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ANEMIA AND ITS ASSOCIATION WITH DIETARY INTAKE AND INFANT AND YOUNG CHILD FEEDING PRACTICES: A CROSS-SECTIONAL STUDY AMONGST 0-2-YEARS-OLD SYRIAN REFUGEE CHILDREN IN LEBANON

by
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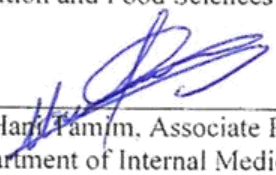

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AN ABSTRACT OF THE THESIS OF

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Title: Anemia and its association with dietary intake and infant and young child feeding practices: a cross-sectional study amongst 0 to 2 years-old Syrian refugee children in Lebanon

High levels of pediatric anemia are reported in the Eastern Mediterranean Region. This is particularly true for infants and young children below two-years of age, given their increased nutritional requirements and rapid growth rates. Displaced populations such as Syrian refugees are more prone to develop anemia and other nutritional deficiencies, given the high rates of infections in these populations, coupled with poor dietary intake, lack of proper hygiene practices as well as overall compromised nutritional status. No studies have investigated the possible determinants of anemia among Syrian refugee children in Lebanon. Hence, this study aims to assess the prevalence of anemia amongst Syrian refugee children aged 0-2 years old living in the Greater Beirut area, and to investigate the association of anemia with feeding practices, dietary intakes and anthropometric characteristics.

This is a cross-sectional study that was conducted in the Greater Beirut area among 0-2-year-old Syrian refugee children (n=255). Mothers were recruited from randomly selected primary health care centers in the most vulnerable areas of Greater Beirut according to the highest vulnerability level of localities. A multicomponent questionnaire was used for data collection, inquiring about socio-demographic characteristics and infant and young child feeding practices. Dietary intakes were assessed based on a single 24-hour recall. Anthropometric measurements of the children and infants were obtained using standardized protocols. Children Hemoglobin levels were measured using a small blood drop from the finger in children aged 6 months and above, and from the heel among infants aged below 6 months.

The prevalence of anemia in our sample was estimated at 35.3%, with no cases of severe anemia being identified. Children between the age of 6 to 11 months had the highest rates of anemia (50.7%) and regression analyses showed that children aged 6 to 11 months were four times (OR: 4.53, 95% CI: 2.12- 9.72) more likely to be anemic compared to children below 6 months of age. In addition, children aged between 12 to 23 months were twice (OR: 2.39, 95% CI: 1.17-4.90) as likely to be anemic compared to infants aged below 6 months. Inadequate iron intake was associated with approximately three-fold higher odds (OR=3.55; 95% CI: 1.96-6.43) of anemia compared to those that had adequate iron intake. No significant associations were identified between anemia status and the intake of other hematinic micronutrients such as folate, vitamin A,

vitamin C, vitamin B12 or Zinc. As for anthropometric indicators, the prevalence of stunting in the study sample was the highest amongst 12 to 23 months old children (13.4%), compared to younger children (2.3% in those aged less than 6 months and 2.9% in those aged between 6 and 11 months), with significant difference between groups based on anemia status. Stunted children had a significantly higher odd of being anemic compared to those with normal height for age (OR=3.08; 95% CI: 0.94, 10.07). The prevalence of underweight and wasting was low (3.9% and 6.7% respectively) and these indicators were not associated with anemia. The rates of exclusive breastfeeding were low (21.6%) and the proportion of children meeting the minimum dietary diversity did not exceed 30%. No significant associations were observed between exclusive breastfeeding, complementary feeding indicators and anemia. However, children who were breastfed within one hour of birth were found to be at a significantly higher risk of being anemic (OR: 1.87 95% CI: 1.06 – 3.31).

This study provided new data regarding the prevalence of anemia in Syrian refugee children aged less than 2 years, a highly vulnerable population group. The study has also investigated the association of anemia with dietary intake, and nutritional status, shedding light on anemia determinants that can be potentially tackled by future interventions. Taken together, the study findings highlight the need for cost-effective, feasible and culture specific interventions aimed at enhancing the nutritional status of Syrian refugee infants and young children, optimizing their dietary intakes, and improving infant and young child feeding practices in this displaced population.

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ILLUSTRATIONS

TABLES

ABBREVIATIONS

2D	Two-Dimensional
µg	Microgram
AAP	American Academy of Pediatrics
AI	Adequate Intake
AMDR	Acceptable Macronutrients Distribution Range
BAZ	BMI-for-age Z score
BMI	Body Mass Index
CHO	Carbohydrate
CI	Confidence Interval
cm	centimeters
d	Day
DFE	Dietary Folate Equivalent
dL	Deciliter
DRI	Dietary Reference Intake
EAR	Estimated Average Requirement
EER	Estimated Energy Requirement
EI	Energy Intake
EMR	Eastern Mediterranean Region
et al.	And Others
FAO	Food and Agriculture Organization

FFQ	Food Frequency Questionnaire
g	Gram
HAZ	Height-for-age Z score
Hb	Hemoglobin
HC	Head Circumference
ID	Iron-deficiency
IDA	Iron-deficiency Anemia
IOM	Institute Of Medicine
IYCF	Infants and Young Children Feeding Practices
Kcal	Kilocalorie
kg	kilogram
L.L.	Lebanese Lira
MENA	Middle East and North Africa
mg	milligram
m.o	Months
MUAC	Mid-Upper Arm Circumference
MUFA	Monounsaturated Fatty Acids
n	Sample size
N/A	Not Applicable
OR	Odds Ratio
PHCC	Primary Health Care Center
PUFA	Polyunsaturated Fatty Acids
RBC	Red Blood Cells

RDA	Recommended Dietary Allowance
SAM	Severe Acute Malnutrition
SD	Standard Deviation
SE	Standard Error
SES	Socio-economic Status
SFA	Saturated Fatty Acids
SPSS	Statistical Package for Social Sciences
TEE	Total Energy Expenditure
UL	Tolerable Upper Intake Level
UNICEF	United Nations International Children's Emergency Fund
UNHCR	United Nations High Commissioner for Refugee
USDA	United States Department of Agriculture
WAZ	Weight-for-age Z score
WHO	World Health Organization
WHZ	Weight-for-height Z score

CHAPTER I
INTRODUCTION

Anemia is a condition in which the concentration of blood hemoglobin falls below normal levels. It is known to affect one third of the world's population, with a particularly high burden amongst infants and young children (WHO, 2015). In 2011, the prevalence of anemia among children aged below five years was approximately 43% worldwide, which represents around 273 million children (Stevens et al., 2013). High levels of child anemia were also reported in the Eastern Mediterranean Region reaching up to 46.7% amid pre-school children between 0 to 5 years old (WHO, 2015). Anemia in childhood is linked with numerous serious health complications including poor cognitive and motor development, adverse impact on brain structure and function, delayed physical growth, as well as fatigue, recurrent illnesses and increased mortality risk (Cesar G Victora et al., 2008). It has far-reaching impact on human health as well as social and economic development in low- and middle-income countries, particularly among disadvantaged populations (WHO, 2015).

The most proximal risk factors for anemia consist of nutritional deficiencies, infections, as well as genetic hemoglobin disorders (Chaparro & Suchdev, 2019). Children under the age of 5 years are considered as a vulnerable population group for the development of anemia. This is particularly true for infants and young children below two-years of age, given their increased requirements and rapid growth rates (WHO, 2015). The period from conception till the first two years of life is known as the "first 1000 days", during which the quality and quantity of nutrients are both critical for the child's health, growth and survival, while also modulating the child's disease risk later in life. (Organisation Mondiale de la santé, WHO, & UNAIDS, 2003). One of

the main causes of anemia is iron deficiency. Thus, in order to maintain the infant's adequate iron status, strict adherence to a breastmilk diet is recommended until the age of 6 months followed by timely introduction of appropriate and good quality iron-rich complementary foods (Tawai, 2012).

Displaced populations are more prone to develop anemia and other nutritional deficiencies, given the high rates of infections in these populations, coupled with poor dietary intake, lack of proper hygiene practices as well as overall compromised nutritional status (Hossain et al., 2016). The "Vulnerability Assessment of Syrian refugees in Lebanon" (2018) showed that half of the Syrian households in Lebanon were not meeting the minimum requirements for food, health, and shelter (UNHCR et al., 2018). Furthermore, 30% were living above the poverty line, and as for the children, according to the UNHCR, 1 in 4 Syrian refugees' children in Lebanon were found to be anemic (UNICEF, 2017). Nevertheless, no studies have investigated the possible determinants of anemia in this population. Hence, this study aims to assess the prevalence of anemia amongst Syrian refugee children aged 0-2 years old living in the Greater Beirut area, and to investigate the association of anemia with sociodemographic attributes, feeding practices, dietary intakes and anthropometric characteristics.

The specific objectives of this study are:

- To assess the prevalence of anemia among 0-2-year-old Syrian refugee children living in Greater Beirut, Lebanon.
- To characterize infant and young child feeding practices (IYCF) of the mothers and caregivers of Syrian refugee children living in Greater Beirut, Lebanon
- To evaluate dietary intakes of 0-2-year-old Syrian refugee children living in Greater Beirut, Lebanon

- To examine the nutritional status of 0-2-year-old Syrian refugee children, based on anthropometric measurements.
- To investigate the associations between anemia, infant and young child feeding practices (IYCF), anthropometric measurements, dietary intake and socio-economic status among 0-2-year-old Syrian refugee children living in Greater Beirut.

CHAPTER II
LITERATURE REVIEW

A. Definition of Anemia in Infants and Young Children

Anemia is a condition in which a deficit in the quantity or the quality of red blood cells exists. It can occur either when the concentration of hemoglobin decreases or when its oxygen-carrying ability is affected (DeMaeyera & Adiels-Tegmanb, 1985). The concentration of blood hemoglobin is an indicator of the severity of anemia according to age, sex, and physiological status-related cut-off points (WHO, 2015). Its presence can be related to both poor nutrition and poor health (WHO, 2014). When anemia occurs with a reduction in the total body iron, it is defined as iron deficiency anemia; whereas, when the level of iron stores decreases without affecting the morphology of erythrocytes or the level of hemoglobin, it is known as iron deficiency (Percy et al., 2017).

Children are considered a vulnerable part of the population because they are most prone to develop deficiencies, infections, and anemias (Gupta, 2017). Infants and children below two-years of age are particularly vulnerable due to their increased requirements and rapid growth rates. Between the age of 6 months and 24 months, children with hemoglobin levels below 11 g/dl are considered as anemic. They are considered as mildly anemic when their hemoglobin levels are below 10 g/dl and severely anemic when their hemoglobin levels are below 7 g/dl (WHO, 2011). As for infants younger than six months of age, hemoglobin concentrations below 10.5g/dl reflect an anemic status (Marques et al. 2014).

B. Epidemiology of Anemia in Infants and Young Children

In 2011, the prevalence of worldwide anemia among children aged below five years was approximately 43%, which represents around 273 million children (Stevens et al., 2013). The likelihood of developing anemia was higher in developing countries compared to developed countries, regardless of the age group (Shamah et al., 2017).

As for the prevalence of anemia in the Eastern Mediterranean Region (EMR), a range of 7.4% to 88% was reported by the WHO global database of anemia among the total population (WHO, 2015), with a prevalence of 46.7% amid pre-school children aged between 0 to 5 years old.

Hence, the EMR is considered as one of the regions suffering from high rates of anemia and low concentrations of blood hemoglobin (De Benoist et al., 2008). Moreover, Lebanon was found to have an abundant rate of micronutrient deficiencies (Hwalla et al., 2017) and as of 2011 anemia rates reached up to 24% among children aged between 6 and 59 months (WHO, 2015).

During 2018, Lebanon was considered as the country that had “the biggest concentration of refugees per capita” (UNHCR et al., 2018). At the end of 2018 nearly 1 million Syrian refugee were displaced to Lebanon, making one out of sixth of the Lebanese population a Syrian refugee (“Syrian Refugee Crisis,” 2019).

The "Vulnerability Assessment of Syrian refugees in Lebanon" (2018) showed that half of the Syrian households in Lebanon were not meeting the minimum requirements for food, health, and shelter (UNHCR et al., 2018). In fact, 30% were living above the poverty line; and as for the rest, one-third of them were suffering from a moderate to severe food insecurity (UNHCR, 2018).

As for the children, and according to the UNHCR, 1 in 4 Syrian refugees' children in Lebanon were found to be anemic (UNICEF, 2017).

C. Pathophysiology of anemia

Biologically speaking, anemia develops as a result of an imbalance between erythrocyte loss and production. This can occur due to either ineffective/deficient erythropoiesis from nutritional deficiencies, inflammation, and genetic hemoglobin disorder, or as a result of excessive loss of erythrocytes (due to hemolysis, blood loss, or both). The harmful consequences of anemia on health and development appear because of a decreased oxygen delivery to tissues affecting multiple organ systems, in addition to outcomes associated with the multiple underlying causes of anemia (Chaparro & Suchdev, 2019).

Anemia can in fact be caused by one single factor or by multiple factors. It can be induced by acute or chronic infections like malaria and tuberculosis, by parasite infections like hookworms and schistosomiasis, or by heavy blood loss (De Benoist et al., 2008). It can also occur because of a hereditary condition that leads to hemoglobinopathies such as sickle cell anemia or thalassemia. In this case, the morphology of the hemoglobin is affected due to genetic defects (Nicholas J. Kassebaum, 2016).

Additionally, micronutrient deficiencies can increase the risk of developing anemia, known as "nutritional anemia" (Global nutrition report, 2018). It takes place in the case of several B vitamins deficiencies like B_2 (riboflavin), B_6 (pyridoxine), and B_{12} (cobalamin) along with other vitamins such as vitamin A, E, C and D, as well as minerals like folate and copper (WHO, 2017). However, the most prevalent form of nutritional anemia, reaching almost 50%, is the one induced

by iron deficiency known as iron deficiency anemia (IDA). It is considered amongst the most critical determinants of the global burden of diseases (De Benoist et al., 2008).

Children particularly have higher risks to develop iron deficiency anemia due to their increased iron requirements, a critical mineral for growth, development, and health, specifically during the first 1000 days of life (WHO, 2017). In fact, different types of anemia can occur throughout infancy until the age of two years old. Since birth, a healthy infant who is born on term will have high levels of hemoglobin reaching up to 14g/dl. After a period of six to nine weeks, decreased production of erythropoietin occurs along with amplified tissue oxygenation. This leads to a rapid decline in hemoglobin levels from 14g/dl to 10g/dl, hence the occurrence of "physiological anemia of infancy". This type is the most prevalent form of anemia until the age of three months (Strauss, 2010; Widness, 2008). If hemolysis occurs along with a higher reduction in hemoglobin levels, the anemia will be known as "pathological", caused initially by infections or extreme blood loss (Orkin & Nathan, 2009). A third form is known as "anemia of prematurity", found mostly among preterm infants. In this case, the decline in red blood cells production is more severe than the “physiological anemia”, and red blood cells have a shorter life span.

Finally, another less prevalent form of anemia among infants is caused by hereditary genetic defects such as “hemoglobinopathy." It is asymptomatic until the age of six months and can lead to a higher tendency to develop infections. Thus, affected individuals can have a lower life expectancy (Scott, Lutty, & Goldberg, 2013).

Preterm infants are usually born with lower iron stores and hemoglobin levels, which is why they are at higher risks to develop iron deficiency or iron-deficiency anemia during infancy (Strauss, 2010). However, a normal on term infant has higher chances to develop iron deficiency

anemia from the age of six months and onward due to insufficient iron intakes from the diet as well as the low bioavailability of iron (Burke et al., 2014).

D. Health and developmental effects of anemia

The period from conception till the first two years of life is known as the “first 1000 days”. It is significant due to the rapid growth and brain development that takes place during this period. The epigenetic profile of the child is "programmed" and shaped during this time and for the rest of his lifespan, thus affecting his/her chances of developing diseases later in adulthood (Mukuria, Kothari, & Abderrahim, 2006).

Anemia with or without iron deficiency throughout the first 1000 days can have several health and developmental consequences on both the short term and the long term (R. D. Baker & Greer, 2010).

When it occurs before the age of two years, it may affect the protein profile, hormones, metabolism, physical growth as well as the nervous system. In fact, it was strongly associated with neurological development, as well as mental impairment and poor motor development (Carter et al., 2010; Cusick & Georgieff, 2016). Further, it can lead to increased risk of mortality due to infectious diseases, and reduced work capacity in adulthood (Cesar G Victora et al., 2008).

As for iron deficiency anemia (IDA), its occurrence can exacerbate the risk of infections as well, especially amongst children, and may lead to respiratory distress, heart failure and in some rare cases cardiac arrest (N. J. Kassebaum et al., 2014; Shander et al., 2014). It can also alter hormones involved in muscular functions, neurological functions and the regulation of body temperature (Shamah et al., 2017).

Iron is one of the micronutrients that have a critical role in key biological processes such as the generation of red blood cells (RBCs), tissue oxygenation, biosynthesis of neurotransmitters like serotonin and dopamine in the brain tissues, and myelination of nerve fibers. Hence, IDA can lead to cognitive and psychomotor problems, weakness, fatigue and difficulties in concentrating and learning (Lozoff, 2007).

Studies done on animals' models where an experimental iron deficiency was induced while controlling the environmental conditions have allowed to show the role of iron deficiency among infants. Its effects on brain development in relation to its severity, duration, and specific timing were studied. This resulted in the conclusion that iron deficiency with or without anemia can affect the brain differently when it happens at different stages of growth. Furthermore, most of the complications on the brain remained persistent and irreversible, even after treatment and iron repletion, thus leading to reduced or affected mental development in adulthood (P. R. Dallman, Siimes, & Manies, 1975; Peter R. Dallman & Spirito, 1977; Felt et al., 2006; Lozoff, 2007). Other standardized studies done on human subjects confirmed these findings: children with iron deficiency anemia showed poorer cognitive, motor, social, and emotional functioning compared to healthy non-anemic subjects (Lozoff, 2007).

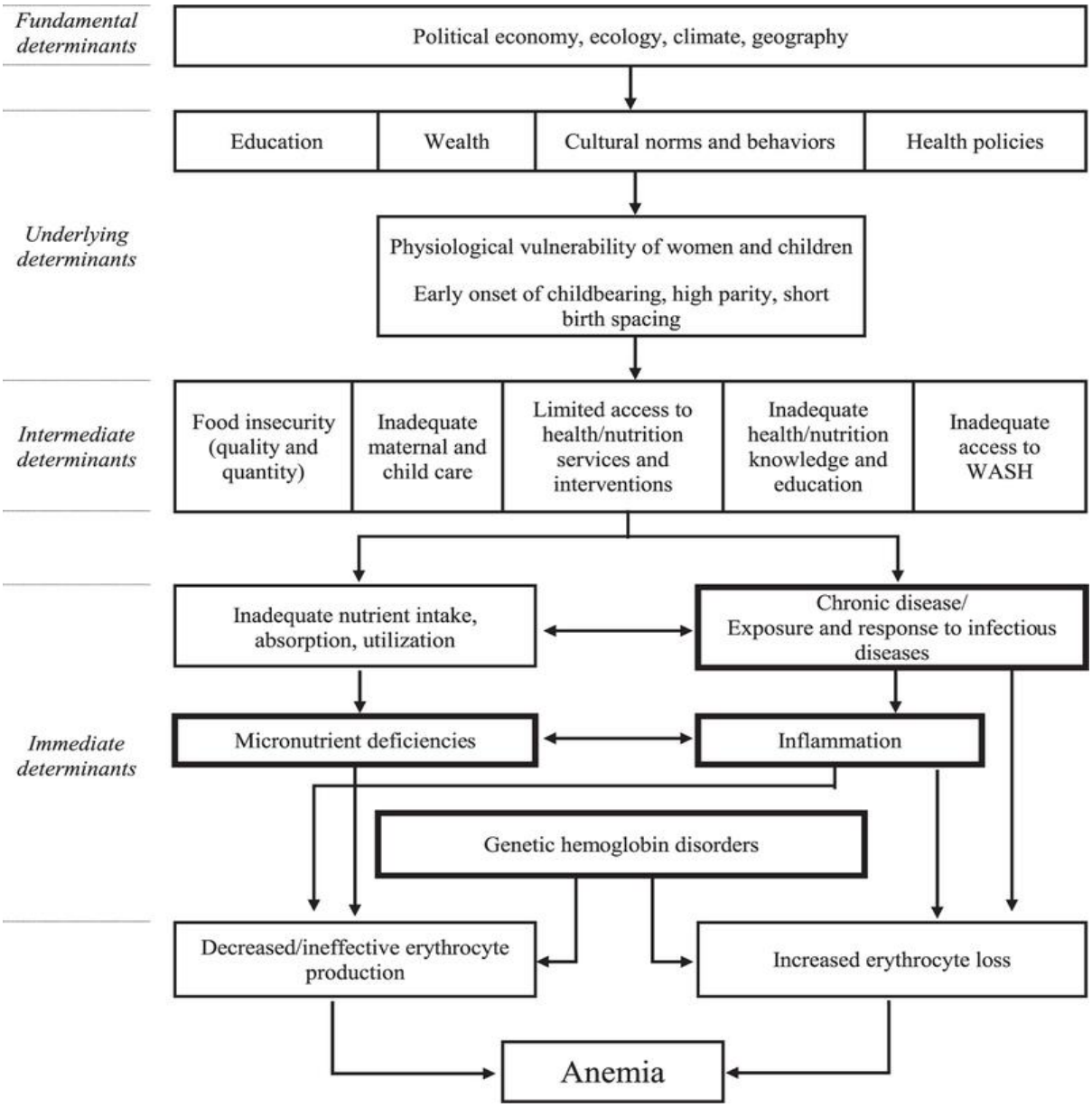
E. Etiology of anemia:

