



## **Paediatric Malnutrition and Associated Factors in the University of Port Harcourt Teaching Hospital**

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### **Authors' contributions**

*This work was carried out in collaboration between both authors. Author LEY designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author LNO managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.*

### **Article Information**

DOI: 10.9734/IJTDH/2017/37926

#### Editor(s):

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Complete Peer review History: <http://www.sciencedomain.org/review-history/22726>

**Original Research Article**

**Received 1<sup>st</sup> September 2017**  
**Accepted 30<sup>th</sup> November 2017**  
**Published 13<sup>th</sup> January 2018**

### **ABSTRACT**

**Aim:** Assessment of the occurrence of malnutrition and associated factors in children.

**Study Design:** Retrospective study.

**Place and Duration of Study:** University of Port Harcourt Teaching Hospital, Rivers State, Nigeria between June 2015 and June 2016.

**Methodology:** Data was collected from the medical records of each patient, data collected include; diagnosis, associated symptoms and parent sociodemographic information.

**Results:** The study showed a 3.6% (37/1017) prevalence of malnutrition among the children. The mean age of the malnourished children was 21.2±10.5 months. There were more underweight children (51.4%), among the malnourished children, while the occurrence of marasmus and kwashiorkor were 29.7% and 18.9% respectively. Malnutrition was mostly common among children that were not breastfed. maternal occupation was shown to be associated with the occurrence of

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malnutrition in the children, especially among mothers that were civil servants and students. Maternal educational status was also shown to be associated with the occurrence of malnutrition, especially in mothers with no formal education.

**Conclusion:** The adverse effects of malnutrition span through the lifetime of the children who survive into adolescence and adulthood. Malnutrition is still prevalent in Port Harcourt, underscoring the need to improve on the ongoing efforts to improve the nutritional and physical wellbeing of the children.

*Keywords: Malnutrition; kwashiorkor; marasmus; breastfeeding.*

## 1. INTRODUCTION

Adequate nutrition is a basic human need, especially for children. Malnutrition is a global public health challenge associated with about 41% of deaths among children between 6 to 24 months in developing countries [1,2]. Malnutrition has been reported to adversely affect cognitive development in children, resulting in low health status, invariably leading to low school attendance rates and poor academic performances [1,3]. An estimated 195 million children suffer from malnutrition globally, while about 80% of world's stunted children lived in just fourteen countries including, which are mostly African countries including Nigeria [4]. Sub-Saharan Africa and South Asia were the home about 3/4th of the world's stunted children, 40% and 39%, respectively [4,5,6].

Complications of malnutrition include: Marasmus, Kwashiorkor, Diarrhea, Anemia, Sepsis, Hypothermia and lactose intolerance [7,8,9]. A common presentation of malnutrition is being underweight, mostly occurring in children under 5 years, with a 33% prevalence reported in Sub-Saharan Africa, affecting about 30 million children [6]. In Africa, about 50% of children between 12 – 15 months are underweight, such high prevalence of malnutrition leads to high mortality and morbidity, and low productivity later in life. Wasting is another predictor of malnutrition with about 52 million children reported to have suffered from moderate to severe wasting globally [5]. In the year 2013, wasting decreased by 36% to 17 million from 51 million reported in 1990, with children in Asia and Africa accounting for close to 1/3rd of the children with severe wasting.

The WHO reports that more than half of the deaths among children below five years were attributed to undernutrition, which could also lead to a greater risk of death and illnesses due to the common childhood infection such as pneumonia, diarrhea, malaria, HIV/AIDS and measles [7,10].

In 2007, the Federal Ministry of Education, reported that over 90% of morbidity and 80% of mortality in under-5 children arise from malaria, vaccine preventable diseases, diarrhea and respiratory infections, with malnutrition accounting for 50% of such mortality [10,11]. The Nigerian Demographic and Health Survey of 2013 reported that 37% under age 5 are stunted, 18% are wasted and 28% are underweight. This study was carried out to assess the prevalence of malnutrition and associated factors in children presenting at the University of Port Harcourt Teaching Hospital, Rivers state, Nigeria.

## 2. METHODS

### 2.1 Study Design

The study was a retrospective descriptive study of the pattern and occurrence of malnutrition within a one-year period (June 2015 to June 2016) at the University of Port Harcourt Teaching Hospital.

### 2.2 Study Population

A total of 1,017 children that were admitted and discharged from the different wards of the paediatric wing of the University of Port Harcourt Teaching hospital were studied.

### 2.3 Data Collection

All the case notes of children admitted and managed for malnutrition were retrieved. Information collected included: biodata, and nutritional status including height, weight, z score, presence or absence of oedema, immunization status, breastfeeding practice of mother and mothers sociodemographic data.

