Prevalence and Contributing Factors of Anaemia among Under Five Years Children in Um Zikra Village, Gezira State, Sudan (2013)

By
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MBBS., University of Khartoum (2001)

A Dissertation
Submitted in Partial Fulfillment of the Requirements for the Degree
of Master of Science
in
Family Medicine

Department of Family Medicine and Community
Faculty of Medicine
University of Gezira

August, 2013
Prevalence and Contributing Factors of Anaemia among Under Five Years Children in Um Zikra Village, Gezira State, Sudan (2013)

By
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Supervision Committee

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<td>Main supervisor</td>
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Date: 14.8.2013
Prevalence and Contributing Factors of Anaemia among Under Five Years Children in *Um Zikra* Village, Gezira State, Sudan (2013)

By
Mohammed Musa Elsiddig Subahi

**Examination Committee:**

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<td>Internal Examiner</td>
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Date of Examination: 14/8/2013
Quran

بسم الله الرحمن الرحيم

"أو لم ير الإنسان إنا خلقناه من نطفة فإنها هو خصيم مبين"

صدق الله العظيم

سورة يس الآية 77
Dedication

To:

My family members, especially my mother, to my wife,
to my daughter who always encourage and support me.
Acknowledgement

All salutations are for Allah and no one is equal to him.

I would like to express my special thanks to Dr. Mohammed Elmukhtar, Associated professor of Community Medicine, University of Gezira, for his advisory effort that made this work come to true. He did not hesitate to devote his knowledge and time for me, and giving his arguments in this field.

Also, I would like to thank Dr. Osman Hamid Abdulhamid, for his continuous support and help.

My deepest gratitude to the staff and the patients of Om Zikra Health Center for the help and assistance that without them this study could not be achieved.

My thanks also extend to my colleagues for their continuous help in many ways.
Prevalence and Contributing Factors of Anaemia among Under Five Years Children in Um Zikra Village, Gezira State, Sudan (2013)

By:

Mohammed Musa Elsiddig Subahi
M.Sc in family Medicine, 14/8/2013

Department of Family and Community Medicine
Faculty of Medicine, Gezira University

Abstract
This is a descriptive analytic case-control community based cross-sectional study, aiming at studying prevalence of anaemia in under five years old children and different factors related to it, in Om zikra village in Elmanagil locality, Gezira state, Sudan. Data was collected by a structured questionnaire and haemoglobin concentration results. A total of 240 mothers of under 5 years were interviewed, among the examined children 175 (72.9%) were anaemic, while 65 (27.1%) were not, mean = 9.09 ± 1.743. According to medical history of the children, (62.9%) had a history of malaria during the past three months, while (37.1%) had not, there was a significant association (P. = 0.040). Health education programs should be initiated to increase mothers awareness towards anaemia, and to reduce iron deficiency anaemia among children in the study area, rich local food with iron (Baleela Adasia and Godaim) should be prescribed to mothers and children beside the usual medications. In addition to that distribution of Folic acid and equivalents should be done from the health center for mothers and anaemic children.
معدل الانتشار والعوامل المؤثرة علي الأنيميا في الأطفال دون سن الخامسة في قرية أم ذكرى، ولاية الجزيرة، السودان (2013)

إعداد:
محمد موسي الصديق صباحي
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ملخص الدراسة

