*IOSR Journal of Nursing and Health Science (IOSR-JNHS)*
*e-ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 7, Issue 6 Ver. II. (Nov.-Dec.2018), PP 56-62*
*www.iosrjournals.org*

# Prevalence of AnaemiaAmong Under Five Children Seen At A Government Children Hospital In Ibadan, Nigeria

Adenike A.O Olaniyi[1], Kayode O. Osungbade[2]
[1](School of Nursing, University College Hospital, Ibadan, Nigeria)
[2](Dept. of Preventive Medicine and Primary Care, College Of Medicine, University ofIbadan)
Corresponding author: Adenike A.O Olaniyi

***Abstract:****Anaemia is a significant public health problem globally. It contributes significantly to child morbidity and mortality. However, prevalence of anaemia among under-five children is high, especially in developing countries including Nigeria. This study aimed at assessing the prevalence of anaemia among under five children seen at a children hospital in Ibadan, Nigeria. A case-control study was conducted among children at Oni Memorial Children Hospital. One hundred and seventy-five children were consecutively enrolled into each of the study and control groups. Data were collected from caregivers, anthropometric measurements of the children were taken and compared with World Health Organisation reference standard; blood was tested for haemoglobin estimation and malaria parasites. Descriptive statistics, students't-test and Chi-square test were used to analyse the data at 5% level of significance. Mean ages of caregivers of children in study and control groups were 30.7 ± 7.0 years and 29.8 ± 4.8 years respectively. Mean ages of children in study and control groups were 33.9. ± 16.4 months and 21.7 ± 1 5.0 months respectively. The study revealed 1.6% as an overall prevalence of anaemia among children seen during the study with the highest prevalence among children between 6 and 18 months of age. There is a significant association between anaemia and malaria frequent hospital admission and under-nutrition. Malaria prevention and control strategies, prompt treatment of children with malaria as well as nutritional interventions are recommended.*

---

Date of Submission: 13-11-2018 Date of acceptance: 28-11-2018

---

## I. Introduction

Anaemia is a condition where the level of haemoglobin in the blood is below the normal range. From the age of one year until puberty, the normal haemoglobin level is 11g/dl or above [1]. Anaemia impairs normal development in children and it constitutes a major public health problem in young children in the developing world with wide social and economic implications. It is the best known manifestation of iron deficiency which It retards physical and cognitive development, and affects about two billion people worldwide [2]. Anaemia is a significant public health problem globally and in Africa, many children below the age of five years suffer from the condition. The World Health Organization (WHO) strategy for anaemia detection, under the Integrated Management of Childhood Illness (IMCI), includes algorithms for pallor assessment. However, pallor is not very sensitive for detecting anaemia among children, even for health professionals, wherefore early recognition by additional symptoms and signs by caretakers are desirable [2].

Anaemia impairs normal development in children and it constitutes a major public health problem in young children in the developing world with wide social and economic implications. Anaemia is the best known manifestation of iron deficiency. It retards physical and cognitive development and affects about two billion people worldwide [2]. Iron deficiency affects children under five years of age more than any other group. This is because iron stores are exhausted between 4 months and 6 months after which the child needs iron supplementation in the diet [3]. Poor dietary intake can also contribute to deficiencies in other micronutrients and macronutrients that are needed to enhance the absorption and metabolism of iron and production of haemoglobin and red blood cells, including folic acid, vitamin B12, vitamin C, vitamin A and animal protein. Dietary surveys and studies suggest that a large proportion of children do not meet daily requirements for several micronutrients and have multiple micronutrient deficiencies[4]. Intestinal infections, such as hookworms and diarrhoea, can lead to iron deficiency anaemia by causing intestinal blood loss, malabsorption of micronutrients, abdominal pain and anorexia among these children. Underlying causes of anaemia in children, many of which the risk factors stem from poverty, include household food insecurity (including a lack of dietary diversification), poor caring practices, inadequate health services and an unhealthy environment had been frequently reported Under nutrition is at the heart of the problem being one of the risk factors contributing to anaemia in children. Under nourished under-fives are unable to learn and this is carried to adult life. One of the most devastating to under-fives is micro nutrient deficiency of iron. [5]. However, it is highly likely that iron

deficiency is the single most important cause of anaemiain under-five children as observed in most countries of the world [6]. At the beginning of the new millennium, an estimated 40% of the population was affected by income poverty [7]. These poor households lack resources to obtain sufficient micronutrient rich-foods, micronutrient supplements, treatment for parasitic disease, insecticide treated bed-nets, and other preventative commodities or services. Key caring practices that contribute to anaemia among children include poor breastfeeding and complementary feeding practices, inadequate dietary intake of bio-available iron and other micronutrients, inappropriate home care and care-seeking for illnesses and a lack of hand-washing and other hygienic behaviours.

