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Prevalence & Risk Factors of Malnutrition Among Children Under Five Years for Internal Displaced Families Who are Living in Sana'a City-2023

Research submitted to the Department of Community Medicine, faculty of Medicine and Health sciences, Emirates international University in partial fulfillment for the degree of BBBH in general medicine and surgery.

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الإهداء

الحمد لله وكفى والصلاة على الحبيب المصطفى وأهله ومن وفى الحمد لله الذي وفقنا لتثمين هذه الخطوة في مسيرتنا الدراسية بمذكرتنا هذه ثمرة الجهد والنجاح بفضله تعالى

آباؤنا الأعزاء

إلى من علمونا كيف يمكننا ان نحقق ما نريد وان بإمكاننا فعل ما نريد الى من وثقوا بنا في كل لحظات يأسنا وقالوا أنتم تستطيعوا الى من حملنا أساميهم ونتمنى ان يحملوا فخراً عظيما نقدمه اليهم

أمهاتنا الغاليات

إلى من كان دعائهن سر نجاحنا إلى من حففنا بتراتيل دعائهن الطاهر

إلى من علمننا الصمود مهما تبدلت الظروف.

والى اخواتنا و إخواننا وجميع اهلنا ف انتم من كنا نستمد منهم عزيمتنا

نهديكم هذا البحث المتواضع الذي نأمل ان يفيد مجتمعنا

الشكر والعرفان

قال الله تعالى ((هَلْ جَزَاءُ الإِحْسَانِ إِلاَّ الإِحْسَانُ))

فنرى انهُ من واجبنا أن نتوجه بالامتنان والتقدير لدور مشرفنا

الدكتور/ معمر محمد بادي

فهو من قام بتوجيهنا وتشجيه لنا وصبره علينا وقام بإعطائنا محاضرات وتوجيهات كانت السبب الرئيسي في تعلمنا لطرق البحث الصحيحة التي ساعدتنا بشكل كبير في إخراج البحث بالصورة هذه.

كما نشعر بالامتنان لعميد كلية الطب والعلوم الطبية في الجامعة الإماراتية الدولية **البروفيسور/ صالح الظاهري**

و البروفيسور/ صادق عبد المغني رئيس قسم الطب في الجامعة الإماراتية الدولية

الذين ساعدونا بطريقه مباشره او غير مباشره في تقديم الدعم الاكاديمي في هذا البحث.

بكل ما تحمله الكلمة من مودة وامتنان نود ان نشكر الأهالي الذين ساعدونا في إعطاء المعلومات عنهم وعن ابناءهم وكانوا ودودين جداً وقدموا لنا الدعم الميداني ونتمنى ان يحمل هذا البحث فائدة مجتمعيه لهم

أخيراً نشكر كل من شجعنا أو ساعدنا ولو بشطر كلمه في إنجاح هذا البحث

Abstract

- **Background**: Malnutrition is a serious public health problem that affects millions of children worldwide, especially in low- and middle-income countries. According to the latest estimates by the UNICEF/WHO/WB Joint Child Malnutrition Estimates group, in 2020, 149 million children under 5 years of age were stunted,45 million were wasted, and 38.9 million were overweight or obese. Malnutrition can have devastating consequences for children's survival, growth, development and well-being, and can increase their risk of morbidity and mortality from infectious and chronic diseases. Malnutrition among children under five years old is particularly prevalent and severe in conflict-affected and displaced populations, where food insecurity, poor sanitation, limited health care services and high exposure to violence and stress can exacerbate the situation[3]. Yemen is one of the countries that faces a humanitarian crisis as a result of the ongoing armed conflict that started in 2014. The conflict has caused widespread displacement, destruction of infrastructure, disruption of basic services and collapse of the economy **Objective**: the main objective of this study was to measure the prevalence rate of malnutrition among children under five years old who are living within the internal displaced families in Sanaa city.. **Methodology** : the study adopted a cross-sectional design to assess the prevalence and determinants of malnutrition among children under five years old who are living within the internal displaced families in Sanaa city. The study population consisted of children who were registered as internally displaced persons. .**Results**: The current study revealed that the prevalence of malnutrition among under five children, was 40% (12.2% with SAM and 27.7% with MAM). Moreover, 35.3% of the children are at risk for malnutrition and need preventive measures. Only a quarter of the children are well nourished and have adequate growth and development. **Conclusion**: The prevalence of malnutrition among children under five years of age within the displaced families in Sana'a was 40%, and this rate is considered very high and requires interventions to improve the situation of children in t hose areas.

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List of Abbreviation

Abbreviation	Meaning
AIDS	Acquired Immunodeficiency Syndrome
ALRI	Acute Lower Respiratory Infection
ANC	Anti Natal Care
AOR	Adjusted Odds Ratio
CI	Confidence Interval
CMAM	Community Management of Acute Malnutrition
DHQ	Diet History Questionnaire
EPI	Expanded Program on Immunization
FAO	Food and Agriculture Organization
IDPs	Internally Displaced Persons
IPC	Integrated Food Security Phase Classification
IYCF	Infant and Young Child Feeding
MAM	Moderate Acute Malnutrition
MUAC	Mid Upper Arm Circumference
NSPMS	National Social Protection Monitoring Survey
OR	Operational Research
PEM	Protein Energy Metabolism
SAM	Sever Acute Malnutrition
SD	Standard Deviation
SOS	Sever Our Souls
SPSS	Statistical Package for Social Sciences Software
UNICEFE	United Nations International Children's Emergency Fund
WFP	World Food Programme
WHO	World Health Organization
YFHS	Yemen Family Health Survey

Chapter (1)
Introduction

Introduction

Malnutrition is an important problem in all health care settings. Malnutrition can be defined as a disorder of nutritional status resulting from reduced nutrient intake or impaired metabolism hypertension, Good nutrition is essential for the growth and development that occurs during an infant's first year of life [1].

Infant's under nutrition is a significant health problem in developing countries and one of the major causes of disability, morbidity and mortality, it is ranked as the top cause of global burden of disease and underlying 53% of deaths in children under five years. Worldwide, almost 7 million children die each year before they reach their fifth birthday[2].

In Yemen, it has been clearly stated that malnutrition is a major public health concern and an underline cause of high mortality and is ranked as the most important factor among preventable factors affecting infants' healthy life [3]

According to Yemen family health survey (YFHS) an estimated 53.1% of under five children suffered from stunting and 30% were severely stunted. 12.4% were suffering from wasting and 3% were severely wasted. 45.6% were suffering from underweight and 15.2% were severely underweight [4] . The first years after birth are the base for quality improvement of life time . Therefore, follow-up and surveillance of children are vital for the health of society. Growth parameters are important tools for assessing growth of infants and young children [5].

The World Health Organization (WHO) estimates that malnutrition accounts for 54percent of child mortality worldwide[, about 1 million children[3], Another estimate also, by WHO states that childhood underweight is the cause for about 35% of all deaths of children under the age of five years worldwide [6]

Malnutrition has several forms, including the transformation of people to skin and bones. It also blunts children growth and intellect, thus reflecting negatively on their productivity and income in the future. Acute malnutrition is increasing every day and pockets of hunger start to kill people in Tihama area (Al-Hodeidah governorate and the western parts of Taiz and Hajja governorates), that is still awaiting relief [7]

Classification of Malnutrition

Malnutrition in children can take the form of stunting, wasting, or underweight . Children whose weight-for-age indicator is more than two or three standard deviations below the median for the international reference population (ages 0-59 months) are considered moderately or severely underweight . Children whose height/length-for-age indicator is more than two or three standard deviations below the median for the international reference population (ages 0-59 months) are considered moderately or severely stunted [8]

Children whose weight-for-height/length indicator is more than two or three standard deviations below the median for the international reference population (ages 059 months) are considered moderately or severely wasted [9].

Children's nutritional status in Yemen

Children's nutritional status in Yemen Children's nutritional status has been widely used to assess the adequacy of their diet and growth during infancy, as it reflects overall child health and, thus, the overall health of an entire population. The situation of Yemeni children is serious; according to the 2012 2013–NSPMS final report, nearly half of the children below five years old were stunted (42.5%), and 12.6% were severely stunted. Wasting affected 9.7%, with 1% of children aged 6 59–months being severe cases. Furthermore، 32.4% of children were too thin for their age [10].

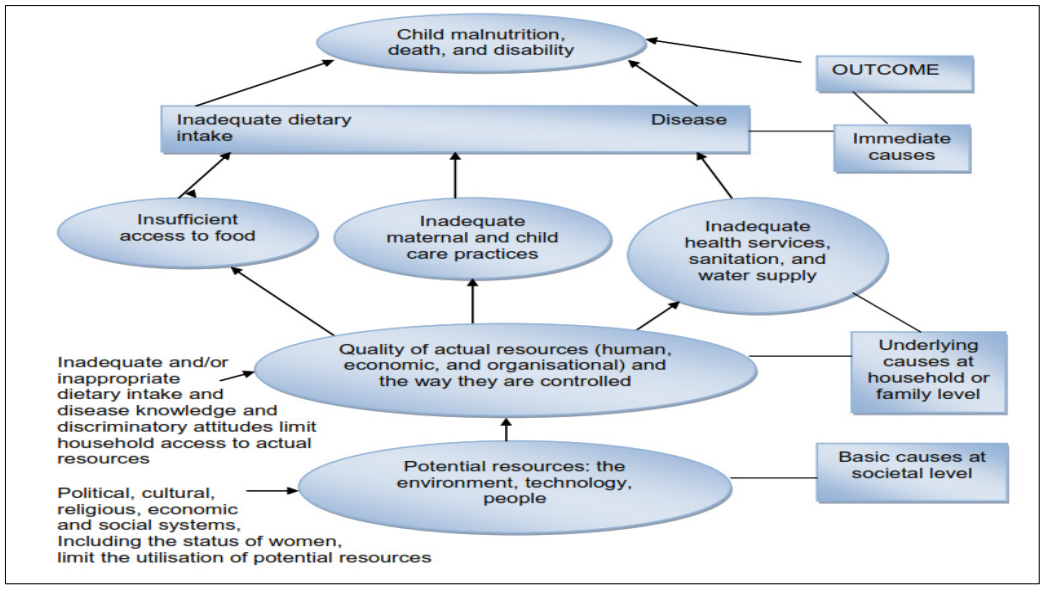

Figure 1. UNICEF conceptual framework for causes of malnutrition in society[11]

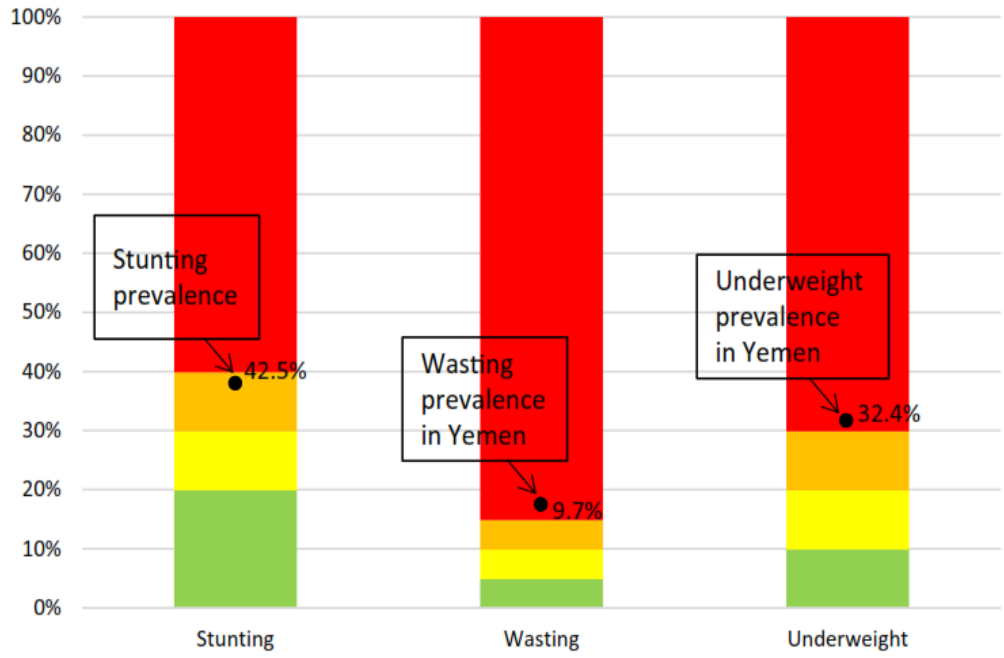

Figure 2. illustrates the severity of child malnutrition in Yemen to the four levels according to WHO classification [12]

Figure 2 illustrates the severity of child malnutrition in Yemen by comparing these statistics to the four levels of the WHO classification for assessing the severity of undernutrition: low, moderate, high and very high malnutrition.