هذه الدراسة دراسة مستعرضة وصفية تحليلية بناء على المجتمع لرصد الحالات والشواهد، بهدف معرفة الانتشار مرض فقر الدم بين الأطفال دون سن الخامسة من العمر والعوامل المختلفة المتصلة بها، في قرية أم ذكرى في محلية المناقل، ولاية الجزيرة، السودان. وقد تم تجميع البيانات عن طريق استبيان منظم ونتائج تركيز الهموغلوبين في الدم. وأجريت مقابلات مع 240 من أمهات الأطفال دون سن 5 سنوات، بين الأطفال أظهر الفحص أن 175 (72.9%) يعانون من فقر الدم، في حين أن 65 (27.1%) لا يعانون، وكان الوسيط لقراءات فحص الدم يساوي 9.09 ± 1.743 جرام لكل ديسي لتر. وفقًا للتاريخ الطبي للأطفال، (62.9%) أصيبوا بالملاريا خلال الأشهر الثلاثة الماضية، في حين أن (37.1%) لم يصابوا. كانت هناك علاقة ذات دلالة إحصائية (P = 0.040) ينبغي البدء في برامج التثقيف الصحي لزيادة وعي الأمهات نحو فقر الدم، والحد من نقص الحديد بين الأطفال في منطقة الدراسة، والتشجيع على تناول الأغذية المحلية الغنية بالحديد (كالبليلة العدسية والقضيم) والتي يجب توصيف للأمهات والأطفال بجانب الأدوية المعتادة. بالإضافة إلى توزيع حمض الفوليك والمقويات المكافئة من المركز الصحي للأمهات والأطفال المصابين بفقر الدم.
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Chapter One
Introduction

Anaemia defined as haemoglobin concentration below established cutoff level, is a widespread public health problem with major consequences for human health as well as social and economic development.

Although estimates of the prevalence of anaemia vary widely and accurate data are often lacking, it can be assumed that in resource poor areas significant proportions of young children and women of childbearing age are anaemic.

WHO estimates the number of anaemic people worldwide to be staggering two billion and that approximately 50% of anaemia can be attributed to iron deficiency. The most dramatic health effects of anaemia, i.e., increased risk of maternal and child mortality due to severe anaemia, have been well documented.

In addition, the negative consequence of iron deficiency anaemia (IDA) on cognitive and physical development of children and work productivity of adult are of major concern.\(^1\)

Sudan has severe prevalence of anaemia for preschool age children.\(^2\)

Haemoglobin thresholds to define anaemia by WHO consider children from 0.5 to 4.99 years anaemic if they have Hb level below 11 g/dl.\(^2\)

Anaemia is a condition in which the number of red blood cells (and consequently their oxygen carrying capacity) is insufficient to meet the body physiologic needs. Specific physiologic needs vary with Persons

1
age, gender, residential elevation above sea level (Altitude), Smoking, behavior, and different Stages of pregnancy. Iron deficiency is thought to be the most common cause of anaemia globally, but other nutritional deficiencies (including folate, vitamin B12 and vitamin A), acute and chronic inflammation, parasitic infections, and inherited or acquired disorders that affect haemoglobin synthesis, red blood cells production or red blood cells survival, can all cause anaemia.³

In heavily endemic malaria areas, it is almost inevitable that malarial infection will be associated with anaemia, although malaria may not be the Prime cause of anaemia.⁴
Chapter Two

Literature review and rationale

In a cross-sectional study of children aged 6-60 months was carried out in nine Local Government Areas (LGAs) in Nigeria. A total of four hundred (400) under-five children were selected by purposive sampling method. Two hundred were from the urban and another two hundred from the rural locations. Height, weight, and mid-upper arm circumferences of the children were measured. Weighed 3-day food record for 20% of the sub sample was analyzed for proximate composition. Blood samples for determination of haemoglobin (Hb), packed cell volume (PCV), and vitamin C levels were obtained by vein puncture. Stool samples were collected to determine parasitic infestations. Structured and validated questionnaire was administered to elicit information related to socio-economic status of the parents and health status of the children. Statistical analysis was done using SPSS/PC (version 13), level of significance taken as P<0.05. The results showed that 70.5% of under-fives were anaemic and 48.1% were iron deficient. Vitamin C necessary for iron absorption was below recommended allowances. Anaemia was prevalent in both rural and urban locations; however it was more in rural settings. Educational levels of parents, mosquito bites, child’s size and appearance ratings, and vitamin/mineral drops consumption were the socio-economic factors associated with prevalence of anaemia. Based on these findings high premium for nutrition of mothers is advocated.5

Another study conducted in Tanzania, to document the prevalence, age-distribution, and risk factors for anaemia in Tanzanian children less than 5 years old, thereby assisting in the development of effective strategies for controlling anaemia.
Cluster sampling was used to identify 2417 households at random from four contiguous districts in southeastern United Republic of Tanzania in mid-1999. Data on various social and medical parameters were collected and analyzed.