Plasmodium falciparum malaria is also a common risk factor for anaemia in children living in endemic areas [8,9].Severeanaemia which is a life threatening condition is a common occurrence in children's emergency units in most hospitals in the developing countries. Reasons like malaria endemicity, frequent bacterial infections and high parasitic infestations have been given for these high anaemia rates. Late presentation of patients to health facilities, ignorance and poverty on the part of the parents/ caregivers are other factors which compound these high rates. Infectious diseases – in particular malaria, helminth infections and other infections such as tuberculosis and HIV/AIDS – are important factors contributing to the high prevalence of anaemia in many populations [10,11]. For example, Plasmodium falciparummalaria-related anaemia contributes significantly to childhood mortality and thus preventing and treating anaemia in children is of a major importance [11]. Helminth infections, in particular hookworm infections and schistosomiasis, cause blood loss and thus also contribute to the etiology of anaemia especially in children [12]. HIV/AIDS is an increasing cause of anaemia and anaemia is recognized as an independent risk factor for early death among HIV/AIDS-infected individuals [13]. Hence, this study was proposed to investigate the prevalence of anaemia among under-five children at a children hospital in Ibadan, Nigeria.

## II. Material And Methods

This case-control prospective study was carried out among under five attending children out-patient clinic of Oni Memorial Children Hospital, Ibadan, Nigeria. This consisted of children aged 0-5years old who presented with anaemia (i.e. confirmed by haematocrit estimation) at the children out-patient clinic of the hospital and their mothers/caregivers as cases while children of the same age who were not anaemic but presented for immunization and their mothers/caregivers were the control group.

**Study Design:** Prospective case-control study

**Study Location**: This study was conducted at Oni Memorial Children's Hospital in Ibadan. Ibadan is the capital city of Oyo State of Nigeria. Oyo State is an inland state in south-western Nigeria. It is one of the 36 States of Nigeria and was created out of the Western Region in 1976 [14]. It has a population of 5,591,589 million [15]. Over 60% of the population lives in urban areas. Ibadan city is one of the largest cities in Africa. It has a population of 1,338,659 million comprising a blend of people from all works of life including the academia, business world, petty traders and farmers. Ibadan municipal is divided into 5 local government areas namely -- Ibadan North, North/East, North/West, South/East and South/West; each local government area is further sub-divided into wards. It can also be divided into an inner core and outer core [15].Oni Memorial Children's Hospital Ring Road, Ibadan is a State owned paediatric hospital and is managed under the Oyo State Hospitals Management Board of the State Ministry of Health. It is located in Ibadan South-west Local Government Area. The hospital serves people that cut across different socio- economic class. It is a 60 bedded hospital with six wards and one emergency treatment room, about 2,000 children are seen at the out-patient clinic every month (Hosp. Medical Record).

**Sample size:** 350 patients.

**Sampling method:** All consecutive children who presented with anaemia within the period of data collection (5 months) were recruited until the desired number was attained.Controls were selected from the immunization clinic of thesame hospital.

**Inclusion criteria:**

Children who are aged 0 – 5 years old who presented with haemoglobin estimation of <11g/dl (PCV <30%) for the cases and children of the same age who are not anaemic for controls (i.e. haemoglobin estimation ≥ 11g/dl or P.C.V ≥ 30%).

**Exclusion criteria:**

Children who are over 5 years old with or without anaemia

**Procedure methodology**

After written informed consent was obtained, a well-designed questionnaire was used to collect the data of the recruited patients prospectively. The questionnaire included socio-demographic characteristics of caregivers

such as age, marital status, family type, level of education, occupation and number of children while for the index child, age, sex, height, weight, and Hb estimation were obtained.

**Statistical analysis**

The data was analyzed using SPSS version 15 (SPSS Inc., Chicago, IL). Student's *t*-test was used to ascertain the significance of differences.

