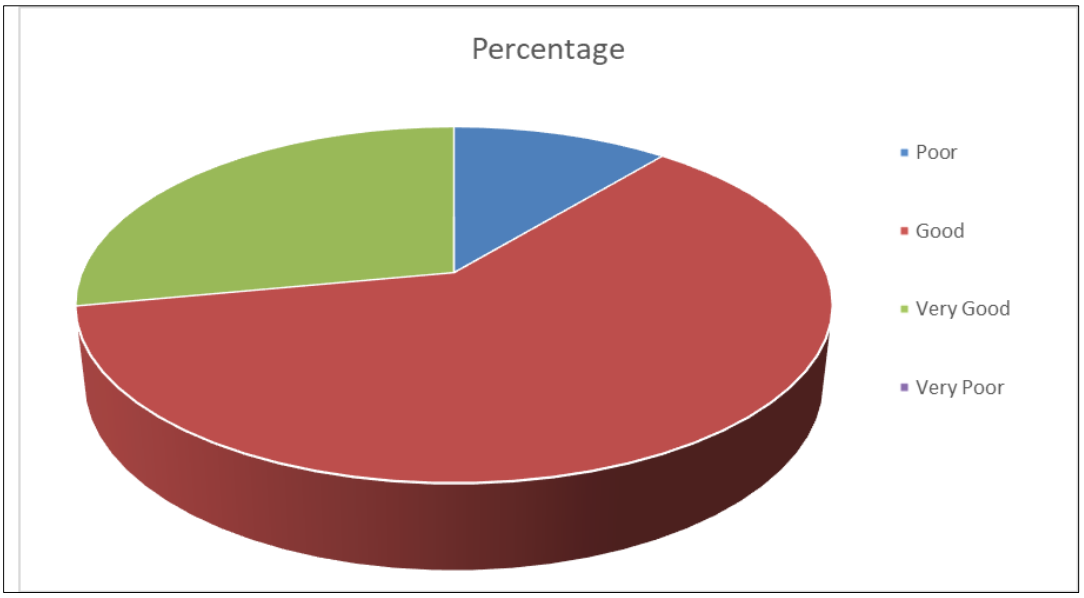


**Figure 2** Perceived Health Status of Under-Five Children with Protein-Energy Malnutrition

**Table 3** Health problem dissociated with Protein malnutrition

| | Frequency | Percentage |
|---|---|---|
| Yes | 133 | 38.00 |
| No | 217 | 62.00 |
| TOTAL | 350 | 100 |

This shows that the health problems associated with protein energy malnutrition. (38.00%) of the respondents answered yes to the question "Do you think the children might have any health problem associated with protein malnutrition, while (62.00%) of the respondents thinks otherwise.