Blood haemoglobin concentrations (Hb) were available for 1979 of the 2131 (93%) children identified and ranged from 1.7 to 18.6 g/dl. Overall, 87% (1722) of children had an Hb <11 g/dl, 39% (775) had an Hb <8 g/dl and 3% (65) had an Hb <5 g/dl. The highest prevalence of anaemia of all three levels was in children aged 6–11 months, of whom 10% (22/226) had an Hb <5 g/dl. However, the prevalence of anaemia was already high in children aged 1–5 months (85% had an Hb <11 g/dl, 42% had an Hb <8 g/dl, and 6% had an Hb <5 g/dl). Anaemia was usually asymptomatic and when symptoms arose, they were nonspecific and rarely identified as a serious illness by the care provider. A recent history of treatment with antimalarials and iron was rare. Compliance with vaccinations delivered through the Expanded Programme of Immunization (EPI) was 82% and was not associated with risk of anaemia.

Anaemia is extremely common in southeastern United Republic of Tanzania, even in very young infants. Further implementation of the Integrated Management of Childhood Illness algorithm should improve the case management of anaemia.

However, the asymptomatic nature of most episodes of anaemia highlights the need for preventive strategies. The EPI has good coverage of the target population and it may be an appropriate channel for delivering tools for controlling anaemia and malaria. WHO found that, anaemia globally affects 1.62 billion people (95% CI: 1.50–1.74 billion), which corresponds to 24.8% of the population (95%
CI: 22.9–26.7%). The highest prevalence is in preschool-age children (47.4%, 95% CI: 45.7–49.1), and the lowest prevalence is in men (12.7%, 95% CI: 8.6–16.9%). However, the population group with the greatest number of individuals affected is non-pregnant women (468.4 million, 95% CI: 446.2–490.6).

Whereas in Sudan Abdelsalam Elnour et al found that, 88% of the children had hemoglobin concentrations <1.86 mmol/L.\(^7\)

Another study done in Emergency Paediatric Unit of University of Abuja Teaching Hospital, Gwagwalada, reported that the three leading causes of admissions were severe anaemia from severe malaria (14.7%), pneumonia (13.8%) and gastroenteritis (11.2%); while the least causes were surgical conditions (0.8%), bone/soft tissue disorders (1.5%) and renal conditions (1.5%). Children less than five years were responsible for 80.1% of all admissions, while those less than two years accounted for 56.8% and infants less than one year (30.8%). Diarrhoeal disease (20.0%), severe anaemia from severe malaria (12.6%), malnutrition (11.6%), were the three major causes of mortality in children in the present review. Although meningitis was among the least causes of admission, it however caused the highest mortality of 45.5% per disease entity. The overall mortality rate in this study was 15.8%.\(^8\)

In a study conducted in Canada, included were 1647 healthy children (median age 36 months) with survey, anthropometric, and laboratory data. An association was found between increasing duration of breastfeeding and lower serum ferritin (\(P = .0015\)). Adjusted logistic regression analysis revealed the odds of iron deficiency increased by 4.8% (95% confidence interval: 2%-8%) for each additional month of breastfeeding. Exploratory analysis suggested an increasing cumulative
probability of iron deficiency with longer total breastfeeding duration with an adjusted odds ratio of 1.71 (95% confidence interval: 1.05-2.79) for iron deficiency in children breastfed over versus under 12 months of age. The relationship between total breastfeeding duration and iron deficiency anemia did not meet statistical significance.\(^9\)

Parents’ level of education may be considered an important socioeconomic factor for the occurrence of anemia. A higher level indicates increased chances of having a job and income, and consequently, easier access to iron-rich foods. The mother’s level of education, in its turn, influences the practices related to the child’s health care.