### 2.4 Data Analysis

The data was presented using mean, frequency and percentage. Chi-square was used to analyze the association of malnutrition and age, sex, immunization status, duration of breastfeeding

and mother's sociodemographic data and a p-value < 0.05 was considered significant. All analyses was done with the SPSS v20 software.

### 3. RESULTS

There were 37 (3.6%) malnourished children among the children seen at the hospital during the study (Fig. 1).

Table 1 shows the demographic distribution of the subjects. The mean age of the subjects was 21.2±10.5 months. There were 20 (51.4%) subjects between 0 – 11 months, 12 (32.4%) were between 12 – 59 months and 5 (13.5%) were ≥60 months old. Among the subjects, 23 (62.2%) were male and 14 (37.8%) were female. The male female ratio was 1:1.6.

**Table 1. Sociodemographic data of subjects**

Age in months (mean/SD)	21.2/10.5
Age groups	Frequency n=37 (%)
0 – 11	20 (54.1)
12 – 59	12 (32.4)
≥60 months	5 (13.5)
Sex	
Male	23 (62.2)
Female	14 (37.8)

Fig 2 shows that 7 (18.9%) subjects had kwashiorkor, 11 (29.7%) had marasmus and 19 (51.4%) were underweight.

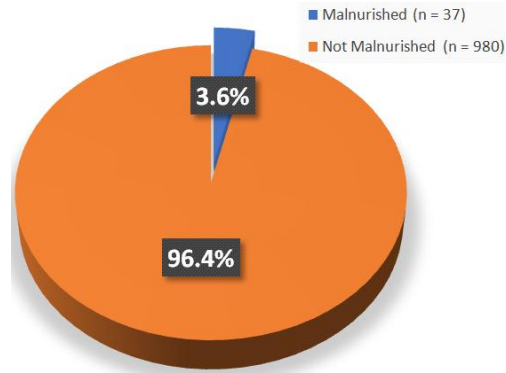
Table 2 shows the distribution of malnutrition by age. Among subjects with kwashiorkor, 2 (28.6%) were between 0 – 11 months, 4 (57.1%) were between 12 – 59 months and 1 (14.3%) was above 60 months. In subjects with marasmus, 9 (81.8%) was between 0 – 11 months, 1 (9.1%) was between 12 – 59 months and 1 (9.1%) was above 60 months. In the underweight subjects, 9 (47.4%) was between 0 – 11 months, 7 (36.8%) was between 12 – 59

**Table 2. Distribution of malnutrition by age**

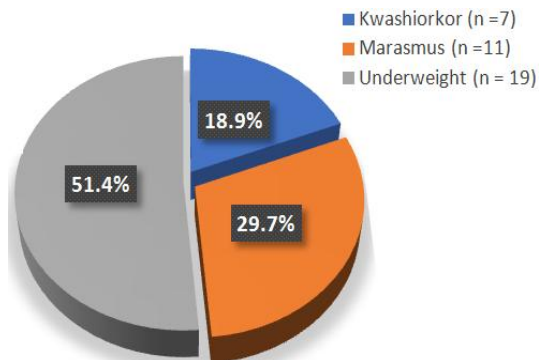
Age groups (months)	Kwashiorkor (n, %)	Marasmus (n, %)	Underweight (n, %)	Chi-square (p-value)
0 – 11	2 (28.6)	9 (81.8)	9 (47.37)	5.58 (0.0612)**
12 – 59	4 (57.1)	1 (9.1)	7 (36.84)	4.85 (0.0883)**
≥60	1 (14.3)	1 (9.1)	3 (15.79)	0.27 (0.8729)**
<b>Total</b>	<b>7 (100.0)</b>	<b>11 (100.0)</b>	<b>19 (100.0)</b>	

\*\*Differences between the groups are not statistically significant (p > 0.05)

months and 3 (15.8%) were ≥60 months. Chi square showed that there was no significant difference (p > 0.05) in the distribution of malnutrition by the different age groups of the subjects.



**Fig. 1. Proportion of malnourished children**



**Fig. 2. Distribution of malnutrition by age**

Table 3 shows the distribution of malnutrition by gender. Among the male subjects, 3 (10.1%) had kwashiorkor, 6 (26.1%) had marasmus and 14 (60.9%) were underweight. In the female subjects, 4 (28.6%) had kwashiorkor, 5 (35.7%) had marasmus and 5 (35.7%) were underweight. There was no significant difference (p > 0.05) in the distribution of malnutrition between both sexes.

