
Prevalence and Risk Factors of Underweight in Children Aged between 6 Months to 6 Years among Sons of Female Medical Staff in Sana'a City, Yemen

A research Project Submitted to Faculty of Medicine, 21 September UMAS in
Partial Fulfillment of Requirements for MBBS

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انتشار وعوامل خطورة نقص الوزن في الأطفال الذين تتراوح أعمارهم بين ٦ أشهر إلى ٦ سنوات من أبناء العاملات في المجال الصحي في مدينة صنعاء باليمن،
٢٠٢٢م

(بحث مقدم إلى كلية الطب البشري كمتطلب للحصول على درجة البكالوريوس في الطب العام والجراحة)

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1444-2023

Abstract

Background:

Underweight is one of the important anthropometric components of malnutrition among under-five children and is a major public health concern in Yemen because it contributes to mortality as well as morbidity. In designing suitable health programs and policies with the goal of attaining UN SDG Goals, it is necessary to identify the critical risk factors of under-five malnutrition. Therefore, the authors aimed to find the prevalence and determinants of underweight in children aged between 6 Months to 6 Years in Sana'a city of Yemen.

Methods:

A hospital-based cross-sectional study was conducted in Sana'a city from May 1, 2022 to May 30, 2023 to assess the prevalence and factors associated with underweight in children between 6 months to 6 years. A structured questionnaire was used to collect data from 288 children paired with their mothers. Anthropometric measurements and determinant factors were collected. SPSS version 25.0 statistical software was used for analysis.

The study used the Chi-Squared test to test the significant association between independent variables and being malnourished declared significant if p-value was less than 0.05.

Results:

This study revealed, based on weight-for-age on the growth chart, that 41.5% of the children whose mothers work as employees in the government health sector suffer from nutritional underweight as their weight-for-age chart is less than the 5% percentile.

The study shows that the most important risk factors are nurse mother, the children is between 1 and 3 years old, Leaving the children at home without the presence of a

housewife, the mother works for more than 12 hours a day, the presence of more than two children under the age of six years, the low social and economic situation of the family preterm and babies those with low birth weight.

Conclusion:

The mother's work, whatever its academic level, when there is no one to take care of the child and feed him adequately and appropriately for his age while she is outside the home, or when the economic situation of the family is not good in spite of her work: negatively affects the health and development of children.

Keywords: Underweight, Children under six years, Sana'a, Yemen

الخلاصة

الخلفية النظرية:

نقص الوزن هو أحد مؤشرات سوء التغذية الهامة بين الأطفال دون سن الخامسة، وهو مشكلة صحية عامة رئيسية في اليمن لأنه يساهم في الوفيات والمراضة. وتصميم برامج وسياسات صحية مناسبة بهدف تحقيق أهداف الأمم المتحدة للتنمية المستدامة، من الضروري تحديد العوامل الحرجة لسوء التغذية لدى الأطفال دون سن الخامسة. لذلك، هدف الباحثون في هذه الدراسة إلى تحديد انتشار وعوامل الخطر لنقص الوزن بين الأطفال الذين تتراوح أعمارهم بين ٦ أشهر إلى ٦ سنوات في مدينة صنعاء باليمن.

الطرق والادوات:

أجريت دراسة مستعرضة في المستشفيات في مدينة صنعاء خلال الفترة من ١ مايو ٢٠٢٢ إلى ٣٠ مايو ٢٠٢٣ لتقييم انتشار وعوامل الخطر لنقص الوزن بين الأطفال الذين تتراوح أعمارهم بين ٦ أشهر إلى ٦ سنوات. تم استخدام استبيان مهيكّل لجمع البيانات من ٢٨٨ طفلاً مقابل أمهاتهم. تم جمع البيانات الأنثروبومترية والعوامل المحددة. تم استخدام برنامج SPSS الإحصائي الإصدار ٢٥,٠ للتحليل. استخدمت الدراسة اختبار الكاي المربع لاختبار العلاقة بين المتغيرات المستقلة وسوء التغذية والذي يعتبر معنوياً إذا كانت قيمة الـ p أقل من ٠,٠٥.

النتائج:

كشفت هذه الدراسة، بناءً على الوزن مقابل العمر على جدول النمو، أن ٤١,٥٪ من الأطفال الذين تعمل أمهاتهم كموظفات في القطاع الصحي الحكومي يعانون من نقص الوزن الغذائي حيث يقل وزنهم على جدول النمو عن النسبة المئوية الخامسة. كما تشير الدراسة إلى أن أهم العوامل الخطر هي الأم التي تعمل كممرضة، وأن الطفل يتراوح عمره بين ١ و ٣ سنوات، وأن يترك الطفل في المنزل بدون وجود ربة منزل لرعايته، وأن الأم تعمل لأكثر من ١٢ ساعة يوميًا، وأن هناك أكثر من طفلين تحت سن الستة، وأن الوضع الاجتماعي والاقتصادي للأسرة منخفض، والولادات قبل الأوان والأطفال ذوي الوزن المنخفض عند الولادة.

الاستنتاج:

يؤثر عمل الأم، بغض النظر عن مستواها الأكاديمي، عندما لا يوجد أحد لرعاية الطفل وتغذيته بشكل كافٍ ومناسب لعمره أثناء غيابها عن المنزل، أو عندما لا تكون الحالة الاقتصادية للأسرة جيدة على الرغم من عملها: تؤثر سلبًا على صحة وتطور الأطفال.

الكلمات المفتاحية:

نقص الوزن، الأطفال دون سن السادسة، صنعاء، اليمن.

DEDICATION

This project is dedicated to our parents who have never failed to give us financial and moral support, to confront all our needs during our educational trip and for teaching us that even the largest task can be accomplished if it is done one step at a time.

To our family members who believed in us more than we believed in ourselves.

To our friends who give us the support and encouragement until this work was successfully done.

To our first love, Yemen.

Acknowledgments

First, our prayers are to Allah the most gracious the most merciful for helping us in completing this humble work.

Second, many warm thanks covered with our love and gratitude for the full support, encouragement and inspiration of our families.

Third, special thanks dedicated to

Dr. Ahmed Al-Shahethi,

Dr.Nora Noraldeen

and **Dr.Salwa Alghomairy**

for their professional notes, comments and accepting to be the supervisors of this study, we can't forget their role in encouraging us to finish this study and for their efforts at every step of this monumental work.

We are highly indebted to Faculty of Medicine, 21 September University of Medical & Applied Sciences to be our lighthouse that guides us always in our future and our dreams.

Finally, we would like to all those who contributed directly and indirectly to the success of this humble effort, to the people who contributed in finishing this study.

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ABREVIASSIONS

PEM	Protein Energy Malnutrition
WHO	World Health Organization
CDC	Centers for Disease Control and Prevention
GPs	General Practitioners
SPSS	Statistical Package for the Social Sciences

CHAPTER 1 : INTRODUCTION

1.1 Background

Malnutrition in all its forms includes undernutrition (wasting, stunting, and underweight), vitamins or minerals (micronutrient-related malnutrition), overweight, obesity, and the resulting diet-related non-communicable diseases (*WHO, 2023*). Malnutrition usually occurs as a deficiency in the intake of energy, protein, or micronutrients (*Mohseni, Aryankhesal, & Kalantari, 2019*). Around 45% of deaths among children under 5 years of age are linked to undernutrition. These mostly occur in low-, and middle-income countries (*WHO, 2023*).

Malnutrition "undernutrition", is one of the main causes of the death of children under the age of 5 years and is one of the most common causes of the decline in the health and life of children, which results in decreased learnability, inefficiency, and an inability to acquire skills

Malnutrition, or undernutrition contributes to the deaths of nearly half of the children under five years of age in Asia and Africa also Inadequate nutrition increases the risk of death due to the common infections, increasing the number and severity of the infections, and may lead to delayed recovery (*Mohseni, Aryankhesal, & Kalantari, 2019*).

Three important indicators used in estimating malnutrition are stunting (low height for age, wasting low weight for height and underweight low weight for age).

According to a UNICEF report in 2014, the prevalence of underweight, stunting, and wasting in the world was 15%, 25%, and 8%, respectively (*Mohseni, Aryankhesal, & Kalantari, 2019*).

1.2 In Eastern Mediterranean Region

Undernutrition is a significant public health concern in the Eastern Mediterranean Region (EMR), which includes 22 countries, including Yemen, Syria, and Iraq. According to a report by the World Health Organization (WHO), undernutrition affects approximately 30% of children under the age of five in the EMR (*World Health Organization, 2018*).

Undernutrition can take various forms, including stunting, wasting, and micronutrient deficiencies. Stunting, which is a measure of chronic undernutrition, affects approximately 25% of children under the age of five in the EMR. Wasting, which is a measure of acute undernutrition, affects approximately 8% of children under the age of five in the region. Underweight is ranging from 1.38% in Palestine to 39.0% in Yemen (*Al-Shameri, Al-Shahethi, & Wafa, 2022*). Micronutrient deficiencies, such as iron deficiency anemia and vitamin A deficiency, are also prevalent in the EMR (*UNICEF, 2018*).

Several factors contribute to undernutrition in the EMR, including poverty, conflict, displacement, and poor access to healthcare and education. The ongoing conflict in Syria, for example, has led to a significant increase in undernutrition among children, with an estimated 1.5 million children suffering from acute malnutrition (*United Nations, 2020*).

Addressing undernutrition in the EMR requires a multi-sectoral approach that involves collaboration between governments, non-governmental organizations, and the private sector. Strategies may include improving access to nutritious and affordable food, promoting healthy dietary patterns, enhancing food safety and hygiene, and strengthening health systems to support nutrition interventions.

1.3 In Yemen

According to the World Food Program, even before the war started, Yemen had one of the highest rates of malnutrition in the Arabian Peninsula (*Eshaq, Fothan, Jensen, Khan, & AlAmodi, 2017*).

Most researches says that more than 2.3 million children under the age of five in Yemen suffer from acute malnutrition (*Alves et al., 2022*).

A results of 2019 retrospective study of Yemeni nutrition surveillance programs for 5276 children under five in Ibb and Sana'a found that acute malnutrition in 13.3% of overall screened children (*Dureab et al., 2019*). Another study of 13,624 Yemeni children under 5 years of age shows that higher malnutrition level; the prevalence of stunting was 47%, wasting " acute malnutrition" was 16%, and underweight was 39% (*Al-Zangabila et al., 2021*).

1.4 Statement of the problem

Yemen is known to have some of the highest acute and chronic malnutrition rates in the world. Such emergency levels of acute and chronic malnutrition are second globally only to Afghanistan. Meanwhile, the proportion of underweight in Yemen is the third highest in the world after India and Bangladesh (*WFP, 2012, 2018*) With rates of chronic malnutrition this high, the physical and mental development of Yemeni children is severely at risk, a disadvantage from which they cannot recover. The situation is further exacerbated by high rates of acute malnutrition. At 13 percent, the situation in Yemen refers to the serious phase according to WHO standards. The factors affecting the malnutrition status are immediately linked to continuing civil war, the dismal economic situation and food insecurity in Yemen. To reduce the prevalence of malnutrition in Yemen is the main concern of the general public health, Millennium Development Goals (MDGs) and sustainable development goals (SDGs) where the factors related to malnutrition was poorly understood.

Over than 3.5 million mothers and children under five die unnecessarily each year due to the underlying cause of undernutrition, and millions more are permanently disabled by the physical and mental effects of poor dietary intake in the earliest months of life (*Black, Bhutta, Bryce, Morris, & Victora, 2013*). In Yemen, in 2015 the share of total national income per capita in Yemen amounted to about US\$ 1,140, and about 35 percent of the

population living in poverty. Total fertility rates remain among the highest in the world, and about 50% of the population under the age of 15 years (*United Nations., 2012*). Maternal mortality and child mortality less than a fifty-nine month in Yemen are the highest among Middle Eastern countries, and the presence of 148 per 100,000 live births and 53 per 1,000 live births, respectively. In addition, 16% of children under five Years are suffering from wasting, 39% are underweight and 47% are of stunting in 2015 (*MoPHP & CSO, 2015*).

Malnutrition is a tremendous burden on vulnerable children, particularly those living in a deteriorating social-economic situation. In addition, such children are more likely to be under a high risk of dying due to lack of resistance to common infectious diseases. On the other hand, it has been clearly evidenced that malnutrition is the underlying cause of the high mortality rate and stunting. In fact, stunting, underweight and the wasting of the body affect not only people's health but also their standard of living, economic and social situation as well as adversely affect the lives of individuals (*Alves et al., 2022*) (*MoPHP of Yemen, 2009*).

In Yemen, child mortality under five years, months recorded the highest prevalence rate in the Middle East (*MoPHP & CSO, 2015*). Moreover, it was found that the average birth weight of newborns in Yemen was 2.8 kg and 22% of them weighed between 0.7 and 2.5 kg (*Makki, 2002*). Furthermore, according to preliminary estimates of the Nutrition Cluster in October 2016 indicated that 4.5 million children, pregnant and lactating women require malnutrition treatment while in late 2014, 2.2 million children under five years required urgent humanitarian assistance to avoid further deterioration in their nutritional status. As a matter of fact, Severe Acute Malnutrition (SAM) blunts the child's intellect and makes them nine times more likely to die compared to their healthy peers, which poses a serious risk to the future of human development in Yemen (*MoPHP & IC, 2016*), for example, Yemen's situation is more severe compared to Somalia, Syria, Iraq and Afghanistan. This undoubtedly demonstrates the seriousness of the nutritional and humanitarian situation in Yemen (*IFPRI, 2016*). Recently, the Global Nutrition

Report (GNR) 2016 has indicated a relative decline in the prevalence of stunting and underweight in children under five years during 1997-2014, whereas acute malnutrition (wasting) has remained almost unaltered. However, those rates remained the highest in the world with nearly half of the children (46.5%) under five were chronically malnourished (stunted), 16.3% wasted and 39% underweight in 2014 (*MoPHP & IC, 2016*).

Nutritional status surveys (SMART) conducted by United Nations Children's Emergency Fund (UNICEF) and the Ministry of Public Health and Population (MoPHP) in nine governorates during 2015-2016 revealed alarming levels of malnutrition among children under five years of age (*MoPHP & IC, 2016*). The highest malnutrition prevalence was in Hodeida, where the Global Acute Malnutrition (GAM) reached 31%, and then the lowland in Taiz (25%), Hajjah (21%) and Lahj (21%) governorates (*MoPH&PoY & UNICEF, 2006*).