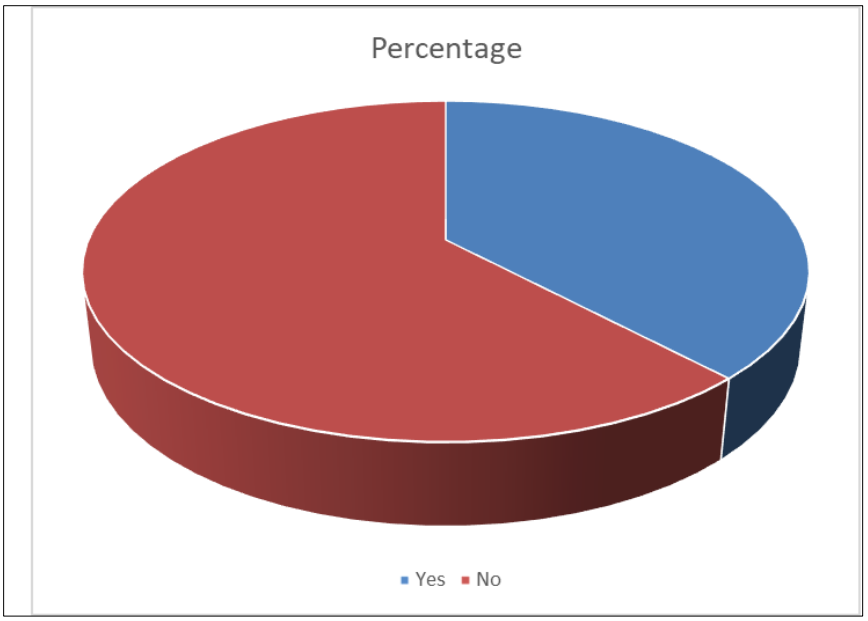


**Figure 3a** Health Problems Associated with Protein-Energy Malnutrition

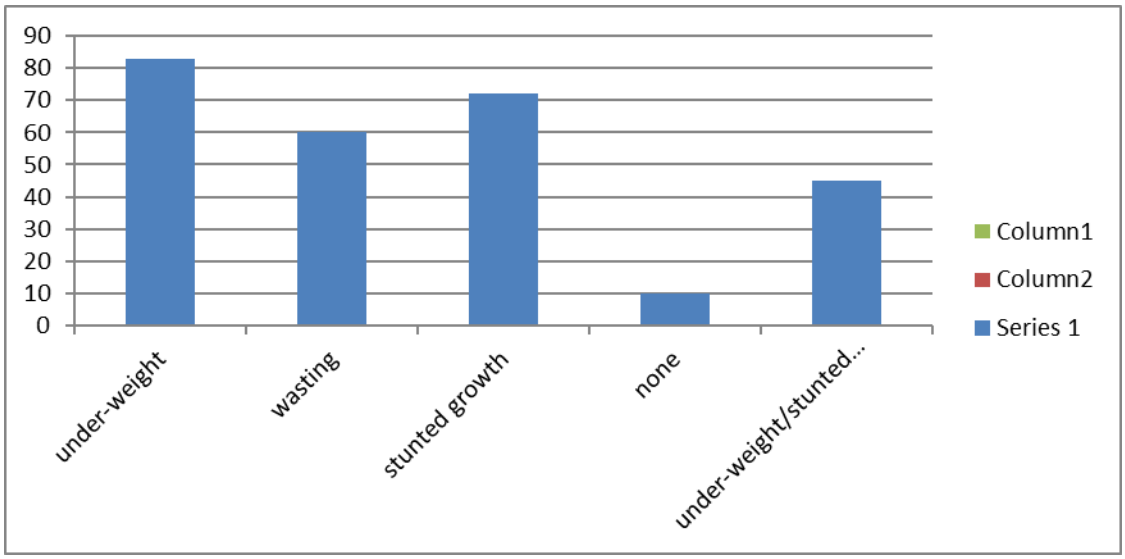


**Figure 3b** Likely Diseases Experienced by Children with Protein-Energy Malnutrition

This shows the bar charts of likely diseases experienced by the children. Underweight has the highest prevalence of (83%), followed by stunted growth (72%), and wasting (60%).

### 3.3. Section C

**Table 4** Frequency of Sanitation in Hospital

| Frequency | Frequency | Percentage |
|---|---|---|
| Once daily | 2 | 5 |
| twice week | 18 | 45 |
| 3 times a week | 15 | 37.5 |
| Once a week | 5 | 12.5 |
| TOTAL | 40 | 100 |

This shows the frequency of sanitation exercise in the hospital. (5%) of the respondents answered once daily to the question, "how often do you carry out sanitation exercise in your hospital? (45%) answered twice a week, (37.5%) answered three times a week, (12.5%) answered once a week.