A conceptual model of the etiology of anemia was published by Chaparro et al. (2019) explaining how distal factors can trigger anemia. It included food insecurity, access to clean water, and sanitation, as well as the most direct causes of anemia such as nutritional deficiencies, disease, inflammation, and hemoglobin disorders. It was based on the concept that several of these

determinants are interconnected. For instance, poverty, is considered as a major determinant of health and nutrition, and low socioeconomic status is linked with greater risk of anemia among children. Likewise, low parental education is associated with higher prevalence of anemia. Furthermore, Chaparro et al. (2019) highlighted the fact that the main causes of mild and moderate anemia are different from the primary causes of severe anemia. Even though limited studies on the etiology of severe anemia were done, malaria is still considered as a major cause of severe anemia, especially amongst African children. In fact, several studies done in Africa observed that the most consistent predictors of severe anemia were found to be malaria, as well as poor sanitation, underweight, and inflammation. Other determinants such as stunting, vitamin A deficiency and rural geographical setting were significant as well in high to very high infection countries (Engle-Stone et al., 2017). Severe anemia was also found to co-exist with severe acute malnutrition (SAM); for example, in India, 67% of hospital-based children who were diagnosed with SAM, also had severe anemia (Thakur et al., 2014)

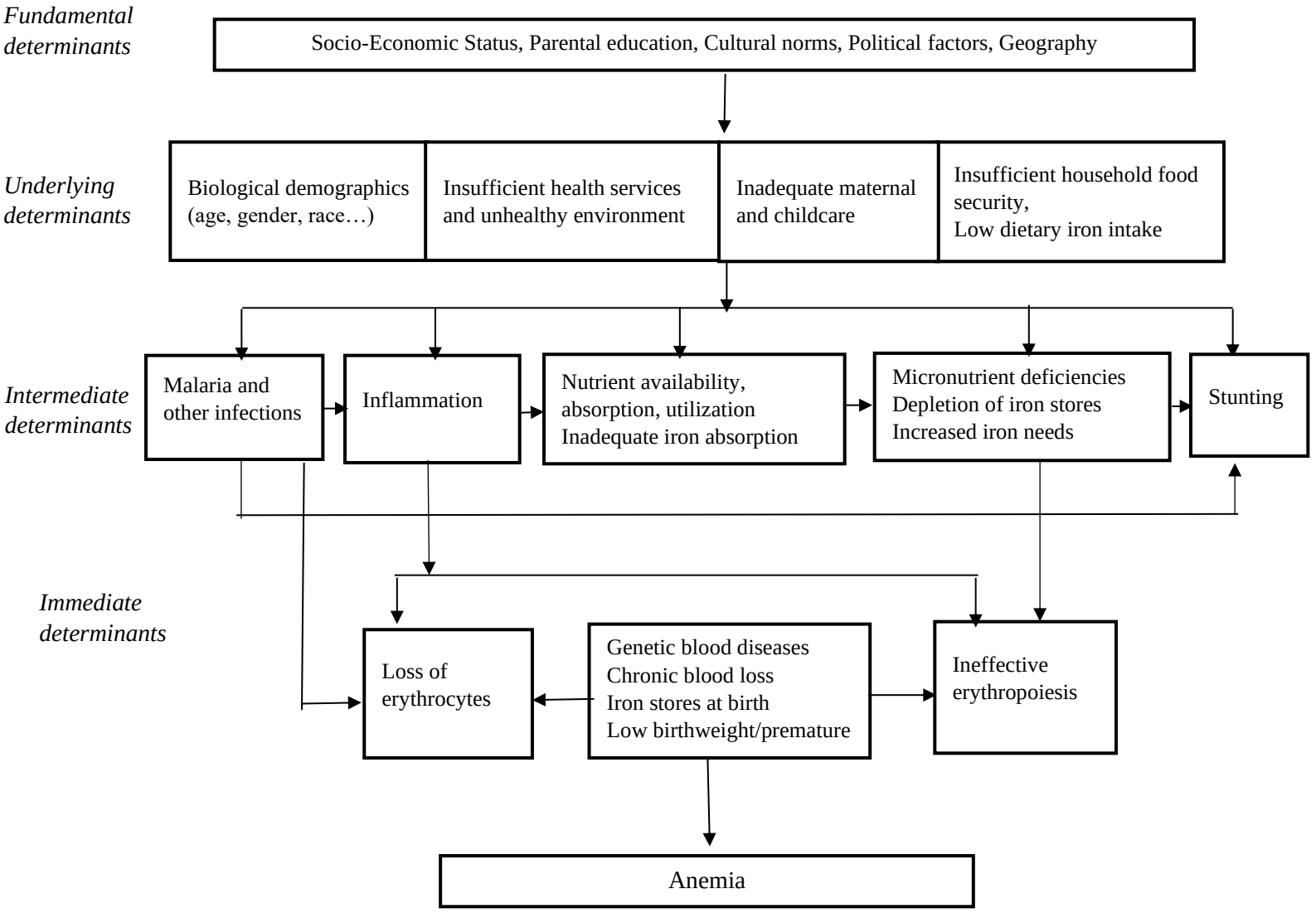
As identified in the figure 1 below, the most proximal risk factors for anemia consist of nutritional deficiencies, disease, and infections, as well as genetic hemoglobin disorders. As for children below the age of 5 years old, figure 2 shows the most common factors associated with child anemia (Ngnie-Teta et al., 2007; Namaste et al., 2017).

Figure 1: Conceptual model of the etiology of anemia



(Chaparro & Suchdev, 2019)

Figure 2: Conceptual model of the etiology of anemia for children under 5 years old



(Ngnie-Teta et al., 2007; Namaste et al., 2017)

1. Maternal Nutrition during the first 1000 days

Optimal nutrition throughout the first 1000 days can have significant effects on the child's health and disease risk later in life (Boo & Harding, 2006). Maternal malnutrition, whether undernutrition or overnutrition during pregnancy and throughout the breastfeeding period has been found to affect the health and development of the child and modulate his risk for disease.

The relationship between maternal anemia and the risk of child anemia is still being studied and has shown controversial results. While a few studies showed that maternal iron deficiency can possibly affect the child's iron status and may predispose him to iron deficiency and iron deficiency anemia during infancy and at later stages of growth (Burke et al., 2014; Cao & O'Brien, 2013), other studies showed no significant relation between maternal anemia and the child's hemoglobin levels (Koura et al., 2012).

Yet, low hemoglobin status among mothers through pregnancy was found to have a possible effect on the child's birthweight as well as the risk of perinatal and maternal mortality (Burke et al., 2014; Stevens et al., 2013).

Additionally, Menon et. al (2016) found that anemic mothers are more likely to have offspring with negatively affected physical growth and brain development. Infants of non-anemic women were found to have higher birthweight, larger head circumference and were taller than infants of anemic mothers, especially when anemia occurred during the second trimester of the pregnancy (Menon et al., 2016).

2. Iron needs and stores in the first 1000 days

Since birth, infants born on term rely on two main sources for iron: external sources such as breastmilk, and internal sources such as the iron stores that have been accumulating throughout the last 10 weeks of gestation (Burke et al., 2014).

The amount of iron in the breastmilk is highly bioavailable but is relatively low. This is why the presence of optimal iron stores at birth is crucial to cover the needs of infants born on term during the first 4 to 6 months of life (Saarinen et al., 1977; World Health Organization & Food and Agriculture Organization of the United Nations, 2004). However, if a child is born before term, or with a low birthweight, his/her iron stores might not be sufficient, thus, he will be at higher risks of developing iron deficiency and iron deficiency anemia (Singla et al., 1985; Burke et al., 2014). Different maternal conditions during gestation could also affect the fetal iron stores such as maternal anemia, hypertension, intrauterine growth restriction and diabetes, which increase the risk of insufficient iron stores (R. D. Baker & Greer, 2010).

A set of age and sex specific nutrients requirements were developed by the IOM (2001) to describe absolute daily required amounts of nutrients, known as the Daily Recommended Intakes (DRIs). A nutrient will have either an Estimated Average Requirement (EAR) and Recommended Dietary Allowances (RDA), or an Adequate Intake (AI). When an EAR for the nutrient cannot be determined and therefore, neither can the RDA, then an AI is used for the nutrient. In addition, most nutrients will have a Tolerable Upper Intake Level (UL).

According to the IOM (2001), the EAR is the average nutrient intake level estimated to meet the needs of 50% of the healthy individuals in a particular population. The RDA is the average daily intake level of a given nutrient which, when consumed, is sufficient to meet the requirements

and needs of nearly 97% to 98% of the healthy individuals in a particular gender and life stage . When there is insufficient evidence to establish the RDA for a nutrient, the adequate intake (AI) is given instead. The AI is based on observed or experimentally determined approximation of the amount of nutrient intake that is consumed in a healthy population and is assumed to be adequate. While the UL is the highest average daily nutrient intake level that is likely to pose no risk of adverse health outcomes for almost all individuals in the population. (Institute of Medicine (U.S.) Panel on Micronutrients, 2001).

For iron, an adequate intake of 0.27 mg/day is used for infants aged between 0 and 6 months, it reflects the average amount of iron in breast milk (Lönnerdal & Kelleher, 2007). Healthy term infants are born with iron stores, which, in addition to the iron content in breast milk, are sufficient to meet the infant's iron needs until 4 to 6 months of age . Beyond this age, iron stores are depleted due to the rapid growth, and hence, the recommended daily allowance (RDA) for infants between 7 to 12 months of age is set at 11 mg/day and for children between 1 year to 3 years at 7 mg/day (Institute of Medicine (U.S.) Panel on Micronutrients, 2001).

3. Anemia of infection

Anemia of infection is known to be the second most prevalent form of anemia after iron deficiency anemia (Madu & Ughasoro, 2017). It can be induced by different factors like chronic infection, kidney disease, or autoimmune disease, as well as by some parasitic infections like hookworm. Infections cause an increase in hepcidin, an inflammation regulated acute phase peptide that inhibits iron absorption and causes iron retention by reticuloendothelial cells. It affects the release of recycled iron making this mineral inaccessible for hemoglobin synthesis (Pasricha

et al., 2018). Anemia of infections is usually diagnosed by a low serum iron concentration despite adequate reticuloendothelial iron stores and is most of the times confused with iron deficiency anemia (Means, 2000).

Vulnerable populations are more prone to developing infections and have higher risks of developing vitamins and minerals deficiencies due to their poor dietary intake, lack of proper hygiene practices as well as food insecurity (Hossain et al., 2016). Pregnant women, as well as young infants, are considered to be vulnerable and are most susceptible to a deterioration in their nutritional status because of their increased needs for adequate care and feeding practices (Gasseer et al., 2004).

F. Infants and young child feeding practices (IYCF)

The quality and quantity of nutrients during the first few years of life are both critical for the baby's health and growth. Correct feeding practices have significant effects on the survival of the child below the age of five years (Organisation Mondiale de la santé, WHO, & UNAIDS, 2003). Therefore, a set of indicators were published by the WHO in 1991 in order to provide helpful tools to evaluate the progress of infant and young child feeding practices . Afterwards, in 2001, exclusive breastfeeding was recommended for six months, and several recommendations were directed towards complementary feeding practices (WHO, 2007). Updated recommendations of infants and young child feeding practices were established by the WHO and were published in 2007. They contained eight different core indicators and seven optional indicators, including both breastfeeding as well as complementary feeding, as shown in Table 1.

The core indicators are considered as the ones essential for the population's nutritional assessment and surveillance. These indicators include: early initiation of breastfeeding, exclusive breastfeeding under the age of 6 months, continuation of breastfeeding till the age of one year, introduction of foods whether soft; semi-solid or solid, minimum dietary diversity, minimum meal frequency, minimum acceptable diet and consumption of iron-rich or iron-fortified food (WHO, 2007).

The optional indicators were considered as less critical but might be needed to assess further and monitor the needs of a population. They consist of: the proportion of children ever breastfed, continuation of breastfeeding until two years of age, age-appropriate breastfeeding, predominant breastfeeding under 6 months, duration of breastfeeding, bottle feeding of infants and milk feeding frequency for non-breastfed children (WHO, 2007).

Table 1: Infant and young child feeding indicators

Core IYCF indicators	
Early initiation of breastfeeding	Proportion of children born in the last 24 months who were put to the breast within one hour of birth
Exclusive breastfeeding under 6 months	Proportion of infants 0–5 months of age who are fed exclusively with breast milk (including only drops, syrups like vitamins and minerals, or medicines)
Continued breastfeeding at 1 year	Proportion of children 12–15 months of age who are fed breast milk
Introduction of solid, semi-solid or soft foods	Proportion of infants 6–8 months of age who receive solid, semi-solid or soft foods
Minimum dietary diversity	Proportion of children 6–23 months of age who receive foods from 4 or more food groups which are: grains, roots and tubers; legumes and nuts; dairy products; flesh foods (meat, fish, poultry, liver or organ meats); eggs; vitamin A-rich fruits and vegetables; other fruits and vegetables
Minimum meal frequency	Proportion of breastfed and non-breastfed children 6–23 months of age who receive solid, semi-solid, or soft foods the minimum number of times or more (including milk feeds for non-breastfed children). Minimum number of times is defined as 2 times for breastfed

	infants 6–8 months, 3 times for breastfed children 9–23 months, 4 times for non-breastfed children 6–23 months
Minimum acceptable diet	Proportion of children 6–23 months of age who receive a minimum acceptable diet (apart from breast milk) defined as: breastfed children who had at least the minimum dietary diversity and the minimum meal frequency during the previous day and non-breastfed children who received at least 2 milk feedings and had at least the minimum dietary diversity and the minimum meal frequency during the previous day
Consumption of iron-rich or iron-fortified food	Proportion of children 6–23 months of age who receive an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified at home
Optional IYCF indicators	
Children ever breastfed	Proportion of children born in the last 24 months who were ever breastfed
Continued breastfeeding at 2 years	Proportion of children 20–23 months of age who are fed breast milk
Age-appropriate breastfeeding	Proportion of children 0–5 months of age who are only receiving breastmilk and proportion of children 6-23 months of age who received breast milk, as well as solid, semi-solid or soft foods during the previous day
Predominant breastfeeding under 6 months	Proportion of infants 0–5 months of age who received breast milk as the predominant source of nourishment during the previous day, along with liquids such as water-based drinks, fruit juice and ritual fluids
Duration of breastfeeding	Median duration of breastfeeding among children less than 36 months of age
Bottle feeding	Proportion of children 0–23 months of age who are fed with a bottle
Milk feeding frequency for non-breastfed children	Proportion of non-breastfed children 6–23 months of age who receive at least 2 milk feedings

(World Health Organization (WHO), 2008)

1. Breastfeeding practices

Breastfeeding has several protective effects on the infant and on the mother ("Position of the American Dietetic Association," 2009). Due to its antibacterial and immunological characteristics, breastmilk protects the child against infections, low respiratory tract diseases, and

gastrointestinal illnesses (Bachrach et al., 2003; Oddy et al., 2003). Human milk can also affect the brain development. In fact, when compared to formula-fed children, breastfed children scored higher results on intelligence and developmental tests, had higher performance at school as well as during adolescence (Horwood & Fergusson, 1998; Richards et al., 2002; Cesar G. Victora et al., 2005).

Exclusive breastfeeding includes breastmilk as the only source of adequate nutrients, along with drops, syrups like vitamins and minerals, or medicines. It is known to protect infants under the age of 6 months from infections and lessens the frequency and severity of infectious episodes, which could decrease their risks of developing iron deficiency and anemia (Howie et al., 1990; Ladomenou et al., 2010).

Moreover, breastmilk is one of the essential sources of easily digestible and bioavailable vitamins for the growth and development of the child. It contains adequate amounts of carbohydrates, saturated fats, long-chain polyunsaturated fatty acids, as well as adequate supplies of iron until 6 months of age (Riordan & Auerbach, 2001). Hence, due to its extensive benefits on the child's health, the WHO recommends every child to be exclusively breastfed during the first six months of life, and breastfed until the age of two years (Organisation Mondiale de la santé et al., 2003).

Early initiation of breastfeeding is defined as putting the infant in contact with the breast within one hour of birth (WHO, 2007). Exclusive breastfeeding, in addition to early initiation of breastfeeding, were shown to decrease children's death rates by 50% in the first week of life (E. J. Baker et al., 2006). Similarly, longer durations of breastfeeding were linked with decreased incidences of chronic childhood illnesses; the WHO recommends early initiation of breastfeeding

and continuation of breastfeeding until the age of two years (American Academy of Pediatrics, 2007).

However, the relation between the duration of breastfeeding and anemia is still unclear. Some studies have shown an association between longer durations of exclusive breastfeeding for more than 6 months and lower iron stores, lower hemoglobin levels as well as higher risks of iron deficiency anemia (Ali & Zuberi, 2003; Meinzen-Derr et al., 2006; Reinbott et al., 2016; Clark et al., 2017).

Therefore, in order to maintain infant's iron stores, strict adherence to a breastmilk diet until the age of 6 months followed by timely introduction of appropriate and good quality iron-rich complementary foods is crucial (Tawai, 2012).

2. Complementary feeding practices

Starting the age of six months, exclusive breastfeeding would no longer be enough to fulfill the infant's needs. In addition, the digestive system would be mature enough to digest nutrients from other food sources (Naylor & Morrow, 2001). The WHO recommends solid, semi-solid, and soft foods to be introduced as of this age.

The different core indicators related to complementary feeding are: the minimum dietary diversity; minimum meal frequency; and the minimum acceptable diet (WHO, 2007).

The minimum dietary diversity was developed in order to make sure that children aged between 6 and 23.9 months are receiving enough nutrients from their diets. In order to meet this indicator, a child must be consuming a minimum of four out of the seven following food groups:

grains, roots and tubers; legumes and nuts; dairy products like milk, yogurt and cheese; flesh foods like meat, fish, poultry and liver or organ meats; eggs; vitamin A-rich fruits and vegetables; as well as other fruits and vegetables.

The minimum meal frequency is defined as the number of times the child is fed any form of food, including breastfeeding and milk-feeding. It tackles the approximate amount of energy consumed from actual foods, consisting of non-liquids for breastfed children and milk and food (solid; semi-solid or soft) for non-breastfed ones. This indicator is aggregated depending on the age of the child: two times being the minimum for breastfed infants aged between 6 to 8 months; three times for breastfed infants between 9 to 23 months old; and four times for non-breastfed children between 6 to 23 months.

The last core indicator regarding complementary feeding is the minimum acceptable diet, which tackles the previous two indicators together: the minimum meal frequency and minimum dietary diversity. It was set in order to ensure that the child is receiving an adequate and diverse diet (WHO, 2007).

3. Iron-rich or fortified foods

Complementary foods should provide adequate amounts of micronutrients, energy, and protein, in order to fulfill the child's needs starting the age of six months. According to the infant and young child feeding textbook developed by the WHO, an essential nutrient that must be fulfilled by complementary feeding is iron. In fact, after the age of six months, the content of iron in breastmilk would no longer suffice to meet the child's increased needs. Hence, iron-rich foods must be included in the infant's diet, preferably from flesh foods like animals or fish, as

well as pulses or fortified foods and supplements (WHO, 2009). The consumption of iron-rich or iron-fortified indicator assesses the sufficiency of iron intake in the diet of the child below the age of 24 months, by tackling the proportion of children aged between 6 and 23.9 months who are consuming iron-rich foods or fortified foods (WHO, 2007).

Malnutrition along with anemia and improper child feeding practices during early years of life can have detrimental outcomes on the development of current and future generations. It can affect the cognitive, motor skill, physical, social, and emotional wellbeing. The association between the prevalence of anemia with infant and young child feeding practices among Syrian refugees' children residing in Greater Beirut is still scarce. Hence, this study aims to investigate the prevalence of anemia among Syrian Refugees' children below the age of two-years, residing in the Greater Beirut area, while assessing their dietary intake, nutritional status and feeding practices.

CHAPTER III
MATERIALS AND METHODS

A. Study design and Study population

This is a cross-sectional study that is based on data collected within a larger parent project targeting mothers and children under five belonging to the Syrian refugees' community in Lebanon as well as the Lebanese host community . In the parent project, a total of 539 mothers with their children were recruited from selected Primary Healthcare Centers (PHCCs) using a two-stage random cluster sampling in the most vulnerable areas of Greater Beirut. The highest vulnerability level of localities is based on the multi-deprivation index, the Lebanese population dataset and the refugee population figures (UNOCHA 2015). Accordingly, six different health care centers were chosen and were located in: Burj Hammoud, Chiyah, Mazraa, Mousaytbeh, Bourj Barajneh, and Baouchriyeh. The recruitment strategy included identifying mother-child pairs through the nurse, by direct approach from the research assistant in the waiting rooms, or by posing flyers with a short description of the survey in the PHCC premises. Mothers and their children were recruited using an oral script according to the following inclusion and exclusion criteria.

Mothers:

- *Inclusion Criteria:* Lebanese or Syrian mothers aged between 15 to 49-years-old.
- *Exclusion criteria*: any different nationality.

Children:

- *Inclusion criteria*: children aged between 0 to 5 years old, born to either Syrian or Lebanese parents.
- *Exclusion criteria:* any different nationalities, along with the presence of any physical malformations or inborn errors of the metabolism that could affect the feeding practices and the growth.