## III. Result

### 1. Socio- demographic characteristics of the respondents

A total of 350 mothers/caregivers were recruited for the study. All responded by completing the questionnaire administered to them, giving a response rate of 100.0%. There were 175 mothers of cases and same number for controls. The overall age of mothers ranged from 19 to 68 years with a mean age of 30.0 ± 6.0 years. The mean age of mothers of cases was 30.7 ± 7.0 years while that of controls was 29.8 ± 4.8 years ($p<0.005$). Fifty- nine (33.7%) mothers of cases and 37 (21.1%) of controls had no formal education while 76 (43.4%), 26 (14.9%), 14 (8.0%) mothers of cases and 68(38.9%), 30 (17.1%), 40 (22.9%) of controls respectively had primary, secondary and tertiary education ($p<0.005$). Majority of mothers of cases 144 (82.3%) and 154 (88.0%) of controls were employed, out of which 78 (44.6) were private/self-employed and 66 (37.7%) were civil servants while 31 (17.7%) mothers of cases and 21 (12.0%) of controls were unemployed ($p>0.005$). One hundred and fifty-four (47.5%) mothers of cases and 170 (52.5%) of controls received antenatal care, out of which majority 76 (43.4%) mothers of cases and 122 (69.7%) of controls delivered their children in government hospital, 68 (47.1%) and 34 (19.4%) mothers of cases and controls delivered at a private hospital while 16 (9.1%) and 10 (5.7%) mothers of cases and controls went to other places like TBA, mission houses, individual homes to deliver their children respectively ($p< 0.005$) (Table 1).

**Table 1:Socio-Demographic characteristics of mothers of cases and controls**

| n (%) | Cases (175) n (%) | Controls (175) N(%) | Total (350) | p-value |
|---|---|---|---|---|
| **Age of Mothers (years)** | | | | |
| 19 – 28 | 73 (41.7) | 72 (41.1) | 145 (41.1) | 0.087 |
| 29 -38 | 84 (48.0) | 96 (54.9) | 180(51.4) | |
| 39 -48 | 12 (6.9) | 7 (4.0) | 19(5.4) | |
| 49 -58 | 5(2.9) | - | 5(1.4) | |
| 59 -68 | 1 (0.6) | - | 1(0.3) | |
| **Mean age of mothers (years)** | 30.7 ± 7.0 | 29.8 ± 4.8 | 30.3 ± 6.0 | 0.004 |
| **Level of Education** | | | | |
| No Formal Education | 59 (33.7) | 37 (21.1) | 96 (27.4) | 0.005 |
| Completed primary | 76 (43.4) | 68 (38.9) | 144 (41.1) | |
| Completed secondary | 26 (14.9) | 30 (17.1) | 56 (16.0) | |
| Tertiary | 14 (8.0) | 40 (22.9) | 54 (15.4) | |
| **Occupation** | | | | |
| Unemployed | 28(16.0) | 11 (6.3) | 30 (11.1) | 0.77 |
| Private/ self-employed | 78(4.6) | 89 (50.9) | 167 (47.8) | |
| Civil servant | 68 (37.7) | 65(37.1) | 131 (37.4) | |
| Full-time housewife | 3 (1.7) | 10 (5.7) | 13 (3.7) | |
| **Received ANC** | 154 (47.5) | 170 (52.5) | 324 (92.6) | 0.001 |
| **Place of delivery** | | | | |
| Government hosp. | 76 (43.4) | 122 (69.7) | 198 (56.6) | 0.005 |
| Private | 65 (47.1) | 34 (19.4) | 99 (28.3) | |
| P.H.C | 18 (10.3) | 9 (5.1) | 27 (7.7) | |
| Other places | 16 (9.1) | 10 (5.7) | 26 (7.4) | |

**2. Demographic characteristics of the index child**

Out of 350 children studied, 184 (52.4%) were males while 166 (47.6%) were females. Ninety-two (52.3%) children each of cases and controls were males while 83 (47.7%) children each of cases and controls. Overall, 102 (29.1%) were within the ages of 13-24 months, 89 (25.4%) were within the ages 1-12 months, 80 (22.9%) were within 25-36 months, 44 (12.6%) were within 37-48 months and 35 (10.0%) were within 49-60 months. Out of 175 cases, 49 (28.0%) falls within 13–24 months and 38 (21.7%) falls within 25-36 months age range compared with 53 (30.3%) controls, who falls within 13-24 months and 42 (24.0%) who falls within 25-36 months age range. The mean age of cases was 33.9 ± 16.4 months and 21.7 ± 15.0 months for control groups (Table 2).