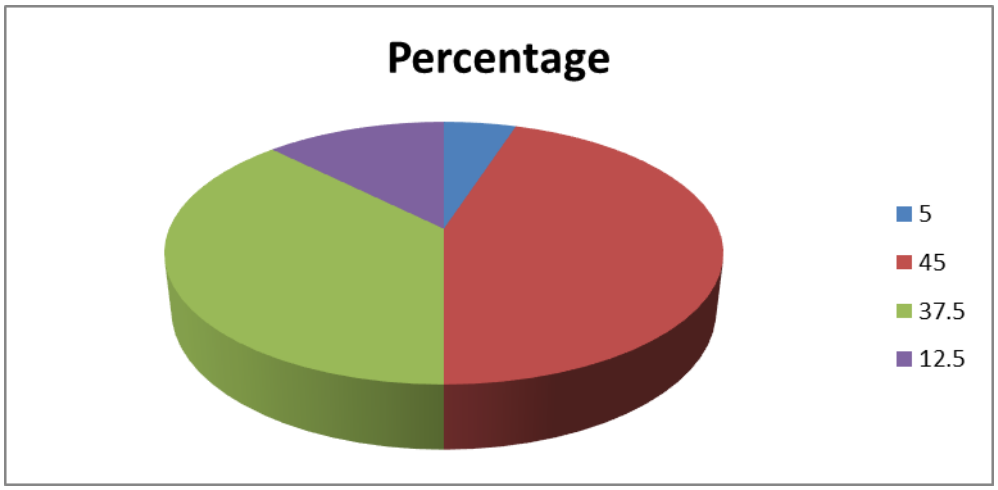


**Figure 4** Frequency of Sanitation Exercises in Healthcare Facilities

**Table 5** Personal hygiene check on Children

| Response | Frequency | Percentage |
|---|---|---|
| YES | 40 | 100 |
| NO | 0 | 0 |
| TOTAL | 40 | 100 |

This shows that (100%) of the respondents answered yes to the question "do you run a personal hygiene check on the children in your hospital"?

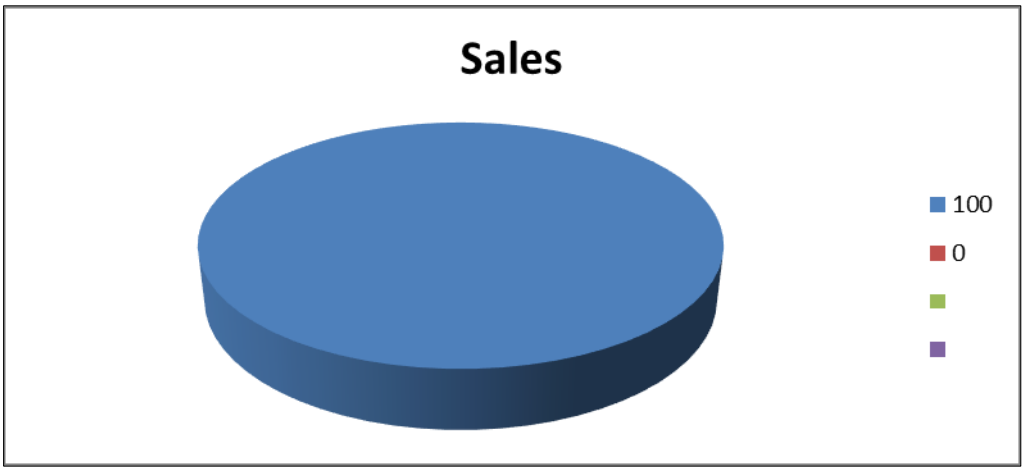


**Figure 5** Implementation of Personal Hygiene Checks in Healthcare Facilities

**Table 6** Provision of food on regular basis

| Food provision | Frequency | Percentage |
|---|---|---|
| YES | 28 | 70 |
| NO | 12 | 30 |
| TOTAL | 40 | 100 |

This shows the provision of food on regular basis. (70%) of the respondents agreed that food was provided on regular basis, while (30%) said no.