Monteiro and Szarfarc\(^10\) have studied the prevalence of anemia in children aged less than 60 months in relation to the family’s socioeconomic level (determined by the family head’s level of education) and have shown that, although none of the strata is immune to anemia, the prevalence was inversely proportional to the level of education. Osório\(^11\) has found a linear association between mother’s level of education and the increase in hemoglobin concentration of children aged between six and 59 months. However, in the reviewed literature, no association was observed between the presence of anemia and mother’s different levels of education. The explanations to these findings could be the same ones used for the previously mentioned income variable.

**Rational:**

There is a high prevalence of anaemia among children of under five years old in the study area, anaemia affects cognitive and physical development...
of children, most of the types are due to infectious diseases, inappropriate weaning and malnutrition, where they are preventable.
Objectives:

General objective:

1. To assess the epidemiology of anaemia in under five years children in Om Zikra village.

Specific objectives:

1. To assess the prevalence of anaemia in the under five years children.

2. To assess contributing factors to anaemia to under five years children.
Chapter Three
Methodology

✓ Study design:

This is a descriptive community based cross-sectional study, aiming at studying prevalence of anaemia in under five years old children and different factors related to it.

✓ Study Area:

Om zikra village is localized in Elmanagil locality, about 20 Kilometers southwest to Elmanagil. The total number of population is about 5600 person, most of them work in agriculture. Most of Sudanese tribes are present in the area, like Kawahla, Rikabia, Folany, Shiwehat and Batahin. There is water and electricity supply, two primary schools and two secondary schools.

✓ Health Center:

The village has a health center with a family physician, nurse, lab assistant, pharmacist assistant, guard and cleaner.

It consist of a clinic for the physician, laboratory, pharmacy, short stay ward and reception.

✓ Study population:

Children between 6 months and five years of age.

✓ Inclusion criteria:

All children aged 6 months to five years reside in Om Zikra village.
✓ **Exclusion criteria:**

Children less than 6 months or older than 5 years, or not from Om Zikra village.

✓ **Sample size and technique of study:**

According to WHO/STEP sample size calculator\(^2\), with the following variables, the sample size was 238.4 ≈ 240:

- **Level of Confidence Measure** = 1.96
- **Margin of Error (MOE)** = 0.05
- **Baseline levels of the indicators** = 0.9
- **Design effect (Deff)** = 1.5
- **Expected Response Rate** = 0.87

The data was selected by a simple random technique, by selecting a random house from near the health center, then one house and next door, if within the house there was more than one under five years old child we choose the youngest.

✓ **Data collection and processing:**

Data was collected by a structured questionnaire (Annex 1), and haemoglobin concentration results.

✓ **Data processing and analyzing:**

Statistical Package for Social Sciences (SPSS) was used to analyze the data, frequency tables and significant test (Chi\(^2\) test) was done.
Chapter Four

Results

The results of this study show that: all participants were examined for these variables:

A total of 240 mothers of under 5 years were interviewed, majority of them (64.2%) were younger than 35 years, while about a third (35.8%) were older than 35 years.

Table 1: Age Group of Mothers of under 5 years children – n=240

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 25</td>
<td>58</td>
<td>24.2</td>
</tr>
<tr>
<td>26-35</td>
<td>96</td>
<td>40.0</td>
</tr>
<tr>
<td>36-45</td>
<td>82</td>
<td>34.1</td>
</tr>
<tr>
<td>&gt; 45</td>
<td>4</td>
<td>1.7</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 2: Educational level of mothers of under 5 years children – n=240

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illiterate</td>
<td>20</td>
<td>8.3</td>
</tr>
<tr>
<td>Primary</td>
<td>130</td>
<td>54.2</td>
</tr>
<tr>
<td>Secondary</td>
<td>84</td>
<td>35.0</td>
</tr>
<tr>
<td>University</td>
<td>6</td>
<td>2.5</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (2): most of the mothers (54.2%), were primary educated.