Diseases associated with malnutrition:

The most common diseases associated with acute malnutrition are respiratory infections. Pneumonia is common in malnourished children and leads to fatal complications. Pneumonia and diarrheal diseases account for approximately 27% of the mortality of children under five in Yemen [13].

Globally, malnutrition is responsible for nearly half (45%) of all deaths of children under the age of five. Together with poor diet, malnutrition is the number one driver of the global burden of disease. According to WHO, 5.9 million children worldwide died under the age of five in 2015, although the deaths were due to preventable and curable conditions if the children had access to simple, a fordable interventions [14].

Children Stunting:

stunting is now identified as a major global health priority and the focus of several high-profile initiatives like Scaling Up Nutrition, the Zero Hunger Challenge and the Nutrition for Growth Summit. Stunting is also at the heart of the six global nutrition targets for 2025 that the World Health Assembly adopted in 2012 (WHO 2012), and it has been proposed as a leading indicator for the post-2015 development agenda[15].

Increased international attention is the result of greater awareness of the significance of stunting as a major public health problem. First, it affects large numbers of children globally. Second, it has severe short-term and long-term health and functional consequences, including poor cognition and educational performance, low adult wages and lost productivity. Third, there is consensus regarding its definition and a robust standard to define normal human growth that is applicable everywhere. Fourth, there is agreement on a critical window – from conception through the first 2 years of life – within which linear growth is most sensitive to environmentally modifiable factors related to feeding, infections and psychosocial care. Fifth, it is a cross-cutting problem calling for a multisectoral response. Action to reduce stunting requires improvements in food and nutrition security, education, WASH (water, sanitation and hygiene interventions), health, poverty reduction and the status of women [16].

Stunting results from a complex interaction of household, environmental, socioeconomic and cultural influences that are described in the World Health Organization (WHO) Conceptual Framework on Childhood. Stunting [16]

Childhood growth faltering: a broader definition of stunting:

Stunting is identified by assessing a child's lengthor height (recumbent length for children less than 2 years old and standing height for children age 2 years or older) and interpreting the measurements by comparing them with an acceptable set of standard values.There is international agreement that children are stunted if their length/height is below-SDs from the WHO Child Growth Standards median for the same age and sex (WHO 2008; de Onis et al. 2013). Similarly، children are considered severely stunted if their length/height is below- SDs from the WHO Child Growth Standards median for the same age and sex [17].

Challenges in measuring childhood stunting: methods and community norms Families and health workers often fail to recognize childhood stunting in communities where short stature is so common that it is considered normal. This is largely because linear growth is not routinely measured as part of community health programmes in addition to lack of awareness of stunting's devastating health consequences. Assessment of linear growth is essential for determining whether a child is growing adequately or has a growth problem or tendency towards a growth problem that should be addressed. Fig.4 provides the example of two girls from the Maldives of identical height (86 cm). While one of the girls, at 2 years and 2 months, is growing adequately the other, who is 4 years and 4 months old, is severely stunted (Fig.3) [18]

It was impossible to distinguish which girl was stunted merely by observing them play and interact with each other. Awareness of their age difference triggered alarms, but was only when their heights were measured and compared with the WHO standards that the very severe stunted growth of one of the girls became evident. Measuring children's length (up to 24 months) or height (from 24 months onwards) should be standard practice [19].

Figure 3. Measuring recumbent length in A child below 2 years of age positioning of baby's feet and health worker's hands (Photo taken in Louboutigué village in the Sila Region, Chad.©UNICEF/NYHQ20112162/Patricia Esteve, 2011).

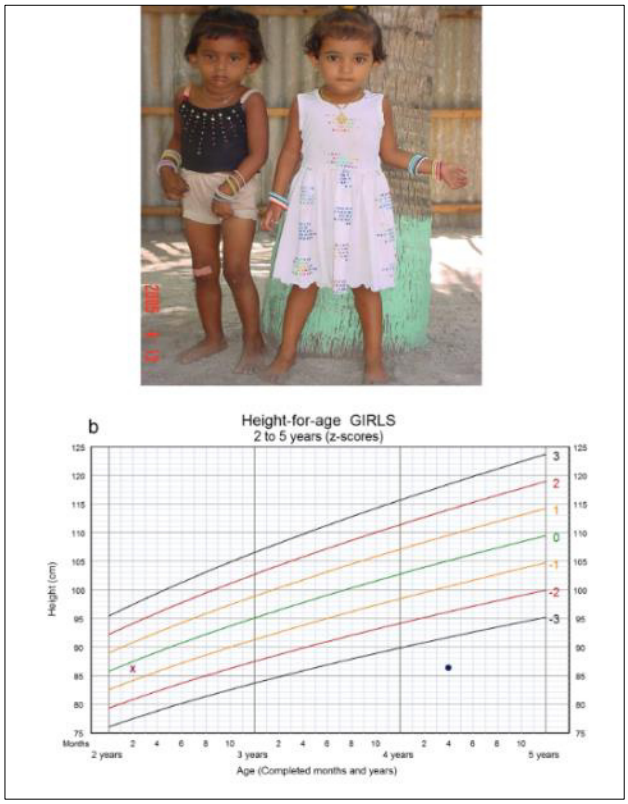

Figure 4. measuring childhood stunting

Scope of the problem

According to the report in 2014, Malnutrition in Yemen (46.5%) under five chronically malnourished (stunted), 16.3% wasted and 39% underweight . This proves that child malnutrition rates in Yemen represent a chronic challenge to human and economic development [7]

Acute malnutrition rates among children under the age of five are the highest ever recorded in parts of Yemen, with more than half a million cases in southern districts, according to the latest Integrated Food Security Phase Classification (IPC) Acute Malnutrition analysis released today by the Food and Agriculture Organization of the United Nations (FAO), the United Nations Children's Fund (UNICEF), the World Food Programme (WFP) and partners [20]

The analysis – which is for 133 districts in southern parts of Yemen only - home to 1.4 million children under the age of five – reveals a near 10 per cent increase in cases of acute malnutrition in 2020. The greatest increase is in cases of young children suffering from severe acute malnutrition (SAM) with a 15.5 per cent rise during 2020. This leaves at

least 98,000 children under five at high risk of dying without urgent treatment for severe acute malnutrition [20].

A dangerous combination of factors, driven by conflict and economic decline, compound the situation for Yemen's youngest children. In the worst-hit areas included in the analysis around one in five children are acutely malnourished (These include Abyan lowlands (23 per cent), Lahj lowlands (21 per cent), Taiz lowlands (22 per cent.) In Hodeidah's lowlands, more than one in four or 27 per cent of children are acutely malnourished [21].

At least a quarter of a million pregnant or breastfeeding women are also in need of treatment for malnutrition. UN experts warn the actual number is likely higher as the drivers of malnutrition in Yemen have worsened in 2020 [22].

Yemen has long battled with some of the highest malnutrition rates in the world. Until now, humanitarian interventions to treat and prevent malnutrition, as well as provide emergency food assistance, have prevented an even more severe deterioration. But in 2020, these hard-won gains are being lost. Escalating conflict and economic decline, plus the overwhelming impact of the COVID-19 pandemic, has pushed an already exhausted population to the brink. In addition to this, many aid projects including emergency food assistance and WASH services have been disrupted by funding shortfalls. Malnutrition treatment programmes are also at risk if additional funds are not received soon [23].

These factors come on top of drivers that have historically made Yemen one of the hardest places to be a child or mother: insufficient and poor-quality diet; high prevalence of communicable diseases; elevated levels of food insecurity, limited access to nutrition and health services, poor sanitation and hygiene; and the inability of many children to access to important vaccines, such as measles and polio [21].

Because of the current war that the country suffering from, many internally displaced persons (IDPs) left their won areas to other areas to safe their life. Some of IDPs returned to their original areas, but many of them still displaced. Lack of stable and secure accommodation and income leaves them more vulnerable to food insecurity. In Sanaa city there are many of IDPs who are still living in the city some of them in camps and almost of them living in simple temporary shelters. This study was designed to assess the prevalence of malnutrition among under five of IDPs families in Sanaa city

Acute malnutrition can be treated and prevented with a package of key services but for that, we need urgent action and support. A great sense of urgency should prevail in making the necessary financial resources available and ensuring access to children and women in dire need of assistance [24]

Yemen remains the world's worst humanitarian crisis. Nearly 80 per cent of the population – over 24 million people - require some form of humanitarian assistance and protection. By mid-October, only US$1.43 billion of the US$3.2 billion needed in 2020 has been received[25].

Objectives of Study:

General objective

To determine the prevalence rate and the risk factors of malnutrition among children under five within the internal displaced families Sanaa city .

Specific objectives

1- To describe the socio-demographic status of the children under study

2- To measure the prevalence of malnutrition among children under study

3- To determine the risk factors of malnutrition

Chapter (2)
Literature Review

The World Health Organization (WHO) defines malnutrition as a general term that refers to a number of diseases, each with a specific cause related to one or more nutrients (for example، protein, iodine or iron) and each characterized by a cellular imbalance between the supply of nutrient and energy and the body's demand for them to ensure growth, maintenance and specific functions. This may lead to both under nutrition and over nutrition. The two main constituents of under nutrition are Protein Energy malnutrition (PEM) and Micronutrient deficiency. In the context of this thesis, deficiency of nutrients in children below five years of age will hereafter be referred to as childhood malnutrition[26].

Classifications of Malnutrition:

Malnutrition in children can take the form of stunting, wasting, or underweight. Children whose weight-for-age indicator is more than two or three standard deviations below the median for the international reference population (ages 0-59 months) are considered moderately or severely underweight [27]. Children whose height/length-for-age indicator is more than two or three standard deviations below the median for the international reference population (ages 0-59 months) are considered moderately or severely stunted [28]. Children whose weight-for-height/length indicator is more than two or three standard deviations below the median for the international reference population (ages 059 months) are considered moderately or severely wasted [9].

Table 1. Classifications of Malnutrition [37]

Classification	Definition	Grading	
Gomez	Weight below % median WFA	Mild (gradel) Moderate (grade2) Severe (grade 3)	75 % - 90 % WFA 60 % - 74 % WFA <60 % WFA
Waterlow	z-scores (SD) below median WFH	Mild Moderate Severe	90% - 90% WFH 70% - 80% WFH <70% WFH
WHO (wasting)	z-scores (SD) below median WFH	Moderate Severe	-3% </= z-score <-2z-score < -3
WHO (stunting)	z-scores (SD) below median HFA	Moderate Severe	-3% </= z-score <-2z-score < -3
Kanawati	MUAC divided by occipitofrontal head circumference	Mild Moderate Severe	<0.31 <0.28 <0.25
Cole	z-scores of BMI for age	Grade 1 Grade 2 Grade 3	<-1 z-core <-2 z-core <-3 z-core

Pathophysiology of Malnutrition:

According to Porter and Kaplan (2019), the initial metabolic response of malnutrition is decreased metabolic rate. To supply energy, the body first breaks down adipose tissue. Later, when these tissues are depleted, the body may use protein for energy, resulting in a negative nitrogen balance. Visceral organs and muscle are broken down, and a decrease in weight occurs. Loss of organ weight is greatest in the liver and intestines, intermediate in the heart and kidneys, and least in the nervous system [29] . Children who are malnourished are at far greater risk of contracting pneumonia, measles, diarrhea, malaria, and HIV/AIDS, and of dying from these conditions [30].

Causes of Malnutrition :

According to the UNICEF conceptual framework for causes of malnutrition in society, there are immediate, underlying, or intermediate, and basic, or root, causes of malnutrition (Botswana Ministry of Health 2005:4). Malnutrition is multifaceted and requires multi-sectoral, multidisciplinary and multi-level action to alleviate it. the basic causes of malnutrition act at societal level. They include political, cultural, religious, economic and social systems, including the status of women, which limit the utilization of potential environmental, technological and human resources by women [31] .

The underlying causes of malnutrition act at household and family level. They include inadequate or inappropriate dietary intake, inadequate disease knowledge, and discriminatory attitudes, which limit household access to quality and quantity economic and organizational resources [32].

The related studies :

In western Kenya 2020 study conducted by Edwin Gudu, et al about Factors associated with malnutrition in children < 5 years in western Kenya: a hospital-based unmatched case control study and Several recommendations were made was : Proper pre-natal care, child feeding practices and deworming programs should be enhanced. As such, we recommend that close monitoring especially of children more likely to be malnourished should be enhanced. this can be done by providing job aids to providers to help them talk to parents about adherence to key recommended practices such as appropriate feeding, continuous auditing of patient outcomes, and better use of data for improved decision-making should be implemented at these facilities [33] .