Out of a total 539 mother/children pairs that were recruited for the larger parent study, the sample for the present study includes n=255 children aged 0-2 years old from the Syrian refugee community. Sample size was based on the prevalence of anemia of 21% as published in the UNICEF report (2014) among under five Syrian refugee children, in order to assess the prevalence of anemia with a 95% confidence interval and power of 80%.

The prevalence of anemia and its association with infant and young child feeding practices, dietary intake, and anthropometric measurements was assessed.

B. Ethics

This study is based on data collected within a larger research project which was granted approval by the Institutional Review Board of the American University of Beirut. All participants provided written informed consent prior to enrolling in the study. Participants' privacy and confidentiality of data were maintained. If the mother was illiterate, she was informed about the study orally by the interviewer in the presence of a family member or a witness and afterwards both the witness and the mother were asked to sign two copies of the consent form.

Finally, for under 18 years old mothers; they had to be assisted by their legal guardian (other than their husbands). All the collected data remained in a locked location, and the participants' identity remained anonymous.

All mothers received a brochure at the end of the interview that contained nutritional information about breastfeeding and children feeding practices.

C. Data collection and survey instrument

Data collection took place in the selected primary healthcare centers and consisted of administrating a questionnaire to all participating mothers, obtaining the child's anthropometric measurements, and assessing the child's blood hemoglobin levels. Data collection was performed by trained research assistants who have completed the needed ethics certification course and were trained on the study protocol and methodology.

1- Questionnaire

Based on a thorough review of pertinent literature, a multi-component questionnaire was developed for the study. It was adjusted to be culturally suitable and included the following sections:

- Household characteristics like sociodemographic characteristics and economic background
- Breastfeeding practices
- Complementary feeding practices including liquids, solids; semi-solid and soft foods
- 24-hour recalls of the child
- Anthropometric measurements of the child
- Hemoglobin levels test

Dietary assessment included the evaluation of breastfeeding and complementary feeding practices as well as the administration of 24-hour dietary recalls by trained nutritionists through face to face interviews. Standardized NCE 2D food portion visual were used in order to facilitate portion size estimation by the study participants (Mitchell et al., 1996).

2- Anthropometrics Measurements

Anthropometric measurements included: weight, length, mid-upper arm circumference (MUAC) and the head circumference (HC) of the child. All the measurements were taken by trained research assistant using standardized techniques as well as calibrated equipment as follows:

The *length* of the child was taken using a standardized length board; with the help of the mother, the child lying down, knee flat, with the head held against the headboard and the footboard was moved against the feet.

The *weight* was taken using a calibrated scale while being held by the mother or the caregiver, with light clothing, barefooted and to the nearest 0.1 kg.

Head circumference was measured with a flexible, non-stretchable measuring tape, while the infant/child was sitting in the lap of the caregiver; the tape was positioned above the eyebrows, above the ears, and around the back of the head; to measure the maximum head circumference; to the nearest 0.1 cm. Values below the 3^{rd} percentile for age or above the 97^{th} percentile for age were both indicative of health and/or any developmental risks. (WHO, 2007)

Mid-upper arm circumference was measured using a calibrated plastic strip, used at the mid-point between the elbow and the shoulder of the left arm with the arm relaxed and hanging down; and recorded to the nearest 0.1 cm.

The height, weight and age were interpreted based on Z scores of the WHO Global Database on Child Growth and Malnutrition (WHO, 2008) as follows:

Table 2: Child growth assessment indicators

Z-score	Growth indicators			
	Length/height-for-age	**Weight-for-age**	**Weight-for-length/height**	**BMI-for-age**
Above 3	Tall /very tall	Obese	Obese	Obese
Above 2		Overweight	Overweight	Overweight
Above 1				
0 (median)				
Below -1				
Below -2	Stunted	Underweight	Wasted	Wasted
Below -3	Severely stunted	Severely underweight	Severely wasted	Severely wasted

World Health Organization. Training course on child growth assessment-Geneva (WHO, 2008)

- Z-score < -3 indicated severe under-nutrition (classified by severe wasting, stunting and underweight)
- Z-score < -2 indicated moderate and severe under-nutrition (classified by low weight-for-age (underweight), low height-for-age (stunted) and low weight-for-height (wasted))
- Z-score > +1 indicated a risk of overweight (classified as weight-for- height)
- Z-score > +2 indicated overweight (classified as weight-for- height)
- Z-score > +3 indicated obesity (classified as weight-for- height)

MUAC values were interpreted as follows; according to the FAO (2007) nutritional status assessment indicators:

Table 3: Nutritional status assessment indicators

Indicators	MUAC values
Severe under Nutrition	<11.0 cm
Moderate Malnutrition	Between 11.0 cm - 12.0 cm
Serious risk of Malnutrition	Between 12.0 cm - 12.5 cm
Moderate risk of Malnutrition	Between 12.5cm - 13.5 cm

Satisfactory nutritional status	≥13.5 cm

Food and Agriculture Organization: Nutritional Status Assessment and Analysis course (FAO, 2007)

3- Hemoglobin test

Children's hemoglobin levels were measured using 'HemoCue Hb 301 System'. Samples were collected by a certified phlebotomist who was trained on the proper micro-techniques to collect blood through finger and heel prick for pediatric subjects. The hemoglobin status was measured with a small blood drop from the finger in children aged 6 months and above, and from the heel among infants aged below 6 months. The hemoglobin cut-off points used to analyze the prevalence of anemia were the ones set by the WHO (2001) for the children between 6 to 24 months and by Marques *et.al* (2014) for children below 6 months as follows:

Table 4: Hemoglobin cut-off values to define anemia and anemia severity

	Anemic (Hb g/dl)		**Severity (Hb g/dl)**		
Age groups	**Yes**	**No**	**Mild**	**Moderate**	**Severe**
Children <6 months*	< 10.5	≥ 10.5	N/A	N/A	N/A
Children 6-24 months	<11.0	≥11.0	10.0 - 10.9	7.0 - 9.9	<7.0

Hemoglobin concentrations for the diagnosis of anemia and assessment of severity (WHO, 2011)
*Anemia was defined for children below 6 months by hemoglobin levels : < 10.5 g/dl (Marques et al. 2014)

4- Dietary intake Assessment

Dietary intake of participating children was collected by trained nutritionists, with the use of 24-hours recalls that followed the USDA Multiple-Pass Method. It consisted of 5 different steps, where the interviewer started by a quick food listing, followed by a probing for the forgotten foods

list, then the occasion and the time during which the foods were consumed, along with the detailed cycle and the final probe review (Conway et al., 2004).

The exact assessment of the amounts of food consumed was determined using standardized NCE 2D food portion visual for adults (Mitchell et al., 1996).

Data entry was completed by trained nutritionist in order to minimize errors and it was done using NutriSurvey software (NutriSurvey, 2007) based on the United States Department of Agriculture (USDA) database. Local recipes were used for the dietary intake analysis and adjusted according to the Lebanese and Syrian culture. Macronutrients and micronutrients intakes were derived from children 24hr recall and compared to the respective DRIs (dietary reference intake) according to the institute of medicine. As for the estimated energy intake (EER), it was computed according to the IOM (2002) for below 2 years old children. It is equal to the total energy expenditure (TEE) which is adjusted based on the gender of the child, his age and feeding mode, added to the energy deposition in growing tissues, according to each age group as stated below:

EER= TEE + Energy deposition

- 0 to 3 months EER= (89*weight [kg] -100) + 175 kcal
- 4 to 6 months EER= (89*weight [kg] -100) + 56 kcal
- 7 to 12 months EER= (89*weight [kg] -100) + 22 kcal
- 13 to 23 months EER= (89*weight [kg] -100) + 20 kcal

5- Infant and Young Child Feeding Indicators

Infant and young children feeding practices were assessed using the WHO set of indicators (World Health Organization (WHO), 2008) which were divided into breastfeeding and complementary feeding as follows:

Breastfeeding indicators:

- early initiation of breastfeeding
- duration of breastfeeding
- exclusive breastfeeding under 6 months
- predominant breastfeeding under 6 months
- continued breastfeeding at 1 year
- continued breastfeeding at 2 years
- bottle feeding
- milk feeding frequency of non-breastfed children

Complementary feeding indicators:

- introduction of solid, semi-solid or soft foods
- minimum dietary diversity
- minimum meal frequency
- minimum acceptable diet
- consumption of iron-rich or iron-fortified foods

D. Statistical Analysis

Statistical analysis was performed using the Statistical Analysis Package for Social Sciences (SPSS Inc., Chicago, IL, USA). Descriptive statistics were expressed for the continuous variables as means and standard deviations (SD) and for categorical variables as total number of subjects

and proportions. Descriptive statistics were used to determine the prevalence of anemia, stunting; wasting; underweight, overweight, and obese, as well as for the feeding practices, anthropometric variables, and maternal sociodemographic characteristics. The difference between groups was detected using independent t-test for the continuous variables as mean differences and chi-square tests for the categorical variables. Statistical significance level was detected by a p-value<0.05.

In addition, multiple logistics regression was used in order to assess the association between the prevalence of anemia among under 2 years old children with age, dietary intake of iron, stunting as well as early initiation of breastfeeding.

CHAPTER IV
RESULTS

A. Socio-demographic characteristics of the study population:

A total of 255 Syrian refugees children were included in this study. Sociodemographic, parental, and household characteristics of the study subjects are shown in Table 5. Of the study sample, 51.2% were boys and the age distribution of the study population was as follows: 34.5% were aged below 6 months, 27.1% between 6 to 11 months, and 38.4% between 12 to 23 months.

The majority of the mothers were married (99.2%), housewives (97.2%) and were able to read and write (74.3%). As for the fathers, the majority had a paid job (96.8%) and were able to read and write (74.5%), however 16.5% were illiterate and only 8.6% had a university degree/diploma. Most of the households (90.1%) had a crowding index higher than 2, indicating high number of people that exceeds the capacity of the available space. Additionally, the number of children in the house was distributed between 1 to 2 children (56.9%), 3 to 4 children (32%) and above 5 children (11.1%). Almost half of the households had an income range between 300 000 to 750 000 Lebanese Lira (45.8%) while only 35.6% had an income above 750 000 L.L.

Table 5: Socio-demographic, parental and household characteristics of the study sample (N=255)

Socio-demographic characteristics	n[a] (%)
Age of the children	
<6 months	88 (34.5)
6 months – 11 months	69 (27.1)
12 months – 23 months	98 (38.4)
Gender of the children	
Boys	130 (51.2)
Girls	124 (48.8)
Mother's age (years)	
<18 years old	7 (2.7)
18 years – 24.9 years	103 (40.4)
25 years – 29.9 years	79 (31)
30 years – 34.9 years	52 (20.4)
≥35 years	14 (5.5)
Mother's education status	
No schooling/ illiterate	37 (14.6)
Able to read and write/Primary, Intermediate, Secondary school	188 (74.3)
Higher education (university or diploma)	27 (10.7)
Other/ No answer	1 (4)
Mother's employment status	
No paid job/ housewife	243 (97.2)
Paid job (daily, part-/full time)	7 (2.8)
Marital status of the mother	
Engaged/ Widowed/ divorced	2 (0.8)
Married	253 (99.2)
Father's employment status	
No paid job	8 (3.2)
Paid job (daily, part-/full time)	240 (96.8)
Father's education status	
No schooling/ illiterate	42 (16.5)
Able to read and write/ Primary, Intermediate, Secondary school	190 (74.5)
Higher education (university or diploma)	22 (8.6)
Other/ No answer	1 (0.4)
Number of children in the household	
1 to 2	144 (56.9)
3 to 4	81 (32)
≥ 5	28 (11.1)
Household Type	
Nuclear family	124 (48.6)
Extended Family	131 (51.4)
Crowding index [b]	
<2	25 (9.9)
≥2	227 (90.1)

Monthly income (L.L)	
No income	2 (0.8)
< 300 000	32 (12.6)
300 000 – 750 000	116 (45.8)
>750 000	90 (35.6)
No answer	13 (5.1)

[a] Column total may be different because of missing data.

[b] Crowding index was calculated as the number of people living in the household per the number of bedrooms and living rooms (excluding kitchens, bathrooms, hallways, balconies, and garage)

B. Anemia

The prevalence of anemia among 0 to 2 years old Syrian refugees children is shown in Table 6 and figure 3. There was a significant difference in the prevalence of anemia between the different age groups, with the highest prevalence being observed amongst 6 to 11 months infants (50.7%). The prevalence of anemia ranged between 19.8% and 38.1% in the other age groups. Among children aged 6 to 23 months, none of the cases were severely anemic, while 30.7% were mildly anemic and 12.7% were moderately anemic.

Table 6: Prevalence and severity of anemia[a] among 0-2 years old Syrian refugees children by age groups

	Total* (N=252)	**<6 months [a]** (n=86)	**6 - 11 months [a]** (n=69)	**12 - 23 months [a]** (n=97)	**P-value****
			N(%)		
Total Anemia [a]	89 (35.3)	17 (19.8)	35 (50.7)	37 (38.1)	**<0.001**
Mild anemia [b]	51 (30.7)	-	25 (36.2)	26 (26.8)	
Moderate anemia [c]	21 (12.7)	-	10 (14.5)	11(11.3)	0.271
Severe anemia [d]	0 (0.0)	-	0 (0.0)	0 (0.0)	

[a] Anemia was defined for children below 6 months by hemoglobin levels : < 10.5 g/dl (Marques et al. 2014) and < 11 g/dl for children aged between 6 to 23 months (WHO, 2011). For infants <6 months, there is no classification for the severity of anemia

According to the severity cut-off points for children aged 6 to 23 months old (WHO, 2011) :

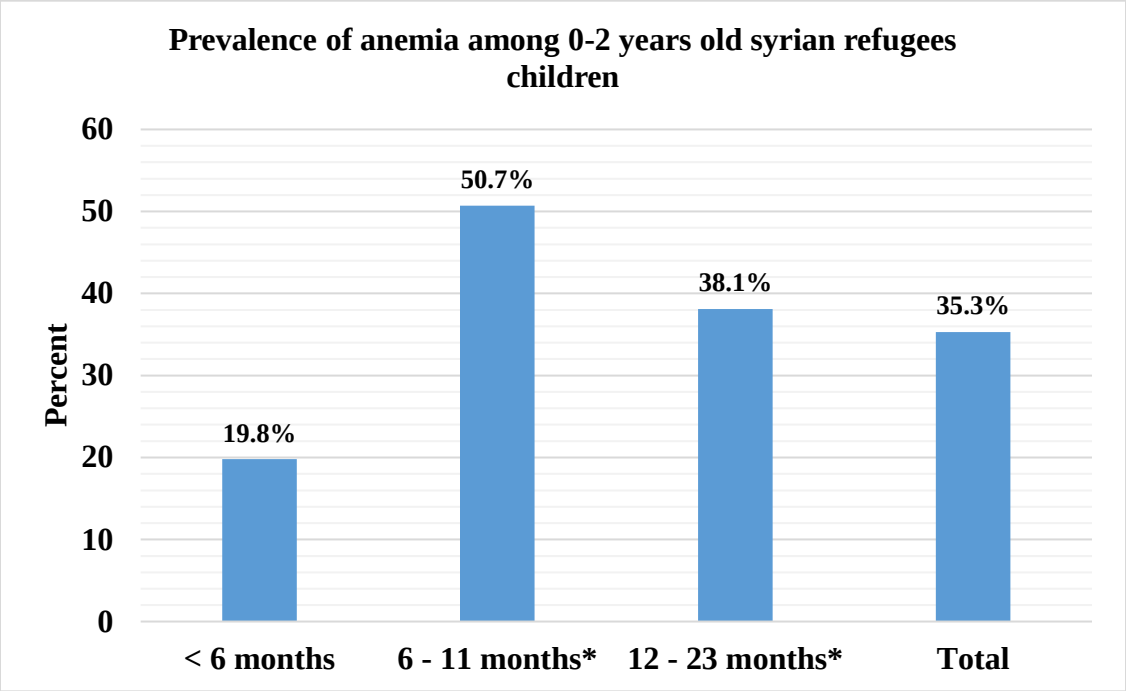
[b] Mild anemia: 10g/dl - 10.9g/dl

[c] Moderate anemia: 7g/dl - 9.9g/dl

[d] Severe anemia: < 7 g/dl

* Column total may be different because of missing data

** P-value is derived from Pearson's Chi-Square for all categorical variable



Significantly associated with anemia at p-value <0.05

Figure 3: Prevalence of anemia among 0-2 years old Syrian Refugees Children

Sociodemographic characteristics of the study subjects are shown in Table 7 according to anemia status. For gender, 53% of the anemic children were boys whereas 46% were girls, with no significant differences between gender. Furthermore, amongst anemic children, 72.7% and 77.5% of the children had mothers and fathers who were able to read and write or who had completed school (primary, intermediate, or secondary). As for income, almost half of the families (50.6%) of anemic children had an income between 300 000 L.L to 750 000 L.L, compared to 43.5% of the non-anemic children. No significant associations were observed between children anemia status and parental sociodemographic characteristics.

Table 7 : Sociodemographic Characteristics of the study sample by anemia status

Socio demographic characteristics	Not anemic (n^a =163)	Anemic* (n=88)	P-value**
	N (%)		
Gender			
Boy	81 (49.7)	47 (53.4)	0.574
Girl	82 (50.3)	41 (46.6)	
Maternal education status			
No schooling/ illiterate	21 (13)	16 (18.2)	
Able to read and write/Primary, Intermediate, Secondary school	121 (74.7)	64 (72.7)	0.268
Higher education (university or diploma)	20 (12.3)	7 (8.0)	
Other/No answer	0 (0.0)	1 (1.1)	
Paternal education Status			
No schooling/ illiterate	27 (16.6)	15 (16.9)	
Able to read and write/Primary, Intermediate, Secondary school	119 (73.0)	69 (77.5)	0.588
Higher education (university or diploma)	16 (9.8)	5 (5.6)	
Other/No answer	1 (0.6)	0 (0.0)	
Monthly income			
No income / < 300 000	20 (12.4)	14 (15.7)	
300 000 – 750 000	70 (43.5)	45 (50.6)	0.562
>750 000	61 (37.9)	27 (30.3)	
No answer	10 (6.2)	3 (3.4)	

* Anemia was defined for children below 6 months by hemoglobin levels : < 10.5 g/dl (Marques et al. 2014) and < 11 g/dl for children aged between 6 to 23 months (WHO, 2011)

** P-value is derived from Pearson's Chi-Square for all categorical variables

C. Anthropometric characteristics of children

Anthropometric characteristics of the study subjects are shown according to age groups in Table 8. There was a significant difference in the prevalence of stunting between age groups, with the highest being observed amongst 12-23 months old children (13.4%). In the two other age groups, the prevalence of stunting was estimated at 2.3 % in infants aged less than 6 months and at 2.9% in those aged 6 to 11 months .

The total prevalence of underweight was estimated 3.9%, with no significant differences between age groups. Based on the BMI-for-age z-scores, wasting was identified in 6.7% of the study sample, while overweight/obesity was observed in 5.9%. The majority of the participants fell in the normal weight category (88%), with no significant difference between the age groups.

Table 8: Anthropometric measurements of 0-2 years old Syrian refugees children by age groups (N=255)

Anthropometric measurements	**< 6 months** (n=88)	**6 -11 months** (n=69)	**12 -23 months** (n=98)	**Total*** (N=255)	**P-value****
		Mean ± SD			
Weight (kg)	6.1 ±1.35	8.7 ± 1.51	10.6 ± 1.71	8.53 ± 2.44	**0.000**
Height/ Length (cm)	61.5 ± 4.87	71.2 ± 6.53	80 ± 5.82	71.25 ± 9.73	**0.000**
Head circumference (cm)	40 ± 2.46	44.5 ± 3.24	46.1 ± 3.97	43.56 ± 4.24	**0.000**
MUAC (cm)	13.8 ± 1.64	14.8 ±1.46	15.4 ± 3.45	14.68 ± 2.55	**0.000**
		N (%)			
Length-for-age (z-scores)					
Stunted [a]	2 (2.3)	2 (2.9)	13 (13.4)	17 (6.7)	**0.015**
Normal length [b]	71 (80.7)	57 (82.6)	74 (76.3)	202 (79.5)	
Tall/Very tall [c]	15 (17.0)	10 (14.5)	10 (10.3)	35 (13.8)	
Weight-for-age (z-scores)					
Underweight [d]	4 (4.5)	1 (1.4)	5 (5.2)	10 (3.9)	
Normal weight [e]	77 (87.5)	62 (89.9)	85 (87.6)	224 (88.2)	0.795
Overweight/Obese [f]	7 (8.0)	6 (8.7)	7 (7.2)	20 (7.9)	
Weight-for-length (z-scores)					0.971
Wasting [g]	6 (6.8)	3 (4.4)	5 (5.2)	14 (5.5)	

Normal weight [h]	78 (88.6)	62 (91.2)	87 (89.7)	227 (89.7)	
Overweight/ Obese [i]	4 (4.5)	3 (4.4)	5 (5.2)	12 (4.7)	
BMI-for-age (z-scores)					
Wasting [j]	7 (8.0)	4 (5.8)	6 (6.2)	17 (6.7)	0.961
Normal weight [k]	75 (85.2)	61 (88.4)	86 (88.7)	222 (87.4)	
Overweight/Obese [l]	6 (6.8)	4 (5.8)	5 (5.2)	15 (5.9)	

According to the World Health Organization. Training course on child growth assessment-Geneva (WHO, 2011) :

HAZ scores:	a. HAZ < -2	b. - 2 ≤ HAZ ≤ 2	c. HAZ > 2
WAZ scores:	d. WAZ < - 2	e. - 2 ≤ WAZ ≤ 2	f. WAZ > 2
WHZ scores:	g. WHZ < - 2	h. - 2 ≤ WHZ ≤ 2	i. WHZ > 2
BAZ scores:	j. BAZ < - 2	k. - 2 ≤ BAZ ≤ 2	l. BAZ > 2

* Column total may be different because of missing data

**P-value is derived from Pearson Chi-Square for all categorical variables and from independent T-test for all the continuous variables

Anthropometric characteristics of the study subjects are shown in Table 9 according to anemia status. The prevalence of stunting showed a significant difference between groups based on anemia status. Amongst the anemic children 11.4% were stunted, whereas amongst the non-anemic children only 3.7% were stunted. There was no significant association between anemia, wasting, or overweight and obesity in the study sample.