**Table 3. Distribution of malnutrition by gender**

Type of malnutrition	Male	Female	Chi-square (p-value)
Kwashiorkor	3 (10.05)	4 (28.57)	1.36 (0.2421) **
Marasmus	6 (26.09)	5 (35.71)	0.38 (0.5343) **
Underweight	14 (60.87)	5 (35.71)	2.20 (0.1376) **
<b>Total</b>	<b>23 (100.00)</b>	<b>14 (100.00)</b>	

*\*\*Differences between the groups are not statistically significant (p > 0.05)*

The distribution of malnutrition by immunization status showed that among the subjects with full immunization, 10 (41.7%) had kwashiorkor, 9 (37.5%) had marasmus, 5 (20.8%) were underweight. Among the subjects with partial immunization, 9 (69.2%) had kwashiorkor, 2 (15.4%) had marasmus and 2 (15.4%) were underweight. There was no significant difference (p > 0.05) in the occurrence of malnutrition according to status of immunization in the subjects.

Fig. 3 shows the distribution of malnutrition in the subjects by duration of breastfeeding. Among subjects with kwashiorkor, 4 (57.1%) had no

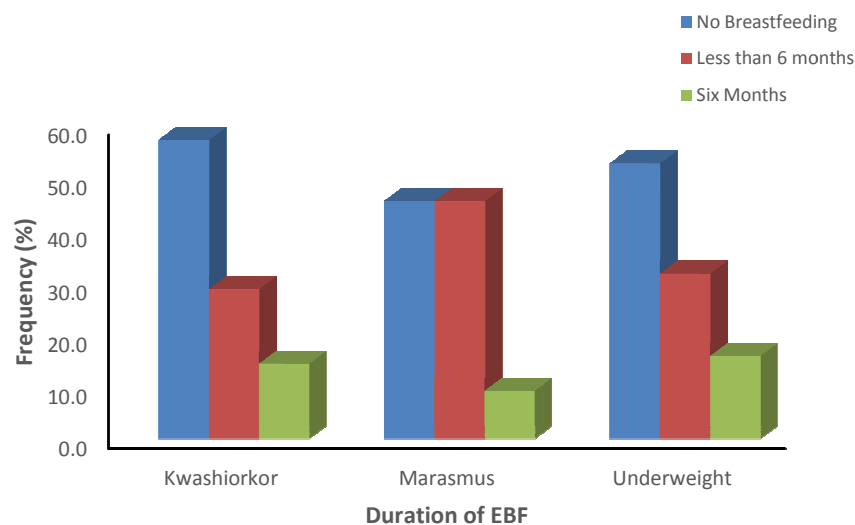
breastfeeding, 2 (28.6%) were breastfed for less than 6 months while 1 (14.3%) was breastfed for 6 months. In subjects with marasmus, 5 (45.5%) were not breastfed, 5 (45.5%) were breastfed for less than six months and 1 (9.1%) was breastfed for 6 months. Among subjects that were underweight, 10 (52.6%) were not breastfed, 6 (31.6%) were breastfed for less than six months, 3 (15.8%) were breastfed for six months.

Table 5 shows the association of malnutrition in the subjects and mother's occupation. Among the subjects with kwashiorkor, 2 (28.6%) were civil servants, 3 (42.9%) were self-employed, and 2 (28.6%) were students. In the subjects with

**Table 4. Occurrence of malnutrition by immunization status**

Type of malnutrition	Full	Partial	Chi-square (p-value)
Kwashiorkor	10 (41.67)	9 (69.23)	2.56 (0.1092) **
Marasmus	9 (37.50)	2 (15.38)	1.97 (0.1600) **
Underweight	5 (20.83)	2 (15.38)	0.16 (0.6862)**
<b>Total</b>	<b>24 (100.0)</b>	<b>13 (100.0)</b>	

*\*\*Differences between the groups are not statistically significant (p > 0.05)*



**Fig. 3. Distribution of malnutrition by duration of Exclusive Breast Feeding (EBF)**

marasmus, 3 (27.3%) were civil servants, 5 (45.5%) were housewives, and 3 (27.3%) were self-employed. While among the underweight subjects, 3 (15.8%) were housewives, 3 (15.8%) were self-employed, 4 (21.1%) were teachers, 7 (36.8%) were traders and 2 (10.5%) were unemployed. There was a significant difference ( $p < 0.05$ ) in the distribution of malnutrition of the subjects in mothers that were civil servants, housewives, students and traders.

The association of mother's educational status and malnutrition is shown in Table 6. In the subjects with kwashiorkor, 1 (14.3%) had primary education, 3 (42.9%) had secondary education and 3 (42.9%) had no formal education. Among subjects with marasmus, 1 (9.1%) had primary education, 4 (36.4%) had secondary education, and 6 (54.5%) had tertiary education. In the subjects with underweight, 3 (15.8%) had primary education, 10 (52.6%) had secondary education and 6 (31.6%) tertiary education. The distribution of malnutrition was significantly different ( $p < 0.05$ ) in subjects with mothers that had no formal education.