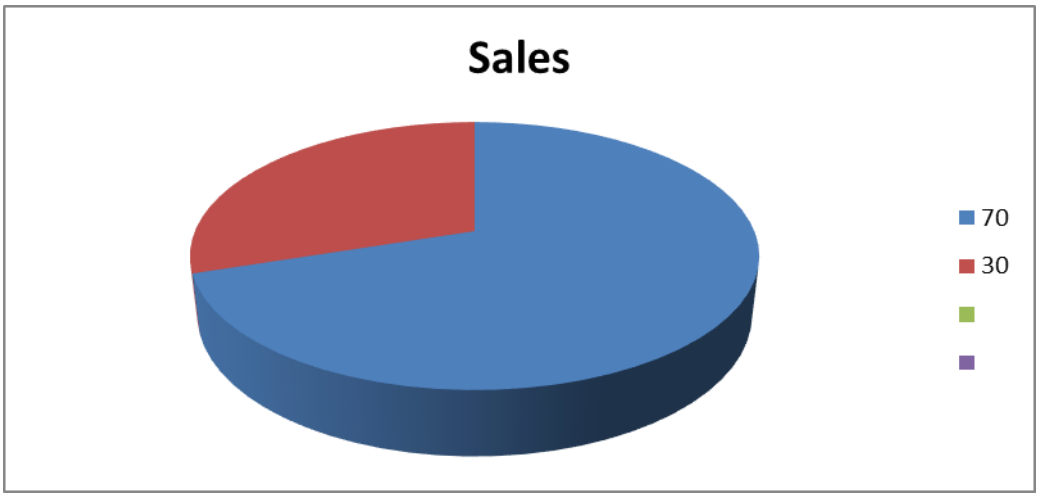


**Figure 6** Provision of Food regularly in Healthcare Facilities

**Table 7** Status of protein content of children's meal

| Protein status | Frequency | Percentage |
|---|---|---|
| Very High | | |
| High | | |
| Moderate | 30 | 75 |
| Low | 10 | 25 |
| Very Low | | |
| TOTAL | 40 | 100 |

This shows the protein content of children's meal. (75%) agreed that the protein content was moderate, while (25%) agreed it was very low.

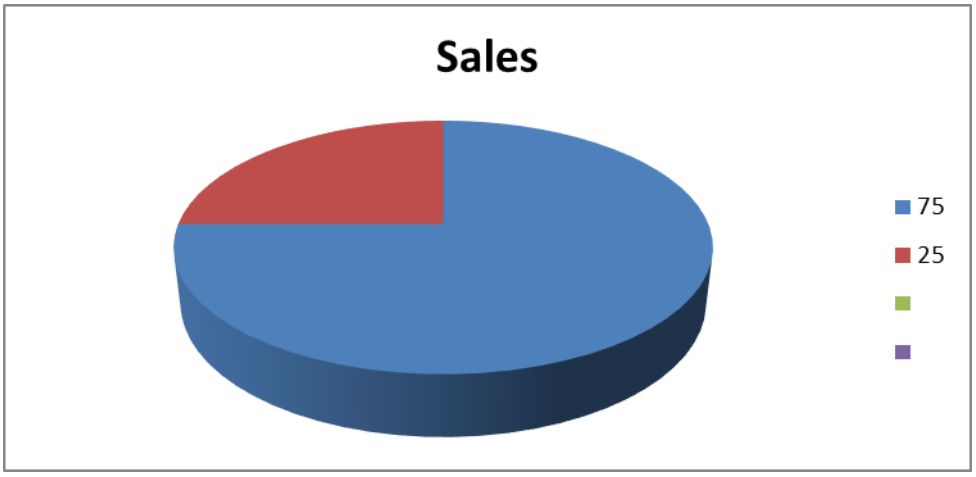


**Figure 7** Protein Content of Children's Meals

**Table 8** Health risk associated with protein energy malnutrition

| Prevalence of health risk | Frequency | Percentage |
|---|---|---|
| Yes | 28 | 70 |
| No | 12 | 30 |
| TOTAL | 40 | 100 |

This shows the prevalence of health risk associated with protein energy malnutrition. (70%) agreed that the health risk is associated with protein malnutrition in children, while (30%) said otherwise.