Moreover, an estimated 25% of women suffer from malnutrition than previous reports on the basis of body mass index (*MoPH&PoY & UNICEF, 2006*). The former reports prove that child malnutrition rates in Yemen represent chronic and structural challenges to human and economic development. Considering those situations, the current study is very important to describe and identify the predictors of the risk contributed to status of malnutrition children under five years' age in Yemen.

1.5 Research questions

1. What are the major risk factors of underweight for children between 6 months to 6 years in Yemen?
2. Does childhood nutritional outcome vary across households in Yemen?
3. Is there a relationship between sociodemographic and other factors and underweight?

1.6 Hypothesis

The null hypothesis (H0): There is no relationship between distal, intermediate and proximal factors and underweight.

The alternative hypothesis (H1): There is relationship between sociodemographic and other factors and underweight.

1.7 STUDY OBJECTIVES

1.7.1 General Objective

To assess the prevalence & risk associated factors of underweight (depend on CDC growth charts; weight-for-age)" in children aged between 6 months to 6 years among sons of female medical staffs in Sana'a city; Yemen: 2022

1.7.2 Specific Objectives

1. Assessing the prevalence of " underweight " among sons of female medical staffs in general hospitals of Sana'a city.
2. Describing the sociodemographic variables of respondents of the study.
3. Identifying the association between sociodemographic and other factors with underweight in children.
4. Determining the risk factors associated with malnutrition among children.

CHAPTER 2 : LITERATURE REVIEW

2.1 Epidemiology

Acute malnutrition is a responsible for almost one third of all deaths in children under 5 years of age and causes intellectual or cognitive impairment among those who survive. The estimated number of underweight children (weight-for-age Z score < -2) globally is 101 million, or 16% (*Dipasquale, Cucinotta, & Romano, 2020*).

Undernutrition has become a major public health concern, especially in developing countries. This prevalent threat affects around 165 million children under the age of 5 every year and causes 13million deaths globally during the same period (*Chowdhury et al., 2018; Müller & Krawinkel, 2005*). Almost half of these deaths caused by undernutrition among children have been reported in Asia alone (*R. E. Black et al., 2013*). Proper diet is an important determinant which leads to normal growth in children, thus proper attention needs to be given to the food, environment, health and hygiene of children (*Nigatu, Assefa Woreta, Akalu, & Yenit, 2018*).

There are many contributing factors which lead to being underweight in children. These include low birth weight of children, poor exclusive breast feeding, discouraged complementary diet, dietary diversity, parent's education, lack of nutrition knowledge, family planning, income status, limited access to adequate food and poor immunisation status (*Chowdhury et al., 2018; Sand et al., 2018*). In addition to these, personal hygiene and sanitation can also help reduce underweight children. These changes would result in a decrease in child mortality by 14%–31% (*Adhikari, Khatri, Paudel, & Poudyal, 2017*). The effect of child malnutrition is very harmful and leads to low physical and cognitive

development during childhood and affects educational accomplishment, health status and performance in labour market outcomes during adulthood, while also resulting in 15% of the total disability (*Ezzati et al., 2003; Nigatu et al., 2018*). Thus far, there is limited research evidence available to explore the determinants of undernutrition (underweight) in Pakistan. The studies that have previously been conducted are mostly based on either specific health facilities (*Baig-Ansari, Rahbar, Bhutta, Badruddin, & bulletin, 2006; Fikree, Rahbar, & Berendes, 2000*), small sample size (*Anwer, Awan, & Health, 2003*) or specific regions with limited covariates (*Shah, Selwyn, Luby, Merchant, & Bano, 2003*); however, no single research has employed a multilevel model to unravel variations at different levels of hierarchy within the data which can help explain the dynamics and, hence, provide robust results for sound policy formulation and interventions. This analysis investigates the association of being underweight as a dependent variable and maternal and child level characters, socioeconomic, demographic and regional factors. Therefore, the aim of this study is to identify possible interventions and indicator-specific programming that can help address the gap and decrease the incidence of underweight children in Pakistan

2.2 Chronic malnutrition

Low height-for-age is known as stunting. It is the result of chronic or recurrent undernutrition, usually associated with poor socioeconomic conditions, poor maternal health and nutrition, frequent illness, and/or inappropriate infant, young child feeding and care in early life. Stunting holds children back from reaching their physical and cognitive potential (*WHO, 2023*).

Both national and other international studies show that increasing a mother education level has a positive effect on child health. the odds of malnutrition decreased with the increase in the level of a mother education due to health knowledge, awareness of prenatal visits and vaccinations, fertility behavior and access to information (*Al-Zangabila et al., 2021; Ghafoor & Shahzadi*).

Therefore, rising education level among unemployed mothers increasing the probability of children's health but mother's employment had a negative effect on child health and increasing the possibility of malnutrition and stunting due to the malnutrition, decreasing in times of childcare and breastfeeding early postnatal return to work, and stress of work also, recent Indian study showed that - the children of nonworking mothers had better health statistics, and improvements in women's employment opportunities are consistently associated with worse child health (*Nankinga, Kwagala, & Walakira, 2019; Shahraki et al., 2018*).

Other factors effect on child health in addition to maternal education and job are paternal education and income and family members, also, being twins had a negative effect on children's health, therefore " Both family income and maternal time are important inputs to child health (*Afsharinia, Gurtoo, & Review, 2022; Page, Schaller, & Simon, 2019*).

2.3 Acute malnutrition or protein energy malnutrition

In 1959, Jelliffe introduced the term "Protein calorie malnutrition" which has been replaced by "Acute malnutrition". protein energy malnutrition defined as nutritional deprivation amongst children in developing countries.

All terms though refer to pediatric undernutrition as a state of nutrition in which deficiency of energy, protein, and other nutrients leads to measurable adverse effects on tissue and body functions, and a clinical outcome of growth deviation (*Dipasquale et al., 2020*).

CHAPTER 3 :METHODOLOGY

3.1 Study design

Our study is a descriptive prospective cross-sectional study to assess prevalence and risk associated factors of nutritional Underweight in children aged between 6 months to 6 years among sons of female medical staffs in Sana'a city, Yemen.

3.2 Study setting

This study conducted in Governmental (general) hospitals of Sana'a City Which are: -

1. Al -Thawra Modern General Hospital (TMGH).
2. Republican Teaching Hospital Authority or (Aljimhory Hospital).
3. Al_kwait University hospital
4. AlSabeen hospital of Maternity and childhood
5. Al-Zobiry Hospital
6. Military Hospital
7. 48 Model Hospital
8. AL-rawdha Hospital

Through the period (1st of May, 2022 to 30th of May, 2023)

3.3 Study Population

Children (males and females) of All Yemeni female health workers (doctors 'GPs & specialists' - nurses - laboratorians - Technicians) in the previous public hospitals

3.3.1 Inclusion criteria

- Children at age from 6 months to 6 years
- Child Who has Yemeni mother works in previous public hospitals as doctor, nurse, laboratorian or technician
- Child Who are cooperative.

3.3.2 Exclusion Criteria

- Child who his mother does not agree to participate in the study
- Children who are not inquiring the above inclusion criteria
- Children who are refuse the measurements taking / examination

3.4 Sample Size

Unfortunately, the sample population could not be collected for reasons, the most important of which is the inability to obtain a list of hospital employees' names from the hospital administration, and also the difficulty of interviewing all hospital female employees to register the employees' children who are within the age we specified

As the sample community is unknown, we used the following equation to determine the sample size

$$n = \frac{Z^2 \cdot (P[1 - P])}{e^2}$$

n = sample size

z = represents confidence; from Z-score table

- confidence at 95% $Z = 1.96$
 - $e =$ acceptable error 5% =0.05
 - $p =$ Estimated prevalence \sim [if unknown maximum = 0.5]
 - By assuming that 50% of female employees in the health aspect of government hospitals have children aged between 6 months and 6 years, and the assumption that 50% of them suffer from malnutrition.
- so, the estimated prevalence (p) = 25 % or 0.25.
- so, sample size = 288

3.5 Data Collection

Three tools used for data collection:

- Tool 1: **Questionnaire:** _

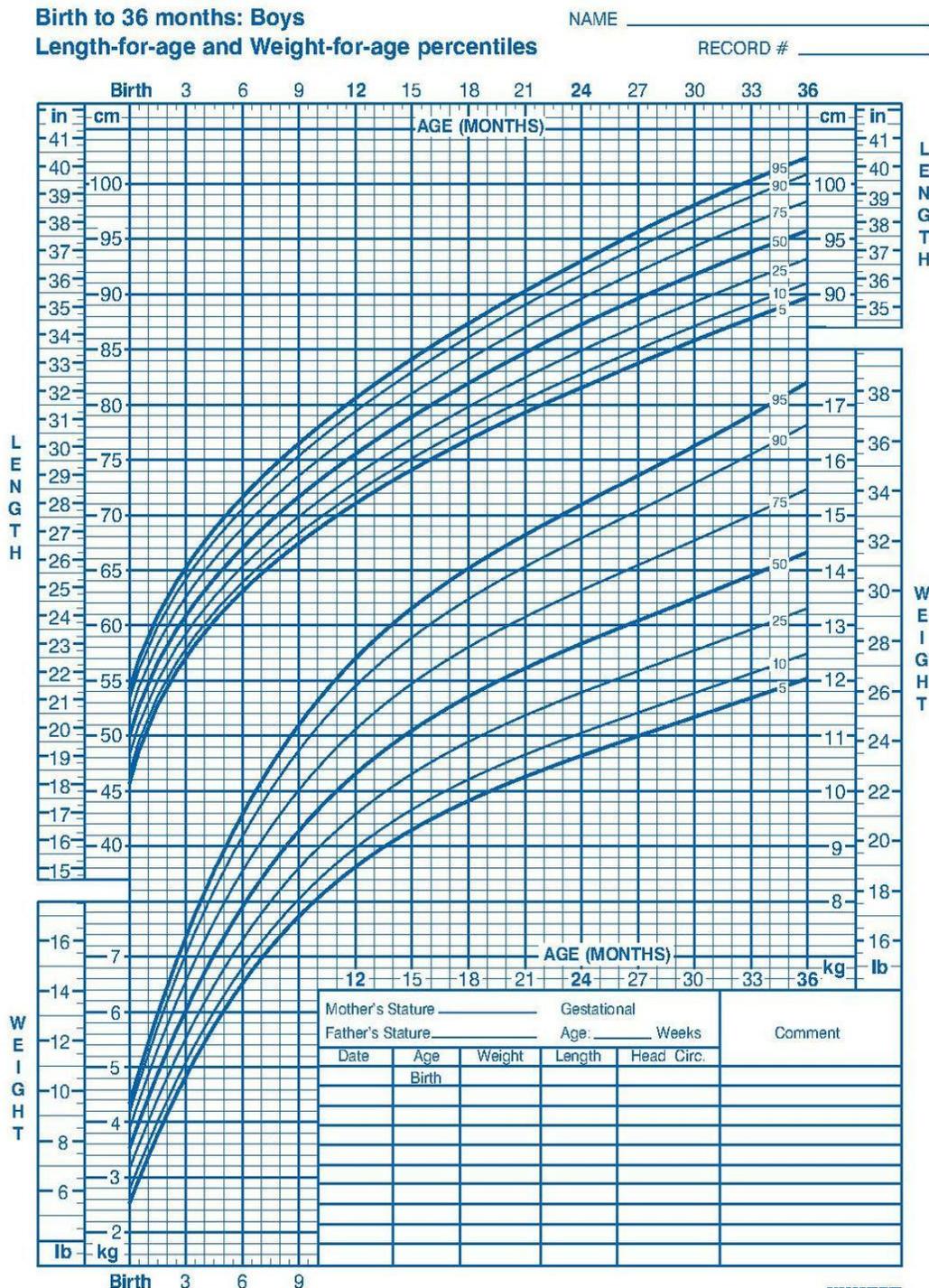
Interview structured questionnaire developed by. the researchers. The questionnaire covered: -

- **Socio - demographic and family-related factors:** (age, gender, residence, father occupation, father education level, family size..., etc.).
- **Mother's employment related factors** (mother age, education level, type of employment, daily time of work ...etc.)
- **Risk factors of Malnutrition** (birth weight, breast feeding period, number of meals etc.)