Table 9: Anthropometric characteristics of 0-2 years old Syrian Refugees Children by anemia status

Anthropometric measurements	**Not-anemic** (n=163) n (%)	**Anemic*** (n=88) n (%)	**Total**[△] (N=251)	**P-value****
		Mean ± SD		
Weight (kg)	8.4 ± 2.56	8.7 ± 2.05	8.5 ± 2.44	0.226
Height/ Length (cm)	70.9 ±10.03	72.1 ± 8.67	71.2 ± 9.73	0.285
Head circumference (cm)	43.4 ± 3.52	44.0 ± 5.18	43.6 ± 4.23	0.259
MUAC (cm)	14.5 ± 1.54	15.03 ± 3.71	14.7 ± 2.55	0.208
		N (%)		
Length-for-age (z-scores)				
Stunted [a]	6 (3.7)	10 (11.4)	16 (6.4)	**0.034**
Normal length [b]	137 (84.0)	64 (72.7)	201 (80.1)	
Tall/ Very tall [c]	20 (12.3)	14 (15.9)	34 (13.5)	
Weight-for-age (z-scores)				
Underweight [d]	5 (3.1)	4 (4.5)	9 (3.6)	0.818

Normal weight [e]	146 (89.6)	77 (87.5)	223 (88.8)	
Overweight/ Obese [f]	12 (7.4)	7 (8.0)	19 (7.6)	
Weight-for-length (z-scores)				
Wasting [g]	9 (5.5)	5 (5.7)	14 (5.6)	0.992
Normal weight [h]	146 (89.6)	78 (89.7)	224 (89.6)	
Obese [i]	8 (4.9)	4 (4.6)	12 (4.8)	
BMI-for-age (z-scores)				
Wasting [j]	10 (6.1)	6 (6.8)	16 (6.4)	0.970
Normal weight [k]	143 (87.7)	77 (87.5)	220 (87.6)	
Overweight/ Obese [l]	10 (6.1)	5(5.7)	15 (6.0)	

*Anemia was defined for children below 6 months by hemoglobin levels : < 10.5 g/dl (Marques et al. 2014) and < 11 g/dl for children aged between 6 to 23 months (WHO, 2011)

According to World Health Organization. Training course on child growth assessment-Geneva (WHO, 2008) :

HAZ scores:	a. HAZ < -2	b. - 2 ≤ HAZ ≤ 2	c. HAZ > 2
WAZ scores:	d. WAZ < - 2	e. - 2 ≤ WAZ ≤ 2	f. WAZ > 2
WHZ scores:	g. WHZ < - 2	h. - 2 ≤ WHZ ≤ 2	i. WHZ > 2
BAZ scores:	j. BAZ < - 2	k. - 2 ≤ BAZ ≤ 2	l. BAZ > 2

[Δ]Column total may be different because of missing data

**P-value is derived from Pearson Chi-Square for all categorical variables and from independent T-test for all the continuous variables.

D. Dietary intake and Nutritional adequacy

1. According to age groups

Table 10 showed the mean dietary intakes of 0 to 2 years old Syrian refugees children compared to the age-specific dietary reference intake (DRI). Except for dietary fat and vitamin C, the intake of macronutrients and micronutrients was significantly different among the age groups. Energy intake was higher than the mean estimated energy requirement in all age groups. Protein (g) and fat (g) intakes as well as carbohydrates (g) remained higher than the age specific DRIs. As for the micronutrients, iron mean intake amongst 6 to 11 months old children was lower than the recommended DRI. Whereas the mean intakes of vitamin D, vitamin E, iodine and copper was less than the recommended intake amongst the different age groups.

Table 10: Dietary Intake of 0-2 years old Syrian refugees children by age groups (N=255)

	DRI <6 mo.	**< 6 mo.** (n=88)	**DRI 6-11 mo.**	**6 - 11 mo.** (n=69)	**DRI 12-23 mo.**	**12 - 23 mo.** (n=98)	**Total 0-23 mo.** (N=255)	**P-value**[△]
				Mean ± SD				
Energy (Kcal)**	577± 109.2	755.1 ± 457.8	701±130.5	883.6 ± 487.4	862 ± 152.1	1055.4 ± 496.1	905.3 ± 496	0.000
CHO [a] (% EI [b])	-	41.8 ± 2.6	-	46.8 ± 8.7	-	49.5 ± 10.5	46.12 ± 8.7	0.000
Protein (% EI)	-	7.2 ± 1.5	-	8.5 ± 2.6	-	10.4 ± 3.7	8.8 ± 3.1	0.000
Fat, total (% EI)	-	51.0 ± 3.1	-	44.9 ± 8	-	41.0 ± 9.1	45.5 ± 8.4	0.000
Saturated fat (%)	-	3.9 ± 6.5	-	5.9 ± 6.4	-	10.6 ± 6.2	7.0 ± 6.9	0.000
PUFA [c] (%)	-	2.2 ± 3.7	-	3.9 ± 3.8	-	7.8 ± 4.9	4.8 ± 4.9	0.000
Sugar, total (%)	-	9.3 ± 14.5	-	12.8 ± 13.7	-	21.5 ± 12.8	14.9 ± 14.6	0.000
Macronutrients								
Carbohydrates (g)	60*	78.6 ± 47	95*	104.3 ± 61.1	**130**	128.2 ±61.7	104.6 ± 60.5	0.000
Protein (g)	9.1*	13.2 ± 7.7	**11**	18.5 ± 11.7	**13**	27.8 ± 17.4	20.3 ± 14.6	0.000
Fat (g)	31*	43.1 ± 26.9	30*	43.9 ± 25.8	35	49.1 ± 27.3	45.6 ± 26.8	0.255
Linoleic acid (g)	4.4*	4.9 ± 2.8	4.6*	6.3 ± 4.6	7*	9.6 ± 7.7	7.1 ± 5.9	0.000
α-Linolenic acid (g)	0.5*	0.1 ± 0.2	0.5*	0.2 ± 0.4	0.7*	0.8 ± 1.3	0.4 ± 0.9	0.000
Saturated fat (g)	-	2.4 ± 4.3	-	5.7 ± 8.4	-	13.2 ± 10.7	7.5 ± 9.6	0.000
Micronutrients								
Iron (mg)	0.27*	1.8 ± 2.1	**11**	3.7 ± 3.7	**7**	6.8 ± 5.5	4.2 ± 4.6	0.000
Calcium (mg)	200*	383 ± 220.6	260*	456.8 ± 338.2	**700**	550.4 ± 451	467.6 ±360.7	0.006
Zinc (mg)	2*	2.2 ± 1.4	**3**	3.2 ± 2.6	**3**	5 ± 3.1	3.5 ± 2.8	0.000
Copper (mg)	200*	0.4 ± 0.2	220*	0.5 ± 0.3	**340**	0.7 ± 0.4	0.6 ± 0.4	0.000
Folate (µg) (DFE)	65*	91.8 ± 52.9	80*	115.9 ± 71.3	**150**	152.9 ± 125.7	121.8 ± 95.1	0.000
Iodine (µg)	110*	46.1 ± 38.8	130*	35.6 ± 34.1	**90**	8.8 ± 16.4	29 ± 34.6	0.000
Vitamin C (mg)	40*	71.1 ± 44	50*	73 ± 44.9	**15**	66.5 ± 46.1	69.8 ± 45	0.629
Vitamin A (µg)	400*	697.1 ± 475.2	500*	652.2 ± 447.6	**300**	498 ± 591.7	608.4 ±522.1	0.024
Vitamin D (µg)	10*	2.3 ± 2.8	10*	2.9 ± 4.2	**15**	4.2 ± 4.7	3.2 ± 4.1	0.005
Vitamin E (mg)	4*	2.7 ± 2.3	5*	3 ± 2.2	**6**	4.1 ± 4.5	3.3 ± 3.4	0.006
Vitamin K (µg)	2.0*	9.1 ± 16	2.5*	17.7 ± 31.2	30*	51.5 ± 67.8	27.7 ± 49.7	0.000
Vitamin B12 (µg)	0.4*	1.2 ± 0.7	0.5*	1.4 ± 1.2	**0.9**	2.1 ± 3.2	1.6 ± 2.1	0.013

[a] %EI: percent energy intake [b] PUFA: Polyunsaturated fatty acids

This table presents Recommended dietary allowance (RDAs) in bold font and Adequate Intakes (AI) in regular font followed by an asterisk (*)

Data from Food and Nutrition Board, Institute of Medicine: *Dietary Reference Intakes for Calcium, and Vitamin D* (1997); *Dietary Reference Intakes for Folate and Vitamin B12* (1998); *Dietary Reference Intakes for Vitamin C and Vitamin E* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Copper, Iodine, Iron, and Zinc* (2001); *Dietary Reference Intakes for Calcium and Vitamin D* (2011). Washington, DC, National Academic Press (www.nap.edu). Data from *dietary reference intakes for carbohydrate, fiber, fat, fatty acids, protein and amino acids*, Washington, DC, 2002, National Academic Press

**Estimated Energy Requirements were calculated based on the weight and the height according to IOM (2002)

Table 11 displays the proportion of children who did not reach the 100% of the recommended DRIs for energy, macronutrients, and micronutrients. Among children aged 6 to 11 months: 95.7% had an iron intake below the recommended DRI, while 44.9% and 36.2% did not reach the DRI for vitamin A and vitamin C. Between 12 to 23 months 80.6% of the children had a low intake of calcium. As for zinc and folate, almost half of the children reached the recommended intake for these nutrients, while only 5.9% of the total sample consumed the recommended intake for vitamin D . Furthermore, the intake of copper was low among all age groups. Significant differences between age groups were noted for carbohydrates, α-linolenic acid, iron, calcium, zinc, folate, vitamin C, A, K and B12.

Table 11: Proportion of children who did not reach 100% of the Recommended Dietary Intake for energy, macronutrients, and micronutrients according to different age groups

	< 6 months (n=88)	**6 - 11 months** (n=69)	**12 – 23 months** (n=98)	**Total*** (N=255)	**P-value**
			N(%)		
Energy (Kcal)	33 (32.5)	32 (46.4)	39 (39.8)	104 (40.8)	0.515
Carbohydrates (g)	32 (36.4)	36 (52.2)	55 (56.1)	123 (48.2)	**0.020**
Protein (g)	30 (34.1)	20 (29.0)	19 (19.4)	69 (27.1)	0.072
Fat (g)	33 (37.5)	27 (39.1)	35 (35.7)	95 (37.3)	0.902
Linoleic acid (g)	42 (47.7)	34 (49.3)	45 (45.9)	121 (47.5)	0.911
α-Linolenic acid (g)	78 (88.6)	59 (85.5)	64 (65.3)	201 (78.8)	**0.000**
Micronutrients					
Iron (mg)	4 (4.5)	66 (95.7)	62 (63.3)	132 (51.8)	**0.000**
Calcium (mg)	15 (17.0)	22 (31.9)	79 (80.6)	116 (45.5)	**0.000**
Zinc (mg)	49 (55.7)	40 (58.0)	32 (32.7)	121 (47.5)	**0.001**
Copper (mg)	88 (100.0)	69 (100.0)	98 (100.0)	255 (100.0)	-
Folate (µg) (DFE)	29 (33.0)	27 (39.1)	67 (68.4)	123 (48.2)	**0.000**
Vitamin C (mg)	16 (18.2)	25 (36.2)	3 (3.1)	44 (17.3)	**0.000**
Vitamin A (RAE) (µg)	20 (22.7)	31 (44.9)	34 (34.7)	85 (33.3)	**0.013**
Vitamin D (µg)	84 (95.5)	65 (94.2)	91 (92.9)	240 (94.1)	0.753

Vitamin E (mg)	70 (79.5)	56 (81.2)	77 (78.6)	203 (79.6)	0.920
Vitamin K (µg)	55 (62.5)	23 (33.3)	47 (48.0)	125 (49.0)	**0.001**
Vitamin B12 (µg)	6 (6.8)	8 (11.6)	29 (29.6)	43 (16.9)	**0.000**

*The total represents the total of children who did not reach the DRI

Data from Food and Nutrition Board, Institute of Medicine: *Dietary Reference Intakes for Calcium, and Vitamin D* (1997); *Dietary Reference Intakes for Folate and Vitamin B12* (1998); *Dietary Reference Intakes for Vitamin C and Vitamin E* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Copper, Iodine, Iron, and Zinc* (2001); *Dietary Reference Intakes for Calcium and Vitamin D* (2011). Washington, DC, National Academic Press (www.nap.edu). Data from *dietary reference intakes for carbohydrate, fiber, fat, fatty acids, protein and amino acids*, Washington, DC, 2002, National Academic Press

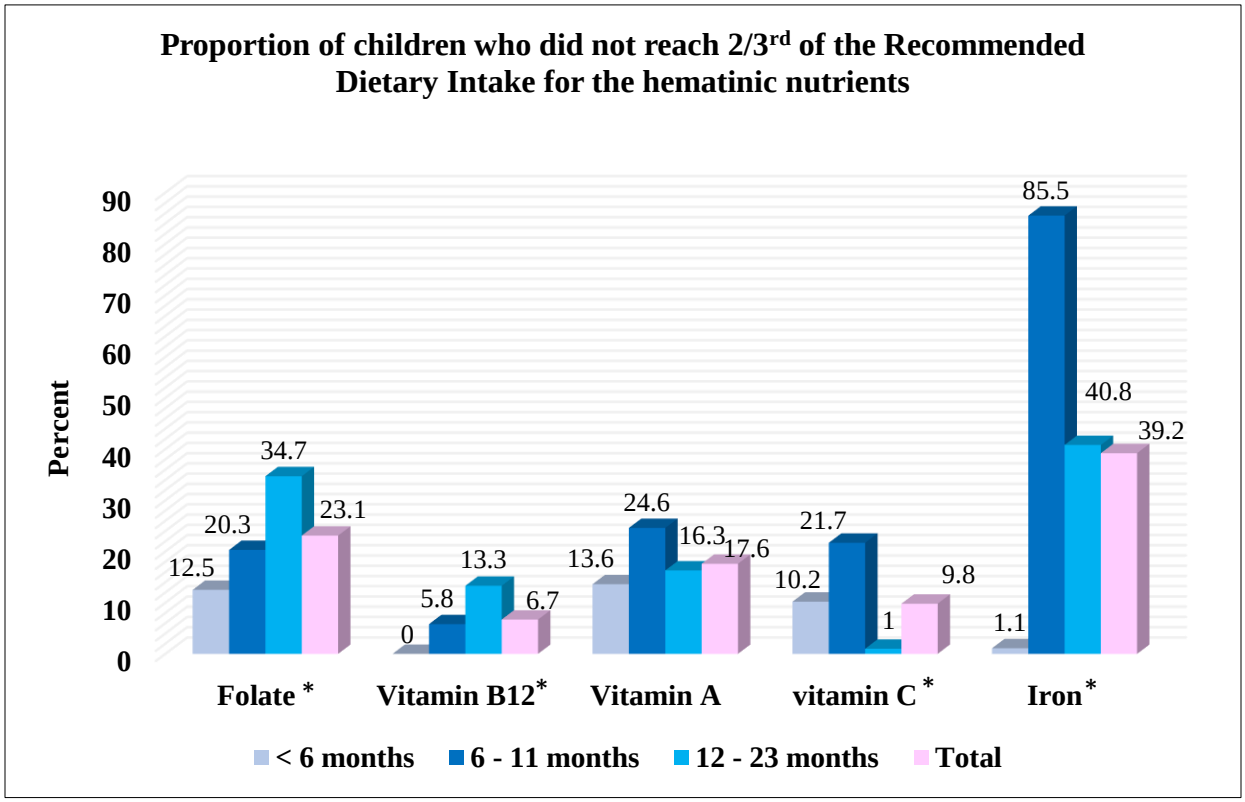
The proportion of children who did not reach 2/3rd the recommended dietary intake is presented in Table 12 and figure 4. The majority of the children between 6 to 11 months had an insufficient intake of iron (85.5%). Furthermore, 40.6% of the children among this age group had a low consumption of zinc. Additionally, very low copper intake was observed among all the children, whereby none of the children reached 2/3rd of the DRIs. As for the vitamin D, 89% of the total sample had an inadequate intake. However, the intakes of vitamin B12, vitamin C and vitamin A were adequate for the majority of children among all the age groups whereby only 6.7% , 9.8% and 17.6% did not reach 2/3rd of the age specific DRIs. Significant differences between age groups were noted for iron, calcium, zinc, folate, vitamin C, vitamin K, and vitamin B12.

Table 12: Proportion of children who did not reach 2/3rd the Recommended Dietary Intake for micronutrients among different age groups

Micronutrients	**< 6 months** (n=88)	**6 -11 months** (n=69)	**12 - 23 months** (n=98)	**Total*** (N =255)	**P-value**
		N (%)			
Iron (mg)	1 (1.1)	59 (85.5)	40 (40.8)	100 (39.2)	**0.000**
Calcium (mg)	7 (8.0)	7 (10.1)	53 (54.1)	67 (26.3)	**0.000**
Zinc (mg)	29 (33.3)	28 (40.6)	16 (16.3)	73 (28.7)	**0.002**
Copper (mg)	88 (100)	69 (100)	98 (100)	255 (100.0)	-
Folate (µg) (DFE)	11 (12.5)	14 (20.3)	34 (34.7)	59 (23.1)	**0.001**
Vitamin C (mg)	9 (10.2)	15 (21.7)	1 (1.0)	25 (9.8)	**0.000**
Vitamin A (RAE) (µg)	12 (13.6)	17 (24.6)	16 (16.3)	45 (17.6)	0.182
Vitamin D (µg)	79 (89.8)	63 (91.3)	85 (86.7)	227 (89.0)	0.624
Vitamin E (mg)	53 (60.2)	45 (65.2)	61 (62.2)	159 (62.4)	0.814
Vitamin K (µg)	50 (56.8)	21 (30.4)	34 (34.7)	105 (41.2)	**0.001**
Vitamin B12 (µg)	0 (0.0)	4 (5.8)	13 (13.3)	17 (6.7)	**0.001**

Data from Food and Nutrition Board, Institute of Medicine: *Dietary Reference Intakes for Calcium, and Vitamin D* (1997); *Dietary Reference Intakes for Folate and Vitamin B12* (1998); *Dietary Reference Intakes for Vitamin C and Vitamin E* (2000); *Dietary Reference Intakes for Vitamin A, Vitamin K, Copper, Iodine, Iron, and Zinc* (2001); *Dietary Reference Intakes for Calcium and Vitamin D* (2011). Washington, DC, National Academic Press (www.nap.edu). Data from *dietary reference intakes for carbohydrate, fiber, fat, fatty acids, protein and amino acids*, Washington, DC, 2002, National Academic Press

*The total represents the total of children who did not reach the DRI



***Significant at p-value <0.05

Figure 4: Proportion of children who did not reach 2/3rd of the Recommended Dietary Intake for the hematinic nutrients*

Table 13 displays the proportion of 12 to 23 months old children who did not reach the recommended AMDR. Overall, 60.2% of the children exceeded the recommended intake of fat and almost half of them consumed equal or above the recommended intake of saturated fat.

However, the majority of the children within this age group met the recommended intake for protein (96.9%) and carbohydrates (59.2%).

Table 13: Proportion of 12-23 months old Syrian Refugees Children who did not reach the Acceptable Macronutrient Distribution Ranges

Macronutrient Ranges	**12-23 months** (n=98) N(%)
CHO (%)	
< 45	33 (33.7)
45 – 65	58 (59.2)
> 65	7 (7.1)
Protein (%)	
< 5	1 (1.0)
5 – 20	95 (96.9)
> 20	2 (2.0)
Fat (%)	
< 30	13 (13.3)
30 – 40	26 (26.5)
> 40	59 (60.2)
SFA (% range)	
< 10	48 (49.0)
≥ 10	50 (51.0)
Linoleic acid (%)	
<5	17 (17.3)
5– 10	62 (63.3)
>10	19 (19.4)
α-linolenic acid (%)	
< 0.6	61 (62.2)
0.6 – 1.2	34 (34.7)
> 1.2	3 (3.1)

Data *from Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids* , Washington, DC, 2002, National Academic Press (2002/2005)

2. According to anemia status

Table 14 presents the proportion of children who did not reach the 100% of the Recommended Dietary Intake for macronutrients and hematinic micronutrients according to

anemia status. Iron intake was observed to have a significant association with anemia, with 70.8% of anemic children not meeting the DRI for iron compared to 41.7% of non-anemic children. No significant difference was found between the intake of other hematinic micronutrients and anemia status.