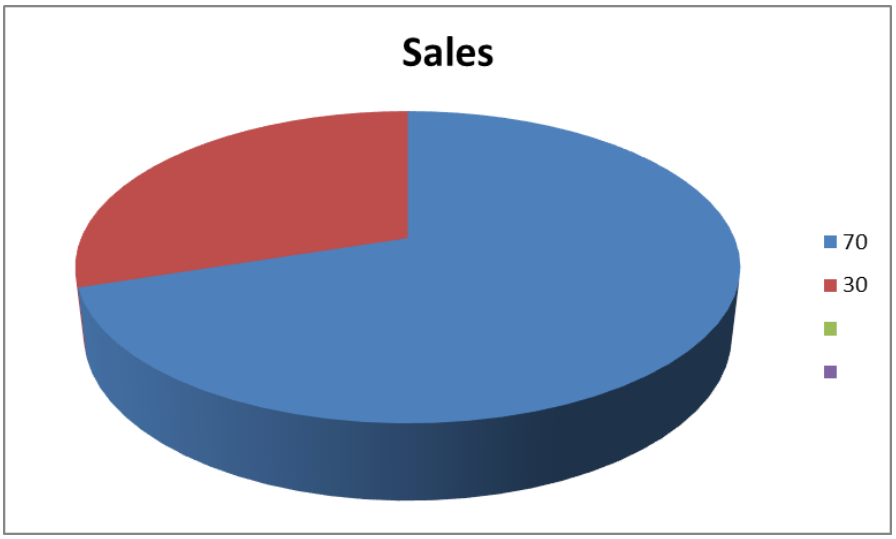


**Figure 8a** Prevalence of Health Risks Associated with Protein-Energy Malnutrition

**Chart 2** Health risk observed among children

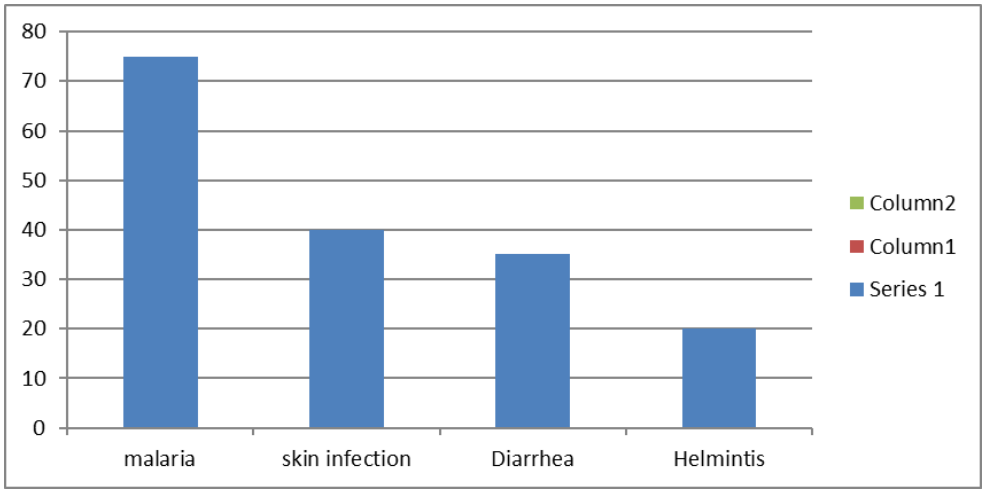


**Figure 8b** Symptoms of Health Risks Observed Among Under-Five Children with Protein-Energy Malnutrition

This shows a bar chart of symptoms of health risk observed among children. Malaria had the highest prevalence of (75%), followed by skin infection (40%), then diarrhea (35%), and helmintis (20%).

**Table 9** Children's level of awareness of food hygiene.

| Awareness level | Frequency | Percentage |
|---|---|---|
| High | 8 | 20 |
| Moderate | 32 | 80 |
| Low | --- | --- |
| Total | 40 | 100 |

This shows the children's level of awareness of food hygiene. (80%) of the respondents agreed that the level of awareness is moderate, while (20%) agreed it was high.