Tool 2: **Anthropometric Measurements**

- Weight

- Height
- Weight-for-age on CDC growth chart



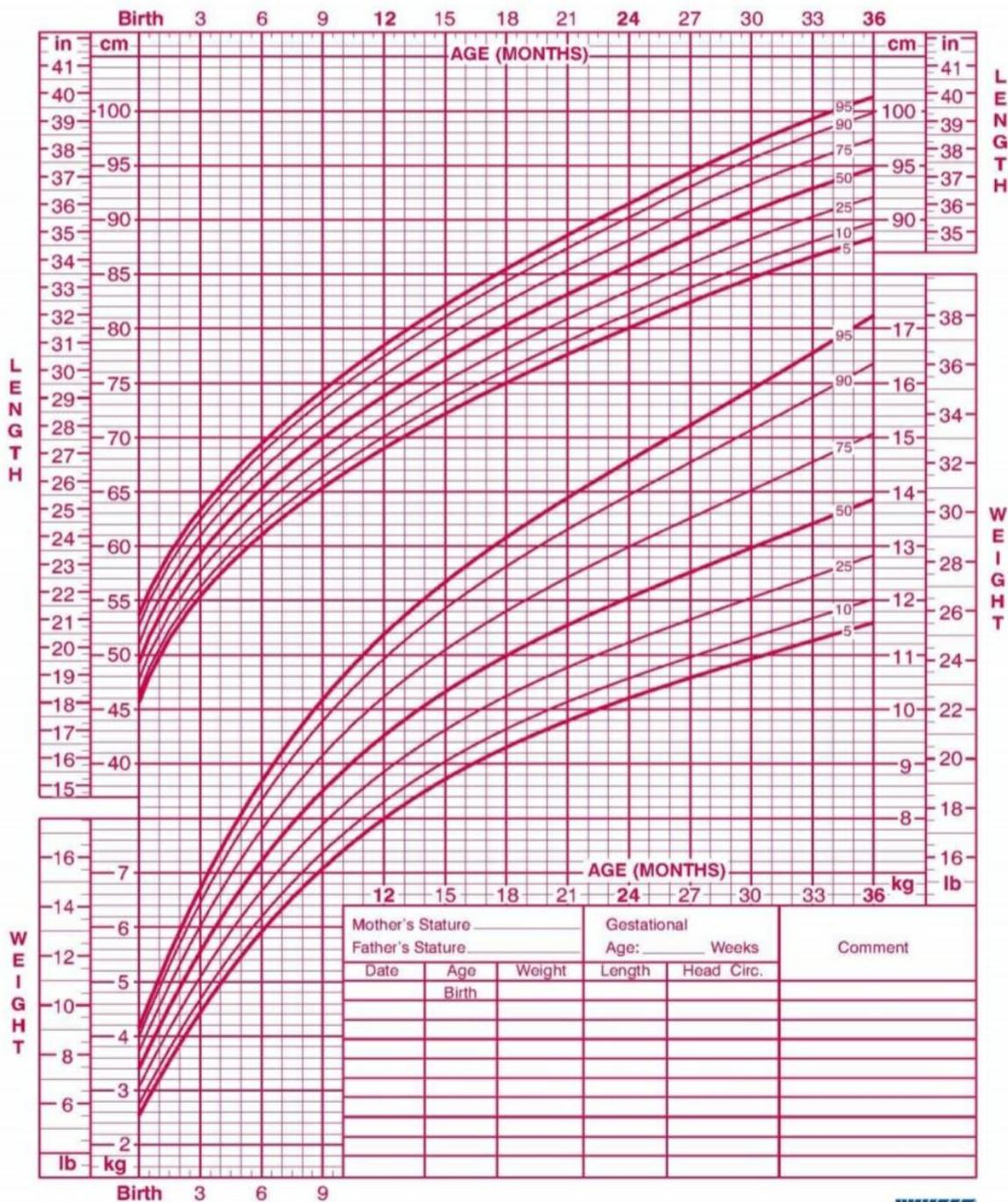
Published May 30, 2000 (modified 4/20/01).
 SOURCE: Developed by the National Center for Health Statistics in collaboration with
 the National Center for Chronic Disease Prevention and Health Promotion (2000).
<http://www.cdc.gov/growthcharts>



Birth to 36 months: Girls
Length-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



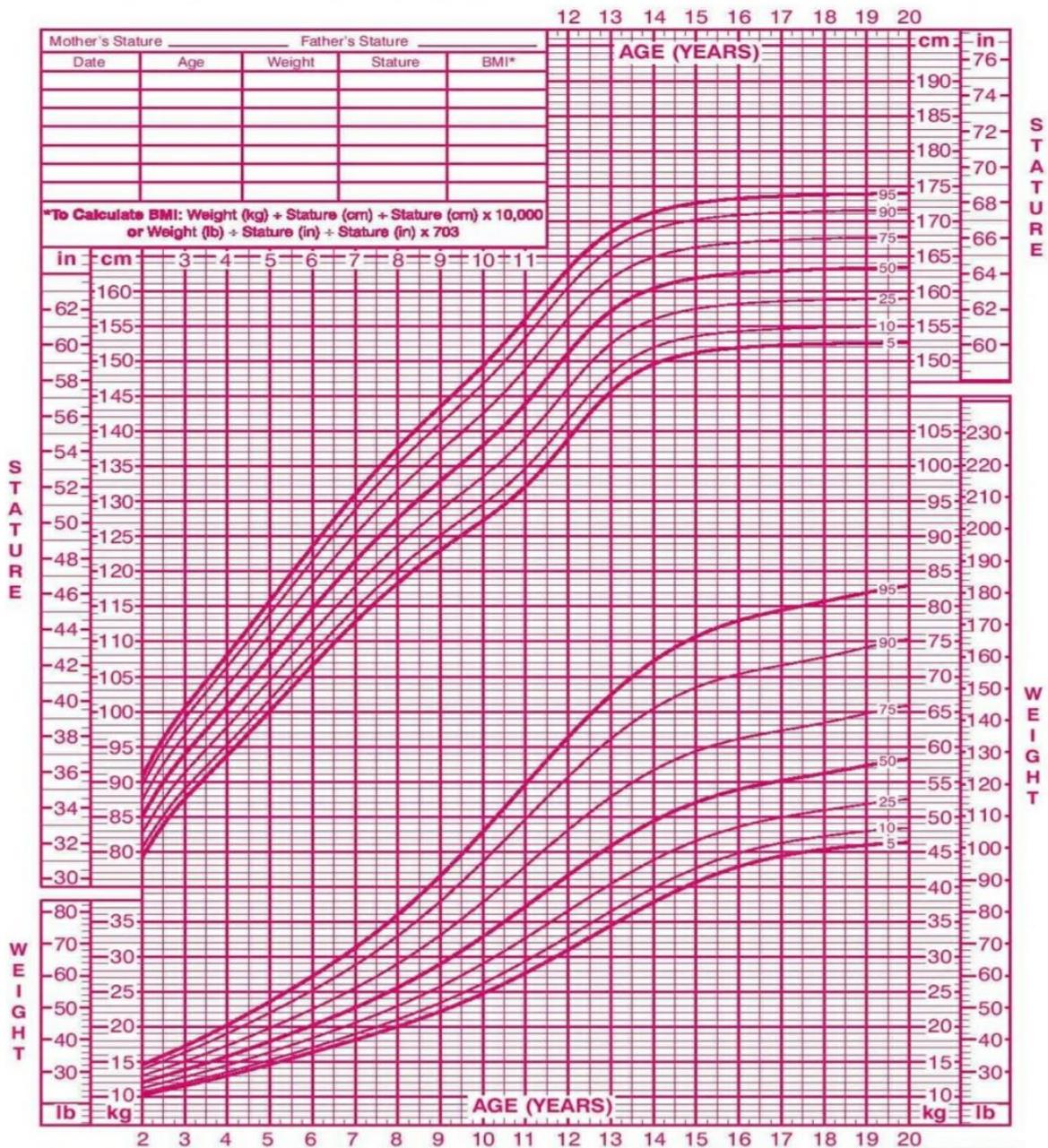
Published May 30, 2000 (modified 4/20/01).
 SOURCE: Developed by the National Center for Health Statistics in collaboration with the National Center for Chronic Disease Prevention and Health Promotion (2000).
<http://www.cdc.gov/growthcharts>



2 to 20 years: Girls
Stature-for-age and Weight-for-age percentiles

NAME _____

RECORD # _____



Published May 30, 2000 (modified 11/21/00).
 SOURCE: Developed by the National Center for Health Statistics in collaboration with
 the National Center for Chronic Disease Prevention and Health Promotion (2000).
<http://www.cdc.gov/growthcharts>



3.6 Ethical Consideration

- We started after a license and guidance from 21UMAS
- The purpose, benefits and procedure of the study explained to every medical worker (child mother), also oral approval obtained before Starting any procedure in the study.
- We were gentle with the children during the examination and taking measurements.
- Every one also had the right to refuse to participating the study.
- All data obtained was confidential and not used for purposes other than scientific research.

3.7 Data Analysis

- After collection of data from Structured questionnaire and anthropometric measurements, these data subjected to editing, followed by coding.
- A codebook developed to provide numerical results for analysis.
SPSS version 25.0 statistical software was used for analysis.
- The study used the Chi-Squared test to test the significant association between independent variables and being malnourished declared significant if p-value was less than 0.05.

CHAPTER 4 :DATA ANALYSIS

4.1 Introduction:

After excluding children who have congenital deformities and/or chronic diseases; This study was conducted on 278 female employees, including 116 nurses, 49 technicians, 49 laboratory technicians, 39 general practitioners, and 27 specialists, all of whom have at least one child between 6 months and 6 years. Information was collected through interviews with the mothers and questionnaires filled out by the researchers. About 45% of the children in the sample were weighed by the researchers themselves, while the weights of the rest were learned from their mothers.

This chapter provides the findings of the study that were generated from data analysis and its interpretation. This chapter starts with data screening which focuses on the way of coding and checking the missing data on SPSS, sample profile which is data about the respondents or subjects' characteristics (in tabular and/or graphical forms). Next, this chapter presents the results of the Chi-square Analysis.

4.2 Personal Data and Measurements:

Gender Frequency:

Gender was the once demographic variable that describes the gender of Children responding to the survey instrument as it is shown in Table 4.1 and Figure 4.1

Table 4.1 Frequency Distribution- gender of Respondents:

Gender	Frequency	Percent
Male	135	48.6%
Female	143	51.4%
Total	278	100.0%

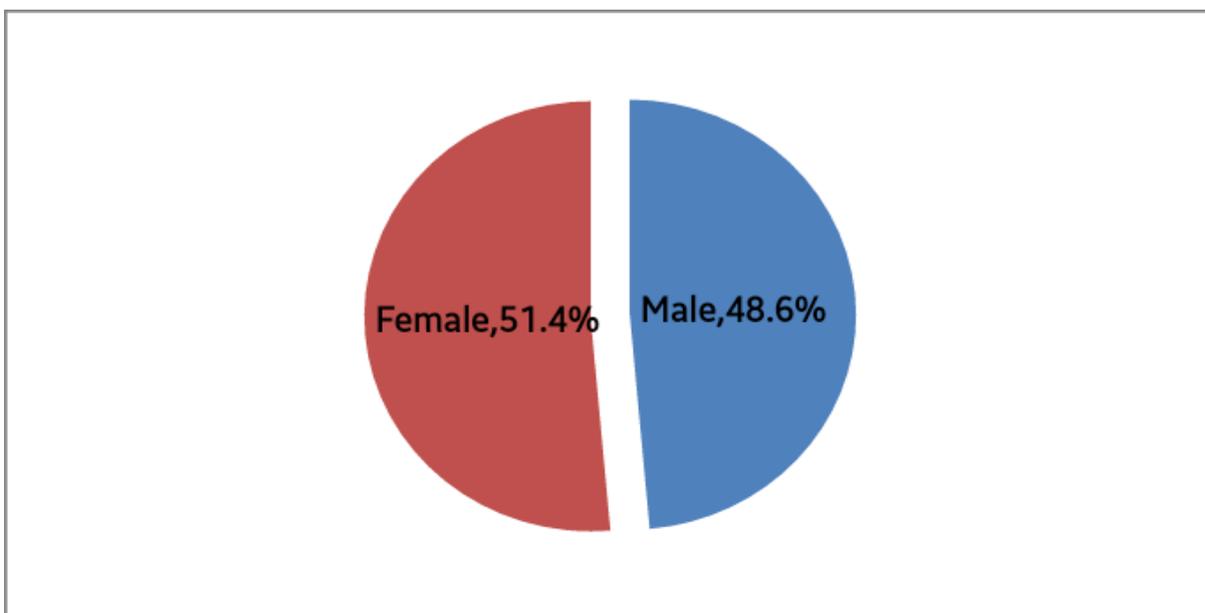


Figure 4.1: Frequency Distribution–gender of Children

Age Frequency:

Age was the second demographic variable which describes the respondents ages to the survey instrument. These data are presented in following Table 4.2 and Figure 4.2.

Table 4.2: Frequency Distribution–age of Respondents

Age	Frequency	Percent
Less than 1 years	48	17.3%
1 - 3 years	110	39.6%
4 years or more	120	43.2%
Total	278	100%

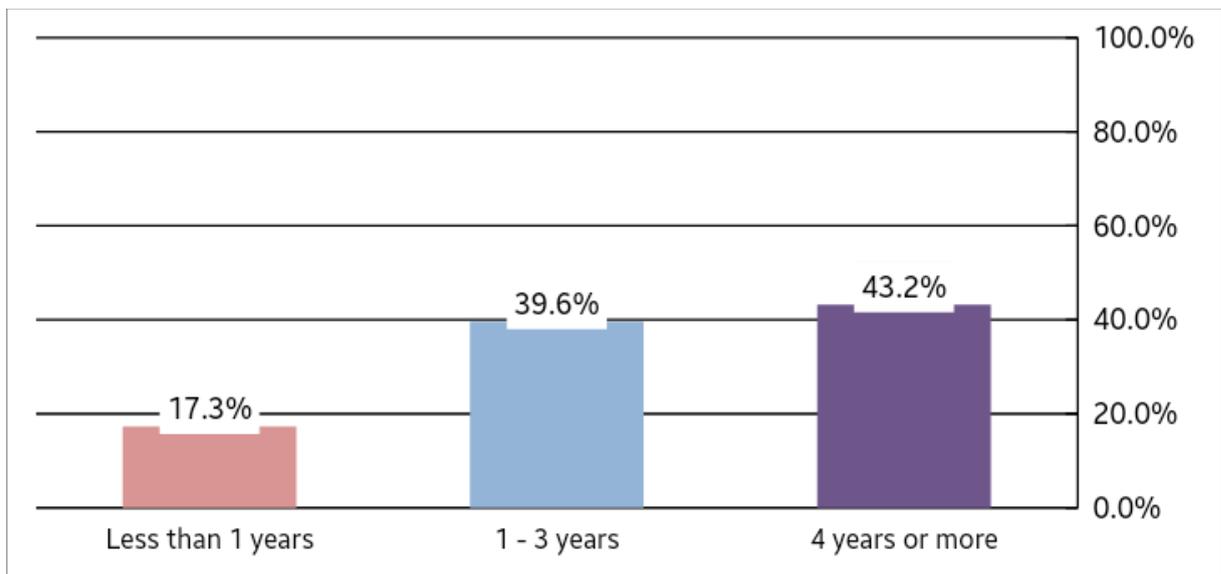


Figure 4.2: Frequency Distribution–age of Respondents

Weigh for Age on Growth Chart Frequency:

Weight-for-age on growth chart was the main variable of this study whereby we determined who was underweight by mean of 'below 5% on growth chart (weight-for-age chart) as it is shown in Table 4.3.

Table 4.3: Frequency Distribution–Weight-for-age on Growth Chart of Respondents

Weight-for-age on growth chart	Frequency	Percent
Below 5%	115	41.5%
5% - 25%	82	29.6%
25% - 50%	34	12.3%
50% -75%	21	7.6%
75% - 95%	11	4.0%
above 95%	14	5.1%
Total	277	100.0%

Table 4.3 shows that 115 children have a (below 5%) of standard deviation on growth chart with a percentage of 41.5% of children included in this study, which indicates malnutritional underweight according to CDC data tables, But CDC itself said that " Growth charts are not intended to be used as a sole diagnostic instrument. So This should be confirmed by other measurements and indexes

4.3 Family and Social Factors:

Family Members Frequency

The frequency distribution of this family members variable shows in Table 4.4 and Figure 4.3 that highest respondents have a (small family) that consists of parents and sons only with a percentage of 89.2% and a total number of 248 respondents. Only 30 respondents or 10.8% have a (large family) of the total number of respondents.