Another study done in Brazil , 2022 by Hermano A.L. Rocha et al entitled Undernutrition and short duration of breastfeeding association with child development: a population-based study , the result was overall, the authors found that undernutrition and breastfeeding are associated with development outcomes among Brazilian children. As a result, integrated nutritional programs may improve child development outcomes. The effect of the results was independent of income, maternal education, and exposure to toxic stress, and the two did not interact. The authors also highlight that the interventions targeting child nurturing should not only focus on food supply but to stimulate sensory and motor stimulation practices with children who are beneficiaries of income transfer programs. Underweight was the factor with the strongest effect, with an adjusted odds ratio (AOR) of 4,14 (2,26–7,58), $p < 0.001$. Breastfeeding for up to two months compared to more than six months (AOR 2,08 (1,38–3,12)) was also associated [34]

In study conducted in Hospital Mogadishu, Somalia, malnourished children suffer from many symptoms; in this study, fever, cough, diarrhea and the child's failure to gain weight were the major history of current illnesses among the children with proportions of 71.6%, 63.8%, 44.8% and 38.3% respectively. Majority (70.0%) of the malnourished children studied had no history of any known chronic disease. Only 7.6% and 7% of the total children studied had history of congenital heart diseases and PTB, respectively with previous hospital admissions of 43.5% of the total malnourished children. According to who referred the child to the hospital, the study revealed that only 53.8% of the total malnourished children admitted to SOS hospital were referred by known medical practitioners of which 41.1%, 9.6% and 3.1% were referred by a doctor, nurse and dietitian respectively. However, other people other than the nurse, doctor or dietitian referred the remaining proportion of admissions, 46.2%. [35]

According to Falbo and Alves (2002), the average weight of newborns in their study was 2.80kg. The study took place in Brazil from 1999 to 2000 and found that among the severely malnourished children, 88.9% were less than six months old and 42.4% had low weights at birth.[36].

A study done by Ramakrishnan (2004) found that the prevalence of low birth weight babies was 10% for Sub-Saharan Africa, but this is not very reliable, as two thirds of births in Africa are never reported. In India, low birth weight is related to maternal nutritional factors such as energy and protein intake during pregnancy and the weight of the mother before she got pregnant [37] .

In a study done in Limpopo, South Africa most children twelve to 24 months old that had a birth weight of less than 2.5kg, were more likely to develop stunting. About 25% of the stunted children weighed less than 2.5kg at birth [38].

In 2014 study done by Ramesh Bhat Yellanthoor, Vishal Kumar Bharath Shah about Prevalence of Malnutrition Among Under-Five Year Old Children With Acute Lower Respiratory Tract Infection Hospitalized at Udupi District Hospital the result found was : Among 206 children with ALRI, 21.9% had pneumonia, 55.8% had severe pneumonia and 22.3% had very severe disease. About 85% of the children were younger than 3 years old. Male to female ratio was 1.34:1. the prevalence of malnutrition was seen in 54.9% of the children. MAC was below 13.5 cm in 59.4 %. Severe malnutrition was observed in 68.7% of 3-5 years age group and 59.4% of 1-3 years age group. Severe malnutrition had shown higher percentages among children with pneumonia and severe pneumonia. Severely malnourished children had more ARI episodes in the preceding 6 months although it was not statistically significant (OR 1.22; 95% CI 0.71-2.12; P = 0.47). In conclusion, most of Acute lower respiratory infection (ALRI) cases occurred in children younger than 3 years old. The prevalence of malnutrition was higher among children from low socioeconomic urban area with ALRI. The high prevalence of severe malnutrition in 1-5 year-old children with ALRI highlights the need for strengthening nutrition intervention programs under the integrated child illness management programs for underprivileged urban children [39]

In 2016 a study conducted about Nutritional Status of Children Under 5 years of Age in Three Tertiary Care Hospitals of Peshawar done by : Yasir Mehmood et al , The Results was : Out of 380 children 247 were male and 133 were female. By using Gomez classification, Malnutrition was observed in 224 children, among which 105(47%) showed grade I, 58(26%) showed grade II, and 61(27%) were in grade III malnutrition. There were 98 cases of Kwashiorkor, 47 of Marasmus and no case observed for Marasmic-Kwashiorkor. Out of 380 children 342 were breast fed and 38 were bottle fed. Calculating the immunization status 53(14%) were non immunized, 106(28%) were partially immunized and 221(58%) were fully immunized. About 294(77.4%) mothers were illiterate . The occurrence of malnutrition was high (58.94%) in children under 5 year of age, mainly due to improper feeding patterns. Associated factors were uneducated mothers and inappropriate immunization. Health education about exclusive breast feeding, proper weaning, routine immunization through EPI schedule and family planning to prevent large family size should be promoted [40]

In India 2018 , a research titled Risk Factors of Malnutrition in under 5 Year Children Admitted at DHQ Teaching Hospital, Dera Ghazi Khan was conducted for researchers as Ahmad, S., Rafique, T., Hussain, N., & Akbar, A. , and the results were the following and the conclusion There were 200 patients in total. Males were 115(57.5%) whereas females were 85(42.5%). Mean age of the patients was 28.65±15.34 months, mean weight was 12.05±2.57kg and mean for percentile of weight for age was 32.20±27.05. When the frequencies of various risk factors were evaluated it was found that delayed weaning (> 6 months later) was present in 77(38.5%) of the patients [41].

Another recently study conducted in Yemen 2021, entitled Alarmingly high malnutrition in childhood and its associated factors: A study among children under 5 in Yemen, study were selected for the evaluation of malnutrition. Independent variables include personal and maternal characteristics, socioeconomic and behavioral factors, and illness conditions. The study used the Chi-Squared test to test the significant association between independent variables and logistic regression to estimate the odds of being malnourished. A total of 13,624 Yemeni children under 5 years of age were included in the study. The results show the high malnutrition level – the prevalence of stunting was 47%, wasting was 16%, and underweight was 39%. There is a statistically significant associationbetween socioeconomic status, behavioral factors, and child malnutrition. The odds of malnutrition decreased with the increase in the level of mother's education, economic status, and frequency of prenatal visits. The odds of malnutrition were least for children whose mothers had highest level of education (OR= 0.64; 95%CI = 0.55–0.76), who belonged to highest wealth index (OR= 0.41; 95%CI =0.36–0.47). Moreover, the likelihood of malnutrition was less among the children whose mother had highest number of prenatal visits during the pregnancy (OR= 0.67; 95%CI = 0.59–0.76) [42].

Also, other study as Naresh, S., & Maiya, G. R. (2021). conducted A cross-sectional study to assess acute malnutrition among under-5 children in the field practise area of a teaching hospital in Chennai. This study had shown To assess acute malnutrition among under 5 years children and determine associated factors responsible, in conclusion malnutrition is being one of the common condition which also leads to various complications in children in future. This study clearly ensures presence of acute malnutrition; wasting is present among 10% wherein 2.7% were severely wasted using WHO standards. Thus, early identification and intervention as soon as possible is important. Also, from this study,

creating knowledge and awareness among people for proper immunization, exclusive breast feeding and complementary feeding practice, maintaining proper hygiene to prevent illnesses etc., are important as these are also associated factors which is leading to acute malnutrition. Necessary measures should also be taken for the public, for the improvement of socioeconomic status and nutrition status as it also contributes to malnutrition [43] .

Chapter (3)
Methodology

Methodology:

Study Design and Settings

A cross-sectional study design was used

Study area and Population

All under five children who are living within the internal displaced families in Sanaa city .

Sample size

The selected key indicator for sampling was the ‘(the prevalence of malnutrition among under five years) One report of the UNICEF in 2020 showed that the prevalence of malnutrition among under five years in Alhodidah governorate was 27%.

The sample size was calculated using the formula for estimating single proportion ؛

$$N = (Z2 \times P \times Q) / D2$$

Where ؛

N sample size required،

Z is the critical value for a given confidence interval،(1.96)

P is expected proportion of the event to be studied (estimated based on findings of previous studies). 27%

Q =1−P (proportion of the population represented with the sample)،

D is margin of error or degree of accuracy desired.(0.05)

The percentage of the prevalence malnutrition is 27% (from previous study).

%95CI and 5% of margin of error = 1.96.

N = ((1.96)2 × 0.27 × 0.73)/(0.05)2= 302،

From the above formula the minimum sample size needed is 302 under five children

Sampling technique

Because of the gab in the data of the internal displaced persons in Sanaa city, the snow ball sampling technique was used to select the elements of the sample

Inclusion criteria

All children under five who are living within internal displaced families that displaced from any region of the country to Sana'a city

Exclusion Criteria

Those who refused to participate in this study

Data collection method

The questionnaire was designed in two main parts, the first containing the demographic data of the participants, while the second part dealt with questions related to malnutrition that reflect the objectives of the questionnaire.

Data analyses

The collected data was entered electronically and analyzed using the SPSS version 21

Ethical consideration

The purpose and importance of the study was explained to care taker and the interview was taken place only with the families who give their agreement to participate. All the data kept safe with researchers to be used only for the scientific research.

Chapter (4)
Results

Results:

Description of the sample under study

i. Children under study

1. Children by age

The data of the age was not normally distributed as it is clear in the figure below, the mean and the SD of the age were (2.19 and 1.5 respectively). The median of the age was 2years and interquartile range was 2.5%.

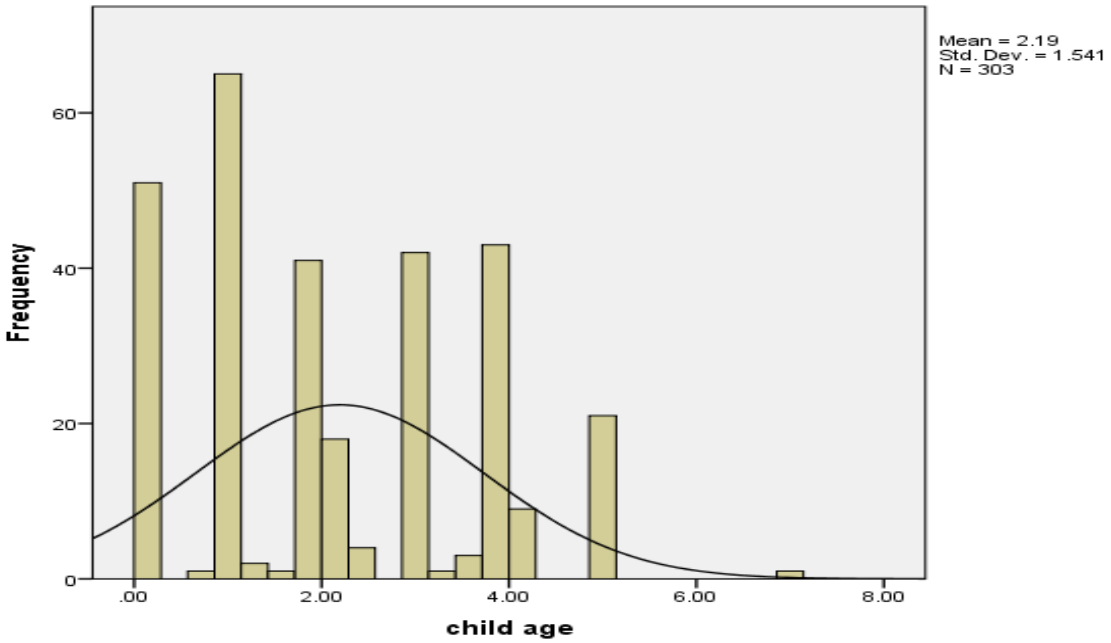

Figure 5. description of the children age

2. The sample by gender

Regarding to the age of the children under study the result showed that females are slightly more than males (51% vs 49% respectively).