**Table 2. Demographic characteristics of the index child**

| **Cases (175) n (%)** | **Controls (175) n (%)** | **Total (350) N(%)** | **p-value** |
|---|---|---|---|
| **Age of the index child (mth)** | | | |
| 1-12 | 26 (14.9) | 63 (36.0) | 89 (25.4) | 0.005 |
| 13-24 | 49 (28.0) | 53 (30.3) | 102 (29.1) | |
| 25-36 | 38 (21.7) | 42 (24.0) | 80 (22.9) | |
| 37-48 | 32 (18.3) | 12 (6.9) | 44 (12.6) | |
| 49-60 | 30 (17.1) | 5 (2.9) | 35 (10.0) | |
| **Mean age of the index child (Months)** | 33.9 ± 16.4 | 21.7 ± 15.0 | 27.8 ± 16.7 | 0.067 |
| **Sex of the index child** | | | | |
| Male | 92 (52.3) | 92 (52.3) | 184 (52.4) | 0.95 |
| Female | 83(47.7) | 83 (47.7) | 166 (47.6) | |

3. **Comparison of child history of cases and controls group**

Out of 175 cases of anaemia, 49 (28.0%) falls within 13-24 months age group, 83 (47.7%) had a positive history of hospital admission, 35 (20.0%) had a history of blood transfusion, 136 (77.7%) reported an illness the last 2 weeks before the study, 107 (61.1%) had AA genotype, 167 (95.4%) had +ve malaria parasite, 78 (45.1%) were deworm, 172 (98.3%) were immunized and 52 (29.7%) were categorized as wasting compared to 53 (30.3%), 8 (4.6%), 3 (1.7%), 11 (6.3%), 145 (82.9%), 10 (4.7%), 91 (58.7%), 175 (100.0%) and 12 (6.9%) of controls respectively; these differences were statistically significant ($p < 0.005$). Out of 175 cases of anaemia, 25 (14.3%) were underweight and 10 (5.7%) were stunted compared to 6 (3.4%) and 7 (4.0%) of controls; these differences were not significant ($p > 0.005$) (Table 3).

**Table 3. Comparison of child history between case and control groups**

| **n(%)** | **Cases n(%)** | **Controls** | **$x^2$** | **p-value** |
|---|---|---|---|---|
| **Age of the index child (mth)** | | | | |
| 1-12 | 26 (14.9) | 63 (36.0) | 42.69 | 0.00 |
| 13-24 | 49 (28.0) | 53 (30.3) | | |
| 25-36 | 38 (21.7) | 42 (24.0) | | |
| 37-48 | 32 (18.3) | 12 (6.9) | | |
| 49-60 | 30 (17.1) | 5 (2.8) | | |
| **History of hospital admission** | 83 (47.7) | 8 (4.6) | 83.53 | 0.00 |
| **History of blood transfused** | 35 (20.0) | 3 (1.7) | 30.23 | 0.00 |
| **Child ill in the last 2 weeks** | 136 (77.7) | 11 (6.3) | 183.26 | 0.00 |
| **Hb Electrophoresis** | | | | |
| AA107 (61.1) | 145 (82.9) | 28.32 | 0.00 | |
| AC 12(6.9) | 7 (4.0) | | | |
| AS41 (23.4) | 16 (9.1) | | | |
| SC | 3 (1.7) | 6 (3.4) | | |

| | | | | |
|---|---|---|---|---|
| SS2 (6.9) | 1 (0.6) | | | |
| **Malaria Estimation** (+ve) | 167 (95.4) | 10 (4.7) | 301.27 | 0.00 |
| **Child deworm** | 78 (45.1) | 91 (58.7) | 6.075 | 0.014 |
| **Child immunized** | 172 (98.3) | 175 (100.0) | 3.026 | 0.082 |
| **Height-for-age** Wasting | 52 (29.7) | 12 (6.9) | 15.450 | 0.00 |
| **Weight-for-age** Under-weight | 25 (14.3) | 6 (3.4) | 1.690 | 0.430 |
| **Weight-for-height** Stunting | 10 (5.7) | 7 (4.0) | 2.470 | 0.291 |