Table 4.4: Frequency Distribution– Family Member of Respondents

Family size	Frequency	Percent
Small	248	89.2%
Large	30	10.8%
Total	278	100.0%

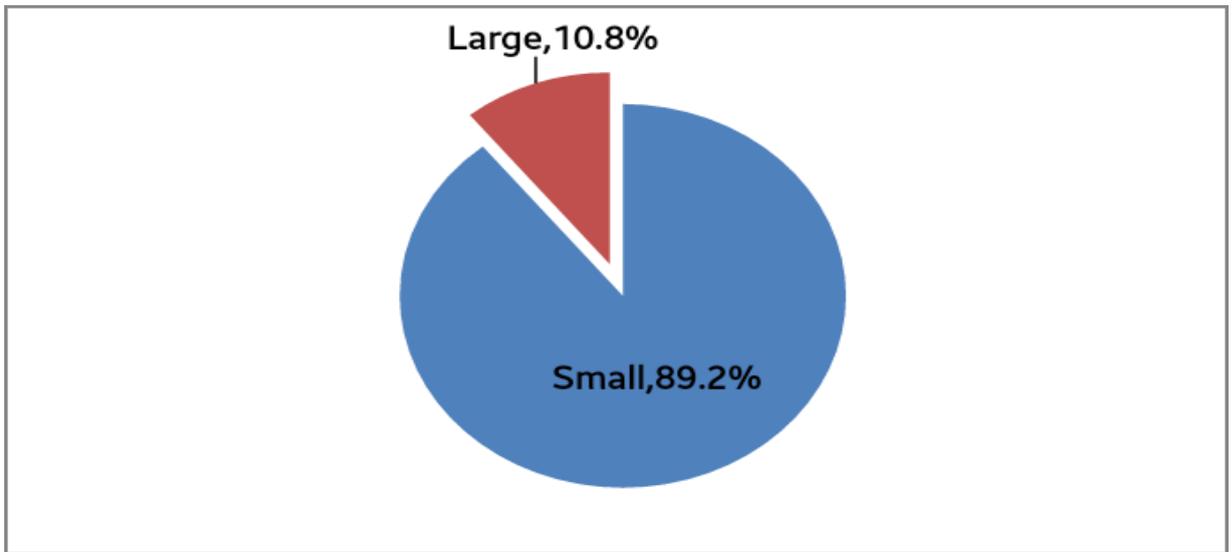


Figure 4.3: Frequency Distribution– Family Member of Respondents

Family Members Frequency:

The frequency distribution of this family members variable shows in Table 4.5 and Figure 4.4 that highest respondents have a (from 4 to 6) with a percentage of 64.7% and a total number of 180 respondents. 25.2% of the total respondents have (less than 4) and this represents the second among respondents with 70 persons. only 28 respondents or 10.1% have a (more than 6) of the total number of respondents.

Table 4.5: Frequency Distribution– Family Members of Respondents

Family Members	Frequency	Percent
Less than 4	70	25.2%
From 4 to 6	180	64.7%
More than 6	28	10.1%
Total	278	100.0%

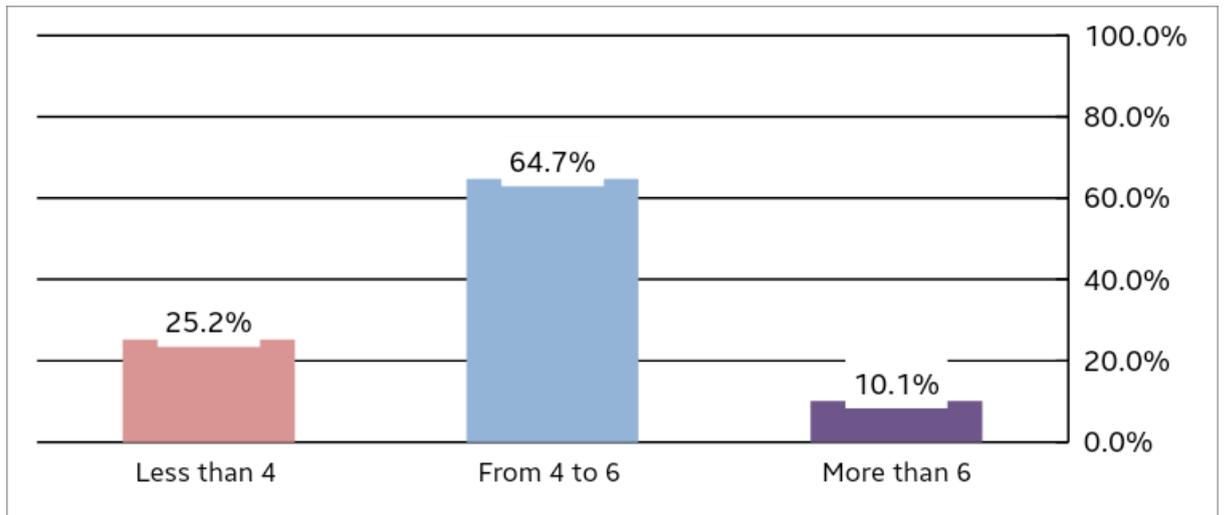


Figure 4.4: Frequency Distribution– Family Members of Respondents

Numbers of Children Frequency:

The result of numbers of children distribution illustrated shows in Table 4.6 and Figure 4.5

Table 4.6: Frequency Distribution– Numbers of Children of Respondents

Numbers of Children	Frequency	Percent
Less than 4	243	87.4%
From 4 to 6	30	10.8%
More than 6	5	1.8%
Total	278	100%

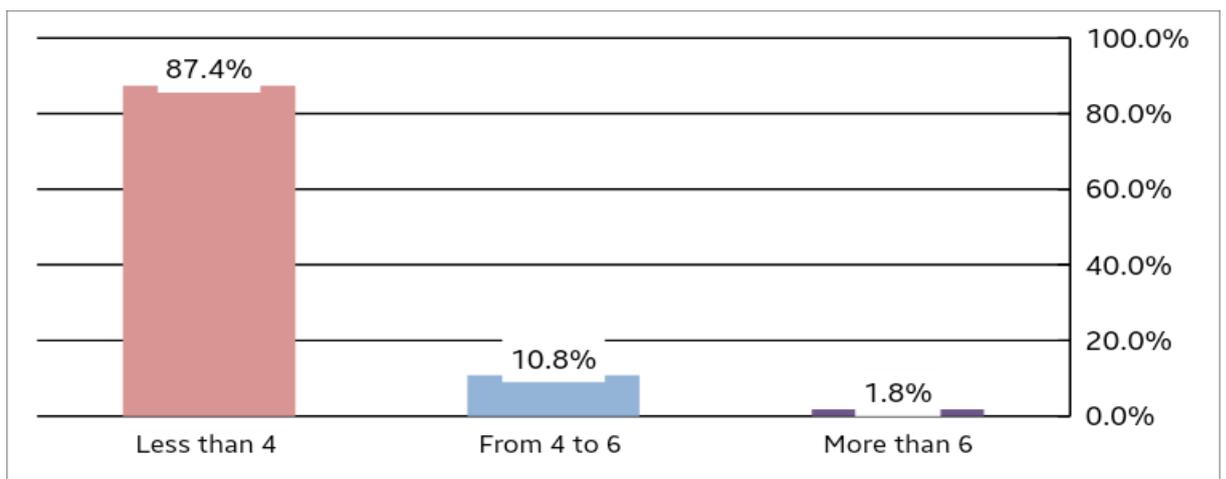


Figure 4.5: Frequency Distribution– Numbers of Children of Respondents

Numbers of Children under 6 years Frequency:

The result of numbers of children under 6 years distribution illustrated shows in Table 4.7.

Table 4.7: Frequency Distribution– Numbers Of children under 6 years of Respondents

Numbers of Children under 6 years	Frequency	Percent
One	161	55.9%
Two	100	36.0%
Three and more	17	6.1%
Total	278	100%

Father's Educational Level Frequency:

The result of father's educational level distribution illustrated shows in Table 4.8 and Figure 4.6 that the greatest number of the respondents was in (academic) with total number of (185) respondents and represent (66.5%) of the total respondents. Then another group followed by respondents (secondary) with total number of (73) respondents and represent (26.3%) of the total respondents. The last group was with (basic) with (20) respondents and represents (7.2%) of the total respondents.

Table 4.8: Frequency Distribution– Father's Educational Level of Respondents

Father's Educational Level	Frequency	Percent
Basic	20	7.2%
Secondary	73	26.3%
Academic	185	66.5%
Total	278	100%

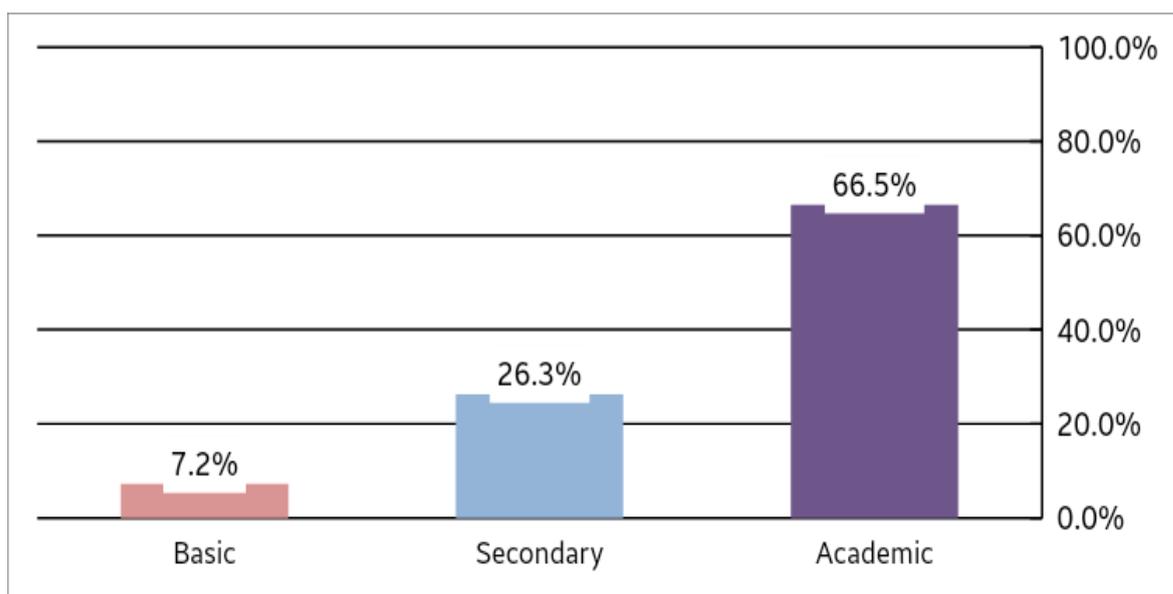


Figure 4.6: Frequency Distribution– Father's Educational Level of Respondent

Father's Job Frequency:

The result of father's job distribution illustrated shows in Table 4.9

Table 4.9: Frequency Distribution– Father's Job of Respondents

Father's Job	Frequency	Percent
Daily wages / No job	82	29.5%
Governmental sector	87	31.3%
Private sector	109	39.2%
Total	278	100%

Child's Living Situation Frequency:

The result of child's living situation distribution illustrated shows in Table 4.10 and Figure 4.7 that the greatest number of the respondents live (with father and mother) with total number of (257) respondents and represent (92.4%) of the total respondents. Then another group followed by those lives (with father) with total number of (15) respondents and represent (5.4%) of the total respondents. The last group that lives (with mother) with (6) respondent and represents (2.2%) of the total respondents.

Table 4.10: Frequency Distribution– Child's living situation of Respondents

Child's living Situation	Frequency	Percent
With father and mother	257	92.4%
With father	15	5.4%
With mother	6	2.2%
Total	278	100%

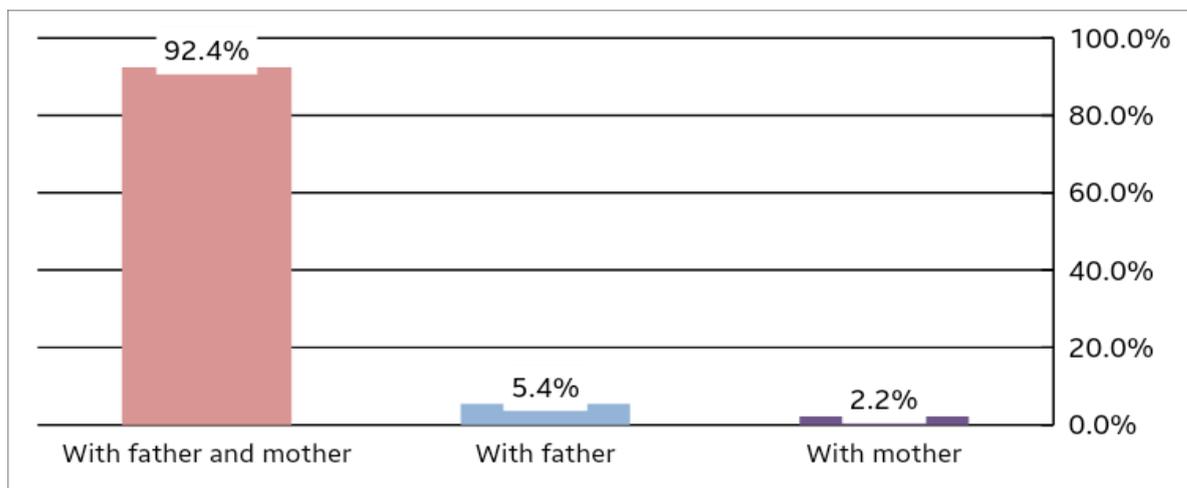


Figure 4.7: Frequency Distribution– Child's living Situation of Respondents

Child's School Frequency:

The result of child's school distribution illustrated shows in Table 4.11 and Figure 4.8 that the greatest number of the respondents was in (especially) with total number of (87) respondents and represent (60.0%) of the total respondents. the last group was with (governmental) with (58) respondents and represents (40.0%) of the total respondents, rest of respondents have not children at school age.