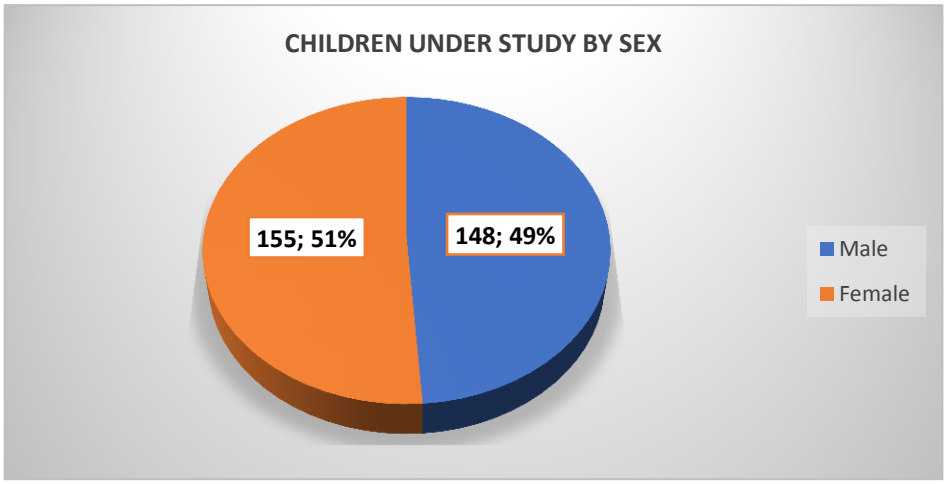

Figure 6. children under study by their gender

3. Anti-natal care

Figure (7) below shows the history of the antenatal care for the children women‟s during their pregnancy of the children under study and the result showed that most of them 64% mentioned that they didn‟t received anti-natal care and only 36% of them who mentioned that they received anti-natal care

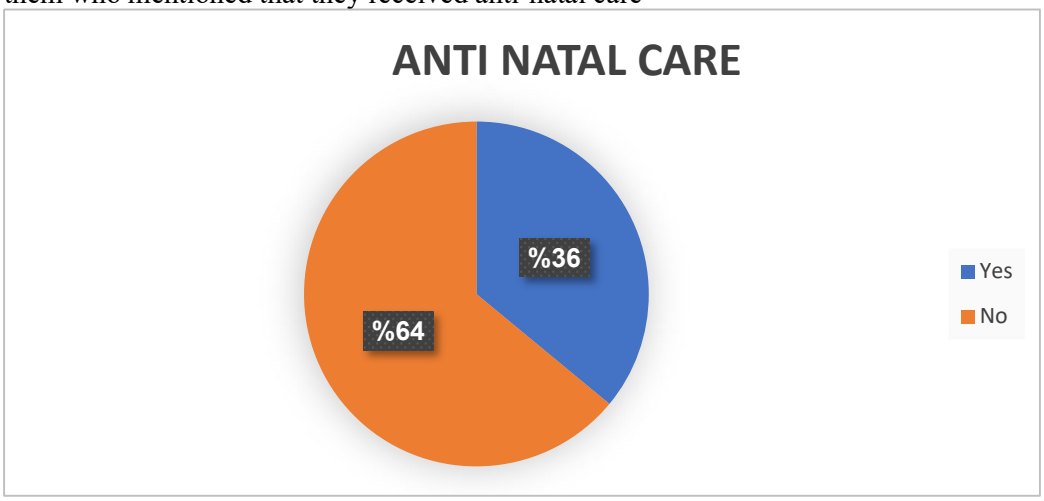

Figure 7. history of anti-natal care

4. Mode of delivery for the children under study

For the children under study the result of the study showed that almost of them 87% had normal delivery and only 13% of them delivered throw caesarian- section.

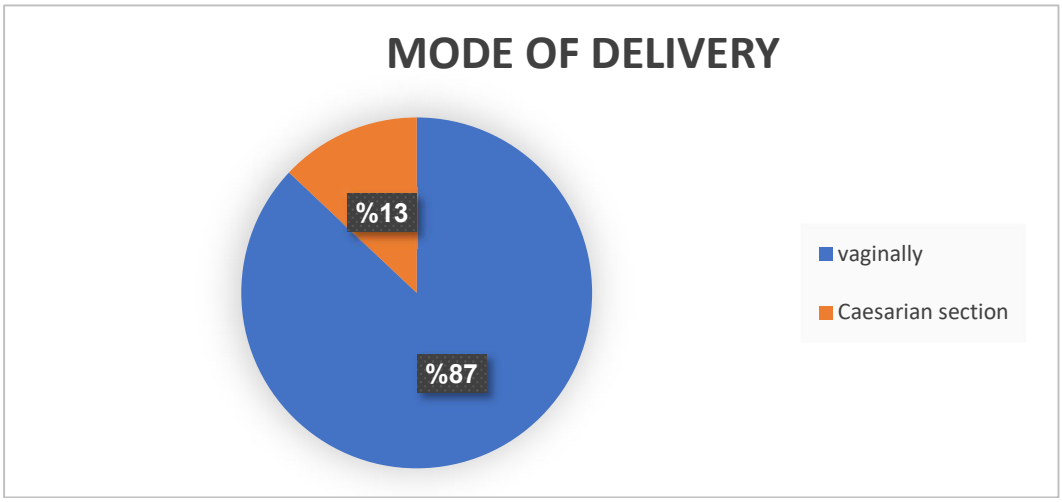

Figure 8. mode of delivery

5. Place of the delivery

Regarding to the place of the birth the result showed that more than half of the children under study 54% were delivered in the hospital.

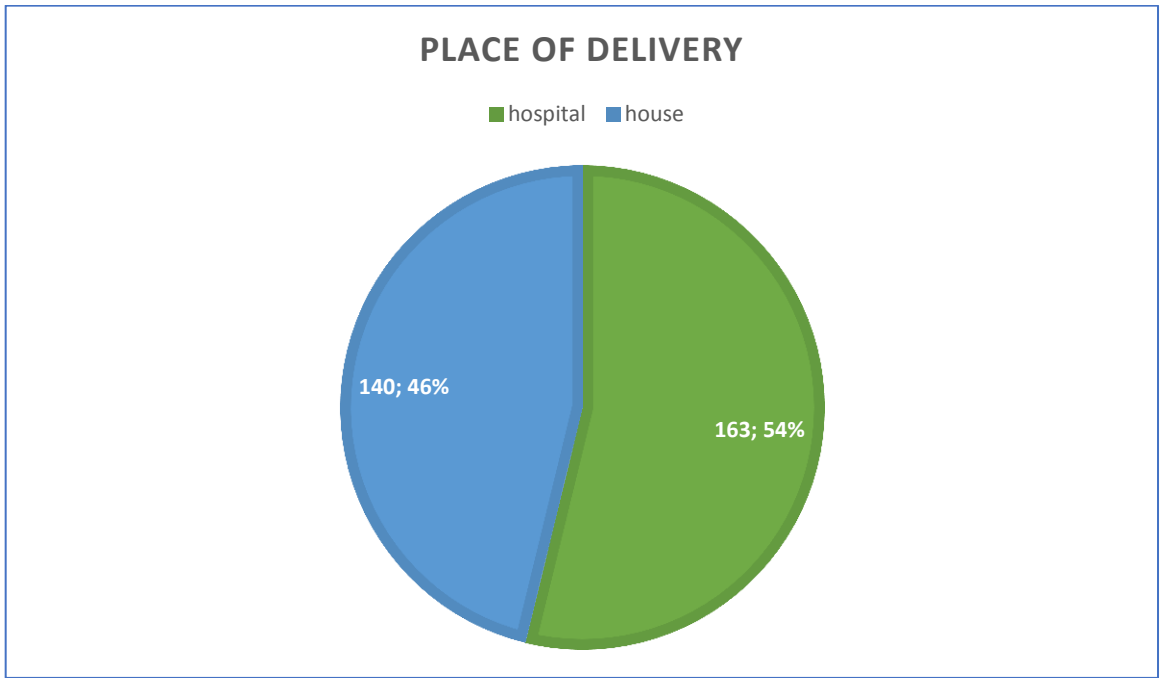

Figure 9. place of delivery

6. Gestational age

Almost of the children under study 94% had full term gestational age and only 5% had pre term delivery.

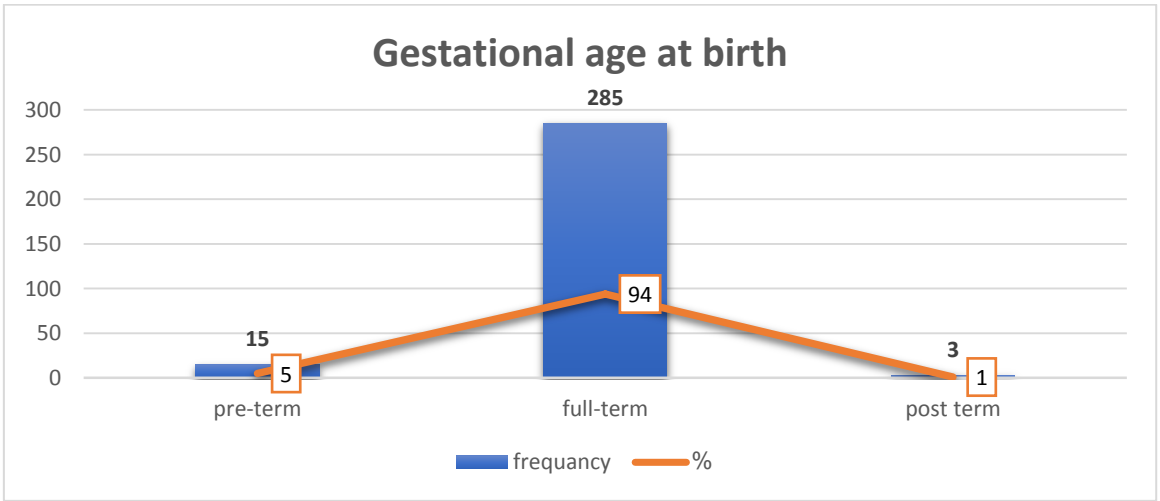

Figure 10. gestational age at birth

7. Wight of the child at birth

Regarding to the wright of the child at the birth almost of the care takers (78.8%) mentioned that thy don't know and 6.3% of them mentioned that their children delivered with low birth weight, while 5.3% mentioned that their children delivered with normal weight (more than 2500 gm)

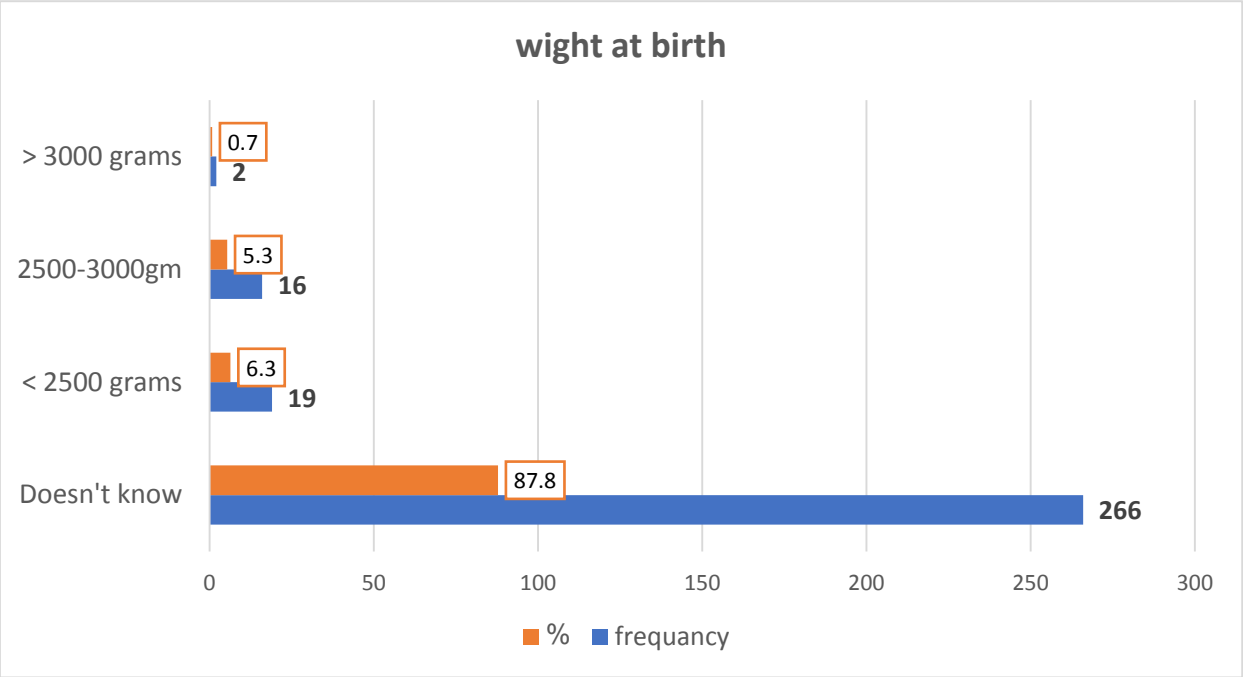

Figure 11. wight at birth

8. Interval between the last birth and the currant baby birth

Regarding to the interval between the last birth and the currant baby birth the result showed that, more than 30% of the children had interval between 1- 2 years followed by those who had interval more than 3 years26%. Those who had interval between 2- 3 years were 21%, while 6.6% had interval less than one year. In the other hand 15.5% of the children mothers had the first birth.