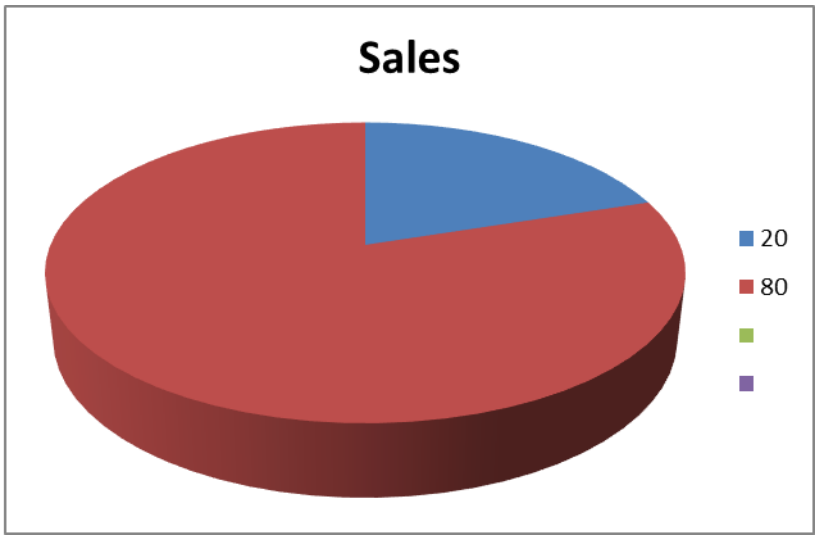


**Figure 9** Children's Level of Awareness of Food Hygiene

**Table 10** Condition of immunization in hospital

| Immunization | Frequency | Frequency |
|---|---|---|
| Yes | 89 | |
| No | | |
| Total | 89 | 100 |

This shows the condition of immunization in the hospital. (89) of the respondents agreed that the hospital conducts immunization.

**Table 11** Number of children immunized per month.

| Number immunized | Frequency | Percentage |
|---|---|---|
| 0-10 children | ---- | -- |
| 11-20 children | 12 | 6.00 |
| 21-30 children | 36 | 17.00 |
| 31-40 children | -- | -- |
| 41-50 children | 54 | 25.00 |
| 50 and above | 115 | 53.00 |
| Total | 217 | 100 |

This shows the number of children immunized per month. (217) of the children were immunized per month according to the respondents.

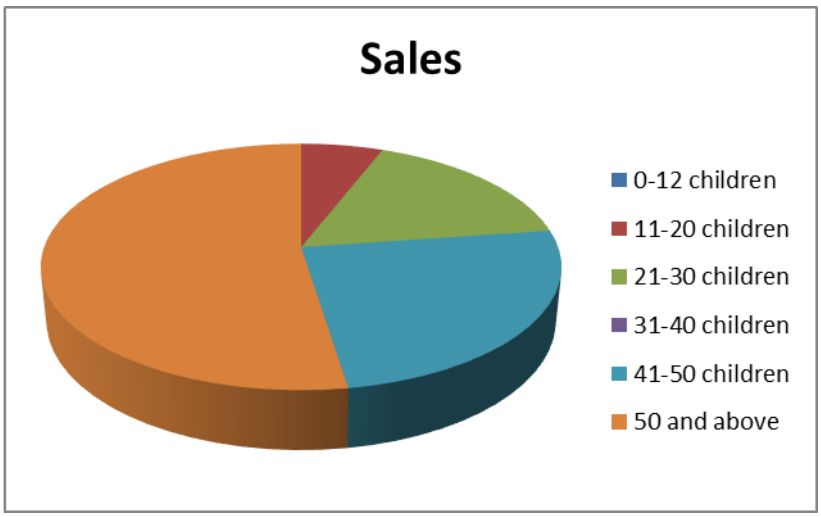


**Figure 10** Number of Children Immunized Per Month

**Table 12** Number that completed immunization exercise dosage

| Number | Frequency | Percentage |
|---|---|---|
| All | 128 | 59.00 |
| Some | 89 | 41.00 |
| Total | 217 | 100 |

This shows the number of children that completed their immunization dosage. (59.00 %%) of the respondents agreed that the children completed their immunization dosage. while (41.00%) did not.