Table 4.11: Frequency Distribution Child's School of Respondents

Child's School	Frequency	Percent
Governmental	58	40.0%
Especially	87	60.0%
Total	145	100%

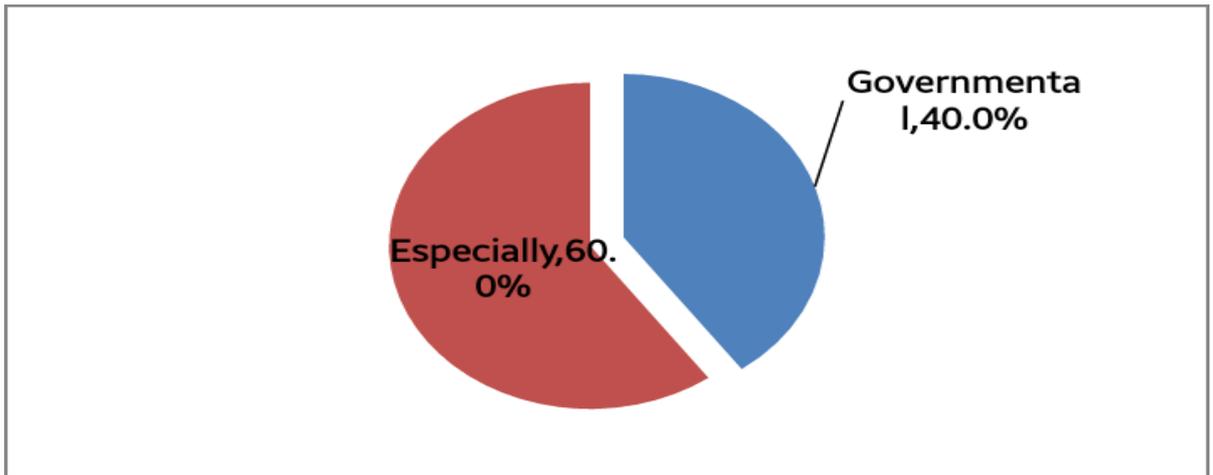


Figure 4.8: Frequency Distribution Child's School of Respondents

Home Frequency:

The result of home distribution illustrated shows in Table 4.12 and Figure 4.14 that the greatest number of the respondents was in (rent) with total number of (168) respondents and represent (60.4%) of the total respondents. The last group was with (own) with (110) respondents and represents (39.6%) of the total respondents.

Table 4.12: Frequency Distribution– Home of Respondents

Home	Frequency	Percent
Own	110	39.6%
Rent	168	60.4%
Total	278	100%

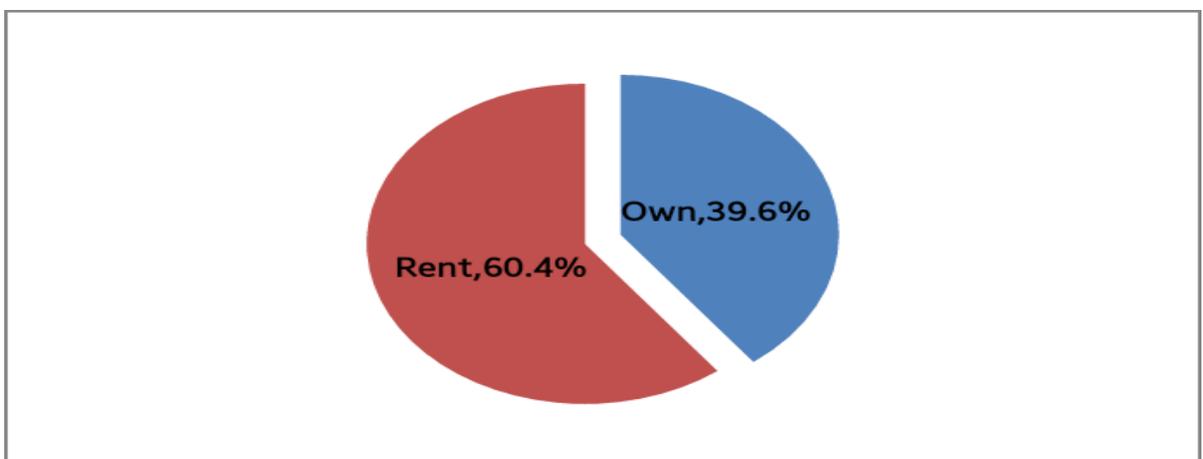


Figure 4.9: Frequency Distribution– Home of Respondents

4.4 Factors Related to the mother's job:

Mother's Age Frequency:

The result of the mother's age distribution in Table 4.13 illustrated that the greatest number of the respondents was (from 20 to 30 years old) with total number of (150) respondents and represent (54.0%) of the total respondents. Then another mother's age group followed by respondents aged (31 to 40 years) with total number of (120) respondents and represent (43.2%) of the total respondents. The last mother's age group was with (more than 40 years) with 8 respondents and represents (2.9%) of the total respondents.

Table 4.13: Distribution Mother's Age of Respondents

Mother's age	Frequency	Percent
20 - 30 years	150	54.0%
31 - 40 years	120	43.2%
More than 40 years	8	2.9%
Total	278	100%

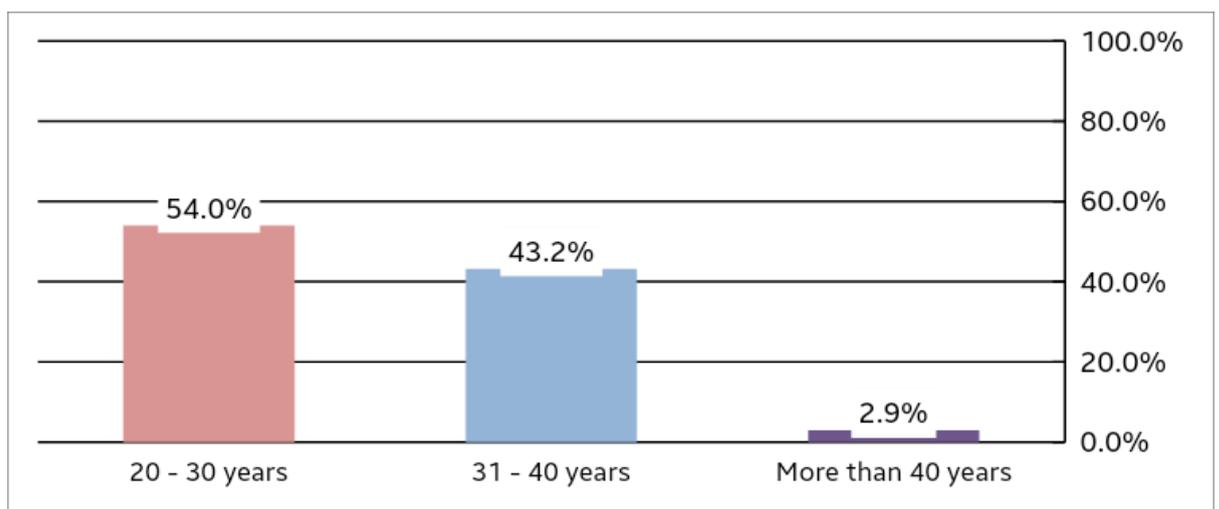


Figure 4.10: Distribution Mother's Age of Respondents

Job Period Time Frequency

The result of the job period distribution in Table 4.14 illustrated that the greatest number of the respondents was (more than 6 years) with total number of (133) respondents and represent (47.8%) of the total respondents. Then another job period group followed by respondents (less than 3 years) with total number of (74) respondents and represent (26.6%) of the total respondents. The last job period group was with (3 - 6 years) with 71 respondents and represents (25.5%) of the total respondents.

Table 4.14: Distribution- Work Time of Respondents

Work Time	Frequency	Percent
Less than 3 years	74	26.6%
3 - 6 years	71	25.5%
More than 6 years	133	47.8%
Total	278	100%

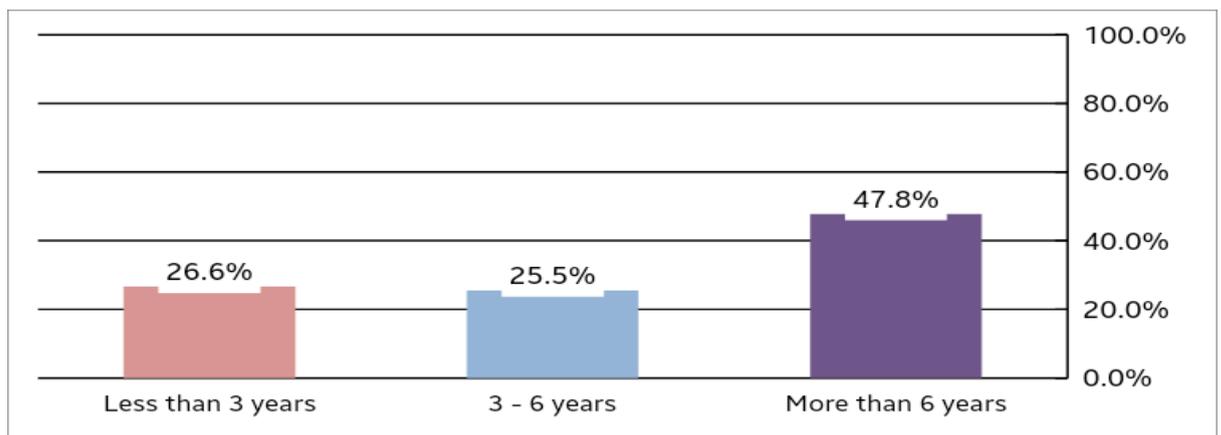


Figure 4.11: Distribution-Work Time of Respondents

Work Place Frequency:

The result of the work place distribution in Table 4.17 illustrated that the greatest number of the respondents was (hospital only) with total number of (221) respondents and represent (79.5%) of the total respondents. Then another work place group followed by respondents (private job with hospital) with total number of (45) respondents and represent (16.2%) of the total respondents. The last work place group was with (all of the above) with 3 respondents and represents (1.1%) of the total respondents.

Table 4.15: Distribution– Work Place of Respondents

Work Place	Frequency	Percent
Hospital only	221	79.5%
Private Job with Hospital	45	16.2%
Hospital with Clinic	9	3.2%
All of the above	3	1.1%
Total	278	100%

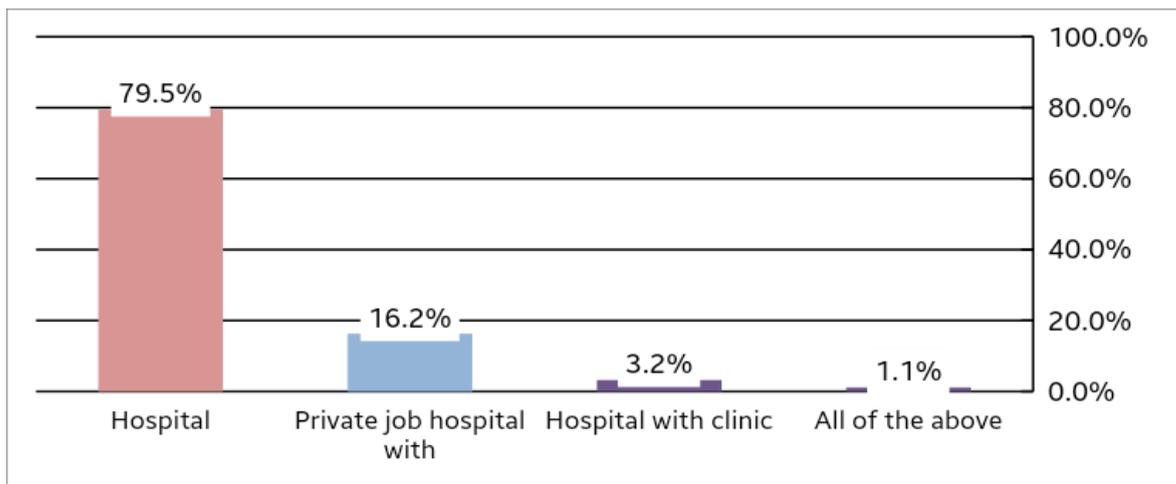


Figure 4.12: Distribution– Work Place of Respondents

Type of the Job Frequency:

The result of the type of the job distribution in Table 4.16 illustrated that the greatest number of the respondents was (nurse) with total number of (116) respondents and represent (41.7%) of the total respondents. Then another type of the job group followed by respondents (technical) and (laboratory) with total number of (49) respondents and represent (17.6%) of the total respondents. The last type of the job group was with (specialist) with 27 respondents and represents (9.7%) of the total respondents.

Table 4.16: Distribution– Type of the Job of Respondents

Type of the Job	Frequency	Percent
Technical	49	17.6%
Laboratory	49	17.6%
Nurse	116	41.7%
General practitioners	37	13.3%
Specialist	27	9.7%
Total	278	100%

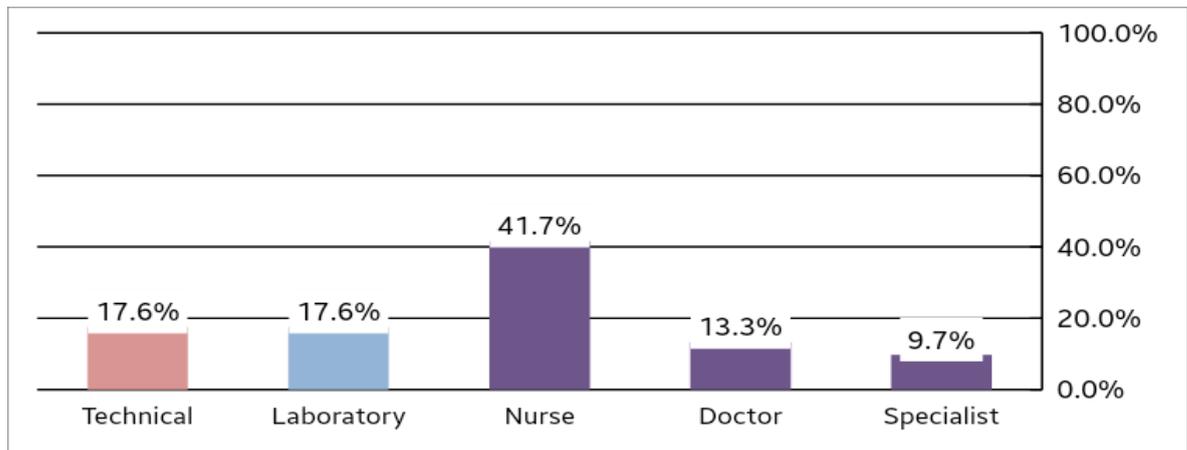


Figure 4.13: Distribution– Type of the Job of Respondents

Number of Working Days Frequency:

The result of the number of working days distribution in Table 4.17 illustrated that the greatest number of the respondents was (5 day per week) with total number of (101) respondents and represent (36.3%) of the total respondents. Then another number of working days group followed by respondents (less than 4 day per week) with total number of (53) respondents and represent (19.1%) of the total respondents. The last number of working days' group was with (4 days per week) with 29 respondents and represents (10.4%) of the total respondents.