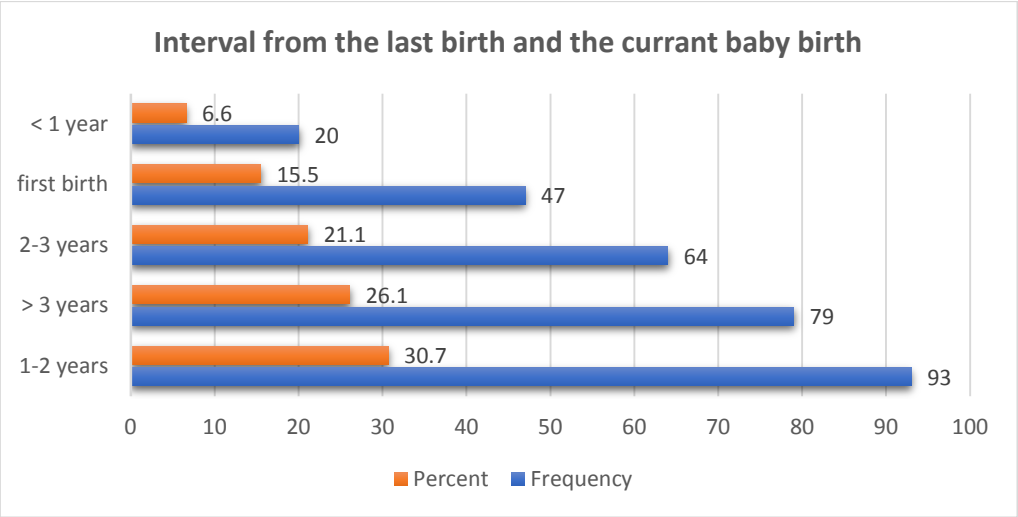

Figure 12. Interval between the last birth and the currant baby birth

9. Breast feeding history

Considering on the breast feeding the result showed that most of the children 68% had exclusive breast feeding, while 9% of the children had history of formula feeding only and 18% had mixed feeding.

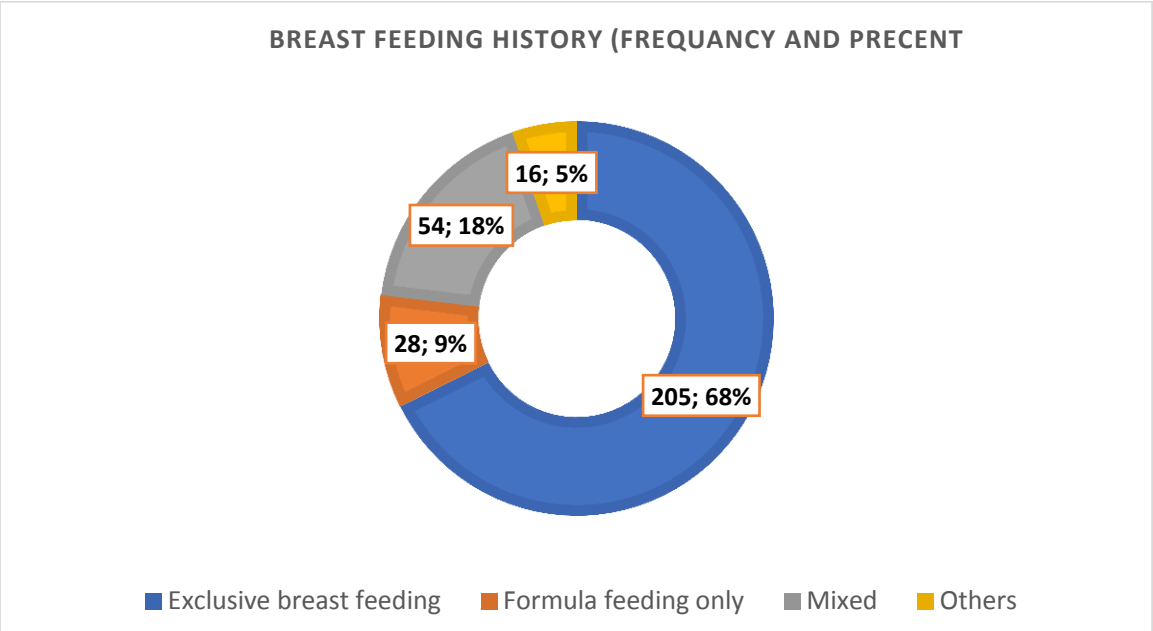

Figure 13. Breast feeding history

10. Duration of breast feeding in general

Depending on the duration of the breast feeding the result showed that, more than one third of the children under study had breast feeding for only 12 months and 14.5% had breast feeding for only less than 6 months. Only 20% of the children had breast feeding for nearly 2 years.

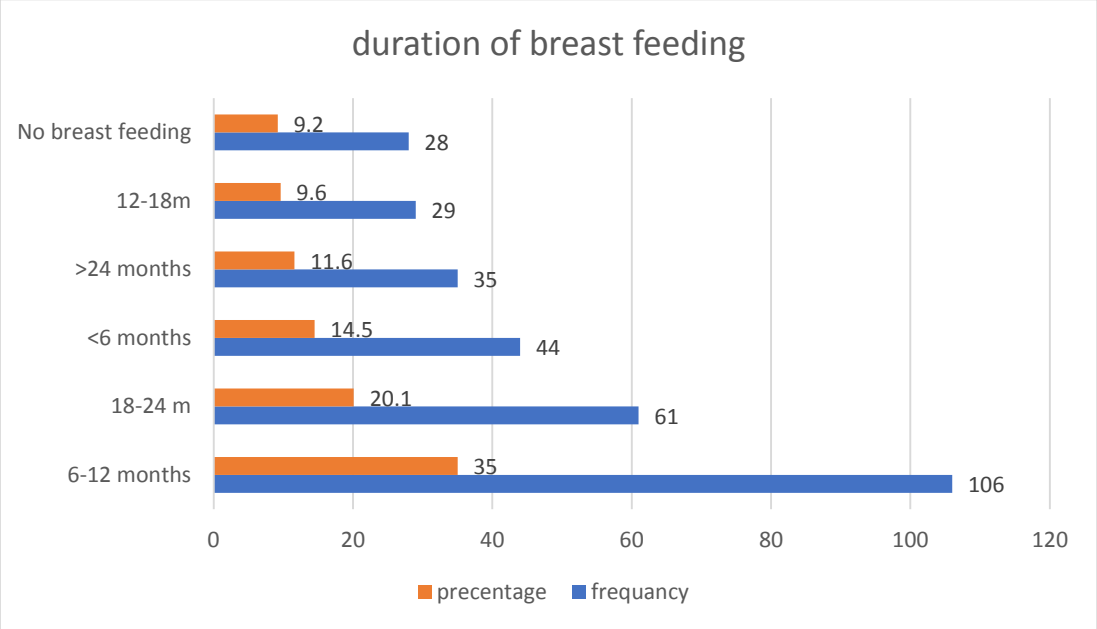

Figure 14. duration of the breast feeding

11. Children's care takers

Regarding to the children's care takers the result showed that almost of the children under study 90% showed that the mother is the care taker, while only 4% mentioned father is the mean care taker and 2% mentioned grandmother as the mean care taker.

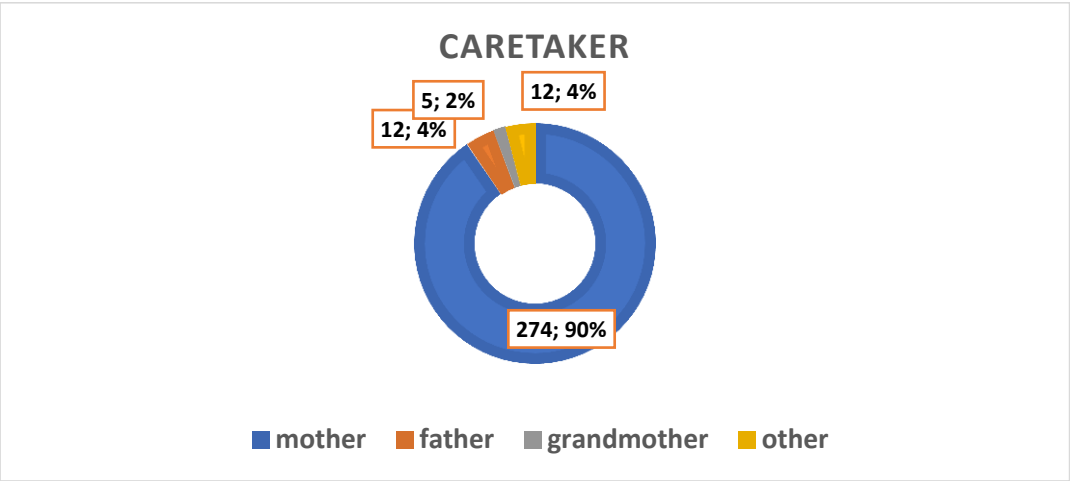

Figure 15. caretaker

ii. Parents of the children under study

1. Parents age

The results showed that the mean and the SD of the age among the fathers were (33.2 and 7 respectively) while the mean and the SD of the age among the mothers were (27.6 and 6.2 respectively)

2. Parents education level

Regarding to the education level of the parents the result showed that, more than 45% of the fathers are illiterate while most of mothers 65.7% are illiterate. Those who have primary school among fathers and mothers were (23% and 21.5% respectively), while those who secondary school among fathers and mothers were (20% and 11.6% respectively).

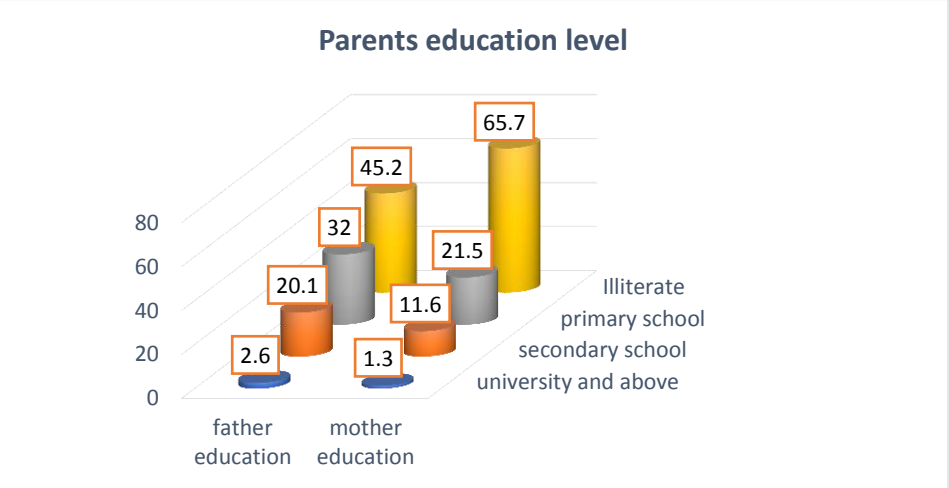

Figure 16. parents' education level

iii. Socio-economic characteristics

1. Origin places of the families

Regarding to the family origin places from which they displaced the result showed that, more than half of the families 51.2% are from Alhodidah governorate and around 20% from Taiz governorate. About 11% from Ibb governorate and 7% from Hajjah governorate. The remaining were from the following governorates (Thamar 5%, Rymah 1.3% and Aljwof 1%)

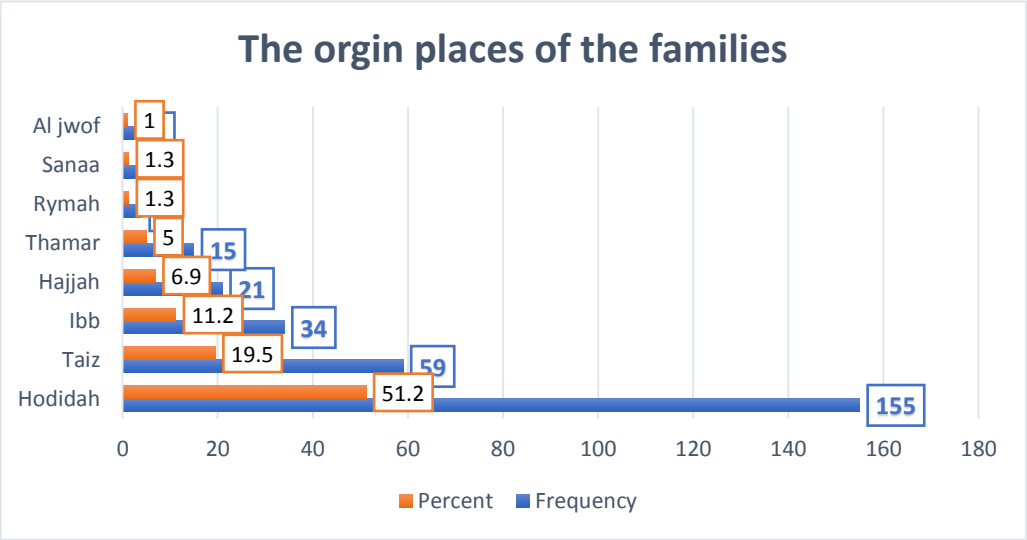

Figure 17. The orgin places of the families

2. family income

Regarding to the family income the result showed that around of 44% of the families their income is less than 50,000 Yemeni reals and 51.5% of the families have monthly income between 50-100 thousand. those who have monthly income more than 100 thousand were only 5%.