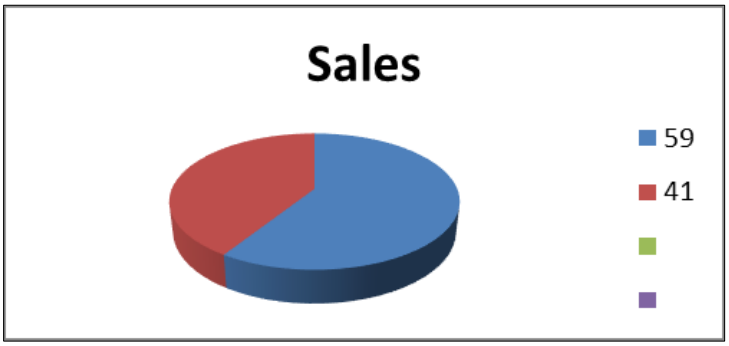


**Figure 11a** Completion of Immunization Dosage Among Children

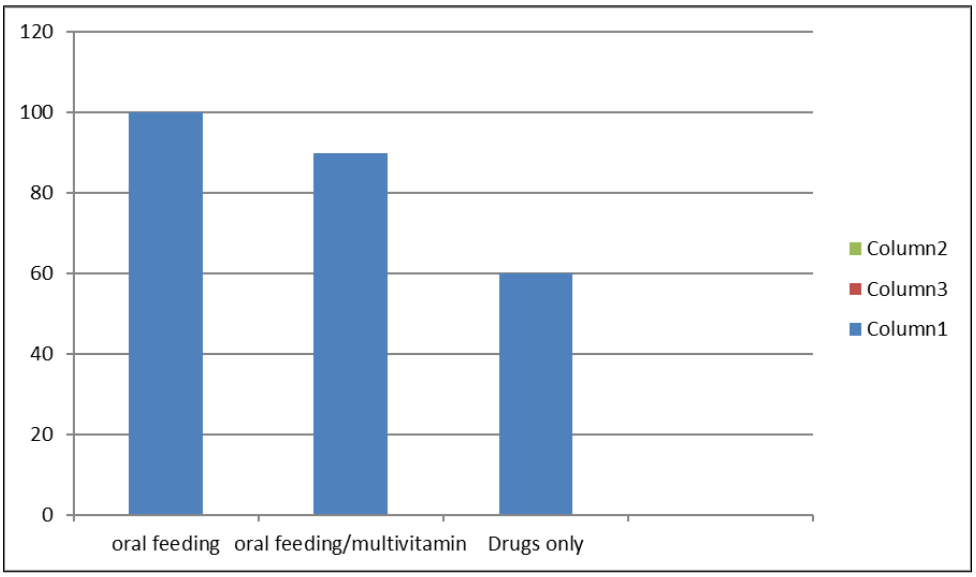


**Figure 11b** Measures for Improving Children's Health Against Protein-Energy Malnutrition

This shows the bar charts of measures of improving the children's health against protein energy malnutrition. (100%) of the respondents agreed on oral feeding/multivitamins supplement, (90%) agreed on drugs/oral feeding, (60%) agreed on oral feeding only.

### 3.4. Testing Hypotheses

HO: There is no relationship between health risk and protein-energy malnutrition of under-five.