Table 14: Proportion of children who did not reach 100% of the Recommended Dietary Intake for macronutrients and hematinic micronutrients according to anemia status

Nutrients	**Not anemic** (n[△]= 163)	**Anemic*** (n=89)	**P-value****
	N (%)		
Macronutrients			
Carbohydrates (g)	76 (46.6)	45 (50.6)	0.550
Protein (g)	44 (27)	23 (25.8)	0.843
Fat (g)	59 (36.2)	35 (39.3)	0.623
Micronutrients			
Iron (mg)	68 (41.7)	63 (70.8)	**0.000**
Zinc (mg)	72 (44.2)	46 (51.7)	0.253
Folate (µg) (DFE)	73 (44.8)	48 (53.9)	0.165
Vitamin C (mg)	29 (17.8)	15 (16.9)	0.851
Vitamin A (RAE) (µg)	49 (30.1)	35 (39.3)	0.136
Vitamin B12 (µg)	23 (14.1)	19 (21.3)	0.141

*Anemia was defined for children below 6 months by hemoglobin levels : < 10.5 g/dl (Marques et al. 2014) and < 11 g/dl for children aged between 6 to 23 months (WHO, 2011)

**P-value is derived from Pearson Chi-Square for all categorical variables and from independent T-test for all the continuous variables.

[△] Column total may be different because of missing data

E. Infant and young child feeding practices

1. According to age groups

a. Breastfeeding practices

Table 15 and figure 3 present the proportion of breastfeeding in each age group. The majority of the children between 0 to 5 months and 6 to 11 months were breastfed the day prior to the interview. However, only one third of the children older than 1 year were still breastfeeding. This finding was also confirmed in Table 16, which presents the different breastfeeding practices according to the WHO indicators. This table shows that almost all of the children were ever breastfed (97.6%), while no more than one third of the children were breastfed within the first hour after birth (36.6%). Exclusive breastfeeding rates reached 21.6%, hence only 1 in 5 children below 6 months were fed solely breastmilk. Furthermore, 40.5% of the children were continually breastfed at the age of 1 year, whereas these long-term breastfeeding rates were lower at the age of 2 years where barely one fifth of the children (17.6%) were continually breastfed.

Table 15: **Proportion of 0-2 years old Syrian refugees children being breastfed a day prior to the interview***

Age group in months (n**)	Proportion of children being breastfed a day prior to the interview : n (%)
0 months – 5 months (n=88)	78 (88.6)
6 months – 11 months (n=69)	54 (78.3)
12 months – 23 months (n=98)	32 (32.7)
0 months to 23 months (N=255)	164 (64.3)

*According to the IYCF indicators (WHO,2007)

**n represents the total number in subgroups

Table 16: Proportion of 0-2 years old Syrian refugees children meeting the WHO breastfeeding indicators

Breastfeeding indicators (n)	n (%)
Indicator 9[a]: Children ever Breastfed (n=255)	249 (97.6)
Indicator 1[b]: Early initiation of Breastfeeding (n=254)	93 (36.6)
Indicator 2 [c]: Exclusive Breastfeeding (n=88)	19 (21.6)
Indicator 3[d]: Continued Breastfeeding at 1 year (n=42)	17 (40.5)
Indicator 10[e]: Continued breastfeeding at 2 years (n=17)	3 (17.6)
Indicator 11[f]: Age-appropriate breastfeeding (n=255)	95 (37.3)
Indicator 12[g]: Predominant Breastfeeding under 6 months (n=88)	45 (51.1)

According to the IYCF indicators (WHO,2007):
[a] Proportion of children born in the last 24 months who were ever breastfed;
[b] Proportion of children born in the last 24 months who were put to the breast within one hour of birth;
[c] Proportion of infants 0 – 5 months of age who are fed exclusively with breast milk;
[d] Proportion of children 12 – 15 months of age who are fed breast milk;
[e] Proportion of children 20 – 23 months of age who are fed breast milk;
[f] Proportion of children 0-23 months of age who are appropriately breastfed;
[g] Proportion of infants 0–5 months of age who are predominantly breastfed.

Table 17 and figure 5 present the proportion of 0 to 2 years old children who were fed using a bottle a day prior to the interview. It was shown that below the age of 6 months up to 40.5% of the children were fed with a bottle a day prior to the interview, which might explain the low rates of exclusive breastfeeding among this age group. This proportion is higher from one age category to the other, reaching up to 56.1% among children aged 12 to 23 months.

Table 17: Proportion of 0-2 years old Syrian refugees children who were fed using a bottle a day prior to the interview

Age group in months (n)	Proportion of children being fed with a bottle: n (%)
0 months – 5 months (n=88)	40 (45.5)
6 months – 11 months (n=69)	35 (50.7)
12 months – 23 months (n=98)	55 (56.1)
0 months to 23 months (N=255)	130 (51)

According to the IYCF indicators (WHO, 2007):
Indicator 14: Proportion of children 0–23 months of age who are fed with a bottle.

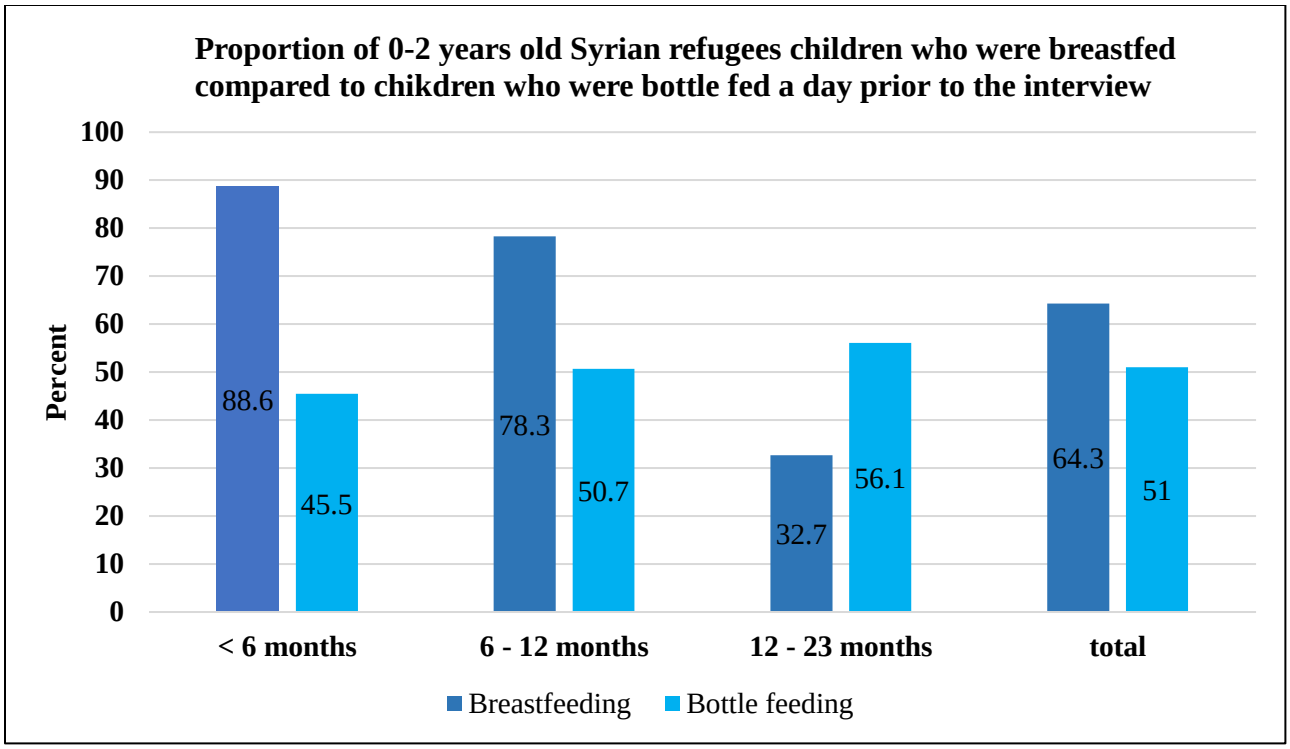


Figure 5: Proportion of 0-2 years old Syrian refugees children who were breastfed compared to children who were bottle fed a day prior to the interview

b. Complementary Feeding practices

Table 18 and figure 6 present the complementary feeding practices according to the WHO indicators (WHO, 2007). The majority of the children between 6 to 8 months (87.2%) were fed solid, semi solid or soft foods the day prior to the interview. Furthermore, 65.6% of the children received foods the minimum number of times or more, according to their breastfeeding status. Whereas only one third of the children met the minimum dietary diversity (30%) and minimum acceptable diet (24.7%) indicators. The consumption of iron-rich or iron-fortified foods (indicator 8) was very low reaching 11.4% among this age group.

Table 18: **Proportion of 6-23 months Syrian refugees children meeting the WHO complementary feeding indicators**

Complementary feeding indicators (N=167)	n (%)
Indicator 15[h]: Milk feeding frequency for non-breastfed children (n=76)	68 (89.5)
Indicator 4[i]: Introduction of solid, semi solid or soft foods (n=39)	34 (87.2)
Indicator 5[j]: Minimum Dietary Diversity (n=223)	67 (30)
Indicator 6 [k]: Minimum Meal Frequency (n=160)	105 (65.6)
Indicator 7 [l]: Minimum Acceptable Diet (n=73)	18 (24.7)
Indicator 8 [m]: Consumption of iron-rich or iron-fortified foods (n=167)	19 (11.4)

Based on the 24h recall according to the IYCF (WHO, 2007):
[h]. Indicator 15: Proportion of non-breastfed children 6–23 months of age who receive at least 2 milk feedings,
[i]. Indicator 4: Proportion of infants 6 – 8 months of age who receive solid, semi-solid or soft foods,
[j]. Indicator 5: Proportion of children 6 – 23 months of age who receive foods from 4 or more food groups,
[k].Indicator 6: Proportion of breastfed and non-breastfed children 6 – 23 months of age who receive solid, semi-solid, or soft foods (but also including milk feedings for non-breastfed children) the minimum number of times or more,
[l] Indicator 7: Proportion of children 6-23 months of age who received a minimum acceptable diet (apart from breast milk),
[m]. Indicator 8: Proportion of children 6–23 months of age who received iron-rich food or iron-fortified food.

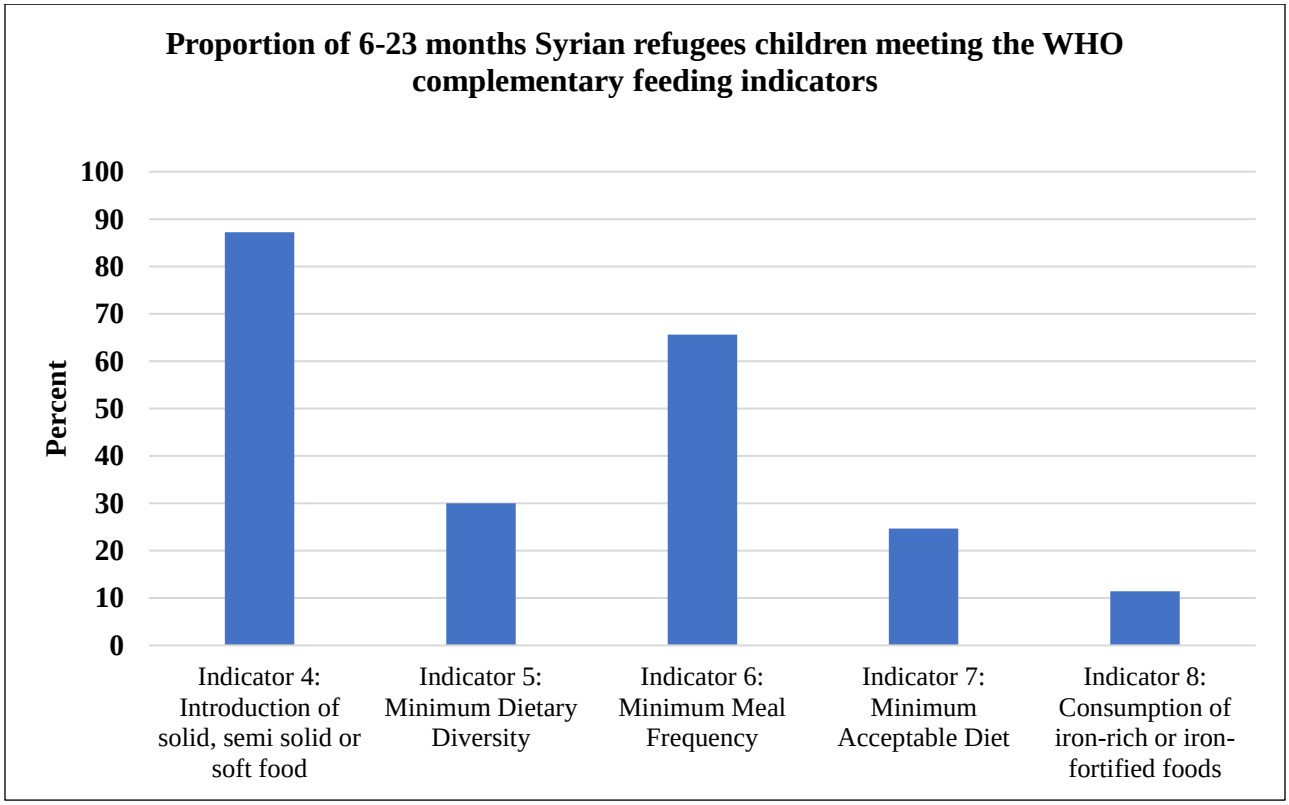


Figure 6: Proportion of 6-23 months Syrian refuges children meeting the WHO complementary feeding indicators

The proportion of children consuming iron-rich or iron fortified foods was segregated further according to the age group in Table 19. This table shows an important decrease in the intake of iron-rich or fortified foods between the two age categories. It was found that 20.3% of the children between 6 to 11 months were meeting this indicator, while only 5.1% of the children between 12 to 23 months received foods containing iron.

Table 19: **Proportion of 6 to 23 months Syrian refugees children who consumed iron-rich or fortified food a day prior to the interview**

Age group in months	**Proportion of children who consumed iron rich foods* n (%)**
6 months – 11 months (n=69)	14 (20.3%)
12 months – 23 months (n=98)	5 (5.1%)
6 months to 23 months (N=167)	19 (11.4%)

According to the IYCF indicators (WHO, 2007):
*Indicator 8: Proportion of children 6–23 months of age who received an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified in the house.

2. According to anemia status

The proportion of 0 to 2 years old Syrian refugees children meeting the WHO feeding indicators according to anemia status is presented in Table 20. There was a significant association between early initiation of breastfeeding and anemia status, 46% of the anemic children were put to breast within one hour of birth compared to 31.5% of the non-anemic children. No significant association was found between anemia and the other feeding indicators listed below.

Table 20: Proportion of 0-2 years old Syrian refugees children meeting the WHO feeding indicators according to the anemia status

IYCF Feeding indicators (n)	Not Anemic (n=163)	Anemic* (n=89)	P-value**
Indicator 9[a]: Children ever Breastfed (n=252)	161 (98.8)	85 (95.5)	0.104
Indicator 1[b]: Early initiation of Breastfeeding (n=251)	51 (31.5)	41 (46.1)	**0.022**
Indicator 2 [c]: Exclusive Breastfeeding (n=86)	15 (21.7)	2 (11.8)	0.355
Indicator 15[d]: Milk feeding frequency for non-breastfed children (n=75)	47 (92.2)	20 (83.3)	0.248
Indicator 4[e]: Introduction of solid, semi solid, or soft foods (n=39)	18 (85.7)	16 (88.9)	0.768
Indicator 5[f] : Minimum dietary Diversity (n=222)	44 (30.6)	23 (29.5)	0.869
Indicator 8[g]: Consumption of iron rich foods (n=166)	9 (9.6)	10 (13.9)	0.387

*Anemia was defined for children below 6 months by hemoglobin levels : < 10.5 g/dl (Marques et al. 2014) and < 11 g/dl for children aged between 6 to 23 months (WHO, 2011)

**P-value is derived from Pearson Chi-Square for all categorical variables and from independent T-test for all the continuous variables.

Based on the 24h recall according to the IYCF (WHO, 2007):

[a] Proportion of children born in the last 24 months who were ever breastfed;

[b] Proportion of children born in the last 24 months who were put to the breast within one hour of birth;

[c] Proportion of infants 0 – 5 months of age who are fed exclusively with breast milk

[d]. Indicator 15: Proportion of non-breastfed children 6–23 months of age who receive at least 2 milk feedings,

[e] Indicator 4: Proportion of infants 6 – 8 months of age who receive solid, semi-solid or soft foods,

[f]. Indicator 5: Proportion of children 6 – 23 months of age who receive foods from 4 or more food groups

[g]. Indicator 8: Proportion of children 6–23 months of age who received an iron-rich food or iron-fortified food that is specially designed for infants and young children, or that is fortified in the house.

Table 21 shows the association between anemia with age, iron intake , initiation of breastfeeding and stunting using multiple logistic regression. Iron intake below the DRI was 3.55 times (95% CI: 1.96-6.43) more likely to increase the risk of anemia among our sample. Age was associated with higher odds of anemia, for instance children between 6 to 11 months of age were four times (95% CI: 2.12- 9.72) more likely to be anemic compared to children below 6 months. While children aged between 12 to 23 months were twice (95% CI: 1.17- 4.90) as likely to be anemic than infants below 6 months. Moreover, infants who were breastfed within one hour of birth were at higher risks of being anemic (OR:1.87, CI: 1.06, 3.31). These risk factors remained

significant after adjusting for maternal and paternal work, parental education, and household income. Whereas stunting was not significant after adjusting for sociodemographic variables.

Table 21: Association between Anemia with iron intake, stunting, early initiation of breastfeeding and age

	Crude OR [a] (95% CI)	**P-value**	**Adjusted OR [b] (95 % CI)**	**P-value**
Iron intake				
≥ DRI	1.0		1.0	
< DRI	3.38 (1.95, 5.88)	**< 0.001**	3.55 (1.96, 6.43)	**< 0.001**
Height-for-age (HAZ)	1.0		1.0	
Not stunted	3.35 (1.17, 9.56)	**<0.05**	3.08 (0.94, 10.07)	0.062
Stunted				
Early initiation of BF				
No	1.0		1.0	
Yes	1.86 (1.09, 3.16)	**<0.05**	1.87 (1.06, 3.31)	**<0.05**
Age				
< 6 months	1.0		1.0	
6 - 11 months	4.17 (2.05, 8.50)	**< 0.001**	4.53 (2.12, 9.72)	**< 0.001**
12 - 23 months	2.50 (1.28, 4.89)	**< 0.01**	2.39 (1.17, 4.90)	< **0.05**

Odds Ratio is significant at a p-value < 0.05.

[a] Crude OR refers to unadjusted odds ratio of anemia among study sample

[b] Adjusted OR refers to odds ratio of anemia after adjusting for all socio-demographic variables (income, parental type of job and education levels)

CHAPTER V

DISCUSSION

This study assessed the prevalence of anemia in infants and young children from the Syrian refugee community in the Greater Beirut area, a nutritionally vulnerable population group. It has also investigated the association of anemia with sociodemographic attributes, infant and young child feeding practices, dietary intake, and anthropometric measurements. The prevalence of anemia was estimated at 35.3% in the study sample, with no significant associations with gender or socioeconomic characteristics, while age disparities were observed. Low dietary intake of iron increased the risk of anemia while early initiation of breastfeeding was associated with higher odds of anemia in the study population. As for stunting, a significant difference was observed between anemic and non-anemic children.

Anemia in our study was defined for children aged 6 months and below as hemoglobin levels lower than 10.5 g/dl (Marques et al. 2014) and for children between 6 to 23 months as hemoglobin values lower than 11 g/dl (WHO, 2011). Accordingly, the prevalence of anemia was estimated at 35.3% in the total sample of 0 to 2 years old Syrian Refugees children. Based on the WHO classification, this prevalence is considered as a moderate public health concern, given that it exceeds 20%, while being lower than 40% (WHO, 2011).

This observed value is similar to the prevalence that was reported in the Lebanese host community among below 2 years old children (37%) (Mhanna et al., 2016), as well as to the prevalence of anemia observed in other Middle Eastern countries, such as in Bahrain (32%), Iran (32%), Iraq (36%), Syria (37%) and Saudi Arabia (39%) (WHO, 2015). This is not surprising as neighboring countries consume similar diets, and have similar prevalence for micronutrient

deficiencies, specifically folate and iron (Hwalla et al., 2017). The prevalence of anemia as observed in our study was higher than that reported in Kuwait (26%), Qatar (26%), and Libya (30%), while being lower than those observed in Oman (41%), Egypt (45%), and Yemen (59%) (WHO, 2015).

When comparing our results with those related to other displaced populations, the observed anemia prevalence is lower than that reported among children in different camp-based refugee populations, specifically amongst African refugee camps such as in Kenya (61.3%), Ethiopia (62.9%), and Uganda (72.9%) due to their poor living conditions, making them more prone to diseases, infections and deficiencies (Seal et al., 2005). However, our estimates are higher than those observed in non-camps-based refugees, where anemia levels were more consistent with those reported amongst the host population (Hossain et al., 2016). The prevalence of anemia that was found in our study was higher than what was reported in 2014 amongst Syrian refugee children residing in Beirut, aged below 2 years old (27.7%) (UNICEF, 2014). It was comparable to what was reported among Syrian refugees children living in Jordan outside of camps (36.6%), while it was less than what was observed among Syrian refugees residing in camps in Jordan (64%) (Hossain et al., 2016) as well as in Turkey (50%) (Bucak et al., 2017). This could also be explained by the fact that refugees residing in camps don't have access to sanitation, water, adequate diet and hence are more prone to a deterioration in their health status.