Table 4.17: Distribution– Number of working days of Respondents

Number of working days	Frequency	Percent
Every day	47	16.9%
6 Day per week	48	17.3%
5 Day per week	101	36.3%
4 Day per week	29	10.4%
Less than 4 day per week	53	19.1%
Total	278	100%

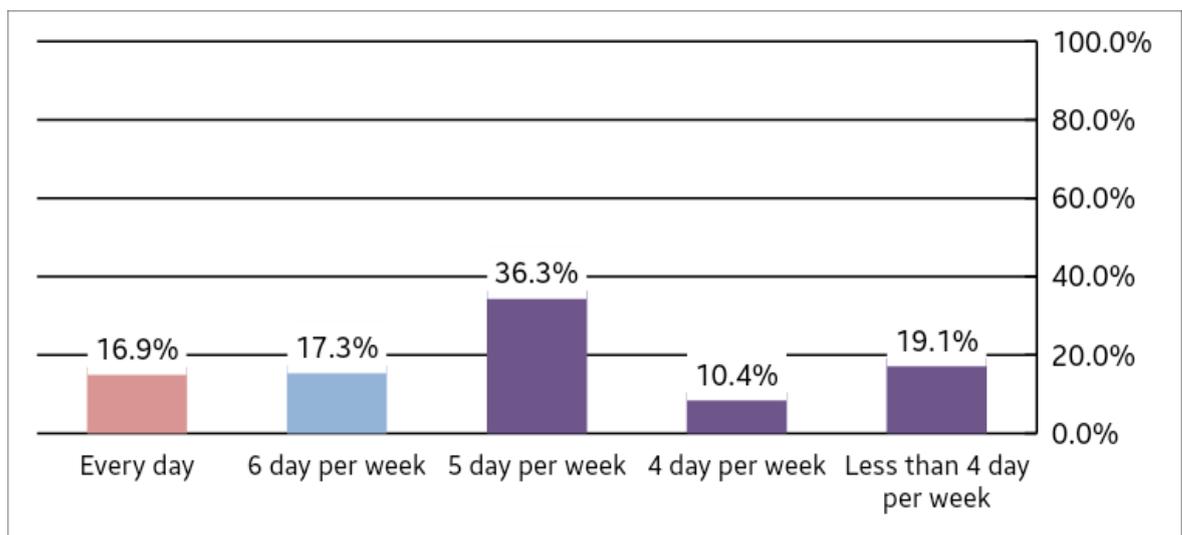


Figure 4.14: Distribution– Number of Working Days of Respondents

Average working hours per day Frequency:

The result of the average working hours per day distribution in Table 4.18 illustrated that the greatest number of the respondents was (6 to 12 hours) with total number of (162) respondents and represent (58.3%) of the total respondents. Then another average working hours per day group followed by respondents (less than 6 hours) with total number of (85) respondents and represent (30.6%) of the total respondents. The last average working hours per day group was with (more than 12 hours) with 31 respondents and represents (11.2%) of the total respondents.

Table 4.18: Distribution– Average working hours per day of Respondents

Average Working Hours per Day	Frequency	Percent
Less than 6 Hours	85	30.6%
6 to 12 Hours	162	58.3%
More than 12 Hours	31	11.2%
Total	278	100%

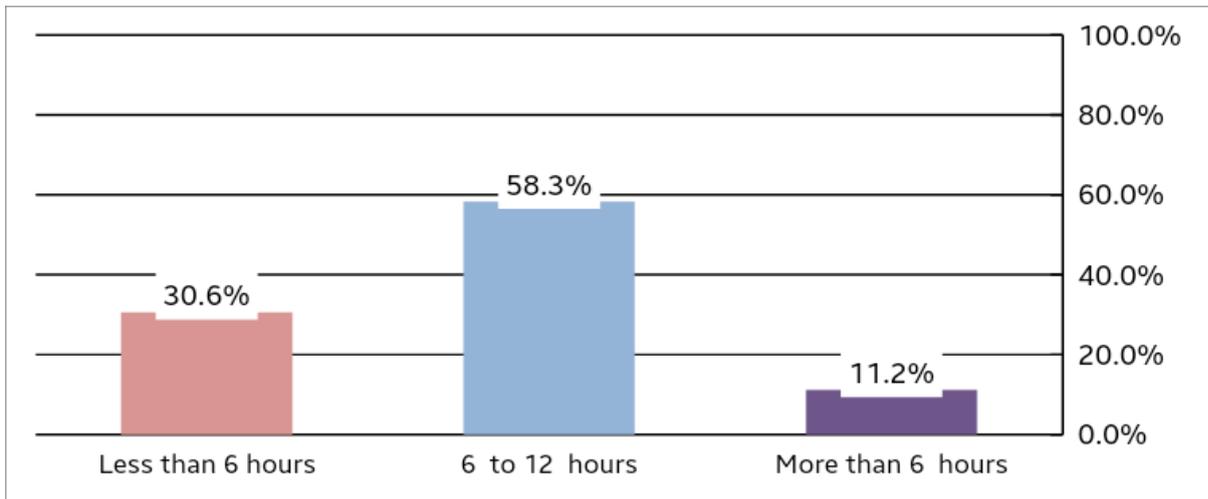


Figure 4.15: Distribution– Average working hours per day of Respondents

If the mother is busy in work, where do you usually put the child?

The result of the If the mother is busy with work, where do you put the child distribution in Table 4.19 illustrated that the greatest number of the respondents was (at a relative) with total number of (101) respondents and represent (36.3%) of the total respondents. Then another group followed by respondents (at home with a housewife) with total number of (90) respondents and represent (32.4%) of the total respondents. The last group was with (at home with no housewife) with 11 respondents and represents (4.0%) of the total respondents.

Table 4.19: Distribution– If the mother is Busy in work, where do you usually put the child of Respondents

If the mother is busy with work, where do you usually put the child?	Frequency	Percent
At home with a housewife	90	32.4%
At home with no housewife	11	4.0%
At a relative	101	36.3%
At one of the neighbors	12	4.3%
In the hospital's kindergarten	64	23.0%
Total	278	100%

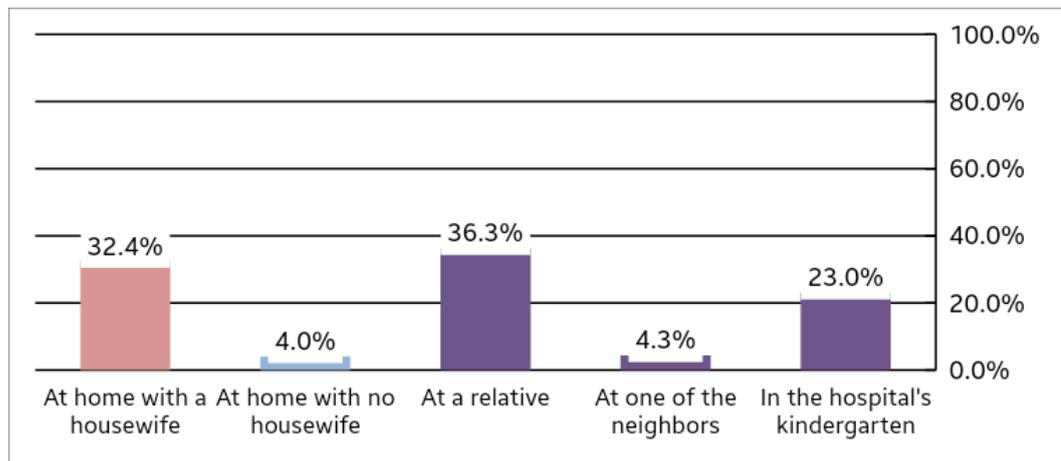


Figure 4.16: Distribution– If the mother is busy with work, where do you put the child of Respondents

4.5 Other factors:

Pregnancy period Frequency:

The result of the pregnancy period distribution in Table 4.20 illustrated that the greatest number of the respondents was (37 to 42 weeks) with total number of (243) respondents and represent (87.4%) of the total respondents. Then another pregnancy period group followed by respondents (less than 37 weeks) with total number of (25) respondents and represent (9.0%) of the total respondents. The last pregnancy period group was with (more than 42 weeks) with 10 respondents and represents (3.6%) of the total respondents.

Table 4.20: Distribution– Pregnancy period of Respondents

Pregnancy period	Frequency	Percent
Less than 37 weeks	25	9.0%
37 to 42 weeks	243	87.4%
More than 42 weeks	10	3.6%
Total	278	100%

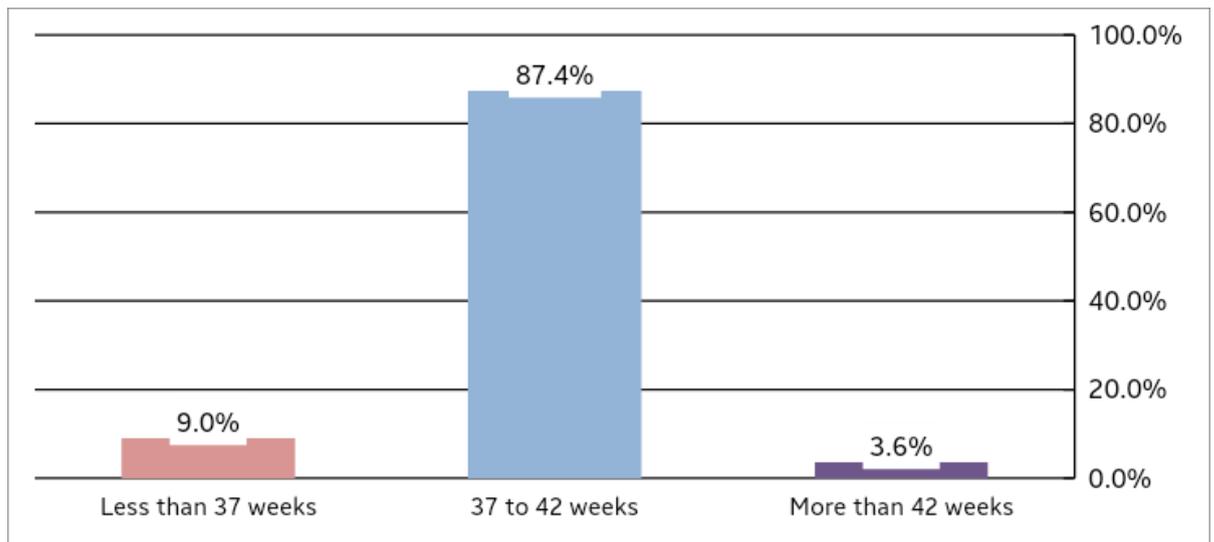


Figure 4.17: Distribution– Pregnancy period of Respondents

Baby weight at birth Frequency:

The result of the baby weight at birth distribution in Table 4.21 illustrated that the greatest number of the respondents was (2.5 to 4 kg) with total number of (183) respondents and represent (65.8%) of the total respondents. Then another baby weight at birth group followed by respondents (less than 2.5 kg) with total number of (81) respondents and represent (29.1%) of the total respondents. The last baby weight at birth group was with (more than 4 kg) with 14 respondents and represents (5.0%) of the total respondents.

Table 4.21: Distribution– Baby weight at birth of Respondents

Baby weight at birth	Frequency	Percent
Less than 2.5 kg	81	29.1%
2.5 to 4 kg	183	65.8%
More than 4 kg	14	5.0%
Total	278	100%

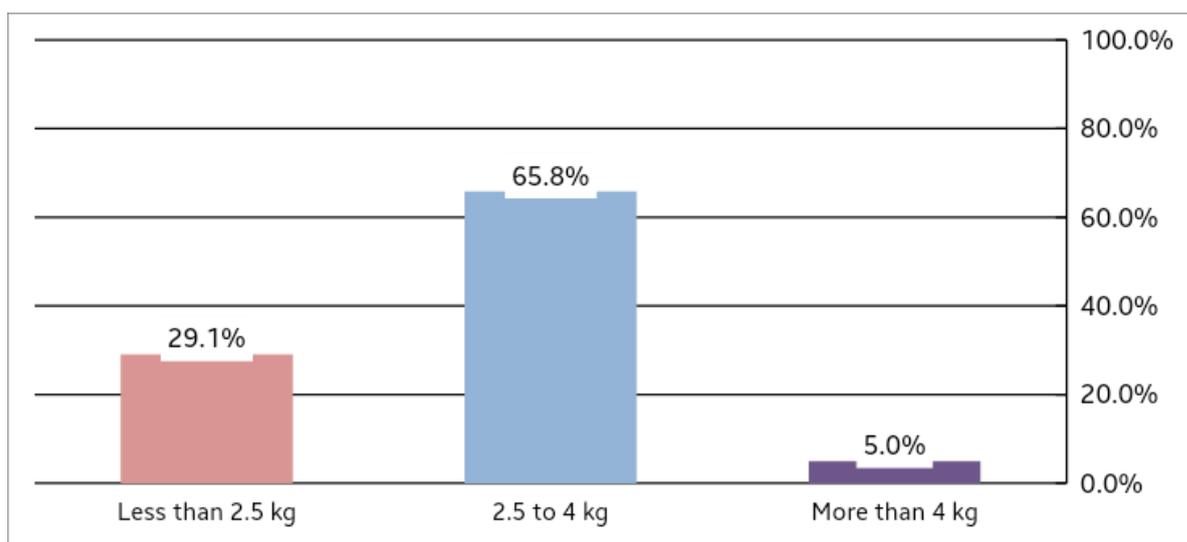


Figure 4.18: Distribution– Baby weight at birth of Respondents:

Breastfeeding period Frequency:

The result of the breastfeeding period distribution in Table 4.22 illustrated that the greatest number of the respondents was (more than 6 months) with total number of (168) respondents and represent (60.4%) of the total respondents. Then another breastfeeding period group followed by respondents (less than 6 months) with total number of (74) respondents and represent (26.6%) of the total respondents. The last breastfeeding period group was with (6 months) with 36 respondents and represents (12.9%) of the total respondents.