HA: There is relationship between health risk and protein-energy malnutrition of under-five

**Table 13** Relationship between health risk and Protein-energy malnutrition

| | **May have health risk due to PEM** | **May not health risk due have to PEM** | **Total** |
|---|---|---|---|
| Have PEM | 33 | 150 | 183 |
| Don't have PEM | 4 | 163 | 167 |
| Total | 37 | 313 | 350 |

X2=3.841 df=1 P – value = 0.000

A chi – square test was performed and a significant relationship was found to exist between the health risk and protein-energy malnutrition. P – value = 0.000 at df = 1 X2 = 3.841. p = 0.000< 0.005, therefore the null hypothesis is rejected and the alternative hypothesis accepted that is to say there is a significant relationship between health risk and protein-energy malnutrition.

### 3.5. Hypothesis two

HO: There is no relationship between protein-energy malnutrition and parental socio-demographic background of under-five.

HA: There is a relationship between protein-energy malnutrition and parental socio- demographic background of under-five.

**Table 14** Relationship between protein-energy malnutrition and parental socio-demographic background of under-five

| | **Good parental socio-demographic background** | **Poor parental socio-demographic background** | **Total** |
|---|---|---|---|
| Have knowledge of PEM | 175 | 104 | 279 |
| Don't have knowledge of PEM | 51 | 20 | 69 |
| Total | 226 | 124 | 350 |

X2 = 3.357 df = 2 P – value = 0.000

A Chi – square test was performed, and a significant relationship was found to exist between protein-energy malnutrition and parental socio-demographic background. P – value = 0.000 at df = 2, X2 = 3.357. P = 0.000<0.005, therefore the null hypothesis is relationship between the parental background as a socio demographic factor and the knowledge of protein-energy malnutrition among under-fives.

## 4. Discussion of Findings

The study found that 62% of the children had health risks due to protein-energy malnutrition. This high prevalence underscores the critical need for targeted nutritional interventions in the region. Comparing this percentage to national or regional averages could further emphasize the severity of the issue. The socio-demographic factors influencing protein-energy malnutrition among under-five include the level of education of parents, parity, poverty, ignorance, etc. For instance, parents with higher levels of education are more likely to understand the importance of balanced nutrition and access resources that can prevent malnutrition. Conversely, poverty and ignorance limit access to nutritious food and knowledge about proper feeding practices. Only Forty one percent (41.00%) of parents had knowledge of protein-energy malnutrition. This highlights a significant gap in awareness that needs to be addressed through educational campaigns and community outreach programs. The study found a statistically significant relationship between protein-energy malnutrition and parental socio-demographic background (X2 = 3.357, df = 2, P =0.000). This indicates that factors such as parental education level, economic status, and knowledge about nutrition are critical determinants of children's nutritional status. Targeting these factors through public health interventions could reduce the incidence of malnutrition.

## 5. Conclusion

The study has demonstrated the health risks and protein-energy malnutrition among under-five children. The socio-demographic factors that influenced proper nutrition among under-five were level of parent's education, poverty, ignorance, poverty, cultural taboos. Health education on the benefits of proper or good nutrition should be organized in the study area.

### *Recommendations*

Based on the findings, the following recommendations were made;

- Health education on good nutrition and management should be organized for the parents and nursing mothers.
- Cultural taboos that prevent proper nutrition for children should be abolished.

- Parents should make proper planning on how to take proper care of their children.
- The barriers and promoters of good nutrition among under-five children should be explored.
- Implementing educational programs to raise awareness about proper nutrition among parents.
- Providing economic support and resources to low-income families to improve their access to nutritious food.
- Enhancing healthcare services to monitor and manage children's nutritional status effectively.

## Compliance with ethical standards

### *Disclosure of conflict of interest*

We sincerely declare that all the authors have participated in the research, evaluation and analysis of the research article, and they have approved the final version. Also, there is no form of conflict of interest in connection with this paper. Furthermore, the material described is not under publication or consideration for publication elsewhere.

### *Statement of informed consent*

Informed consent was obtained from all caregivers/guardians of the under-five children included in this study. Participation was voluntary, and confidentiality of responses was ensured by anonymizing all data collected through the structured questionnaires.

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