Table 2. the family income

	Frequency	Percent
less than 50000YR	133	43.9
between 50- 100 thousands	156	51.5
100-150 thousands	12	4.0
150-200 thousands	2	.7
Total	303	100.0

3. Type of the shelter

The result showed that more than half of the families under study 52% are living in one store room (shops) and more than 25% of the families living in camps, while only 22% of the families living in rental houses.

Table 3. Type of the shelter

Type of current shelter	Frequency	Percent
camp tent	78	25.7
shop	158	52.1
house	67	22.1
Total	303	100.0

iv. History of the diseases among children under five

Regarding to the history of some disease among the children under study the result showed diarrhea was the most common disease, more than half of children 55.8% have history of diarrhea frequently, while 41.9% of the children have history of pneumonia frequently.

The history of measles was with only 9.6% of the children and the heart problems was very rare less than 1%.

Depending on the history of the worm infection the result showed that more half of the children have no history of worm infections, while only 27% of the children have history of worm infections.

Table 4. history of some disease among the children under study

Disease		Frequency	Percent
Diarrhea	Yes	169	55.8
	No	134	44.2
	Total	303	100.0
pneumonia	Yes	127	41.9
	No	176	58.1
	Total	303	100.0
Measles	Yes	29	9.6
	No	274	90.4
	Total	303	100.0
Heart problem	Yes	2	.7
	No	301	99.3
	Total	303	100.0
worm infection	Yes	82	27.1
	No	167	55.1
	don't know	54	17.8
	Total	303	100.0

v. Prevalence of malnutrition

Depending on the MUAC measurement the result showed that, around 40% of the children are malnourished (12.2% SAM and 27.7% MAM), while 35.3% of the children are at risk for malnutrition. In the other hand only 25% of children are well nourished.

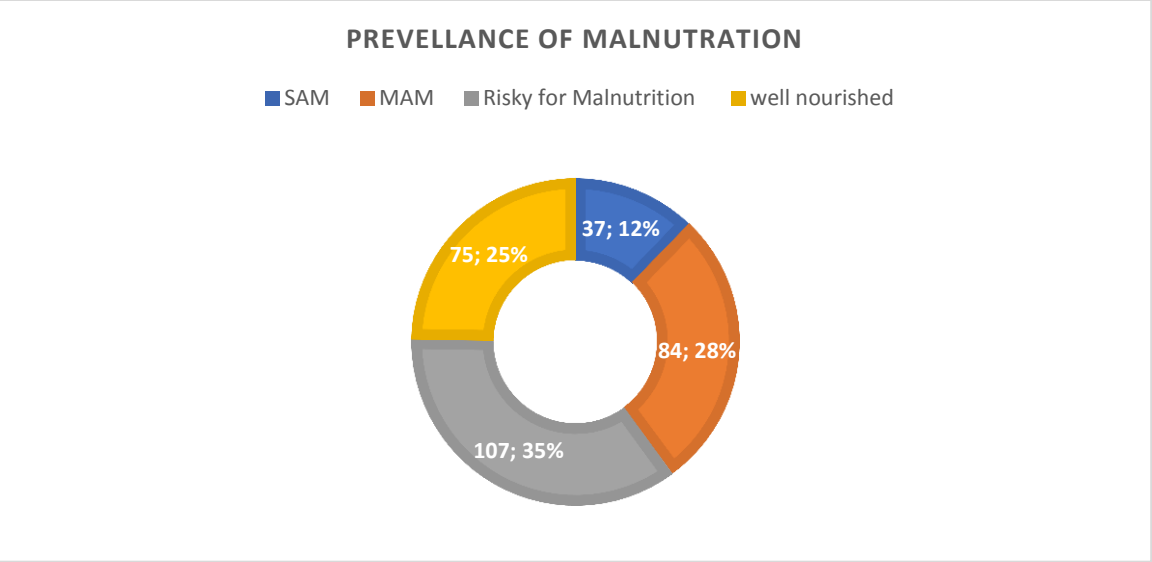

Figure 18. Prevalence of malnutrition

Relationship between the socioeconomic factors and malnutrition

Table (5) represent the relationship between some socioeconomic factors and malnutrition, the result showed that there was no relationship between the parents education and children malnutrition (P value more than 0.05)

Regarding to the family income the result showed that the prevalence of malnutrition was higher among the children of low income families than moderate income families and this difference was statistically significant (P value is less than 0.05)

Table 5. Relationship between the socioeconomic factors & malnutrition

Factors	Sub factors		Malnutrition within sub groups		P value
	Category name	Frequency	Yes %	No %	
father education	Illiterate	137	39.4%	60.6%	0.43
	primary school	97	45.4%	54.6%	
	secondary school	61	34.4%	65.6%	
	university and above	8	25.0%	75.0%	
	Total	303	39.9%	60.1%	
mother education	Illiterate	199	39.2%	60.8%	0.66
	primary school	65	38.5%	61.5%	
	secondary school	35	48.6%	51.4%	
	university and above	4	25.0%	75.0%	
family income	less than 100 thousand	289	41.2%	58.8%	0.048
	more than 100 thousand	14	14.3%	85.7%	

Relationship between some child's related factors and malnutrition

Table (5) represent the relationship between some child's related factors and malnutrition, the result showed that there was no relationship between the (gender, birth interval, ANC and type of feeding) factors and developing of malnutrition (P value more than 0.05)

Regarding to the age of the children re result showed that the mean age among malnourished children was 1.2 years, while the mean age among well-nourished children was 2.8. there was difference in the means of the age between the two groups and this difference was statistically significant (P value less than 0.001)

Also there was no relationship between some disease (diarrhea, pneumonia and measles) and developing of malnutrition (P value more than 0.05)

In the other side there was relationship between the history of the worm infection and malnutrition as the result of the chi-square test showed (P value less than 0.05)

Table 6. Relationship between some child's related factors and malnutrition

Factors	Sub factors		Malnutrition within sub groups		P value
	Category name	Frequency	Yes %	No %	
Child gender	Male	148	43.9%	56.1%	0.19
	female	155	36.1%	63.9%	
Age of the child		The mean of the age	1.2	2.8	0.000
Birth interval	first birth	47	36.2%	63.8%	0.83
	< 1 year	20	40.0%	60.0%	
	1-2 years	93	36.6%	63.4%	
	2-3 years	64	42.2%	57.8%	
	> 3 years	79	44.3%	55.7%	
ANC	Yes	110	40.0%	60.0%	1.0
	No	193	39.9%	60.1%	
Breast feeding	Exclusive breast feeding	216	41.2%	58.8%	0.1
	Formula feeding only	28	50.0%	50.0%	
	Mixed	59	30.5%	69.5%	
Diseases	diarrhea	169	41.4%	58.6%	0.5
	pneumonia	127	42.5%	57.5%	0.4
	measles	29	27.6%	72.4%	0.1
worm infection	yes	82	29.3%	70.7%	0.01
	no	167	44.9%	55.1%	

Chapter (5)
Discussion

Discussion:

This chapter discusses in detail the major findings and the implications of them. The results are put in the context of the previous and recent research in the form of comparing our findings with other researchers finding (where applicable) and comparing the current study findings based on the background variables. The main topics are sociodemographic factors, history of some infections among children, history of ANC and breast feeding, and prevalence of malnutrition.

Regarding to the demographic data of the children under study the current study showed that, the mean and SD of the age were (2.19 and 1.5 respectively) and females are slightly more than males.

This result is in line with other studies showed the mean of the age of the participants was nearly the same mean age in the current study for example, study conducted in Sana'a-Yemen, showed The mean age was 4.3±3 months (4±2.96 month for boys and 4.63±3.08 month for girls) as well as the 190 (47.5%) were boys and 210 (52.5%) were girls..[1]

Regarding to the history of the antenatal care for the children women's during their pregnancy of the children under study the current study showed that most of the mothers 64% mentioned that they didn't received anti-natal care and only 36% of them who mentioned that they received anti-natal care[44].

Regarding the gestational age of the children under study, the current study showed that almost 94% had full-term gestational age and only 5% had pre-term delivery. This result is coherent with other studies showed shows the majority of children 97% were full term and mode of delivery vaginal delivery was the common mode of delivery 83.1% and next one caesarian section 16.9% .Most of mothers 52.6% delivered the index child at home and next one place of delivery at hospital 47.4%[35]

In the other side the current study result is not in the line with other previous studies did not establish whether children who had a low birth weight were born at pre-term or not and whether they were born to undernourished mothers or not which might have led to a child born small for gestation age[21]

Considering on the breast feeding the result showed that most of the children 68% had exclusive breast feeding, while 9% of the children had history of formula feeding only and 18% had mixed feeding. this result is coherent with other studies showed that a

proportion slightly above average (62 %) of the total children had been breastfed while 38 % were not breast fed. This shows that a child being malnourished may be attributed to low/lack of breast feeding [35]

In the other side the current study result is not in the line with other researchers who showed a proportion slightly above average (56.8%) of the total children had been breastfed while 43.2% were not breast fed. this shows that a child being malnourished may be attributed to low/lack of breast feeding [39]

Another study showed that significantly higher cases16 (61.5%) not exclusive breastfeeding, and those children who received exclusive breastfeeding were higher among normal status nutrition 20 (76.9 %). The findings imply that lack of breastfeeding is a risk factor for under-nutrition in this study population. From the results, of the controls continued to breastfeed past the 2 years recommended weaning age[45].

Kishoyian et al., (2017) also found that the study found that about 58.6% of children were underweight and that only 31.6% practices exclusive breastfeeding for the first six months. In this study, there was no significant different between males and females in relation to malnutrition [46]

Depending on the duration of the breast feeding the result showed that, more than one third of the children under study had breast feeding for only 12 months and 14.5% had breast feeding for only less than 6 months. Only 20% of the children had breast feeding for nearly 2 years.

This result is coherent with A recent Nepalese study reported that prolonged breastfeeding (more than 12 months) lead to increased risk of stunting and severe stunting among Nepalese children [47]. In the other side the current study result is not in the line with other researchers who showed Children who were breastfed between 6 - 18 months were more likely to be stunted and severely stunted than those breastfed for less than 12 months [48]

Regarding to the family income the result showed that around of 44% of the families their income is less than 50,000 Yemeni reals and 51.5% of the families have monthly income between 50-100 thousand. those who have monthly income more than 100 thousand were only 5%.

This result is coherent with other studies showed that, Severe acute malnutrition (SAM) affects a number of children below five years of age in low- and middle-income countries. the disorder is associated with 1 million to 2 million preventable child deaths each year [48]. In addition, around 45% of deaths among children under 5 years of age are linked to undernutrition. these mostly occur in low- and middle-income countries. at the same time, in these same countries, rates of childhood overweight and obesity are rising[49]

Regarding to the history of some diseases among the children under study the result of the current study showed that, diarrhea was the most common disease more than half of children 55.8% have history of diarrhea frequently, while 41.9% of the children have history of pneumonia frequently. Depending on the history of the worm infection the result showed that more half of the children have no history of worm infections, while only 27% of the children have history of worm infections.

This result is coherent with WHO & UNICEF (2009) which has reported that the children who are underweight are at an increased risk of mortality from infectious illnesses such as diarrhea and pneumonia. Infections play a major etiological role in under nutrition because they result in increased needs and high energy expenditure, lower appetite, nutrient loss due to vomiting, diarrhea, poor digestion, malabsorption and the utilization of nutrients and disruption of metabolic equilibrium [50]

In the other side the current study result is not in the line with other researchers who showed Significantly more cases malnutrition were attacked infectious disease by malaria (44%) and diarrhea (26%) than the controls which were 38.6% and 11.4% respectively. These findings imply that Malaria and diarrhea are risk factors for under-nutrition in this study population. The malaria parasite (plasmodium) breaks down red blood cells which are responsible for the transportation of nutrients and oxygen throughout the body for metabolism[51]

Regarding to the prevalence of malnutrition among under five the result of the current study showed that, around 40% of the children are malnourished (12.2% SAM and 27.7% MAM), while 35.3% of the children are at risk for malnutrition. In the other hand only 25% of children are well nourished.