Our study documented no significant association between gender and anemia status. The literature is inconsistent with respect to gender disparities in anemia prevalence. Such disparities were mainly reported in studies where gender specific feeding practices differed between boys and girls, affecting the duration of breastfeeding and the quality of complementary foods given to infants. For instance, this was reported in Southeast Asia (Wieringa et al., 2007), in Kenya (Jaeggi

et al., 2013), as well as in India where girls were observed to be breastfed for shorter periods than boys and given less milk, making them at higher risks for nutritional disadvantages (Fledderjohann et al., 2014). In contrast, males had a higher risk of anemia and iron deficiency among Swedish and Honduran infants aged between 4 to 9 months (Domellöf et al., 2002), whereby boys were found to be breastfed for longer durations than girls, hence having less access to iron-rich food sources, increasing their risk of deficiencies and anemia.

Our study emphasizes the considerable role that age plays in the development of anemia. In fact, a significant difference in the prevalence of anemia was observed between the different age groups, the highest being observed amongst 6 to 11 months infant (50.7%) compared to those younger than 6 months (19.8%) or older than 12 months (38.1%). Moreover, regression analyses showed that children between 6 to 11 months of age were four times (OR: 4.53, 95% CI: 2.12-9.72) more likely to be anemic compared to children below 6 months of age. While children aged between 12 to 23 months were twice (OR: 2.39, 95% CI: 1.17- 4.90) as likely to be anemic than infants aged below 6 months. Similar findings were reported by other studies: the highest prevalence of anemia was observed among 6 to 11 months age group in Cambodia (70.9%) (Reinbott et al., 2016), and another study conducted in Uganda found that the prevalence of anemia was also the highest amongst children aged 6 to 11 months (63.2%) (Kuziga et al., 2017). Our study findings are also comparable to those reported by the UNICEF for the Syrian refugees population of Lebanon (UNICEF, 2014), whereby children between the age of 6 to 23 months tended to have a higher prevalence of anemia compared to other age groups.

The association between age and anemia as observed in this study may be due to the fact that, starting 6 months of age, the infant's iron stores are usually depleted, and this is accompanied by rapid growth and increased iron needs (Burke et al., 2014). Another cause might be the increase

in infections' risk as the child starts to discover his/her surroundings, which leads to malabsorption of nutrients and increases the risk of anemia (Roba et al., 2016). Also, starting this age, the introduction of complementary foods takes place, which in some cases might be of poor quality, and hence might not be meeting the dietary requirements for iron, causing iron deficiency and iron deficiency anemia. Our study results support this hypothesis. In fact, despite the fact that the majority of the study subject met their estimated energy needs as well as the recommended intake for macronutrients, iron intake was found to be suboptimal, with 70.8% of the anemic children not meeting the recommended intake of iron. Regression analyses showed that after adjusting for potential confounders, low iron consumption was associated with 3.55 times (95% CI: 1.96-6.43) higher risk of anemia in the study sample. Hence children not having adequate iron intake were at approximately 4 times higher risks of developing anemia. This finding is in agreement with several other studies that identified low iron intake as a significant contributor to anemia in this age group. In China, a study showed that low iron intake was a major cause of anemia (Ma et al., 2008) in infants and young children, while another study found that both deficiencies in iron and folic acid were the main biological causes of young children's anemia (Huang et al., 2019). In South Africa, anemic infants had lower dietary intake of iron when compared to non-anemic infants (Faber, 2007). A study done in Kenya found similar results, with dietary iron intake being a significant predictor of iron deficiency anemia (Onyangore F. O. et al., 2016). In contrast to our study findings, a study conducted in in Bangladesh did not find any association between previous day consumption of iron rich foods and anemia or iron deficiency in young children (Rawat et al., 2014), highlighting the role that other dietary or environmental factors may play in the etiology and development of anemia in this age group.

In developing countries, the diets of infants and young children tend to be insufficient in iron due to lower consumption of animal derived foods as well as low availability and access to iron-fortified food. One of the leading causes of anemia in the MENA region was in fact attributed mostly to low intakes of dietary iron, or the high intake of non-heme iron which has low bioavailability (Bagchi, 2004; Austin et al., 2012). Also, poor uptake of iron is exacerbated by high consumption of inhibitors in this region such as tea, and the minimal intake of enhancers like meats and fresh fruits (Austin et al., 2012). Inadequate dietary intakes of iron in infants and young children might lead to a depletion of body's iron stores or iron deficiency (ID) which, if not treated, could progress into iron deficiency anemia (IDA) (Burke et al., 2016).

In the present study, the prevalence of inadequate intakes for hematinic micronutrients such as zinc, folate, vitamin A, C and B12 ranged between 17% and 68%. However, no significant associations were identified between anemia status and the intake of these hematinic micronutrients, although micronutrient deficiencies are known to be a risk factor for the development of anemia (UNICEF, 2014). Vitamin A deficiency was found to be a significant predictor of anemia in countries such as Jordan (Khatib & Elmadfa, 2009), Venezuela (Castejon et al., 2004) and Vietnam (Van Nhien et al., 2008). In China, the primary risk factor for anemia among young children included vitamin B12 and iron deficiencies (Wang et al., 2015). Children who suffer from nutritional deficiencies are more likely to have weaker immune systems which, in return, make them more vulnerable to various illnesses and infections such as parasitic infections or chronic inflammation (Rahman et al., 2019). These conditions may lead to reduced hemoglobin levels in blood, and hence to an increased anemia prevalence (Lönnerdal & Kelleher, 2007; Rahman et al., 2019).

Early life feeding practices have also been suggested as key modulators of anemia risk in infants and young children. In our study, a significant association was observed between early initiation of breastfeeding and anemia status among Syrian refugees children. More specifically, infants who were breastfed within one hour of birth were significantly at higher risk of being anemic (OR: 1.87 95% CI: 1.06 - 3.31) even after adjusting for potential confounders . In fact, the relation between early initiation of breastfeeding and anemia was not mentioned directly in the literature. However, it was shown that neonates who are partially breastfed are at greater risk of all-cause mortality and infection-related mortality in the first month of life compared with those who are exclusively breastfed (Khan et al., 2015). Given the fact that exclusive breastfeeding rates were low in our study, higher anemia rates associated with early initiation of breastfeeding could be explained by the fact that a high proportion of mothers administered prelacteals such as honey, sugar water, and herbal tea along with early breastfeeding during the first few days of life. This practice is common among refugees mothers, and could lead to increased risks of anemia due to infections by increasing the exposure and ingestion of infectious pathogens (Clemens et al., 1999; Debes et al., 2013; Legesse et al., 2014; Melku et al., 2018). Moreover, by interfering with breastfeeding during the first days of life, prelacteal feeding affects the immunological benefits that a newborn receives from breastmilk and increases his/her susceptibility to infections. Also, by exposing infants to contaminated feeds, utensils, and water, prelacteal feeding can be a direct cause of illness (Hailemariam et al., 2015). Another cause that was not analyzed in our study could be the mother's iron status during pregnancy, that might compromise the child's iron stores at birth, making him at higher risk for anemia during the first few months of life (Burke et al., 2014; Cao & O'Brien, 2013).

Moreover, no significant associations were observed between anemia and any other feeding indicator in our study. Previous studies have shown controversial results regarding breastfeeding indicators with the prevalence of anemia and some studies have reported a correlation between the two. For instance, children who were never breastfed were identified to have a significantly higher prevalence of anemia among refugees living in Palestinian camps in Lebanon, Jordan, Syria, and Gaza (Hassan et al., 1997). In China, the lack of exclusive breastfeeding in addition to predominant breastfeeding, which is defined as the addition of liquids other than breastmilk, during the first 4 months of life were found to be associated with higher rates of infant anemia (Yang et al., 2012). In Brazil, exclusive breastfeeding during the first six months of life was associated with the highest concentrations of blood hemoglobin among children (Assis et al., 2004). However, another study in China did not notice any association between whether the children were ever breastfed and early initiation of breastfeeding with anemia status (Wang et al., 2015). In agreement with our findings, anemia was not found to be associated with breastfeeding duration nor with exclusive breastfeeding in a study done among Brazilian children (Novaes Oliveira et al., 2010). Similarly, exclusive breastfeeding, initiation rates of breastfeeding, as well as the average age of the introduction of solid foods was not found to differ between anemic and non-anemic infants in South Africa (Faber, 2007). The fact that we did not observe a significant association between exclusive breastfeeding and anemia status may be due to the fact that in our study, exclusive breastfeeding rates were low, estimated at only 21.6%, with no difference between anemic and non-anemic children. Below the age of 6 months, up to 40.5% of the children participating in our study were bottle-fed a day prior to the interview, which might explain the low rates of exclusive breastfeeding among this age group. Bottle feeding may be based on milk powder, infant formula, or cow milk.

In addition, no significant association was observed between complementary feeding practices and anemia in our study. The literature however suggests that the time, frequency as well as the quality of complementary foods are significant contributors to anemia in infants and young children (Yang et al., 2012). Children meeting the minimum meal frequency indicator as well as minimum acceptable diet were in fact observed to have a lower prevalence of anemia (Rohner et al., 2013). In our study, only one third of the children met the minimum dietary diversity (30%) and minimum acceptable diet (24.7%) indicators. The consumption of iron-rich or iron-fortified foods was very low, reaching 11.4% in total in our sample. Only 5.1% of the children between 12 to 23 months received foods containing iron. This might be a result of the quality of foods consumed by refugees and their children, which are usually centered around starchy foods such as rice and bread (FAO, 2017). Anthropometric measurements are one of the key methods to assess the adequacy of infants growth as well as their nutritional status. Stunting, underweight, and wasting are important indicators of malnutrition. In this study, stunting was defined as the percentage of children with a low height-for-age (z scores <-2), wasting was defined as low weight-for-height (z scores < -2) and underweight was defined as low weight-for-age (z scores < -2) based on the WHO criteria (WHO, 2008). In our study, the prevalence of stunting was the highest amongst 12 to 23 months old children (13.4%), compared to younger children (2.3% in those aged less than 6 months and 2.9% in those aged between 6 and 11 months). This in agreement with the literature which generally shows that stunting is more likely to occur above the age of 12 months because it takes longer time to manifest (C. G. Victora et al., 2010; Danaei et al., 2016). Stunting denotes chronic malnutrition, it is considered as a reflection of the cumulative effects of undernutrition and infections since and even before birth. This measure can therefore be interpreted as an indicator of poor environmental conditions or long-term restriction.

The prevalence of stunting in this study showed a significant difference between groups based on anemia status. This is in agreement with what was found in Uganda, where stunting was a predictor of anemia (Kuziga et al., 2017). This may be due to the fact that both stunting, and anemia can be caused by malnutrition, as well as by infectious diseases. Another study done in Bangladesh found that stunted children had a higher prevalence of anemia than their normal counterparts (Rahman et al., 2019). In fact, stunting and anemia share different basic and underlying risk factors. Both can be a result of multiple aspects like socio-economic, environmental, inappropriate feeding practices, as well as malnourishment, and failure to meet micronutrient requirements (Paudel et al., 2012; Kuziga et al., 2017). Hence, a child at risk of anemia may be also at risk of stunting or vice versa. Their co-occurrence in young children of low-income countries was a subject of study in India and Peru (Gosdin et al., 2018) as well as in Ethiopia, where it was found to be also more common in children above 12 months of age (Roba et al., 2016).

As for the other anthropometric indicators, the prevalence of underweight was estimated 3.9%, wasting at 6.7%, and overweight/obesity at 5.9% in the study sample. Although no significant association was found in this study between anemia and any of these indicators, few other studies observed a relation between these indicators and anemia in children. In Timor-Leste, wasting had a significant and independent effect on hemoglobin concentrations, and wasted children were found to be at a significantly higher risk of anemia (Agho et al., 2008). In Ethiopia, children who were classified as underweight and who had a MUAC measurement below 12 cm were more likely to be anemic compared to their counterparts (Gebreegziabiher et al., 2014).

Additionally, although there was no association in our study between anemia and BMI-for-age, being overweight was associated in the literature with greater risks of iron deficiency and

anemia (Pinhas-Hamiel et al., 2003; Zimmermann et al., 2008). This might be a result of poor diet quality, higher iron requirement due to higher blood volume and a reduced iron absorption induced by chronic low-grade inflammation (Pacey et al., 2011).

In this study, socioeconomic characteristics, including maternal education, parental education, and monthly income did not show any significant association with anemia in infants and young children. This finding is in disagreement with what was reported from different studies, especially in low to middle-income countries, where anemia was found to be associated with socioeconomic attributes (Lutter, 2008). As stated by Balarajan et al (2011), anemia is considered as a pattern of socioeconomic disadvantage, where the least educated, and the poorest are considered at higher risks to develop anemia; children living in low income households were 21% more likely to be anemic than children living in wealthier households; whereas mothers with no education were more likely to have anemic children (Balarajan et al., 2011). In the Middle East Region, a study done on Palestinian refugees in Gaza revealed that income was significantly associated with anemia amongst the children (El Kishawi et al., 2015). Children who live in very low income households had higher risks of developing anemia due to inadequate diet, limited access to basic needs such as health services and sanitation, as well as higher susceptibility to infectious diseases (Müller & Krawinkel, 2005; Yang et al., 2012; De Benoist et al., 2008). It is important to note that in our study, the sample consisted in its totality of Syrian refugee children who are all living in disadvantaged settings that compromise their nutritional status. The majority of children shared similar socioeconomic attributes such as maternal education and paternal education levels. This little variability in the subjects' characteristics may explain the lack of association between anemia and SES status in the study sample. Nevertheless, the long-term consequences of anemia, with an inadequate varied diet along with poor caring practices often

leads to intergenerational malnutrition. A newborn baby girl with a poor nutritional status is likely to remain underweight, may have stunting (chronic malnutrition), and has a higher chance to develop anemia. Later in adolescent life, when she becomes pregnant and gives birth to an underweight baby, he/she will be more prone to be anemic as well. Therefore, it is crucial to start tackling anemia early in life to break this inter-generational cycle (UNHCR&WFP, 2006).

The results of this study must be considered in light of the following limitations. This is a cross-sectional study which allowed us to show associations rather than causalities between the different factors studied in relation with child anemia. A cohort study might be more optimal to determine the causalities and to understand the etiology of anemia in infants and young children . In addition, like in other dietary intake investigations, dietary assessment may be associated with recall bias and over/under-estimation. However, the strengths of the study rely on very well-trained nutritionists who collected the dietary intake data, and who received extensive training prior to the collection in order to minimize interviewer errors, social desirability, and inter-observer errors. Furthermore, standardized tools were used in dietary intake collection such as the USDA Multiple-Pass-Method (Conway et al., 2003), as well as validated items, like the NCE 2D food portion visual (Mitchell et al., 1996) in order to ensure accurate and reliable assessment. Also, anthropometric measurements were taken using standardized scale and length board as well as consistent plastic measuring tapes. As for the hemoglobin levels, they were quantified using precise measuring equipment (HemoCue Hb 301 System) which were constantly calibrated and tested. While the blood samples were collected by certified phlebotomists who were trained on the proper micro-techniques to collecting blood through the fingers for children aged above 6 months and heel pricks for infants below 6 months of age. Nevertheless, one further limitation can be the fact that we based our anemia assessment solely on hemoglobin status, further exploring anemia

rates using more advanced methods such as iron stores and transferrin could have been helpful as well. Also, the status of micronutrients was assessed through dietary intake, rather than accurate blood measures and biochemical assays.

Moreover, the study sample was not representative of the whole Syrian refugees population residing in Lebanon. It was based on Syrian mothers with children aged below 2 years old, who are attending primary healthcare centers in the most vulnerable areas of Greater Beirut.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

This study evaluated the prevalence of anemia amongst 0-2-year-old Syrian refugee children and investigated its association with feeding practices, dietary intake, anthropometric measurements, and socioeconomic characteristics. The prevalence of anemia was estimated at 35.3%, thus being rated as a moderate public health concern. Interestingly, no cases of severe anemia were identified in the study sample. Children between the age of 6 to 11 months had the highest rates of anemia and the highest odds of being anemic. The factors that were found to increase the likelihood of anemia in Syrian refugee children included age, low intake of iron, early initiation of breastfeeding and stunting.

Iron intake was in fact very low, specifically among children between 6 to 11 months of age, not reaching 2/3rd of the recommended dietary intake. In addition, a low consumption of iron-rich and iron-fortified foods was identified in the study sample. Expectedly, dietary intake of participating children was found to be limited in diversity, with only 30% of the participating children meeting the minimum dietary diversity indicator.

Surprisingly, children who were breastfed within one hour of birth were found to be at a significantly higher risk of being anemic. This underlies the need to better understand early feeding practices in this population, especially the time of introduction of prelacteals to newborns, which may offset the benefit of early breastfeeding initiation. Stunting was also found to be positively associated with anemia in the study population, underlining the co-existence of chronic

undernutrition with micronutrient deficiencies at such an early stage in life. Inadequate nutritional intakes carry far reaching ramification on health such as delayed growth and development, poor cognition, increased risk of infections and morbidity in infants and young children, while also increasing the risk of disease later in life. Taken together, the study findings highlight the need for interventions to enhance the nutritional status of Syrian refugee infants and young children and decrease the prevalence of anemia in this age group. Such interventions, which should target early prevention of iron deficiency, will help in reducing the heath, social and economic impacts of anemia in this vulnerable population. These interventions ought to be feasible, cost-effective, and culturally acceptable within the displacement settings where this population is living. The following recommendations and interventions may be suggested: anemia should preferably be addressed through a dietary diversification program as well as improved access to foods that are known to have high levels of bioavailable iron, which include animal products in addition to foods with high vitamin C content to improve iron absorption.

Interventions and nutritional educational sessions about adequate IYCF practices should be given, tackling the importance of cutting prelacteals feeding among infants to avoid the ingestion of pathogens early in life, coupled with awareness on complementary foods, their quality, timing as well as information about different cooking methods. That in addition to customized recipes based on the foods that are available and affordable to the refugees population. Also, sanitation and hygiene practices should be encouraged amongst mothers, in order to reduce any chances of infections, promoting optimal hand washing, hygienic methods of sanitation especially related to food preparation.

Anemia screening should also be strengthened to identify any cases of anemia early on, and refer them to treatment, targeting both refugees mothers and children (UNICEF, 2014).

Moreover, iron supplementation, as well as other micronutrients, can be used for individuals and groups at high risks in order to optimize iron intakes if dietary improvement cannot be instituted. However, supplementation programs must address challenges that might limit their effectiveness, such as poor compliance, insufficient doses, as well as the consequences of high doses. Other food-based approaches to be taken into consideration could be fortification of staple foods, condiments, and commonly eaten foods in this population but might not be ideal in Lebanon. Lastly, broader contextual factors such as the poor living conditions of refugees, food insecurity and other financial and livelihoods challenges need to be addressed by different programs considering their impact on the nutritional status and the dietary intake of refugees children.

APPENDIX I

ARABIC CONSENT FORM

موافقة للإشتراك في البحث العلمي (الجزء الأول - الاستمارة)

إسم البحث : الحالة الغذائية للأمهات و الأطفال عند اللاجئين والمجتمعات المضيفة في بيروت الكبرى، لبنان: تركيز خاص على فقر الدم.

الباحثون الرئيسيون: الدكتورة لارا نصردين – كلية العلوم الزراعية و الغذائية – الجامعة الأميركية في بيروت.
الدكتورة نهلا حولا – كلية العلوم الزراعية و الغذائية – الجامعة الأميركية في بيروت.
الدكتورة فيرونيكا شيرباوم –معهد الكيمياء الحيوية وعلوم التغذية (140a) – جامعة هوهنهايم، ألمانيا.

الباحثون المتعاونون: الدكتورة لميس جمعة – كلية العلوم الزراعية و الغذائية – الجامعة الأميركية في بيروت.
الدكتور جان فرانك – معهد الوظائف الحيوية وسلامة الأغذية (140b) – جامعة هوهنهايم، ألمانيا.

الباحثون الطلاب: جوانا أبو رزق – طالبة دكتوراه – معهد الكيمياء الحيوية وعلوم التغذية (140a) – جامعة هوهنهايم، ألمانيا.
تريزا جريميلس – طالبة دكتوراه – معهد الكيمياء الحيوية وعلوم التغذية (140a) – جامعة هوهنهايم، ألمانيا.

أنتِ مدعوة للمشاركة في بحث الدكتوراه العلمي الذي تجريه كل من الأنسة جوانا أبو رزق و الأنسة تريزا جريميلس في جامعة هوهنهايم في ألمانيا و الجامعة الأميركية في بيروت بالتعاون مع وزارة الصحة العامة في لبنان. من المهم أن تقرأي المعلومات أدناه بعناية. يصف هذا البيان الأهداف والإجراءات والفوائد والمخاطر والاحتياطات المتعلقة بالدّراسة. كما يتم وصف الإجراءات البديلة ، إن وُجدت، المتعلقة بكِ و عن حقك في الانسحاب من الدّراسة في أي وقت. لا تتردّدي في طرح الأسئلة إذا كنتِ بحاجة إلى توضيح حول ما ورد في هذه الإستمارة أو إذا كنتِ بحاجة إلى أي معلومات إضافية.

أهداف الدّراسة:

تهدف هذه الدراسة إلى التحقيق في الدوافع الرئيسية لإنعدام الأمن الغذائي بين اللاجئين السوريين والمجتمعات المضيفة اللبنانية مع تركيز خاص على النقص الغذائي لدى الأم والطفل وعلى نقص المغذيات الدقيقة في بيروت الكبرى. ستساهم نتائج هذه الدّراسة في تصميم إطار تغذوي وتوجيه السياسات إلى إعادة إصلاح الصحة التغذوية في سوريا بعد انتهاء النزاعات وتعزيز النظام الصحي و الغذائي في لبنان. أهمية هذا الأمر تتعلق بالدراسات الحديثة التي أظهرت أن نقص التغذية عند الأمهات والأطفال خلال أول سنتين من عمر الطفل قد يأثران بشكلٍ كبيرٍ على مخاطر الإصابة بأمراض مُزمنة في وقت لاحق و على الصحة البدنية و النمو العقلي و المعرفي.