Table 3: Occupation of mothers of under 5 years children – n=240

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housewife</td>
<td>238</td>
<td>99.1</td>
</tr>
<tr>
<td>Teacher</td>
<td>2</td>
<td>0.9</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (3): almost all the mothers (99.1%), were housewives.

Table 4: Income of the household in the study – n=240

<table>
<thead>
<tr>
<th>Monthly Income</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average (500-1000 SDP)</td>
<td>235</td>
<td>97.9</td>
</tr>
<tr>
<td>High (&gt; 1000 SDP)</td>
<td>5</td>
<td>2.1</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 5: Age group of children under 5 years in the study – n=240

<table>
<thead>
<tr>
<th>Age in months</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-23</td>
<td>51</td>
<td>21.3</td>
</tr>
<tr>
<td>24-35</td>
<td>43</td>
<td>17.9</td>
</tr>
<tr>
<td>36-47</td>
<td>73</td>
<td>30.4</td>
</tr>
<tr>
<td>48-59</td>
<td>73</td>
<td>30.4</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (5): most of the children (60.8%), were older than 3 years.
Table 6: Gender of children under 5 years in the study – n=240

<table>
<thead>
<tr>
<th>Gender</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>115</td>
<td>47.9</td>
</tr>
<tr>
<td>Female</td>
<td>125</td>
<td>52.1</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (6): most of the children (52.1%), were females.

Table 7: Hb Status among the study population – n=240

<table>
<thead>
<tr>
<th>Hb</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aneamic (Less than 11 g/dl)</td>
<td>175</td>
<td>72.9</td>
</tr>
<tr>
<td>Normal (Greater than or equal 11 g/dl)</td>
<td>65</td>
<td>27.1</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (7): the majority of the children (72.9%), were anemic.

Table 8: Classification of anaemia according to WHO among the study population – n=175

<table>
<thead>
<tr>
<th>Anaemia</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>19</td>
<td>10.9</td>
</tr>
<tr>
<td>Moderate</td>
<td>128</td>
<td>73.1</td>
</tr>
<tr>
<td>Severe</td>
<td>28</td>
<td>16.0</td>
</tr>
<tr>
<td>Total</td>
<td>175</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 9: PALM Examination of the child in the study – $n=240$

<table>
<thead>
<tr>
<th>Examination</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>41</td>
<td>17.1</td>
</tr>
<tr>
<td>Average</td>
<td>119</td>
<td>49.6</td>
</tr>
<tr>
<td>Pale</td>
<td>79</td>
<td>32.9</td>
</tr>
<tr>
<td>Very pale</td>
<td>1</td>
<td>0.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From Table (9): nearly half of the children (49.6%), were average PALM status.

Table 10: Type of breastfeeding among the study population – $n=240$

<table>
<thead>
<tr>
<th>Type</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exclusive</td>
<td>173</td>
<td>72.1</td>
</tr>
<tr>
<td>Not Exclusive</td>
<td>67</td>
<td>27.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From Table (10): most of the children (72.1%), were exclusively breastfed.
Table 11: Weaning status among the study children – n=240

<table>
<thead>
<tr>
<th>Weaning</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not weaned</td>
<td>44</td>
<td>18.3</td>
</tr>
<tr>
<td>Weaned in 2 years</td>
<td>48</td>
<td>20.0</td>
</tr>
<tr>
<td>Weaned in &lt; 2 years</td>
<td>148</td>
<td>61.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From Table (11): most of the children (61.7%), were weaned in less than 2 years.