## IV. Discussion

This study revealed 1.6% as an overall prevalence of anaemia among children seen during the study. It found a high prevalence of anaemia among female children. This was in contrast to a study by Schellenberg et al [16] which found 87% prevalence of anaemia among under 5 years children. This was contradictory to a study by Fowowe[17] where all the children who participated had anaemia and 54% of male children had anaemia. This finding agreeing with another study on the prevalence and aetiology of severe anaemia among under-five children which revealed 9.7% as the overall prevalence of anaemia, and 54.2% of male children had anemia [18], still similar to the outcome of a previous study by George and Otaigbe[19] where the prevalence rate of anaemia was 9.7% and also high in males. Another study revealed that the prevalence of anaemia among under-five children was 70.5% this was higher than the WHO [20] estimate of 40% for South East Asia and sub-Saharan Africa. This study agreed with the finding of other studies which revealed the prevalence of anaemia as 49% of children under 12 months and 22% were between 12 and 24 months in New Zealand [21]. It agreed with the findings of a study which reported the prevalence of anaemia as 85% of children under 6 months, 96% in the second half of infancy and 10% among 6 -11 months old children [16]. In sub-Sahara Africa, the prevalence found was 82% in Benin and 83% in Mali [22].

This study also agrees with the findings of a study as reported by Osorio et al [23] showing a high prevalence among children between 6 and 18 months of age. This disagrees with another study where the overall prevalence of anaemia 35.8% was found in healthy children and 55% among sick children. The study also revealed that anaemia prevalence was seen in 24.0% of pre-school children, 40.4% among school-age groups. The highest prevalence 55% was found in the rural school-age group while the lowest 20% was among the economically better-off urban pre-school children [24]. This indicates that all children in Nigeria are not anaemic, this is a good indication and measures should be taken to improve mothers' awareness through enlightenment programmes such as health education on anaemia and other childhood illnesses.

This present study was in contrast with a community–based study for World Health Organization, which revealed that the highest prevalence of anaemia among under-five children occurs during the first six month of life and reaching maximal level in the second half of infancy [16]. This disagrees with another study which revealed that the prevalence of anaemia was higher among children aged one year and lowest among five years of age, followed by children under one year of age [17], but similar to this present study. In another study, a higher prevalence 58.8% of anaemia was reported among children under 5 years of age [19]. This was in support of a previous study by Muoneke and Chidibekwe[1818], which revealed a prevalence of 63.6% among children less than 2 years of age.

In a study by Muoneke and Chidibekwe[18], it was reported that the prevalence of anaemia was higher in males 54.2% than females 45.8% with the mean age of 25.1 ± 16.7 months, with 63.6% of the children less than 24 months. Another study, showed that 70.5% of under-five children were anaemic from a total of 400 children studied from both urban and rural areas [25], it was reported that anaemia was prevalent in both places; however, it was higher in the rural area 78.7% than 61.3% in urban, where 84.8% were between the age group of 12 and 23 months. This implies that anaemia was more prevalent among 1-2 years age group. Mothers should be educated on how to detect early signs of anaemia and consult the health care facility for proper care. The present study showed that majority of children whose mothers claimed to have exclusively breastfed had anaemia compared to those that were not exclusively breastfed.This is similar to a study on the association between extended

breastfeeding and anemia, where it was revealed that children who were exclusively breastfed 42.9% were observed to have a high prevalence of anaemiacompared to 16.4% that was fed with artificial milk [26]. Although, exclusive breast-feeding protects children against iron deficiency for the first 4 to 6 months of life, after which iron-rich foods are needed.

A study conducted by the World Health Organization estimated that about 40% of the world's population i.e more than 2 billion individuals suffer from anaemia where about 50% were infants, 48% were children between 1-2 years, 40% were school children and 25% were preschool children. But few countries have collected representative data on the prevalence of anaemia among children, much of the information was from clinic records or small surveys, therefore national or regional estimates of anaemia in children are not very precise. Nevertheless, it is apparent that the prevalence of anaemia among under-five in developing countries is about four times that of developed countries [6].This same study also agrees to another comparative study of 6 month old children who were exclusively breastfed, presumably illustrating the lower accumulation of iron in uteroby of children. It was revealed that the iron content of breast-milk was low and cannot supply enough for the full-term infant after the age of 6 months. Therefore, prolonged breastfeeding, as well as inadequate amounts of absorbable iron in complementary foods, explains the peak prevalence of anaemia between 9 and 18 months of age. About half of the infants in developing countries become anaemic by 12 months [6]. This important observation needs further study and should not be interpreted to suggest that extended breast-feeding is not beneficial to the health of any infant [6].