وصف المشروع:

ستكون الدّراسة مزيجاً من دراسة رصدية (الجزء 1) ودراسة تداخلية (الجزء 2). **الجزء 1** من الدّراسة يشمل عينة من 1426 ثنائي مؤلّف من امرأة في سن الإنجاب (49-15 عام) وطفلها (0 إلى 59 شهراً)، منها 713 ثنائي من اللاجئين/النازحين السوريين و 713 ثنائي من اللبنانيين من مراكز الرعاية الصحية في بيروت الكبرى.

أنتِ مدعوة الآن للمشاركة في المرحلة الأولى من الدراسة.

إن مشاركتك في هذه الدراسة طوعية و سيتم السعي للحصول على الموافقة من النساء المؤهلات اللواتي لهن الحق في قبول أو رفض المشاركة من تلقاء أنفسهن و بالنيابه عن أطفالهن.

طريقة التعيين في الدراسة التي وافق عليها مجلس الأخلاقيات تتضمن تحديد ثنائي الأم / الطفل من خلال الممرضة أو عن طريق اتصال مباشر من مساعدي الباحث في غرفة الانتظار في مباني مركز الرعاية الصحية الأولية. عندما يكون العديد من الأطفال دون سن الخامسة مؤهلين، سيتم اختيار الطفل بشكل عشوائي. إذا وافقتِ على المشاركة في هذه الدّراسة، ستتمّ مقابلتكِ في موقع الدّراسة. في حالة عدم الانتهاء من المقابلة أو كنت تفضل بدء المقابلة في وقت لاحق أو إذا كان الطفل غير موجود معك، يجوز لنا مواصلة المقابلة في يوم آخر في موقع الدراسة أو في منزلك، كما ترغبين.

المقابلة والمدة:

سوف تستغرق المقابلة حوالي 40 دقيقة من وقتكِ باستخدام الحواسيب اللوحية والاستبيانات على الورق . يتمّ طرح أسئلة عليكِ حول ممارسات التغذية الخاصة بطفلك (الرضاعة الطبيعية والتّغذية التكميلية) وخصائص نمط حياتك (التدخين، النشاط البدني) وخصائصك الاجتماعية (العمر والجنس ومكان السكن والتعليم والمهنة و المدخول الشهري والظروف المعيشية) و عن النظام الغذائي الخاصّ بكِ وبطفلك (الاستدعاء الغذائي على مدار 24 ساعة)، بالإضافة إلى الأسئلة المتعلقة بالأمن الغذائي ومشاعرك. كذلك، سوف يتم أخذ القياسات الجسدية لك و لطفلك. سوف يتم أخذ وزنك، طولك، محيط خصرك و محيط منتصف الذراع العلوي كما سيتم أخذ وزن، طول، محيط الرأس و محيط منتصف الذراع العلوي لطفلك. أيضاً، سوف يطلب منكم الخضوع لاختبار الهيموغلوبين مع وخزة صغيرة على إصبعك وعلى إصبع أو كعب قدم طفلك باستخدام " HemoCue Hb 201+ System".

البحوث المستقبلية:

نود أن نتصل بك مرة أخرى لدعوتك لمزيد من البحوث عند موافقتك ومشاركتك طوعية. أنت غير مجبرة على المشاركة في البحوث المستقبلية حتى لو وافقتِ على أن يتم الاتصال بك. إذا رفضت الاتصال بك، فلن يؤثر ذلك على مشاركتك في هذه الدراسة. كمرحلة من الجزء الأول، من المقرر إجراء نقاشات جماعية في موضوع محدّد وإجراء مقابلات متعمقة معك أو مع أحد أفراد الأسرة (أي جدي لطفلك ، زوجك ، إلخ.) لمواصلة التحقيق في الحواجز التي تواجهونها تجاه نظام غذائك ونظام غذاء طفلك. وبالإضافة إلى ذلك، في حال كنت و/أو طفلك مؤهلين للمشاركة في المرحلة الثانية من الدراسة، نود أن ندعوكما للمشاركة في الجزء الثاني من الدراسة.

معايير المشاركة:

الجزء 1: أنتما مؤهلان للمشاركة إذا: (1) كنتِ تحملين الجنسية اللبنانية أو السورية، (2) يتراوح عمرك بين 15 و 49 سنة، (3) كنت أم لطفل يتراوح عمره بين 0 و 59 شهراً، و (4) أن طفلك لا يعاني من أمراض باطنية أو تشوهات خلقية.

المخاطر، المضايقات و الفوائد:

على الرغم من أن أي دراسة قد تترافق مع مخاطر لا يمكن التنبؤ بها، هذه الدراسة تحمل الحد الأدنى من المخاطر ولا توجد مخاطر كبيرة ناتجة عن مشاركتكما. لا تحمل أي من عمليات جمع البيانات أية مخاطر على المدى الطويل و يمكنك اختيار عدم الإجابة على بعض الأسئلة في حالة عدم الاحساس بالراحة. سوف يتم إجراء الوخزة الصغيرة في ظروف وقائية صحية صارمة. من الأثار الجانبية الضئيلة التي من المحتمل أن تصيبكما: ألم معتدل، نزف محدود، رضة خفيفة في موضع إدخال الابرة. و قد تحدث في بعض الأحيان حالات إغماء أو دوار خفيف، و لكنها لا تدوم عادةً أكثر من دقائق قليلة. في حال تم الكشف عن فقر الدم الشديد (الهيموجلوبين < 7 g/dL للأطفال دون سن الخامسة و <8 g/dL للنساء في سن الإنجاب)، حالة نقص التغذية من معتدلة إلى شديدة عند الأم (BMI<17) أو سوء تغذية حاد عند الطفل (MUAC<12.5 cm, WFH<-2SD) سوف يتم إحالة حالات الأمهات أو الأطفال المتضررين إلى الرعاية الطبية الفورية في المركز الرعاية الصحية الأولية. في حالة تم تشخيص مؤقت بالاكتئاب الطفيف إلى الاكتئاب الرئيسي (PHQ-9 score < 10)، حالة من اضطرابات ما بعد الصدمة، يقوم المساعد البحثي بإبلاغ أخصائي الرعاية الصحية (الممرضة أو الطبيب) في المركز ، الذي يقوم بإبلاغ النتيجة إلى المشارك وتقديم قائمة بمراكز الرعاية الصحية مع الدعم النفسي والاجتماعي في المنطقة. في حال لم تتمكن المشاركة من استكمال محتويات الرئيسية بالاستبيان وترفض أخذ قياسات الجسم، فلن تكون مؤهلة للمشاركة في الدراسة. إذا لم ترغب أحدى المشاركات في المشاركة في الدراسة لسبب خاص بها، باحثون الدراسة سينهون مشاركتها. سوف يقدم لك و لطفلك إستشارة غذائية عامة بعد إنهاء المقابلة، حتى إذا قررت توقيف أو سحب مشاركتك من الدراسة.

السرية:

إذا وافقت على الاشتراك بهذا البحث، سوف تبقى كافة البيانات محفوظة بسرية تامة و سيتم اتخاذ تدابير لضمان عدم خرق خصوصية المشاركين. كما سيتم تعيين للمشاركين رموز عشوائية لمزيد من ضمان سرية السجلات. فقط فريق البحث يمكنه الإطلاع على الاستبيانات والبيانات الإلكترونية، وهذه المعلومات سوف تستعمل فقط لأهداف بحثية. سوف تحفظ جميع الرموز

والبيانات في خزانة مقفلة في غرفة مقفلة. وسيتم مراقبة السجلات و يجوز لمجلس الأخلاقيات أن يدقّقوا لضمان السرية. كما سيتم نشر النتائج بشكل جماعي فقط في المجلات العلمية.

حقوق المشارك:

إن مشاركتك في هذه الدراسة طوعية و سيتم السعي للحصول على الموافقة من النساء المؤهلات اللواتي لهن الحق في قبول أو رفض المشاركة من تلقاء أنفسهن و بالنيابه عن أطفالهن. الرجاء أخذ العلم بأن عدم المشاركة أو الإنسحاب من المشاركة لن يؤثر سلباً في المستقبل على منافعك الشخصية والمنافع التي تقدمها مراكز الرعاية الصحية.

a) **هل يمكننا الإتصال بك لدعوتك و/أو أحد أفراد الأسرة (أي جدي لطفلك ، زوجك ، إلخ.) للمزيد من التحقيقات في الجزء 1 المتعلقة بك أو بطفلك (مناقشات جماعية في موضوع محدّد وإجراء مقابلات متعمقة)؟**

نعم **لا**

الجزء الثاني ستكون دراسة تداخلية تجرى بين مجموعتين: الأطفال المصابين بفقر الدم الذين يتراوح أعمارهم بين 6 أشهر و 59 شهراً والنساء المصابات بفقر الدم في سن الإنجاب (49-15 سنة). سوف تهدف إلى التحقيق في فعالية جلسات الإرشاد و التعليم الغذائي في تحسين مستويات الهيموغلوبين و المدخول الغذائي الغني بالمغذيات عند النساء والأطفال المصابين بفقر الدم.

b) **هل يمكننا الاتصال بك لدعوتك أو طفلك إلى الجزء 2 من الدراسة، إذا كنتما مؤهلين للمشاركة؟**

نعم **لا**

إذا كانت الإجابة نعم على واحدة من الأسئلة السابقة ، يرجى تزويدنا برقم الهاتف الخاص بكِ:____________________

قد نستخدم بعض أو جميع المعلومات الناتجة عن هذه الدراسة في دراسات أخرى في المستقبل. وقد يستدعي ذلك مشاركة المعلومات مع باحثين اخرين. قبل أن نفعل ذلك، سوف نتخلّص من أي روابط بين هويتك والمعلومات المجموعة منك. أيضاً، نود الاتصال بك لدعوتك للمشاركة بدراسات مستقبلية.

c) **أوافق على أن يتم استخدام المعلومات التي تم جمعها عني و عن طفلي لمشاركتها مع باحثين اخرين و / أو لإستخدامها في البحوث المستقبلية :**

نعم **لا**

d) **هل يمكننا الاتصال بك لدعوتك أو طفلك بدراسات مستقبلية؟**

نعم **لا**

للإستفسار:

في حال لديك أية اسئلة أو إستفسار حول الدراسة ، الرجاء الإتصال ب:

الدكتورة فيرونيكا شيرباوم – معهد الكيمياء الحيوية وعلوم التغذية (140a) – جامعة هوهنهايم، ألمانيا.

تليفون:+49-711-459-23496 E-mail: veronika.scherbaum@uni-hohenheim.de

الدكتورة نهلا حولا – كلية العلوم الزراعية و الغذائية – الجامعة الأميركية في بيروت.

تليفون: (+961-1-350000 (Ext 4400 E-mail: nahla@aub.edu.lb

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الدكتورة لميس جمعة – كلية العلوم الزراعية و الغذائية – الجامعة الأميركية في بيروت.

تليفون:(+961-1-350000 (Ext 4544 E-mail: lj18@aub.edu.lb

الدكتور جان فرانك – معهد الوظائف الحيوية وسلامة الأغذية (140b) – جامعة هوهنهايم، ألمانيا.

APPENDIX II

ARABIC QUESTIONNAIRE

بحث الدكتوراه العلمي: الحالة الغذائية للأمهات عند اللاجئين/النازحين السوريين والمجتمعات المضيفة اللبنانية في بيروت الكبرى، لبنان: تركيز خاص على فقر الدم.

تاريخ المقابلة [السنة / الشهر/ اليوم]: /__ __ __ __ / __ __ / __ __/ تعريف (ID) المشاركة: /__ __ __ __/

إسم الباحث: _____ مكان المقابلة: _____

	العوامل الاقتصادية و الديموغرافية
1	ما هي جنسيتك؟ 1 = لبنانية 2 = سورية
2	ما هي جنسية طفلك؟ 1 = لبنانية 2 = سورية
3	ما هو تاريخ ميلادك؟ [السنة / الشهر/ اليوم]: /__ __ __ __ / __ __ / __ __/
4	ما هو تاريخ ميلاد طفلك؟ [السنة / الشهر/ اليوم]: /__ __ __ __ / __ __ / __ __/
5	ما هو جنس طفلك؟ 1 = ذكر 2 = أنثى
6	ما هو وضعك العائلي؟ 1 = عزباء 2 = خاطبة 3 = متزوجة 4 = أرملة 5 = مطلقة 99 = لا جواب
7	ما هو مكان الإقامة؟ حددي رجاءً: _____
8	منذ متى تعيشين في هذه المنطقة؟ حددي رجاءً: / __ __/ سنوات و / __ __/ أشهر
9	ما هو مستواك العلمي الأعلى الذي حقّقتِه؟ 1 = لم ألتحق بالمدرسة / أمي 2 = أجيد القراءة و الكتابة 3 = المدرسة الابتدائية 4 = المدرسة المتوسطة 5 = المدرسة الثانوية 6 = دبلوم تقني/فنّي 7 = الشهادة الجامعية 87 = آخر، حددي رجاءً: _____ 99 = لا جواب
10	**إذا كانت الأم تحمل شهادة:** هل تخصّصتِ في إحدى المجالات المتعلّقة بالصحة؟ 0 = كلا 1 = نعم، حددي رجاءً: _____ 2 = لا جواب
11	ما هو مستوى العلمي الأعلى الذي حقّقه **زوجك**؟ 1 = لم ألتحق بالمدرسة / أمي 2 = أجيد القراءة و الكتابة 3 = المدرسة الابتدائية 4 = المدرسة المتوسطة 5 = المدرسة الثانوية 6 = دبلوم تقني/فنّي 7 = الشهادة الجامعية 87 = آخر، حددي رجاءً: _____ 99 = لا جواب
12	ما نوع العمل الذي تقومين به ؟ 1 = لا عمل مدفوعة الأجر/ ربة المنزل 2 = مؤقت، غير منتظم أو موسمي 3 = عمل يوم 4 = عمل بدوام جزئي 4 = عمل بدوام كامل 5 = أعمل لحسابي الخاص 6 = متقاعدة (لا تعمل) 87 = آخر 99 = لا جواب حددي رجاءً نوع العمل / آخر: _____
13	ما نوع العمل الذي يقوم به **زوجك** ؟ 1 = لا عمل مدفوعة الأجر 2 = مؤقت، غير منتظم أو موسمي 3 = عمل يوم 4 = عمل بدوام جزئي 4 = عمل بدوام كامل 5 = أعمل لحسابي الخاص 6 = متقاعد (لا يعمل) 87 = آخر 99 = لا جواب حددي رجاءً نوع العمل / آخر: _____
14	هل تعتمد عائلتك على المدخرات أو الدعم (التحويلات النقدية أو التحويلات المالية)؟ *يرجى تحديد كل ما ينطبق* 0 = كلا 1 = المدخرات 2 = الدعم (التحويلات النقدية أو التحويلات المالية) 3 = إعانات الإيجار 87 = آخر 99 = لا جواب
15	هل تتلقى أسرتكِ أي نوع من المساعدات؟ *يرجى تحديد كل ما ينطبق* 0 = كلا 1 = قسائم غذائية (e-voucher) 2 = المساعدة النقدية (غير ال-e-voucher)، حددي رجاءً: _____ 3 = المساعدة غير النقدية، حددي رجاءً: 99 = لا جواب

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16	كم طفلا لديك؟ *يرجى تحديد الجنس والعمر لجميع الأطفال دون سن 18 عاما و التحقيق خصيصاً للأطفال من العمر 0-59 شهراً.* **العمر (أشهر - سن أقل من 5 سنوات) + ذكر (M) / انثى (F)** **العمر (أشهر - سن أقل من 5 سنوات) + ذكر (M) / انثى (F)** 1 = /_____/ /_____/ 6 = /_____/ /_____/ 2 = /_____/ /_____/ 7 = /_____/ /_____/ 3 = /_____/ /_____/ 8 = /_____/ /_____/ 4 = /_____/ /_____/ 9 = /_____/ /_____/ 5 = /_____/ /_____/ 10 = /_____/ /_____/
17	هل لديك أقارب يعيشون تحت سقف واحد وتتقاسموا نفس وعاء الطعام؟ (نوع المنزل) 0 = لا [الأسرة **الأولية**: الأب والأم، وأطفالهم] 1 = نعم [الأسرة **الممتدة**: الأب والأم، وأولادهم بالإضافة إلى الأخ (الأخوات) و/أو والدي الأب / الأم] إذا كان الجواب نعم، حددي رجاءً من سيعيش معكم:_____
18	هل لديك مساعدة تعيش معكم في المنزل؟ 0 = كلا / 1 = نعم
19	ما هو العدد الإجمالي لأشخاص الذين يعيشون في منزلك؟ (بما في ذلك أفراد الأسرة الموسعة والمساعدين) حددي رجاءً: _____
20	كم عدد الغرف في منزلك باستثناء المطبخ، الحمام، الكاراج أو الشرفات التي لم يتمّ إحاطتها بالزجاج؟ حددي رجاءً: _____
21	من هو رب الأسرة؟ (خاصة في سلطة اتخاذ القرار) 1 = الأم 2 = الأب 87 = آخر، حددي رجاءً: _____ 88 = غير واضح 99 = لا جواب
22	هل لديك أي نوع من التأمين الصحي؟ 0 = غير مضمون 1 = ضمان 2 = خاص 87 = آخر، حددي رجاءً: _____
23	أين تبحثون عادةً على الرعاية الصحيّة لنفسك وأفراد أسرتك؟ (للخدمات العامة) 1 = مراكز الرعاية الصحية الأولية 2 = مستشفى عام 3 = مستشفى خاص 4 = عيادة خاصة 5 = عيادة متنقلة 6 = صيدلية 87 = آخر، حددي رجاءً: _____
24	أين تسمع بشكل عام على الرسائل الصحية والتغذوية (الرضاعة الطبيعية وتغذية طفلك الصغير)؟ *يرجى اختيار كل ما ينطبق* 0 = لا تسمع رسائل 1 = طبيب 2 = ممرضة/ داية 3 = صيدلاني 4 = عامل صحة اجتماعي 5= اختصاصي تغذية / صف تغذية 6 = الأم 7 = الحماة 8 = الأخت 9 = الزوج 10= الأصدقاء/الجيران 11 = وسائل الإعلام (راديو / تلفزيون) 12 = وسائل الإعلام الاجتماعية / الإنترنت 87 = آخر، حددي رجاءً: _____ 88 = لا أعرف
	خصائص صحّة الأم
25	هل سمعت عن فقر الدم من قبل؟ 0 = لا 1 = نعم إذا كان الجواب نعم، هل يمكن أن تخبرني كيفية التعرف على شخص لديه فقر الدم؟ *يرجى تحديد كل ما ينطبق* 1 = طاقة أقل 2 = باهت اللون 3 = تقعر الأظافر 4 = أكثر عرضة للتعرض للمرض 87 = آخر، حددي رجاءً: _____ 88 = لا أعلم
26	هل سبق لك أن عانيت من فقر الدم في الماضي؟ 0 = لا 1 = نعم إذا كان الجواب نعم، متى تم تشخيصك؟ _____ حددي رجاءً مستوى الهيموغلوبين (g/dL) في وقت التشخيص: _____