This result is higher than other study conducted In Indonesia on 2017, as many as 3.8% of toddlers (0-23 month) have poor nutritional status and 14.0% of children under

five years have malnutrition. Percentage of malnutrition at the group of children under five year old (17.8%) was higher than the group of toddler (14.8%). West Sumatera is one of province in Indonesia. Prevalence of malnutrition in Sumatera Barat is 17.5% [52].

In another study the prevalence of malnutrition in Padang city was 14.9 percent of the children between 0-5 years. Survey done in 2017 that the high case of malnutrition in Pauh subdistricts 20% an the low case of malnutrition in Lubuk kilangan Sub districts [53]

On the other hand, another study demonstrated that, of all the cases 36.5% (n=19) were diagnosed with MAM, 46.2% (n=24) with SAM, 1.9% (n=1) with moderate PEM and 7.7% (n=4) each for PEM and Severe PEM. all the cases had presented with clinical signs and symptoms of severe acute malnutrition [54]

The current study showed that, there was no relationship between the parents education and children malnutrition (P value more than 0.05), while there was relation between malnutrition and the family income as the prevalence of malnutrition was higher among the children of low income families than moderate income families and this difference was statistically significant (P value is less than 0.05)

This result in Consistent with the results from a study in Mabutsane and Bobirwa (Botswana), whose purpose it was to assess child nutrition and the household economic situation in the context of rising food prices. This study showed that the risk of malnutrition in children was lower in children with a birth weight greater than 2,500 grams and that breastfeeding exposure did not influence the risk of malnutrition as well as low economic status can contribute significantly to the poor nutritional status of mothers by restricting their Status, Infectious Disease, and breastfeeding [55].

In the other side the current study result is not in the line with another study in the Philippines, Barrera showed that children of better educated mothers have higher height-for-age scores especially significant for children in the weaning period (less than 2 years of age). family income as a confounding factor was shown to not be statistically significant in his study [56]

The result of this study showed that there was no relationship between the (gender, birth interval, ANC and type of feeding) factors and developing of malnutrition (P value more than 0.05). regarding to the age of the children, result showed that the mean age among malnourished children was 1.2 years, while the mean age among well-nourished

children was 2.8. there was difference in the means of the age between the two groups and this difference was statistically significant (P value less than 0.001) this result is not in the line with other researchers who showed No significant effect of age or gender was found on the frequencies of various risk factors of malnutrition in the study population [41].

Also, there was no relationship between some disease (diarrhea, pneumonia and measles) and developing of malnutrition (P value more than 0.05). In the other side there was relationship between the history of the worm infections and malnutrition as the result of the chi-square test showed (P value less than 0.05)

This result is coherent with other studies found that malnutrition among hospitalised children was associated with ethnic minority, diarrheal diseases, respiratory infections, and earthquake damage to house [57]

Chapter (6)
Conclusion & Recommendation

Conclusion:

The current study revealed that malnutrition is a serious problem among under five children, affecting of them . Moreover,
of the children are at risk for malnutrition and need preventive measures. Only
of the children are well nourished and have adequate growth and development.

As well as, the result of this study showed that there was significantly relationship between the family income and women infection

Recommendation:

The study of malnutrition among children under five years old who were displaced from Hodeida and other governorates to Sanaa revealed that the prevalence of malnutrition was high and that the determinants of malnutrition were multifactorial and complex. Based on the findings of the study, the following recommendations are proposed to improve the nutritional status and health outcomes of the displaced children and their families5

- Strengthen the coordination and collaboration among the humanitarian actors, the local authorities and the host communities to ensure the delivery of adequate and timely food, water, sanitation, health care and protection services to the displaced population.
- Implement evidence-based interventions to prevent and treat malnutrition among children under five years old, such as community-based management of acute malnutrition (CMAM), micronutrient supplementation, infant and young child feeding (IYCF) counselling and support, and deworming.
- Enhance the monitoring and evaluation of the nutritional situation and the quality and coverage of the interventions, using standardized indicators and tools, such as the WHO Child Growth Standards and the UNICEF/WHO/World Bank Joint Child Malnutrition Estimates[1].
- Conduct further research to explore the underlying causes and consequences of malnutrition among displaced children, such as food insecurity, poverty, violence, psychosocial stress, infectious diseases and environmental factors.
- Advocate for a peaceful resolution of the conflict and a sustainable recovery of the country, which are essential for ensuring the long-term well-being and development of the children and their families.

Study limitation:

In this study, we encountered some limitations that need to be recognized and addressed in future research. Some of the limitations are:

The cross-sectional design of the study did not allow the establishment of causal relationships between the determinants and outcomes of malnutrition. A longitudinal or experimental design would be more appropriate to examine the causal effects of interventions and changes in nutritional status over time.

The study relied on self-reported data for some variables, such as dietary intake, feeding practices, and healthcare utilization, which may be subject to recall bias, social bias, or measurement error. Objective measures, such as a food diary, observation, or vital signs, would be more accurate and reliable for assessing these variables.

It was difficult to reach the families, as there are no lists of the names of the displaced families in the capital's secretariat and the needs of families for aid and its impact on the movement of the team.

References:

[1] N. A. Al-Rabeei, A. M. Dallak, and M. H. Al-Barakani, "Prevalence of malnutrition among infants in Sana'a city, Yemen," *Ulutas Med. J.*, vol. 1, no. 1, pp. 1–6, 2015.

[2] L. Alkema and D. You, "Child mortality estimation: a comparison of UN IGME and IHME estimates of levels and trends in under-five mortality rates and deaths," 2012.

[3] T. S. Sunil, "Effects of socio- economic and behavioural factors on childhood malnutrition in Yemen," *Matern. Child Nutr.*, vol. 5, no. 3, pp. 251–259, 2009.

[4] J. Bryce, C. Boschi-Pinto, K. Shibuya, and R. E. Black, "WHO estimates of the causes of death in children," *Lancet*, vol. 365, no. 9465, pp. 1147–1152, 2005.

[5] M. I. El Mouzan *et al.*, "Pattern of sex differences in growth of Saudi children and adolescents," *Gend. Med.*, vol. 7, no. 1, pp. 47–54, 2010.

[6] A. Pruss-Ustun and W. H. Organization, *Safer water, better health: costs, benefits and sustainability of interventions to protect and promote health.* World Health Organization, 2008.

[7] "Ministry of Planning & International Cooperation Economic Studies & Forcasting Sector," no. 19, 2016.

[8] H. A. Elgazzar, "Raising returns: The distribution of health financing and outcomes in Yemen," 2011.

[9] Y. E. Kadima, "Factors influencing malnutrition among children under 5 years of age in kweneng west district of Botswana." University of South Africa, 2012.

[10] C. S. O. MoPHP and M. D. H. S. PAPFAM, "Yemen National Health and Demographic Survey 2013," *Minist. Public Heal. Popul. Cent. Stat. Organ. Pan Arab Progr. Fam. Heal. Maryl. USA ICF Int.*, 2015.

[11] Botswana Ministry and Health., "Growth monitoring and promotion Of, nutrition surveillance. Guidelines for health workers. Gaborone," *Botswana Minist. Heal. UNICEF.*, 2008.

[12] L. R. De Souza, "Correlates of child undernutrition in Yemen," *Bandung*, vol. 4, no. 1, pp. 1–27, 2017.

[13] M. J. Chisti, M. Tebruegge, S. La Vincente, S. M. Graham, and T. Duke, "Pneumonia in severely malnourished children in developing countries–mortality risk, aetiology and validity of WHO clinical signs: a systematic review," *Trop. Med. Int. Heal.*, vol. 14, no. 10, pp. 1173–1189, 2009.

[14] W. H. Organization, *World health statistics 2016: monitoring health for the SDGs sustainable development goals*. World Health Organization, 2016.

[15] W. H. Organization, "WHO Child Growth Standerds!: Head Circumference for-age, arm Circumference-forage, triceps Skinfold-for-age and Subscapular Skinfoldfor-age-Methods and Development." Geneva: WHO, 2007.

[16] C. P. Stewart, L. Iannotti, K. G. Dewey, K. F. Michaelsen, and A. W. Onyango, "Contextualising complementary feeding in a broader framework for stunting prevention," *Matern. Child Nutr.*, vol. 9, pp. 27–45, 2013.

[17] C. G. Victora, M. de Onis, and R. Shrimpton, "Linear growth faltering should be assessed in absolute and relative terms," *J. Nutr.*, vol. 144, no. 12, pp. 2092–2093, 2014.

[18] W. H. O. M. G. R. S. Group and M. de Onis, "WHO Child Growth Standards based on length/height, weight and age," *Acta Paediatr.*, vol. 95, pp. 76–85, 2006.

[19] M. Onis, "WHO Child Growth Standards based on length/height, weight and age," *Acta Paediatr.*, vol. 95, pp. 76–85, 2007.

[20] Chatham House, "Malnutrition in Yemen : Developing an urgent and effective response," *Chatham House*, no. February, p. 2011, 2011.

[21] M. S. Butt, Z. H. Tharwani, S. K. Shaeen, A. Shahzad, and M. Y. Essar, "Maternal mortality and child malnutrition: Complications of the current crises in Yemen," *Clin. Epidemiol. Glob. Heal.*, vol. 15, p. 101051, 2022.

[22] A. M. Eshaq, A. M. Fothan, E. C. Jensen, T. A. Khan, and A. A. AlAmodi, "Malnutrition in Yemen: an invisible crisis," *Lancet*, vol. 389, no. 10064, pp. 31–32, 2017.

[23] UNICEF, "Yemen: Acute malnutrition hits record levels in Yemen with a devastating toll on children under five," vol. 19, no. December, 2021, [Online]. Available: https://www.unicef.org/press-releases/acute-malnutrition-threatens-half-

children-under-five-yemen-2021-un.

[24] A. A. Al-Waleedi and A. S. Bin-Ghouth, “Malnutrition among hospitalized children 12–59 months of age in Abyan and Lahj Governorates/Yemen,” *BMC Nutr.*, vol. 8, no. 1, p. 78, 2022.

[25] S. Kuruvilla *et al.*, “The Global strategy for women’s, children’s and adolescents’ health (2016–2030): a roadmap based on evidence and country experience,” *Bull. World Health Organ.*, vol. 94, no. 5, p. 398, 2016.

[26] B. M. Al-eryani, “Child Malnutrition in Yemen : Child Malnutrition in Yemen : the Role of Female Education,” 2006.

[27] L. A. Mengiste, Y. Worku, Y. A. Aynalem, and W. S. Shiferaw, “Prevalence of stunting and its associated factors among children aged 6–59 months in Angolela Tera District, Northeast Ethiopia,” *Nutr. Diet. Suppl.*, vol. 12, pp. 311–319, 2020.

[28] W. H. Organization, “WHO country cooperation strategy 2014-2020: Botswana,” 2014.

[29] T. R. Oh *et al.*, “Association between health related quality of life and progression of chronic kidney disease,” *Sci. Rep.*, vol. 9, no. 1, pp. 1–9, 2019.

[30] M. B. Prieto and J. L.-H. Cid, “Malnutrition in the critically ill child: the importance of enteral nutrition,” *Int. J. Environ. Res. Public Health*, vol. 8, no. 11, pp. 4353–4366, 2011.

[31] E. Mabaya, D. Jordaan, P. Malope, M. Monkhei, and J. Jackson, “Attribute preferences and willingness to pay for fortified cereal foods in Botswana,” *Agrekon*, vol. 49, no. 4, pp. 459–483, 2010.

[32] O. R. Katoch, “Determinants of malnutrition among children: A systematic review,” *Nutrition*, vol. 96, p. 111565, 2022.

[33] E. Gudu *et al.*, “Factors associated with malnutrition in children< 5 years in western Kenya: a hospital-based unmatched case control study,” *BMC Nutr.*, vol. 6, no. 1, pp. 1–7, 2020.

[34] H. A. L. Rocha *et al.*, “Undernutrition and short duration of breastfeeding association with child development: a population-based study,” *J. Pediatr. (Rio. J).*,

vol. 98, pp. 316–322, 2022.