Table 4.22: Distribution– Breastfeeding period of Respondents

Breastfeeding period	Frequency	Percent
Less than 6 months	74	26.6%
6 months	36	12.9%
More than 6 months	168	60.4%
Total	278	100%

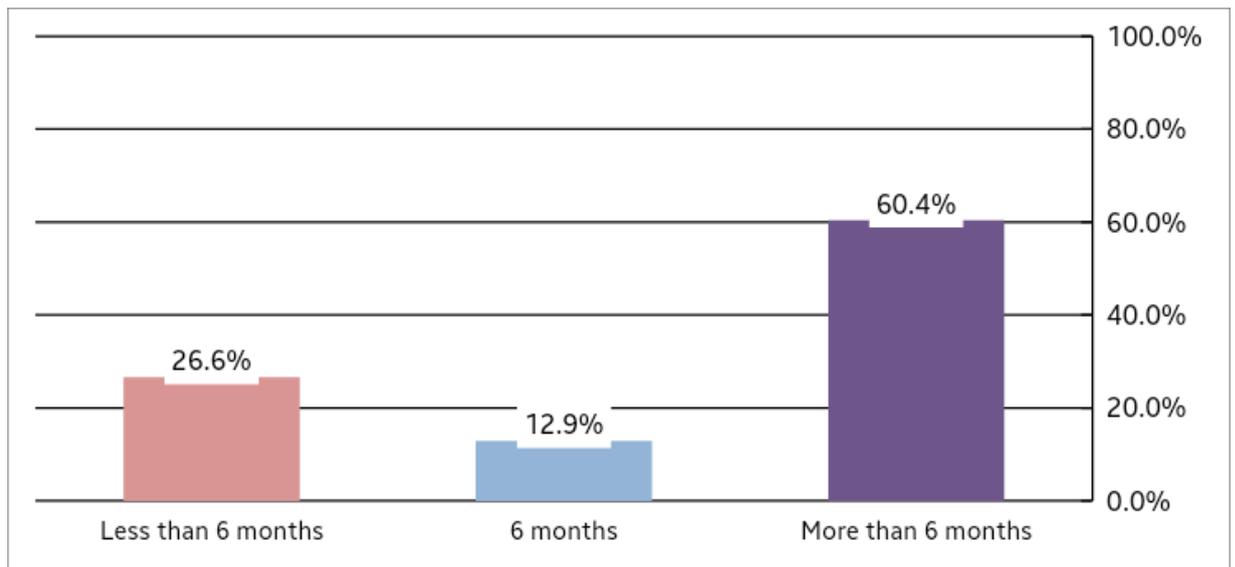


Figure 4.19: Distribution– Breastfeeding period of Respondents

4.6 Association between personal factors and underweight:

4.6.1 Association between Gender, Age and underweight:

The table 4.23 show that there was a significant relationship between the two variables, $X^2(N=277) = 4.77$, $p = .029$. Male child was less likely to suffer from underweight compared to female.

Table 4.23: Association between Gender & age and underweight (n = 277)

Factors	Category	Growth chart below 5% n (%) 115 (41.5)	Growth chart equal and more 5% n (%)162 (58.5)	X^2	P
Gender	Male	65 (56.5)	70 (43.2)	4.77	0.029*
	Female	50 (43.5)	92 (56.8)		
Age	Less than 1 years	19 (16.5)	29 (17.9)	5.064	0.08
	1 - 3 years	54 (47.0)	55 (34.0)		
	4 years or more	42 (36.5)	78 (48.1)		

4.6.2 Association between family and social factors and underweight:

The table 4.24 presents a chi-square test of independence was performed to evaluate the relationship between family size and father's job and underweight. The relationship between these variables was significant, $\chi^2 (N = 277) = 4.734, p = 0.030$. and $\chi^2 (N = 277) = 10.579, p = 0.014$, respectively. Small family size and father's job in Governmental sector were more likely to underweight.

Table 4.24: Association between family and social factors and underweight (n = 277)

Factors	Category	Growth chart below 5% n (%) 115 (41.5)	Growth chart equal and more 5% n (%) 162 (58.5)	X ²	P
Family size	Small	97 (84.3)	150 (92.6)	4.734	0.030*
	Large	18 (15.7)	12 (7.4)		
Family member	Less than 4	30 (26.1)	40 (24.7)	2.156	0.34
	From 4 to 6	70 (60.9)	109 (67.3)		
	More than 6	15 (13.0)	13 (8.0)		
Numbers of children	Less than 4	98 (85.2)	144 (88.9)	0.998	0.607
	From 4 to 6	15 (13.0)	15 (9.3)		
	More than 6	2 (1.7)	3 (1.9)		
Numbers Of children under 6 years	One	68 (59.1)	93 (57.4)	0.436	933
	Two	39 (33.9)	60 (37.0)		
	Three and more	8 (7.0)	9 (5.6)		
Father's educational level	Basic	7 (6.1)	13 (8.0)	1.85	0.397
	Secondary	35 (30.4)	38 (23.5)		
	Academic	73 (63.5)	111 -68.5		

Father's job	Not working / Daily wages	40 (34.8)	42 (25.9)	10.579	0.014*
	Governmental sector	42 (36.5)	44 (27.2)		
	Private sector	33 (28.7)	76 (46.9)		
Child's living situation	With father and mother	104 (90.4)	152 (93.8)	1.124	0.57
	With father only	8 (7.0)	7 (4.3)		
	With mother only	3 (2.6)	3 (1.9)		
Child's school	Governmental	26 (44.8)	32 (36.8)	0.939	0.333
	Especially	32 (55.2)	55 (63.2)		
Home	Own	42 (36.5)	68 (42.0)	0.835	0.361
	Rent	73 (63.5)	94 (58.0)		

4.6.3 Association between factors related to the mother's job and underweight:

Table 4.25: Association between factors related to the mother's job and underweight (n = 277)

Factors	Category	Growth chart below 5% n (%) 115 (41.5)	Growth chart equal and more 5% n (%) 162 (58.5)	X ²	P
Mother's age	20 - 30 years	66 (57.4)	83 (51.2)	1.02	0.598
	31 - 40 years	46 (40.0)	74 (45.7)		
	More than 40 years	3 (2.6)	5 (3.1)		
Job period	Less than 3 years	30 (26.1)	44 (27.2)	0.51	0.771
	3 - 6 years	27 (23.5)	43 (26.5)		
	More than 6 years	58 (50.4)	75 (46.3)		
Work place	Hospital only	93 (80.9)	127 (78.4)	2.439	0.486
	Private job with hospital	19 (16.5)	26 (16.0)		
	Hospital with clinic	3 (2.6)	6 (3.7)		
	All of the above	0 (0.0)	3 (1.9)		
Type of the job	Technical	17 (14.8)	32 (19.8)	5.831	0.212
	Laboratory	16 (13.9)	33 (20.4)		
	Nurse	57 (49.6)	58 (35.8)		
	General practitioner ' Doctor '	15 (13.0)	22 (13.6)		
	Specialist	10 (8.7)	17 (10.5)		
Number of working days	Every day	17 (14.8)	30 (18.5)	1.451	0.835
	6 day per week	23 (20.0)	25 (15.4)		
	5 day per week	42 (36.5)	58 (35.8)		
	4 day per week	12 (10.4)	17 (10.5)		
	Less than 4 day per week	21 (18.3)	32 (19.8)		
Average working hours per day	Less than 6 hours	32 (27.8)	53 (32.7)	2.808	0.246
	6 to 12 hours	66 (57.4)	95 (58.6)		
	More than 12 hours	17 (14.8)	14 (8.6)		
If the mother is busy with work, where do you put the child	At home with a housewife	41 (35.7)	49 (30.2)	7.281	0.122
	At home with no housewife	8 (7.0)	3 (1.9)		
	At a relative	40 (34.8)	60 (37.0)		
	At one of the neighbors	3 (2.6)	9 (5.6)		
	In the hospital's kindergarten	23 (20.0)	41 (25.3)		

4.6.4 Association between other factors and underweight:

The table 4.26 shows that there was a significant relationship between the two variables, $\chi^2(N=277) = 10.662$, $p = .005$. Breastfeeding period less than 6 months was more likely to experience from underweight compared to 6 months and more>.

Table 4.26: Association between other factors and underweight, n = 277)

Factors	Category	Growth chart below 5% n (%) 115 (41.5)	Growth chart equal and more 5% n (%) 162 (58.5)	χ^2	P-value
Pregnancy period	Less than 37 weeks	14 (12.2)	11 (6.8)	2.796	0.247
	37 to 42 weeks	96 (83.5)	146 (90.1)		
	More than 42 weeks	5 (4.3)	5 (3.1)		
Baby weight at birth	Less than 2.5 kg	38 (33.0)	43 (26.5)	1.453	0.484
	2.5 to 4 kg	72 (62.6)	110 (67.9)		
	More than 4 kg	5 (4.3)	9 (5.6)		
Breastfeeding period	Less than 6 months	33 (28.7)	40 (24.7)	10.662	0.005*
	6 months	23 (20.0)	13 (8.0)		
	More than 6 months	59 (51.3)	109 (67.3)		

About 48% of male's children are below 5 % of standard deviation on weight-for-age chart, compared to 35 % of females; so, we can say that underweight is more prevalent among boys than in girls.

Also, children between 1-3 years are exposed to the risk of underweight more than others, where the incidence of them reached 49%, followed by those who are less than a year by 40%, and finally at the least risk is children who are older than 3 years and less than 6 years since the rate of underweight in them is 35%.

Percentages of Underweighted children " below 5 % of standard deviation on weight-for-age chart " In Each Category of respondents' children:

Related to child Age & gender: -

Table 4.27: percentages of Underweight in gender and age categories

Factors	Category	Total no. of that with this Catg.	Number of that " Below 5% " on growth chart	%
Gender	Male	135	65	48%
	Female	143	50	35%
Age	Less than 1 years	48	19	40%
	1 - 3 years	110	54	49%
	4 years or more	120	42	35%

Related to Family & Social Factors: -

As shown in Table 4.28, children underweight is more prevalent among large families (more than 1 small family) that consist of more than 6 individuals, more than small families (which consist of parents and their children only) or whose families consist of less than 6 members.

The percentage of underweight in children decreases the fewer the number of children who are less than 6 years in the single family (small family), as the prevalence of it in the child who also has two or more brothers under the sixth (3 or more in total) is almost twice that in the child who does not have a brother under the age of six like him which is 47% and 24%, respectively.

It also appears that the weight of the child is affected by the level of the father's income / the level of the father's job, as the prevalence of underweight in children whose fathers work in the private sector or their fathers have their own business is the lowest of 30%, compared to whom their fathers work in the government sector or who their Fathers work with intermittent daily income, as the prevalence rate in them is 48% and 49%, respectively : this also shows the extent of the impact of employees in the government sector is cutting their monthly salaries due to the instability of the country since 2015 .

We note that the prevalence of underweight in the children of families whose children study in public schools is more than in those whose children study in private schools, also in families who live in rent houses more than in those that have their own homes, in addition to being affected by the father's job (previously explained) makes us can say that the prevalence of underweight in children is affected by the

socio-economic level of the family / level of family income where it is more prevalent in low-income families and less than in good-income families . for clarification; The education in public schools in general was severely affected by bad political and economic conditions of country, which prompted good-income families to transfer their children to private schools .

Table 4.28: percentages of Underweight in relation to family and social factors categories

Factors	Category	Total no. of that with this Catg.	Number of that " Underw eight " on growth chart	%
Family size	Small	248	97	39 %
	Large	30	18	60 %
Family members	Less than 4	70	30	43 %
	From 4 to 6	180	70	39 %
	More than 6	28	15	56 %
Numbers of children	Less than 4	243	98	40 %
	More than 4	35	17	49 %
Numbers Of children under 6 years	One	161	68	24 %
	Two	100	39	39 %
	Three and more	17	8	47 %
Father's job	Daily wages / Non	82	40	49 %
	Government al sector	87	42	48 %
	Private sector / self-business	109	33	30 %
Child's school	Government al	58	26	45 %
	Especially	87	32	37 %
Home	Own	110	42	38 %
	Rent	168	73	43 %

Related to mother's work factors

As shown in Table 4.29, the prevalence of underweight in children decreases with increasing the age of their mothers, and has a complex relationship with the mother's working period (years) ; we cannot explain them.

Also, the prevalence of underweight among children whose mothers have own private clinics (25%) is lower than that of those whose mothers work in government and/or private hospitals (42% in both). This also indicates that the incidence of underweight decreases with increasing the mother / family income . This is supported by the fact that the prevalence rate among children of there mothers are a specialist (37%) is lower than among children of general practitioners and nurses (41% & 49% respectively - 49% is the highest prevalence rate ; So If the mother is a nurse, her child is more likely to be underweight than others) , but we cannot say that the prevalence of underweight children decreases with increasing mother's academic level , because the prevalence of underweight in children of technicians and laboratory technicians (35% & 33%, respectively) is lower than that of children of there mothers are a specialist , this can be attributed to the average working hours per day ; Where it appears in the table that the prevalence of underweight in children increases with the increase in the average number of hours spent by the mother in the job : And since we - according to what we observe realistically - believe that the nurse takes the first place in terms of the number of working hours per day , even if she works in a public hospital only , followed by the general physician and Specialist (because they work at least in two places), then the technician and laboratory technician ; But confirmation of this need a more professional data analysis.

Finally, the table shows that 73% of the children whose mothers leave them at home in the absence of a housewife when they go to work are underweight, which is a high percentage compared to the rest of the options.