This study also revealed that the prevalence was high among the study group with HbAA followed by HbAS while the prevalence decreased among HbSC, HbSS and HbAC respectively. This agrees with the findings of a study by Muoneke and Chidibekwe[18] which reported a high prevalence of 56.7% in children with AA, 14.3% in SS and 30% SC respectively, which was also similar to the findings of Kahigwa et al [27] which reported a lower prevalence of anaemia among children with AS 6.9% and SS 2.8%. This indicates that the misconception that SC and SS are more liable to develop anaemia because of their sickle gene is not true but rather AS and AA groups are more likely to develop anaemia. Thus there is need for furtherance of study on the possible reasons for developing anaemia among AA and AS children.

## V. Conclusion

The findings of this study revealed that childhood conditions like malaria, under-nutrition resulting from short duration of breastfeeding, inadequate weaning diet and frequent hospital admission were some of the factors for high prevalence of anaemia among under-five children seen. Therefore, malaria control and prevention strategies should be improved.Insecticide treated nets should be made available at affordable prices to all mothers and they should be encouraged to seek prompt treatment for their children. Adequate food consumption and regular intake of iron and vitamin C rich foods during early childhood period can prevent under-nutrition.

## References


[1]. Hick R. 2007. Anaemia. Retrieved Feb. 30, 2008, from http//www.bbc.co.uk.

**[2].** Black, R., 2003. Micronutrient deficiency an underlying cause of morbidity and mortality. World Health Organization.

[3]. Domellof, M. R.J., Cohen, K.G., Dewey, O., Hernell, L.L. and Lonnerdal, B. 2001. Iron supplementation of breast–fed Honduran and Swedish infants from 4 to 9 months of age. *Journal of Paediatrics* 138: 679-687.

[4]. Ahmed, F., Khan, M .R., Islam, M., Kabir, I. and Fuchs, G. J. 2000. Anaemia and iron deficiency among adolescent school girls in Periurban Bangladesh. *European Journal of Clinical Nutrition* 54: 678–83.

[5]. Frederickson, C. J. 2000. Importance of zinc in the central nervous system. *Journal of Nutrition* 130:14715-14835.

**[6].** Stolzufus, R. J. and Dreyfuss, M. L. 1998. Preventing and treating anaemia. Guideline for the use of iron supplements to prevent and treat iron deficiency anaemia. Eneva UNICEF/WHO.

**[7].** UNICEF. 2003. Anaemia Prevention and Control: What Works. Taking Action: Developing a Strategy for Anaemia Prevention and Control.

[8]. Menendez, C., Kahigwa, E., Hirt, R., Vounatson, P., Font, F., Aponte, J. J., Acosta, C. J., Schellenberg, D., Galindo, C. M., Kimario, J., Unasa, H., Brabin, B. J., Smith, T. A., Kitua, A. Y., Tanner, M. and Alonso, P. L. 1997. Randomised placebo-controlled trial of iron supplementation and malaria chemoprophylaxis for the prevention of severe anaemia and malaria in Tanzanian infants. *Lancet* 350: 844-850.

[9]. Murphy, S.C. and Breman, J.G. 2001. Gaps in the childhood malaria burden in Africa: cerebral malaria, neurological sequel, anaemia, respiratory distress, hypoglycemia, and complications of pregnancy. *American Journal of Tropical Medicine and Hygiene* 64(12): 57–67.

[10]. May, J., Falusi, A. G., Mockenhaupt, F. P., Ademowo, O. G., Olumese, P. E. and Bienzle, U. 2000. Impact of subpatent multi-species and multi-clonal plasmodia infections on anaemia in children from Nigeria. *Transactions of the Royal society of Tropical Medicine and Hygiene* 94: 399-403.