[35] S. M. NOR, “MALNUTRITION AND COMORBIDITIES AMONG CHILDREN UNDER FIVE YEARS IN SOS HOSPITAL MOGADISHU , SOMALIA SAID MOHAMED NOR MASTER OF SCIENCE (Public Health) JOMO KENYATTA UNIVERSITY OF,” 2019.

[36] A. R. Falbo and J. G. B. Alves, “Severe malnutrition: epidemiological and clinical characteristics of children hospitalized in the Instituto Materno Infantil de Pernambuco (IMIP), Brazil,” *Cad. Saude Publica*, vol. 18, pp. 1473–1477, 2002.

[37] U. Ramakrishnan, “Nutrition and low birth weight: from research to practice,” *Am. J. Clin. Nutr.*, vol. 79, no. 1, pp. 17–21, 2004.

[38] I. C. Kleynhans, U. E. MacIntyre, and E. C. Albertse, “Stunting among young black children and the socio-economic and health status of their mothers/caregivers in poor areas of rural Limpopo and urban Gauteng–the NutriGro Study,” *South African J. Clin. Nutr.*, vol. 19, no. 4, pp. 163–172, 2006.

[39] R. B. Yellanthoor and V. K. B. Shah, “Prevalence of malnutrition among under-five year old children with acute lower respiratory tract infection hospitalized at Udupi District Hospital,” *Arch. Pediatr. Infect. Dis.*, vol. 2, no. 2, pp. 203–206, 2014.

[40] Y. Mehmood, B. Ahad, R. Gul, and T. A. Khan, “Nutritional status of children under 5 years of age in three tertiary care hospitals of Peshawar,” *J. Islam. Med. Dent. Coll.*, vol. 5, no. 2, pp. 50–53, 2016.

[41] S. Ahmad, T. Rafique, N. Hussain, and A. Akbar, “Risk Factors of Malnutrition in under 5 Year Children Admitted at DHQ Teaching Hospital, Dera Ghazi Khan,” *PAKISTAN J. Med. Heal. Sci.*, vol. 12, no. 2, pp. 546–550, 2018.

[42] K. Al-Zangabila, S. P. Adhikari, Q. Wang, T. S. Sunil, S. Rozelle, and H. Zhou, “Alarmingly high malnutrition in childhood and its associated factors: A study among children under 5 in Yemen,” *Medicine (Baltimore).*, vol. 100, no. 5, 2021.

[43] S. Naresh and G. R. Maiya, “A cross-sectional study to assess acute malnutrition among under-5 children in the field practise area of a teaching hospital in Chennai,” *J. Fam. Med. Prim. Care*, vol. 10, no. 1, p. 218, 2021.

[44] K. E. Agho, K. J. Inder, S. J. Bowe, J. Jacobs, and M. J. Dibley, “Prevalence and

risk factors for stunting and severe stunting among under-fives in North Maluku province of Indonesia," *BMC Pediatr.*, vol. 9, no. 1, pp. 1–10, 2009.

[45] Y. Maidelwita, "Risk Factors for Malnutrition of Children Under Five Years Old on the Area of Nanggalo Public Health Center Padang West Sumatera," *Malaysian J. Med. Res.*, vol. 3, no. 1, pp. 10–17, 2019.

[46] G. M. Kishoyian, Y. B. Osinyo, J. N. Kishoyian, and G. O. Otieno, "Factors Contributing to Malnutrition Among Children Under Five Years of Age in Machakos Country Level Five Hospital," *World J. Pharm. Med. Res.*, vol. 3, no. 2, pp. 1–12, 2017.

[47] K. Gaurav, I. S. Poudel, S. Bhattarai, P. M. S. Pradhan, and P. K. Pokharel, "Malnutrition status among Under-5 children in a hill Community of Nepal," *Kathmandu Univ. Med. J.*, vol. 12, no. 4, pp. 264–268, 2014.

[48] Ansuya, B. S. Nayak, B. Unnikrishnan, A. George, S. C. Mundkur, and V. Guddattu, "Risk factors for malnutrition among preschool children in rural Karnataka: a case-control study," *BMC Public Health*, vol. 18, pp. 1–8, 2018.

[49] M. De Onis, M. Blossner, and W. H. Organization, "WHO global database on child growth and malnutrition," World Health Organization, 1997.

[50] W. H. Organization, "WHO child growth standards and the identification of severe acute malnutrition in infants and children: joint statement by the World Health Organization and the United Nations Children's Fund," 2009.

[51] M. A. A. Alexandre *et al.*, "The association between nutritional status and malaria in children from a rural community in the Amazonian region: a longitudinal study," *PLoS Negl. Trop. Dis.*, vol. 9, no. 4, p. e0003743, 2015.

[52] M. Chan, *Ten Years in Public Health 2007-2017: Report by Dr Margaret Chan Director-General World Health Organization*. World Health Organization, 2018.

[53] D. H. Putri, M. Masrul, and L. Evareny, "The Relationship Between The Level of Maternal Knowledge, Maternal Employment Status and Family Support With Exclusive Breastfeeding in The Working Area of The Air Dingin Health Center of Padang City in 2018," *J. Midwifery*, vol. 3, no. 2, pp. 161–175, 2018.

[54] A. Piniel, "Factors contributing to severe acute malnutrition among the under five

children in Francistown-Botswana." University of the Western Cape, 2016.

[55] S. E. O. Mahgoub, M. Nnyepi, and T. Bandeke, "Extent types of and the factors related to malnutrition among children under three years of age in Botswana," *African J. Food, Agric. Nutr. Dev.*, vol. 6, no. 1, 2006.

[56] A. Barrera, "The role of maternal schooling and its interaction with public health programs in child health production," *J. Dev. Econ.*, vol. 32, no. 1, pp. 69–91, 1990.

[57] A. Inoue *et al.*, "Risk factors for wasting among hospitalised children in Nepal," *Trop. Med. Health*, vol. 50, no. 1, p. 68, 2022.

.

ANNEXE

Annexe

QUESTIONNAIRE

Q1: Current Residence Area : .....

Q2: Directorate:.....

Q3: street: .....

Q4: Current housing type:

☐ Camp ☐ Shop ☐ House ☐Other

Q5: Region Of Origin ("displaced from it")

Q6: Governorate: .....

Q7: Directorate: .....

*Personal data

Father's Data -

Q8: Father's Name: .....

Q9: Father's Age : .....

Q10: Father's Occupation : .....

Q11: Educational level

☐ Illiterate ☐ Primary Education

☐ Secondary Education ☐ University or above

-Mother's data:

Q12: Mother's name: .....

Q13: Mother's Age: .....

Q14: Mother's Occupation: .....

Q15: Educational level

☐ Illiterate ☐ Primary Education
☐ Secondary Education ☐ University or above

Q16: Family's income per month?

☐ < 50 Thousand R.Y ☐ 50-100 Thousand R.Y

☐ 100-150 Thousand R.Y ☐ 150-200 Thousand R.Y

- Child data

Q17: Child name :… ……

Q18: Gender of the Child?

☐ Male ☐ female

Q19: Age of child : ……..

Q20: place of residence ?

☐ Rural ☐ Urban

Q21: How Caretaker of child?

☐ Mother ☐ Father ☐ Grandmother ☐ Caregiver or other

Q22: Number of family's member……..

Q23: Number of children < 5 years old in family :……

Q24: Birth interval (from previous birth)?

☐ First birth ☐ < 1 year ☐ 1-2 year

☐ 2-3 year ☐ > 3 year

Q25 :ANC service in this pregnancy (for under the study)?

☐ Yes ☐ No

Q26: The Baby is (For Child under the study)?

☐ Pre-term ☐ Full-term ☐ Post-term

Q27: Mode of delivery?

☐ Vaginally ☐ Caesarian section

Q28: Place of delivery?

☐ Hospital ☐ House

Q29: Weight at birth in grams (For Child under the study)?

☐ < 2500 grams ☐ 2500 - 3000 grams

☐ > 3000 grams ☐ Doesn't know

Q30: What is type of Feeding (from the beginning of life):?

☐ Exclusive breast feeding ☐ Formula feeding only

☐ Mixed ☐ Others

Q31: If Exclusive breast feeding for any duration (weaning age)?

☐ <6 months ☐ 6 months ☐ >6 months

Q32: Duration of breast feeding (in general)?

☐ No breast feeding ☐ <6 months ☐ 6-12 months

☐ 12-18 months ☐ 18-24 months ☐ >24 months

Q33: In the past. The child has suffered from:?

Diarrhea	☐ Yes	☐ No
Pneumonia	☐ Yes	☐ No
Measles	☐ Yes	☐ No
Heart problem	☐ Yes	☐ No

Other ?.....

Q34 : The child had worm infestation in past?

☐ Yes ☐ No

Q35 : Measurement

1- Mid Upper Arm Circumference (MUAC): ……cm

- ☐ **< 11.5 cm** **Sever Acute Malnutrition (SAM)**
- ☐ **11.5-12.5 cm** **Moderate Acute Malnutrition (MAM)**
- ☐ **12.5-13.5 cm** **Risky for Malnutrition and should be follow up**
- ☐ **>13.5 cm** **The child is well nourished**

2- weight …… **Kg**

*** Fit with age:**

☐ **Normal** ☐ **less than normal** ☐ **more than normal**

3- Length/Height…… cm

***Fit with age:**

☐ **Normal** ☐ **less than normal** ☐ **more than normal**

4-stunting

☐ **yes** ☐ **NO**

*** Fit with age:**

☐ **Normal** ☐ **less than normal** ☐ **more than normal**

الملخص العربي

الخلفية:

سوء التغذية مشكلة صحية عامة خطيرة تؤثر على ملايين الأطفال في جميع أنحاء العالم ، وخاصة في البلدان المنخفضة والمتوسطة الدخل. وفقًا لآخر التقديرات الصادرة عن مجموعة تقديرات سوء تغذية الأطفال المشتركة بين اليونيسف ومنظمة الصحة العالمية والبنك الدولي، في عام 2020، كان 149 مليون طفل دون سن الخامسة يعانون من التقزم، و 45 مليونًا من الهزال، و 38.9 مليونًا يعانون من زيادة الوزن أو السمنة. يمكن أن يكون لسوء التغذية عواقب وخيمة على بقاء الأطفال ونموهم ورفاههم ، ويمكن أن يزيد من خطر الإصابة بالأمراض والوفيات بسبب الأمراض المعدية والمزمنة. ينتشر سوء التغذية بين الأطفال دون سن الخامسة بشكل خاص وشديد في السكان المتضررين من النزاع والنازحين ، حيث يمكن أن يؤدي انعدام الأمن الغذائي وسوء الصرف الصحي وخدمات الرعاية الصحية المحدودة والتعرض الشديد للعنف والتوتر إلى تفاقم الوضع. اليمن من البلدان التي تواجه أزمة إنسانية نتيجة النزاع المسلح المستمر الذي بدأ في عام 2014. تسبب الصراع في نزوح واسع النطاق وتدمير للبنية التحتية وتعطيل الخدمات الأساسية وانهيار الاقتصاد.

الهدف الرئيسي:

هدفت هذه الدراسة إلى قياس معدل انتشار سوء التغذية بين الأطفال دون سن الخامسة الذين يعيشون داخل الأسر النازحة داخلياً في مدينة صنعاء.

المنهجية:

اعتمدت الدراسة على تصميم مقطعي لتقييم انتشار ومحددات سوء التغذية بين الأطفال دون سن الخامسة الذين يعيشون ضمن أسر النازحين داخلياً في مدينة صنعاء. تكون مجتمع الدراسة من الأطفال المسجلين كأشخاص نازحين داخلياً.

النتائج:

كشفت الدراسة الحالية أن انتشار سوء التغذية بين الأطفال دون سن الخامسة بلغ 40٪ (12.2٪ مع SAM و 27.7٪ مع MAM) .علاوة على ذلك ، فإن 35.3٪ من الأطفال معرضون لخطر الإصابة بسوء التغذية ويحتاجون إلى تدابير وقائية. ربع الأطفال فقط يحصلون على تغذية جيدة ونمو وتطور كافيين..

الخلاصة

في الختام، بلغ معدل انتشار سوء التغذية بين الأطفال دون سن الخامسة بين العائلات النازحة في صنعاء 40٪ ، ويعتبر هذا المعدل مرتفعا للغاية ويتطلب تدخلات لتحسين أوضاع الأطفال في مناطق الخراطيم.

الجمهورية اليمنية
وزارة التعليم العليا والبحث العلمي
الجامعة الاماراتية الدولية
كلية الطب و العلوم الصحية
قسم المجتمع

معدل انتشار وعوامل خطورة سوء التغذية بين الأطفال دون سن الخامسة لدى الأسر النازحة داخلياً التي تعيش في صنعاء_2023

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2023 م