Table 4.29: percentages of Underweight in relation to mother's work factors categories

Factors	Category	Total no. of that with this Catg.	Number of that " Underweight "on growth chart	%
Mother's age	20 - 30 years	150	66	44%
	31 - 40 years	120	46	38%
	More than 40 years	8	3	36%
Job period	Less than 3 years	74	30	41%
	3 - 6 years	71	27	38%
	More than 6 years	133	58	43%
Work place	Hospital only	221	93	42%
	Private Hospital As well	45	19	42%
	have own clinic in additional to 1 or both of above	12	3	25%
Type of the job	Technical	49	17	35%
	Laboratory	49	16	33%
	Nurse	116	57	49%
	General practitioner	37	15	41%
	Specialist	27	10	37%
Number of working days	Every day	47	17	36%
	6 day per week	48	23	48%
	5 day per week	101	42	42%
	4 day per week	29	12	42%
	Less than 4 day per week	53	21	40%
Average working hours per day	Less than 6 hours	85	32	38%
	6 to 12 hours	162	66	41%
	More than 12 hours	31	17	55%

If the mother is busy with work, where do you put the child	At home with a housewife	90	41	46%
	At home with no housewife	11	8	73%
	At a relative	101	40	40%
	At one of the neighbors	12	3	25%
	In the hospital's kindergarten	64	23	36%

Related to other factors :

The previous table shows that 56% of those who were preterm have underweight compared to only 40% of children who had a normal pregnancy period , therefore , Preterm have great risk of underweight in the future ; we cannot know if these preterm infants had natural weight in the first six months of their lives or not. It is also clear that the incidence of underweight decreases the greater the weight of the child at birth, as the percentage of those who have a underweight who also had a underweight at birth is 47%, compared to 40% of those who had natural weights at birth and 38% of those who had overweight at birth.

The table also shows that infants who continue to breastfeed after the age of six months are at lower risk of underweight than those whose breastfeeding stops at the age of 6 months or before .

Table 4.30: Percentages of underweight in relation to other factors categories

Factors	Category	Total no. of that with this Catg.	Number of that " Underweight " on growth chart	%
Pregnancy period	Less than 37 weeks	25	14	56%
	37 to 42 weeks	243	96	40%
	More than 42 weeks	10	5	50%
Baby weight at birth	Less than 2.5 kg	81	38	47%

	2.5 to 4 kg	183	72	40%
	More than 4 kg	14	5	38%
Breastfeeding period	Less than 6 months	74	33	45%
	6 months	36	23	64%
	More than 6 months	168	59	35%

CHAPTER 5 : DISCUSSION

According to the latest study conducted on children under the age of 5 years in Yemen, which was published in 2021 (*Al-Zangabila et al., 2021*), the prevalence of underweight was 39%, and this percentage is close to the results of our study, 41.5%. Also, similar to study in Nepal the prevalence of underweight among children was 41,4% (*Khatri, Mishra, Khanal, & Choulagai, 2015*). This confirms that the mother's high level of education and her health knowledge does not have a positive effect on the health and development of her child if she is working (an employee). This supports what was mentioned by a study conducted in Tehran - Iran ; which explained that " rising education level among unemployed mothers increased the probability of children's health , but mother's employment had a negative effect on child health ".

However, when comparing the results of these studies with the results of the international study published in 2020 (*Dipasquale et al., 2020*) which stated that the prevalence of underweight in children under 5 years was 16%, we realize the catastrophic prevalence of malnutrition in children in Yemen , and the extent to which children are affected in general in Yemen by political and economic conditions, especially in light of the existing conflict 2015 – 2023.

Our study revealed that the boys were the likelihood of being underweight is more than that of a girls child being underweight. This findings contraversa the study conducted in Pakistan was reported that the likelihood of a girl child being underweight is more than that of a boy child being underweight (OR 0.92, 95%CI 0.8 to 1.0) (*Kumar, Abbas, Mahmood, & Somrongthong, 2019*).

The current study, reported that family size was Significant factors related to the underweight incidence which is in line with a previous study in in Indonesia (*Yunitasari, Sartika,*

Setiarini, & Ruswandi, 2020). Based on this study, delay in time of breastfeeding initiation after childbirth and underweight. This finding is consistent with a study carried out in Nairobi, Kenya (*Muchina, Waithaka, & Development, 2010*).

5.1 Limitations

Some mothers did not comply with bringing their children to the hospital kindergarten to have their weights measured by the researcher himself, and also did not accept the idea of home visits. Many female specialists refused to participate in this study. Finally, our narrow understanding of the subject of data analysis by means of SPSS, and the use of a statistician to do so, which led to inability in the processes of deducing factors and their relationship to each other

5.2 Conclusions

The mother's work - Whatever its academic level - when there is no one to take care of the child and feed him adequately and appropriately for his age in the event of her absence , or when the economic situation of the family is not good despite her work : negatively affects the health and development of children .

5.3 Recommendations

1. Establishing a national program to which all newly born children are subject during the first three years of life; It is based on examining and recording the nutritional status of the child (Weight-for-age - height-for-age - weight-for-height), and growth following up during periodic visits to the health unit, intervening when needed, and following up on recovery after that in a specific period, whether by linking that to the national immunization program or making a separated program .

2. Taking care of malnourished children and providing appropriate, free and close-to-all interventions that ensure a speedy recovery from this problem.
3. We advise mothers in general and female employees in particular to know the appropriate food / food for their children according to their age and the amounts they need per day and at the time of their absence and to provide it for them.
4. Regulating childbearing and not allowing mothers to have more than two children under the age of six, especially those who spend more than 12 hours a day in their jobs.
5. Avoid leaving a child under the age of three without the presence of someone who is aware of how to take care of them and feed them, or with someone who does not care about them. And also not to leave children whose ages range between 3-6 years alone unless they put what they need of ready-to-eat food near them and in an easily accessible manner.
6. Paying more attention to healthy and varied nutrition that includes all the basic ingredients, vitamins and minerals needed the child, which guarantees him perfect growth and good health.

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APENDICES

Appendix I: Questioners (Arabic Version)

Republic of Yemen
Ministry of Higher Education
and Scientific Research
21 SEPTEMBER UNIVERSITY
FACULTY OF MEDICINE



الجمهورية اليمنية
وزارة التعليم العالي والبحث العلمي
جامعة ٢١ سبتمبر العلوم الطبية والتطبيقية

استبيان رقم ----- تاريخ / / ٢٠٢٢م

استبيان حول

الإنتشار و عوامل الخطورة لنقص الوزن التغذوي في أطفال العاملات في المجال الصحي الذين تتراوح أعمارهم بين ٦ أشهر و ٦ سنوات في مدينة صنعاء ; ٢٠٢٢

Prevalence & Risk Factors Of Nutritional Underweight In Children Aged 6 Months To 6 Years Among Son's Of Female Medical Staffs In Sana'a City , 2022

يقوم بهذا الاستبيان الطالب الباحث وذلك بعد موافقة موظفة الكادر الصحي بالمشاركة بالمعلومات التي ستؤخذ منها والتي ستخضع للسرية التامة وفقاً لأخلاقيات البحث العلمي

الموافقة

- هل توافق على المشاركة في هذه الدراسة
- نعم أوافق وأكمل المشاركة ()
 - أنا لا أوافق ()

● - البيانات الشخصية :-

- الاسم :-
- تاريخ الميلاد :-
- اسم الام :-
- الجنس :-
- العمر :-
- مكان الاقامة :-
- رقم التواصل :-

● ١٢ - القياسات المطلوبة

- وزن الطفل :- كجم
- طول الطفل :- سم
- الوزن إلى العمر في مخطط النمو :-
- الوزن إلى الطول / :- Z score

- 3 *العوامل الاسرية والاجتماعية :-

١- حجم الأسرة :-	كبيرة () صغيرة ()
٢- عدد افراد الأسرة :-	
٣- عدد الابناء :-	
٤- عدد الاطفال تحت السادسة :-	
٥- المستوى التعليمي للأب :-	- اساسي () - ثانوي () - أكاديمي ()
٦- الحالة الاقتصادية / وظيفة الاب :-	- بالأجر اليومي / بدون عمل () - موظف في القطاع حكومي () - موظف قطاع الخاص / لديه عمله الخاص ()
٧- الحالة الاجتماعية / الوضع المعيشي للطفل	- مع الأب والام () - مع الام فقط () - مع الأب فقط ()
٨- تعليم الاطفال :-	- حكومي () - اهلي () - لا يوجد أطفال في سن التعليم ()
٩- المنزل :-	- ملك () - ايجار ()

٤- العوامل المتعلقة بوظيفة الام :-

<ul style="list-style-type: none"> - من ٢٠ الى ٣٠ سنة () - من ٣٠ الى ٤٠ سنة () - اكثر من ٤٠ سنة () 	<p>١- عمر الام</p>
<ul style="list-style-type: none"> - اقل من ٣ سنوات () - بين ٣ الى ٦ سنوات () - اكثر من ٦ سنوات () 	<p>٢- فترة الوظيفة</p>
<ul style="list-style-type: none"> - المستشفى فقط () - - المستشفى مع وظيفة خاصة () - المستشفى مع عيادة خاصة () - كل ما سبق () 	<p>٣- مكان العمل</p>
<ul style="list-style-type: none"> - فنية () - - مخبرية () - - ممرضة () - - طبية/عامة () - أخصائية () 	<p>٤- نوع الوظيفة</p>
<ul style="list-style-type: none"> - كل يوم () - ستة ايام بالاسبوع () - خمسة ايام بالاسبوع () - اربعة ايام بالاسبوع () - اقل من اربعة ايام بالاسبوع () 	<p>٥- عدد أيام الدوام</p>
<ul style="list-style-type: none"> - اقل من ست ساعات () - من ٦ الى ١٢ ساعة () - اكثر من ١٢ ساعة () 	<p>٦- متوسطة ساعات في اليوم الواحد</p>
<ul style="list-style-type: none"> - في البيت مع وجود ربة بيت () - في البيت بدون وجود ربة بيت () - عند احد الاقارب () - عند جارتها () - في الحضانه الخاصة بالمشفى () 	<p>٧- في حالة انشغال الأم بالوظيفة أين تضع الطفل؟</p>

نوع الاغذية التي تعطى للطفل في حالة غياب الام:-:

٨. الغذاء لطفل اقل من سنتين	- حليب صناعي () - بسكويت () # عدد الوجبات =
٩. الغذاء لطفل اكبر من سنتين	- جعالة () - فواكه () - اطعمه () # عدد الوجبات =

بعد ملئ هذا الجدول السابق يجيب الباحث على السؤال التالي :-
هل الأم تهتم بنوع الطعام الذي يعطى لطفلها في وقت غيابها ؟
نعم () لا ()

● ٥ - العوامل الاخرى :-

١- فترة الحمل	- اقل من ٣٧ اسبوع () - (مكتمل) بين ٣٧-٤٢ اسبوع () - اكثر من ٤٢ اسبوع ()
٢- وزن الطفل عند الولادة	- اقل من ٢,٥ كجم () - من ٢,٥ كجم الى ٤ كجم () - اكثر من ٤ كجم ()
٣- فترة الرضاعة الطبيعية	- اقل من ٦ اشهر () - ٦ أشهر () - اكثر من ٦ أشهر ()

٤- عدد الوجبات في اليوم الواحد

سواء رضاعة طبيعية او صناعية او تكميلية او وجبات طعام :-

٥- النوع / الأنواع :-

من السؤالين السابقين يجيب الباحث على السؤال التالي :-
هل الأم تهتم بنوع الطعام الذي يعطى لطفلها بشكل مناسب لعمره ؟
نعم () لا ()

٦- تشوهات / أمراض خلقية :-

٧- امراض مزمنة أو متردد:-

Appendix II: Questioners (English Version)

Questionnaire no. ----- | / / 2022

questionnaire about

Prevalence & Risk Factors Of Nutritional Underweight In Children Aged 6 Months To 6 Years Among Son's Of Female Medical Staffs In Sana'a City , 2022

This questionnaire is carried out by the student researcher, after the approval of the health staff employee, to share the information that will be taken from her, which will be subject to strict confidentiality in accordance with the ethics of scientific research

approval

Do you agree to participate in the letter

() *Yes, I agree and complete the post*

() *I do not agree*

1. personal data :-

Name:-

Gender :-

Age:-

Place of residence:-

Date of birth:-

Mother name :-

Contact no. :

2. Body Measurements :- :

Weight (Kg) :-

Height (cm):-

Weight-for-age on growth chart :-

Weight to height / Z-score :-

3. Family and social factors :-

1. Family Size	- Small () - large ()
2. Family members	
3. Members of children	
4. Members Of children under 6 years	
5. Father's educational level	- Basic () - secondary () - academic ()
6. father's Job	- daily wages / no work () - In governmental sector () - in private sector/ has own business ()
7. Child's living situation	- With both parents () - with mother only () - with father only
8. Child's School	- governmental () - especially () - No child at school age ()
9. Home	- Own () - rent ()

4. Factors related to mother's job :-

1. Mother's age	- 20-30 years () - 30-40 years () - More 40 years ()
2. job period	- Less than 3 years () - 3-6 years () - More 6 years ()
3. Workplace	- hospital only () - private job with hospital () - Hospital with clinic () - all of the above ()
4. Type of the job	- Technical () - laboratory() - nurse () - General practitioner () - specialist ()
5. The number of working days	- every day () - 6 day per week () - 5 day per week () - 4 days a week () - less than 4 day per week ()
6. Average working hours per day	- less than 6 h () - 6 to 12 h () - more than 12 h ()
7. If the mother is busy with work, where do you put the child?	- At home with a housewife () - At home with no housewife () - At a relative () - At one of the neighbors () - In the hospital's kindergarten ()

8. Types of meals that given to child during mother absence

.....

9. Number of this meals = []

According to previous 2 questions, the researcher should answer this question ; The mother cares about the type of food given to her child during her absence appropriately to time period , his age & types of foods ? yes () No ()

5. other factors :-

1. pregnancy period	<ul style="list-style-type: none"> - less than 37 weeks () - between 37 to 42 weeks [normal] () - more than 4 weeks ()
2. Baby weight at birth	<ul style="list-style-type: none"> - less than 2.5 kg () - 2.6 to 4 kg () - more than 4 kg ()
3. Breastfeeding period	<ul style="list-style-type: none"> - Less than 6 months () - 6 months () - more than 6 months ()

4. **The number of meals per day Whether breast feeding, artificial or complementary, or meals []**

5. **Types of this foods**

.....

.....

According to previous 2 questions, the researcher should answer this question ; The mother cares about the type of food given to her child appropriately to his age ?

yes () No ()

6. **The Child has Congenital malformations / Hereditary diseases ?**

yes () , No ()

7. **The Child has Chronic or frequent diseases ?**

yes () , No ()