#### 4. DISCUSSION

Malnutrition with complications such as wasting, kwashiorkor and stunted growth remains a public health challenge in developing countries such as Nigeria. The study showed a 3.6% occurrence of

malnutrition, which is lesser than reported prevalence in other parts of the country ranging from 30% – 46% [6,12,13]. The lower proportion could be attributed to the fact that the study was carried out in an Urban center, where levels of malnutrition are reportedly lower in comparison with rural areas [14,15].

The mean age of the subjects that were malnourished was  $21.2 \pm 10.5$  months, while most (51.4%) were between 0 – 11 months, an indication that the child's age is strongly associated with the prevalence of malnutrition as reported in similar studies [14,16,17].

The proportion of underweight children in the study is higher than the estimates from the 2013 national demographic and health survey[1], and similar studies in southern Nigeria which reported underweight proportions from 10% - 30% [14,15,17]. The other forms of malnutrition in these subjects were marasmus (29.7%) followed by kwashiorkor (18.9%). This is consistent with the findings of Emmanuel et al. [14] and Ubesie et al. [17] which could be an indication of acute malnutrition among the malnourished subjects.

The different forms of malnutrition were most common in the subjects that had no breastfeeding, especially among children whom did not have any form of breastfeeding. This corresponds with the findings of

**Table 5. Association of mother's occupation and malnutrition**

Maternal occupation	Kwashiorkor	Marasmus	Underweight	Chi-square (p-value)
Civil Servant	2 (28.6)	3 (27.3)	0 (0.0)	6.10 (0.0421)*
Housewife	0 (0.0)	5 (45.5)	3 (15.8)	5.99 (0.0498)*
Self-Employed	3 (4982.9)	3 (27.3)	3 (15.8)	2.11 (0.3482)**
Student	2 (28.6)	0 (0.0)	0 (0.0)	9.06 (0.0108) *
Teacher	0 (0.0)	0 (0.0)	4 (21.1)	4.24 (0.1195) **
Trader	0 (0.0)	0 (0.0)	7 (36.8)	8.17 (0.0167) *
Unemployed	0 (0.0)	0 (0.0)	2 (10.5)	2.00 (0.3673) **
<b>Total</b>	<b>7 (100.0)</b>	<b>11 (100.0)</b>	<b>19 (100.0)</b>	

\*Differences between the groups is statistically significant ( $p < 0.05$ )  
 \*\*Differences between the groups are not statistically significant ( $p > 0.05$ )

**Table 6. Association of mother's educational status and malnutrition**

Maternal occupation	Kwashiorkor	Marasmus	Underweight	Chi-square (p-value)
Primary	1 (14.3)	1 (9.1)	3 (15.8)	0.27 (0.8729)**
Secondary	3 (42.9)	4 (36.4)	10 (52.6)	0.77 (0.6786)**
Tertiary	0 (0.0)	6 (54.5)	6 (31.6)	4.69 (0.0954)**
No formal Education	3 (42.9)	0 (0.0)	0 (0.0)	13.99 (0.0009)*
<b>Total</b>	<b>7 (100.0)</b>	<b>11 (100.0)</b>	<b>19 (100.0)</b>	

\*Differences between the groups is statistically significant ( $p < 0.05$ )  
 \*\*Differences between the groups are not statistically significant ( $p > 0.05$ )

Sebanjo et al. [15] and Mengistu et al. [18] which concluded that the practice of exclusive breastfeeding decreases the probability of malnutrition, especially among children under the age of five. Breastfeeding is crucial in the development of any child, apart from its nutritional importance, it also helps build immunity of the child during its early years [19,20].

Maternal occupation and education are important factors associated with malnutrition in children. The study showed significant associations of malnutrition with mothers who were civil servants and students. While there was a significant association of malnutrition (especially kwashiorkor) with mothers whom had no formal education. Studies have shown that mothers that are schooling and also have tedious work schedules are pre-occupied with just getting their children fed, without attention to details such as nutritional needs, while some may not feed their children as much as they also need due to their schedules [6,14,17,18]. Maternal education have also been reported to be vital in the amount of information on child nutrition available to nursing mothers, which in turn affects the perception of most un-educated nursing mothers on the nutritional needs of their children [1,12,17].

## 5. CONCLUSION

Malnutrition remains prevalent in among children despite efforts for improving the nutritional status of the children, maternal education and breastfeeding habits were the most common factors associated with the occurrence of malnutrition, especially Kwashiorkor. There is a need to intensify efforts to improve nutritional of children, especially enlightenment of mothers in Port Harcourt and its environs.

## CONSENT AND ETHICAL CONSIDERATION

All authors hereby declare that all experiments have been examined and approved by the appropriate ethics committee and have therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. While informed consent was obtained from the parents of the subjects.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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