Table 12: Type of supplementation among the study population – n=240

<table>
<thead>
<tr>
<th>Supplementary diet</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ordinary diet + Milk</td>
<td>77</td>
<td>32.1</td>
</tr>
<tr>
<td>Ordinary diet</td>
<td>163</td>
<td>67.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>240</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

From Table (12): most of the children (67.9%), were depending on ordinary diet without milk.
Table 13: History of Malaria during last month among the study population –
\[ n=240 \]

<table>
<thead>
<tr>
<th>Malaria</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>151</td>
<td>62.9</td>
</tr>
<tr>
<td>No</td>
<td>89</td>
<td>37.1</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (13): most of the children (62.9%), had a positive malaria history during the last month.

Table 14: History of Tonsillitis during last month among the study population –
\[ n=240 \]

<table>
<thead>
<tr>
<th>Tonsillitis</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>14</td>
<td>5.8</td>
</tr>
<tr>
<td>No</td>
<td>226</td>
<td>94.2</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (14): the majority of children (94.2%), were not having a history of tonsillitis during the last month.
Table 15: Malnutrition according to MUAC parameter among the study population

- n=240

<table>
<thead>
<tr>
<th>Malnutrition / MUAC</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 12.5 cm</td>
<td>18</td>
<td>7.5</td>
</tr>
<tr>
<td>≥ 12.5 cm</td>
<td>222</td>
<td>92.5</td>
</tr>
<tr>
<td>Total</td>
<td>240</td>
<td>100.0</td>
</tr>
</tbody>
</table>

From Table (15): most of the children (92.5%), were not malnourished according to MUAC parameter.
Chapter Five
Discussion, Conclusion and Recommendations

Discussion

From the result of this study it is obvious that:

A total of 240 mothers of under 5 years were interviewed, majority of them (64.2%) were younger than 35 years, while about a third (35.8%) were older than 35 years.

A chi$^2$ test was done to measure the statistical association between mother’s age and prevalence of anaemia among the study population and it was very significant ($P = 0.000$).

8.3% of mothers were illiterate, 54.2% were primary educated, 35% were secondary educated and only 2.5% were graduated. This is may be due to the fact that the economic status is correlated with the ability of families to educated their siblings and some families have wrong opinion about girl education out of the village.

To measure the statistical association between mother’s educational level and the prevalence of anaemia among the study population a chi$^2$ test was performed and it was significant.$^{10,11}$

Almost all of the mothers were housewives (99.1%), and their economical status is average (97.9%). No statistical relationship fond and this mismatches the previous studies, but may be due to the non-variation in mothers occupations.

21.3% of the children were between 6 months and two years, 17.9% were aged between 2-3 years and 30.4% were at the age groups 3-4 and 4-5 years old. There is a strong statistical correlation between child’s age and
anaemia, this is corresponding to G. A. Onyemaobi\textsuperscript{5}. 47.9% of the children were males, while 52.1% were females. No statistical association was found between gender and anaemia and this is not matching the results of Romano Ngui\textsuperscript{13}.

Among the examined children 175 (72.9\%) were anaemic, while 65 (27.1\%) were not. (Minimum = 6, maximum = 12, mean = 9.09, Std. Deviation = ± 1.743). According to WHO/UNICEF/UNN (2001) classification, (10.9\%) were mild, (73.1\%) moderate and (16.0\%) were severely anaemic.

The prevalence rate of anaemia is similar to many countries, the PHNI (2003) statistics reported the prevalence of anaemia in many WHO countries of the world. For example, in Ghana (1999) the prevalence was 84\%, Mali was 82.7\% for children 6-59 months in 2001. Gambia had 76\% for 1-5 years.\textsuperscript{5}

Concerning the clinical examination (PALM examination), (49.6\%) were average, (17.1\%) were normal, (32.9\%) were pale and (0.4\%) were very pale. A chi\textsuperscript{2} was done to determine the relationship between PALM examination and anaemia it was statistically very significant (P. = 0.000).

173 (72.1\%) were exclusively breastfed, while 67 (27.9\%) were breastfed unexclusively.