[11]. Nussenblatt, V. and Semba, R.D. 2002. Micronutrient malnutrition and the pathogenesis of malaria anaemia. *Acta Tropical* 82: 321–337.

**[12].** Torlesse, H. and Hodges, M. 2001. Albendazole therapy and reduced decline in haemoglobin concentration during pregnancy in Sierra Leone. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 95: 195–201.

[13]. Van, E., Ayisi, A. M., terKuile, J. G., Misore, F.O., Otieno, A. O., Kolczak J.A., Kager, M. S., Steketee, P. A. and Nahlen, R.W. 2002. Malaria and human immunodeficiency virus infection as risk factors for anemia in infants in Kisumu, Western Kenya. The *American Journal of Tropical Medicine and Hygiene* 67: 44–53.

[14]. Areola, O. 1994. The Spatial Growth of Ibadan City and its impact on the rural Hinterland. In M. O. Filani, F.A. Akintola and C.O Ikporukpo Eds. Ibadan Region. Rex Charles Publication, Ibadan. 99.
[15]. National Bureau of Statistics. 2006. Nigeria provisional results of the 2006 Population Census. Retrieved Nov.13, 2006, from http//www.nigerianstat.gov.ng.
[16]. Schellenberg, D., Schellenberg, A., Mushi, A., de Savigny, D., Mgalula, L., Mbuya, C. and Victoria, C. G. 2003. The silent burden of anaemia in Tanzanian Children: a community-based study. Bulletin of the WQorld Health Organization Geneva 81(8).
[17]. Fowowe, A. A. 2011. Malaria: A major cause of anaemia among under-five children on hospital bed in State Specialist Hospital, Ondo, Ondo State, Nigeria. *Nigerian Journal of Paediatrics* 32: 10-14.
[18]. Muoneke, V.U. and ChidiIbekwe, R. 2011. Prevalence and aetiology of severe anaemia in under-five children in Abakaliki South-eastern Nigeria. *Journal of Paediatric and Therapeutics* 1: 107.
[19]. George, O. and Otaigbe, B.E. 2012. Anaemia in Critically Ill Children. A Case Study from Nigeria. *International Journal of Tropical Disease and Health*2(1): 55-61.
[20]. World Health Organization. 2001. Iron deficiency anaemia. Assessment, Prevention and Control: A guide for programme managers. World Health Organization: Geneva.
[21]. Soh, P., Ferguson, E. L., McKenzie, J. E., Homs, M. Y. V. and Gibson, R. S. 2004. Iron deficiency and risk factors for lower iron stores in 6-24 month-old New Zealanders. *European Journal of Clinical Nutrition* 58(1): 71-9.
[22]. Ngnie-Teta, I., Receveur, O. and Kuate-Defo, B. 2007. Risk factors for moderate to severe anaemia among children in Benin and Mali: insights from a multilevel analysis. Food Nutrition Bulletin 28(1): 76-89.
[23]. Osório, M. M., Lira, P.I., Batista-Filho, M. and Ashworth, A. 2001. Prevalence of anemia in children 6-59 months old in the state of Pernambuco, Brazil.RevPanamSalud Publication 10:101-7.
[24]. Adewuyi, J.O., 1992. Current prevalence and some clinical associations of childhood anaemia in urban and rural communities of central Nigeria. *Central African Journal of Medicin*e 38(2):66-72.
[25]. Onyemaobi, G.A. and Onimawo, I.A. 2011. Anaemia Prevalence among Under-five Children in Imo State, Nigeria. *Australian Journal of Basic and Applied Sciences* 5(2): 122-126.
[26]. Willows, N. D., Morel, J. and Gray-Donald, K. 2000. Prevalence of anaemia among James Bay Cree infants of Northern Quebec. *Canadian Medical Association Journal*162(3): 323-6.
[27]. Kahigwa, E., Schellenberg, D., Sanz, S., Aponte, J., Wigayi, J., Mshinda, H., Alonso, P. and Menendez, C. 2002. Risk factors for presentation to hospital with severe anaemia in Tanzanian children: a case–control study. *Tropical Medicine and International Health* 7 (10): 823–830.

Adenike A.O Olaniyi. "Prevalence Of Anaemia Among Under Five Children Seen At A Government Children Hospital In Ibadan, Nigeria. " IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 7, no.6 , 2018, pp. 56-62.