(18.3\%) of the children not weaned yet, while (20.0\%) weaned after 2 years and (61.7\%) were weaned before completing 2 years of breastfeeding. The prevalence was significantly higher among children weaned (73\%) as compared with those fully weaned (30\%).\textsuperscript{5}

(32.1\%) were supplemented by ordinary diet and milk, while (67.9\%) were supplemented by ordinary diet only.
According to medical history, (62.9%) had a history of malaria during the past three months, while (37.1%) had not, there was a significant association (P. = 0.040). Studies found that in heavily endemic malaria areas, it is almost inevitable that malarial infection will be associated with anaemia, although malaria may not be the prime cause of it.\textsuperscript{14}

Only (5.8%) had a history of tonsillitis, while (94.2%) had not. No statistical association found.

(7.5\%) of the studied children were malnourished according to MUAC parameter, while (92.5\%) were not. A strong statistical relationship was found (P. = 0.000).
Conclusion

A total of 240 mothers of under 5 years were interviewed to assess anaemia and factors contributing to it in Om Zikra village.

The statistical association between mother’s age and prevalence of anaemia among the study population was very significant but between mother’s educational level and prevalence of anaemia was not significant.

No statistical relationship found between mothers’ occupation and anaemia.

There is a strong statistical correlation between child’s age and anaemia, while no statistical association was found between child’s gender and anaemia.

Among the examined children 175 (72.9%) were anaemic, while 65 (27.1%) were not, mean = 9.09 ± 1.743.

The relationship between PALM examination and anaemia was statistically very significant.

There was a significant association between malaria and anaemia, but for tonsillitis, there was no statistical association found.

Regarding MUAC parameter and anaemia relationship, a strong statistical relationship was found.
**Recommendations**

Regarding the results of this study, the following recommendation should be considered:

1- Health education programs should be initiated to increase mothers awareness towards anaemia.

2- To reduce iron deficiency among children in the study area, rich local food with iron (Baleela Adasia and Godaim) should be prescribed to mothers and children beside the usual medications.

3- Distribution of Folic acid and equivalents should be done from the health center for mothers and anaemic children.
References

1 Focusing on anaemia, towards an integrated approach for effective anaemia control by WHO and Unicef. World Health Organization, 2004
12 http://www.who.int/chp/steps/resources/sampling/en/
Appendix: Questionnaire

بسم الله الرحمن الرحيم

استبيان حول مرض فقر الدم والعوامل المتربطة به لدى الاطفال دون سن الخامسة في منطقة أم ذكرى، محلية المناقل – ولاية الجزيرة

الرقم المتسلسل: ..............

الأم: عمر الأم: ........................

2/ مستوى تعليم الأم:
[ ] أمي أبتدائي [ ] اساس [ ] ثانوي [ ] جامعي

3/ دخل الأسرة في الشهر:
[ ] ضعيف [ ] متوسط [ ] مرتفع

4/ مهنة الأم:
[ ] موظفة [ ] ربة منزل

5/ عمر الطفل: .............................
[ ] ذكر [ ] انثي


7/ نتيجة الفصل السريري لكف اليد:
[ ] طبيعي [ ] شاحب جداً [ ] شاحب

8/ نتيجة الفصل السريري لكف اليد:
[ ] طبيعي [ ] شاحب جداً [ ] شاحب

9/ نوع الرضاعة في الست أشهر الأولى: طبيعي فقط [ ] مختلطة

10/ نوع الفطام:
[ ] غير مفطوم [ ] أكمل الرضاعة لعامين

11/ نوع الأغذية الإضافية: غذاء عادي مع اللبن [ ] غذاء عادي مع اللبن

12/ هل أصيب الطفل بالملاريا خلال الثلاث أشهر الماضية: نعم [ ] لا

13/ هل أصيب الطفل بالتهاب اللوز خلال الثلاث أشهر الماضية: نعم [ ] لا

14/ قياس متوسط قطر الذراع: .............................