27	هل تتناولين حالياً أي مكملات غذائية ؟ 0 = كلا 1 = نعم إذا كان الجواب نعم، a) حددي رجاءً كل نوع: 1 = الحديد 2 = الحديد - حمض الفوليك 3 = فيتامي B12 4 = غيرها من الفيتامينات B 5 = فيتامين D 6 = فيتامينات متعددة 87 = آخر، حددي رجاءً: _____ 88 = لا أعرف b) حددي رجاءً عدد مرات التناول: 1 = غير ملتزم 2 = أسبوعياً 3 = يومياً
28	هل أنت حامل؟ 0 = كلا 1 = نعم، حددي رجاءً أسبوع الحمل: /__ __/
29	هل شعرت بتغيير في وزنك خلال ال 3 أشهر الماضية (**إن لم تكن حاملا**)؟ 1 = وزن مستقر 2 = وزن مفقود 3 = وزن مكتسب إذا كانت الإجابة بنعم، يرجى تحديد عدد كجم: _____
30	هل تعاني حالياً من مرض مزمن أو لديك احتياجات محددة؟ *يرجى اختيار كل ما ينطبق* 0 = لا 1 = ضغط الدم 2 = السكري 3 = أمراض الغدة الدرقية 4 = شحوم الدم 5 = السرطان 6 = أي إعاقة جسدية 7 = الإصابة بالديدان 87 = آخر 88 = لا أعرف 99 = لا جواب
31	هل أنت مريضة حالياً وتعاني من عدوى، غريب ، أو أي نوع من المرض؟ *يرجى تحديد كل ما ينطبق* 0 = لا 1 = عدوى 2 = غريب 3 = حرارة 87 = آخر، حددي رجاءً: _____
32	هل تعانيت من أي أعراض التالية خلال الأسبوعين الماضيين؟ *يرجى تحديد كل ما ينطبق* 0 = لا 1 = صداع 2 = دوار 3 = صعوبة التركيز 4 = جلد شاحب 5 = الأرق 6 = فقدان الشهية 7 = التعب 8 = ضيق في التنفس 87 = آخر، حددي رجاءً: _____
33	هل تتناولين حالياً أي أدوية؟ 0 = كلا 1 = نعم إذا كان الجواب نعم، a) حددي رجاءً كل نوع: _____ b) حددي رجاءً عدد مرات التناول: 1 = غير ملتزم 2 = أسبوعياً 3 = يومياً
34	هل لديك دورة شهرية منتظمة في الأشهر ال 3 الماضية؟ 0 = كلا 1 = نعم إذا كان الجواب كلا، حددي رجاءً: _____
35	ما هو معدل مدة الدورة الشهرية ؟ /__ __/ أيام
36	يرجى وصف النزيف في الدورة الشهرية ؟ 0 = خفيف 1 = نزيف معتدل 2 = نزيف شديد 3 = النزيف الشديد لفترات طويلة
37	كم مرة ذهبت إلى المستشفى / المركز الصحي لرعاية ما قبل الولادة أثناء الحمل مع طفلك (أقل من 5 سنوات)؟ 0 = لم تذهب 1 = 1 مرة 2 = 2 مرات 3 = 3 مرات 4 =< 3 مرات 88 = لا أعرف **إذا كان الجواب لا**، يرجى تحديد السبب: _____
38	هل عانيت من أي مشاكل صحية أثناء الحمل مع طفلك (أقل من 5 سنوات)؟ *يرجى اختيار كل ما ينطبق* 0 = لا 1 = نزف 2 = ارتفاع ضغط الدم 3 = مرض السكري 4 = فقر الدم 87 = آخر، حددي رجاءً: _____ 88 = لا أعرف
39	ما هو نوع الولادة الأخير مع طفلك ؟ 1 = ولادة طبيعية 2 = ولادة قيصرية 3 = أخر
	خصائص صحّة الطفل
40	ما هو سن حمل طفلك بالأشهر؟ (أسابيع) /__ __/
41	ماذا كان وزنه عند الولادة؟ (كغ) /__ __/
42	ما كان طوله عند الولادة ؟ (سم) /__ __/
43	هل عانى طفلك من الأعراض التالية خلال الأسبوعين الماضيين؟ *يرجى اختيار كل ما ينطبق* 0 = لا 1 = حرارة 2 = إسهال 3 = قيء 4 = سيلان الأنف أو رشح 5 = سعال أو أزيز 6 = عدوى الأذن 7 = صداع 8 = التعب 9 = جلد شاحب 10 = الأرق 11 = عصبي 7 = الإصابة بالديدان 87 = آخر 99 = لا جواب

44	هل تم تشخيص طفلك بفقر الدم من قبل؟ 0 = لا 1 = نعم، حددي رجاءً الهيموغلوبين (g/dL) في وقت التشخيص: _____
45	هل تلقى طفلك أي من الأدوية التالية خلال الأسبوعين الماضيين؟ 1 = المضادات الحيوية (antiobiotics) 2 = دواء للألم أو مضادة للالتهابات (anti-inflammatory) 3 = أدوية أخرى، حددي رجاءً: _____
46	هل يأخذ طفلك أي مكملات غذائية في الأشهر ال-6 الماضية ؟ 0 = لا 1 = نعم 87 = آخر 99 = لا جواب إذا كان الجواب نعم، حددي رجاءً كل نوع: 1= حديد 2 = فيتامين د 3 = فيتامين أ 4 = فيتامين ك 5 = الفيتامينات المتعددة 87 = آخر، حددي رجاءً: _____ b) حددي رجاءً عدد مرات التناول: 1 = غير ملتزم 2 = أسبوعياً 3 = يومياً
	نمط غذاء الأم
47	هل تتناولين وجبة الإفطار كلّ يوم؟ 0 = لا 1 = نعم
48	كم وجبة من الوجبات الثلاث (الفطور والغداء والعشاء) تتناولين يومياً؟ /__ __/ وجبات
49	كم وجبة من وجبة خفيفة تتناولين يومياً؟ /__ __/ وجبات خفيفة
50	متى تشربين عادةً القهوة أو الشاي؟ *يرجى تحديد كل ما ينطبق* 1 = 2 ساعة أو أكثر قبل وجبة 2 = مباشرة بعد وجبة الطعام 3 = خلال الوجبة 4 = مباشرة بعد وجبة 5 = 2 ساعة أو أكثر بعد وجبة الطعام 87 = آخر، حددي رجاءً: _____ 88 = لا أعرف 99 = لا جواب
51	متى تضيف عصير الليمون إلى الأطباق المطبوخة؟ 1 = عندما يتم الطهي عالنار 2 = عندما يزال الطعام ساخنا 3 = عندما يبرد الطعام قبل تقديمه 4 = في طبقي مباشرة 87 = أخر
	ممارسات الرضاعة الطبيعية
52	هل رضّعت طفلك في أي وقت من الأوقات بشكل ناجح؟ 0 = لا 1 = نعم **(تخطي السؤال التالي)**
53	**إذا كان الجواب لا،** لماذا لم ترضعين طفلك ؟ *يرجى تحديد كل ما ينطبق* 1 = لا إنتاج لحليب الثدي / لا يكفي حليب الثدي 2 = سوء نوعية الحليب 3 = مشاكل بالحلمة 4 = مؤلم 5 = ضغط و سترس 6 = سوء الحالة التغذوية 7 = مشاكل صحية (الرشح) 8 = رفض الطفل اتخاذ حليب الثدي 9 = كان الطفل مريضاً ولم يستطع الرضاعة الطبيعية 10 = يفضل حليب المركب 11 = لم يكن لدي الوقت 12 = نصيحة الطبيب أو الممرضة 13 = الزوج لم يرد الرضاعة الطبيعية 14 = سياق غير مريح 87 = آخر، حددي رجاءً: _____ **يرجى إنهاء هذا القسم والانتقال إلى القسم التالي**
54	بعد كم من الوقت بعد الولادة بدأتِ الرضاعة الطبيعية؟ 1 = على الفور (خلال أول ساعة من الولادة) 2 = /__ __/ ساعة 3 = /__ __/ أيام 88 = لا أعرف
55	هل سبق أن أعطي طفلك أي طعام سائل/صلب في الأيام التي تلت الولادة قبل تلقي الطفل حليب الثدي من قبل الأم (تغذية ما قبل الدر)؟ 0 = لا 1 = نعم 88 = لا أعرف **إذا كان الجواب نعم،** أي نوع من الطعام/السوائل حصل الطفل حديث الولادة عليه؟ *يرجى تحديد كل ما ينطبق* 1 = ماء الحنفية مغل / المياه المعدنية 2 = ماء الحنفية (غير المغلي) 3 = حليب البقر/ الماعز الطازج 4 = حليب المركب 5 = عسل 6 = شاي أعشاب 11 = ماء الورد 12 = ماء محلاة بالسكر 87 = آخر

56	هل تلقى طفلك الحليب الأول، الذي يأتي من الثدي (حليب الثدي الأصفر واللزج)، "اللبأ"؟ 0 = لا 1 = نعم
57	**إذا كان الطفل أصغر من 6 أشهر**، هل ترضعين طفلك بشكل حصري (بمعنى عدم إعطاء السوائل أو أي نوع من الطعام غير حليب الأم)؟ 0 = لا 1 = نعم
58	**إذا كان الطفل أكبر من 6 أشهر**، هل قمت بإرضاع طفلك بشكل حصري خلال الستة أشهر الأولى؟ 0 = لا 1 = نعم
	بدائل حليب الثدي
59	كم كان عمر طفلك عندما حصل على بدائل حليب الثدي؟ 0 = أبداً 1 = حددي رجاءً عمر الطفل **بالأشهر**: / __ __/ **إذا كان الجواب أبداً، يرجى الانتقال إلى القسم التالي**
60	ما نوع بدائل حليب الثدي الذي تقدميه بدلا من ذلك أو بالإضافة إلى حليب الثدي؟ يرجى تحديد كل ما ينطبق 1 = حليب مركب 2 = حليب البقر الطازج 3 = حليب الماعز الطازج 4 = حليب المبستر 5 = حليب بودرة 87 = آخر، حددي رجاءً: _____
61	هل شرب طفلك أي شيء من زجاجة مع الحلمة أمس خلال النهار أو الليل؟ 0 = لا 1 = نعم
62	هل تقومين بتعقيم الزجاجات قبل الاستخدام؟ 0 = لا 1 = نعم
63	هل تقومين بتخزين بدائل حليب الثدي في البراد؟ 0 = لا، أنا لم تخزينه 1 = نعم، أنا خزنته 2 = لا، أنا خزنته خارج البراد إذا كان خارج البراد ، حددي رجاءً إلى متى؟ / ____/ دقائق
64	هل تقومين بإعادة تسخين الحليب المخزن؟ 0 = لا 1 = نعم
	المحرمات الغذائية والممارسات الغذائية الخاصة بالرضاعة الطبيعية
65	هل زدت تناول بعض الأطعمة/ المحرمات الغذائية / خلطات أعشاب / إتبعت معتقدات تقليدية معينة أثناء الرضاعة؟ 0 = لا 1 = نعم إذا كان الجواب نعم، حددي رجاءً نوع (أنواع): _____ _____
66	هل تجنبت تناول بعض الأطعمة/ المحرمات الغذائية / خلطات أعشاب / إتبعت معتقدات تقليدية معينة أثناء الرضاعة؟ 0 = لا 1 = نعم إذا كان الجواب نعم، حددي رجاءً نوع (أنواع): _____ _____
67	هل أنت مدرك بأي تفاعلات محتملة مع امتصاص الحديد أو آثار جانبية من استخدام علاجات الأعشاب؟ 0 = لا 1 = نعم 88 = لا أعرف 99 = لا جواب
	التغذية التكميلية
68	متى كانت المرة الأولى التي قمتِ بإطعام لطفلك طعاماً صلباً أو شبه صلباً أو ناعماً ؟ 0 = أبداً 1 = حددي رجاءً عمر الطفل **بالأشهر**: / __ __/ 88 = لا أعرف 99 = لا جواب
69	من يعطي الطعام لطفلك؟ *يرجى تحديد كل ما ينطبق* 1 = الأم 2 = الأب 3 = جدة الطفل (أمومية) 4 = حماة 5 = المساعدة 6 = الأشقاء 7 = في روضة الأطفال 87 = آخر، حددي رجاءً: _____ 99 = لا جواب
70	هل تغسلين يديك قبل تحضير الوجبة بالماء والصابون؟ 0 = لا 1 = نعم
71	قبل إطعام طفلك، هل تغسلين يديك بالماء والصابون ؟ 0 = لا 1 = نعم
72	قبل أن يأكل الطفل (إذا كان يأكل وحده)، هل تغسل يدين الطفل بالماء والصابون ؟ 0 = لا 1 = نعم

	ممارسات تغذية الرضع وصغار الأطفال (أمس خلال النهار أو في الليل)	
73	هل قمتِ بإرضاع طفلك يوم أمس خلال النهار أو الليل؟ 0 = لا 1 = نعم	
74	هل أعطيت طفلك أي سوائل أمس خلال النهار أو في الليل؟ ***إذا كانت الإجابة نعم،*** *حددي رجاءً عدد المرات.* 0 = لا 1 = نعم 88 = لا أعرف a. ماء عادي b. حليب المركب c. الحليب (المعلب أو بودرة أو الطازج) d. عصير أو مشروبات عصير e. مرق صافية f. لبن g. حساء الشعير h. أي سائل آخر مثل الشاي، يانسون، بابونج، كاراواي، حددي رجاءً: _____ i. أي سائل آخر، حددي رجاءً: _____ **إذا كان الجواب آبداً، يرجى الانتقال إلى القسم التالي**	نعم / لا عدد المرات a. /_____/ b. /_____/ /_____/ c. /_____/ /_____/ d. /_____/ e. /_____/ f. /_____/ /_____/ g. /_____/ h. /_____/ i. /_____/
75	أمس خلال النهار أو الليل، كم عدد حليب المركب أو حليب (مثال حليب البقر أو الماعز) يتناول طفلك؟ /__ __/ مرة يومياً	
76	الرجاء تحديد طريقة تحضير الحليب المركب: عدد الملاعق (scoop): /____/ و كمية المياه (مل): /____/ حددي رجاءً نوع من الحليب المركب: _____	
77	ما هو نوع الماء الذي استخدمتيه؟ 1 = ماء الحنفية/الينابيع 2 = ماء الحنفية المصفاة 3 = مياه المعدنية 87 = أخر، حددي رجاءً: _____	
78	هل (كنت) تقومين بإضافة أي شيء إلى الحليب؟ 0 = لا 1 = حبوب الأطفال (سيريلاك، بلدين، الخ) 2 = البسكويت 3 = سكر 4 = عسل 5 = أرز 7 = أخر، حددي رجاءً: _____ ححددي رجاءً الكمية (الملعقة الصغيرة): _____	
79	هل تناول طفلك أي أطعمة صلبة أو شبه صلبة أو ناعمة أمس أثناء النهار أو الليل؟ 0 = لا 1 = نعم 88 = لا أعرف 99 = لا جواب	
80	أمس خلال النهار أو الليل، هل إستهلك طفلك أي أطعمة صلبة أو شبه صلبة أو ناعمة مدعمة بالحديد (Cerelac, Bledina, إلخ)؟ 0 = لا 1 = نعم 88 = لا أعرف 99 = لا جواب حددي رجاءً النوع: _____	

	ممارسات تغذية الرضع (الأطفال من صفر إلى 23 شهرا)	
81	كم مرة قد تناول طفلك أي أطعمة صلبة أو شبه صلبة أو ناعمة ما عدا السوائل أمس خلال النهار أو الليل؟ _____/ مرة 88 = لا أعرف 99 = لا جواب	
82	هل تناول طفلك هذه الأطعمة أمس أثناء النهار أو في الليل، سواء في المنزل أو خارج المنزل؟ 0 = لا / 1 = نعم / 88 = لا أعرف 1. عصيدة (porridge) ، خبز، أرز، معكرونة، أو الأطعمة المصنوعة من الحبوب 2. يقطين، جزر، أو بطاطا حلوة (الأصفر أو البرتقالي داخل) 3. بطاطا بيضاء، الكسافا، أو أي جذور 4. خضار ورقية خضراء 5. مانجو، خوخ، مشمش، الفاكهة البرتقال / أصفر 6. فواكه أو خضراوات الأخرى 7. لحوم عضوية (كبد وكلى وقلب، أو غيرها) 8. لحوم (لحم البقر و غنم و دجاج) 9. بيض 10. أسماك و مأكولات البحرية (طازجة أو مجففة) 11. بقوليات (فول، عدس، مكسرات، بذور) 12. منتجات الألبان (لبنة وجبن و لبن) 13. دهون وزيوت (دهون النباتية وزبدة وسمن) 14. حلويات (شوكولاته، الكعك، بسكويت، الحلويات العربية) 15. التوابل (صلصة وخردل وخل وأعشاب) 16. مواد غذائية أخرى 17. الأطعمة المصنوعة من زيت النخيل الأحمر أو الجوز الأحمر	1. _____/ 2. _____/ 3. _____/ 4. _____/ 5. _____/ 6. _____/ 7. _____/ 8. _____/ 9. _____/ 10. _____/ 11. _____/ 12. _____/ 13. _____/ 14. _____/ 15. _____/ 16. _____/ 17. _____/
	ممارسات تغذية الأطفال الصغار (الأطفال من 24 إلى 59 شهرا)	
83	كم مرة تطعمين طفلك عادةً المأكولات التي تتكون أساساً أو تحتوي على الفئات المذكورة في الأسفل أسبوعياً أو شهرياً؟ a. الأطعمة الجاهزة المدعمة بالحديد (حبوب الأطفال، الحليب، الخ) b. حبوب الأطفال (الأرز، القمح، الشوفان، بلدين، سيريلاك، الخ) c. حبوب (الخبز والمعكرونة والمعكرونة والأرز والبرغل والشوفان، الخ) d. البقوليات (الحمص والعدس والفاصوليا وغيرها) e. بيض (صفار، أبيض، كامل) f. لحم (لحم البقر وغنم، الدجاج، الديك الرومي ، الخ) g. الأسماك والمأكولات البحرية (قريدس، سرطان البحر، الخ) h. اللحوم العضوية (الكلى والكبد والقلب، الخ) i. الفاكهة الداكنة الصفراء والبرتقالية (المانجو، الخوخ، المشمش، الخ) j. الفواكه الأخرى (الموز، التفاح، الخ) k. الخضار الورقية الخضراء (السبانخ، روكا، الخس، سلق، هندبه، الخ) l. هريس الخضروات الأخرى (كوسة، البازلاء، الطماطم الخ) m. الجذور الداكنة أو البرتقالية الداكنة أو الدرنات (الجزر والقرع والفلفل الأحمر والبطاطا الحلوة، وما إلى ذلك) n. الجذور والدرنات (البطاطا القلقاس، الخ) o. مشتقات الحليب (اللبنة واللبن والجبن) p. الحلويات مرتكز على الحليب (الكسترد و رز بحليب والمهلبية و بوظة وغيرها) q. حلويات (كيك، جيلو ، حلويات عربية، الخ) r. عسل، مربى	**في الاسبوع** a. _____/ b. _____/ c. _____/ d. _____/ e. _____/ f. _____/ g. _____/ h. _____/ i. _____/ j. _____/ k. _____/ l. _____/ m. _____/ n. _____/ o. _____/ p. _____/ q. _____/ r. _____/

84	**المأخوذ الغذائي خلال الأربع وعشرين ساعة الأخيرة <u>للطفل</u>**	تاريخ [السنة / الشهر/ اليوم]: /__ __ __ __ / __ __ / __ __/	اليوم في الأسبوع /_____/

رجاء" تذكري ماذا تناول طفلك من الطعام أو المشروب من الساعة التي إستيقظ فيها البارحة حتى صباح اليوم التالي (قبل تناول الفطور).
حددي توقيت التناول شاملةً معهما الرضاعة الطبيعية، رضاعة الحليب المركب و الطعام الصلب (عدد المرات و المدة).
الرجاء استخدام 5-step multiple pass method: 1) قائمة سريعة، 2) الأطعمة المنسية، 3) الوقت والمناسبة، 4) معلومات مفصلة، 5) التحقيق النهائي.

الوقت	نوع الطعام	الكمية	طريقة التحضير
85	هل كان اليوم الفائت يوماً عادياً؟ 0 = لا / 1 = نعم إذا كان الجواب لا، حددِ رجاءً (إضراب، عطلة، فرصة، إلخ): _____		/_____/
86	هل هذا النمط هو نمط الأكل المعتاد لطفلك؟ 0 = لا / 1 = نعم إذا كان الجواب لا، لماذا؟ _____		/_____/

87	**المأخوذ الغذائي خلال الأربع وعشرين ساعة الأخيرة للأم**	تاريخ [السنة / الشهر / اليوم]: /__ __ __ __ / __ __ / __ __/	اليوم في الأسبوع / _____ /

رجاءً تذكري ماذا تناولت من الطعام و المشروبات في اليوم الفائت من الساعة التي استيقظت فيها حتى صباح اليوم التالي (قبل تناول الفطور).
الرجاء استخدام 5-step multiple pass method: 1) قائمة سريعة، 2) الأطعمة المنسية، 3) الوقت والمناسبة، 4) معلومات مفصلة، 5) التحقيق النهائي.

الوقت	نوع الطعام	الكمية	طريقة التحضير
88	هل كان اليوم الفائت يوماً عادياً؟ 0 = لا / 1 = نعم إذا كان الجواب لا، حددِ رجاءً (إضراب، عطلة، فرصة، إلخ): _____		/_____/
89	هل هذا النمط هو نمط الأكل المعتاد لك؟ 0 = لا / 1 = نعم إذا كان الجواب لا، لماذا؟ _____		/_____/

90	**إستبيان وتيرة إستهلاك الطعام** - *يرجى منك التفكير بالنمط الغذائي الخاص بك الذي اتّبعته* ***خلال العام الماضي****. الرجاء تحديد الكمية المتناولة عادةً في اليوم أو الأسبوع أو الشهر لكل من المواد الغذائية التالية. الرجاء أن تكون أجوبتك دقيقة قدر المستطاع.*			
CODE	الطعام	مثال عن حجم الحصّة	الحصّة الإعتياديّة	وتيرة الإستهلاك
1	**الحبوب والمنتجات المرتكزة على الحبوب**			
1.1	خبز أبيض	رغيف خبز عربي كبير/ رغيف خبز عربي وسط/ خبز فرنجي (baguette)		يوم □ أسبوع □ شهر □ أبداً □
1.2	خبز أسمر/ قمحة كاملة	رغيف خبز عربي كبير/ رغيف خبز عربي وسط/ خبز فرنجي (baguette)		يوم □ أسبوع □ شهر □ أبداً □
1.3	منتوجات الكعك	كعك بحجم الاصبع		يوم □ أسبوع □ شهر □ أبداً □
1.4	توست وكراكرز	توست وسط		يوم □ أسبوع □ شهر □ أبداً □
1.5	حبوب الفطور العاديّة	علبة صغيرة /Side A		يوم □ أسبوع □ شهر □ أبداً □
1.6	حبوب الفطور المصنوعة من النخالة أو الحبوب الكاملة	علبة صغيرة /Side A		يوم □ أسبوع □ شهر □ أبداً □
2	**المعكرونة والحبوب الأخرى**			
2.1	برغل، مطبوخ	Side A		يوم □ أسبوع □ شهر □ أبداً □
2.2	معكرونة/نودلز، مسلوقة	Side A		يوم □ أسبوع □ شهر □ أبداً □
2.3	الأرز والمنتجات المرتكزة على الأرز	Side A		يوم □ أسبوع □ شهر □ أبداً □
3	**البطاطا ومنتجاتها**			
3.1	بطاطا مقليّة	Side A		يوم □ أسبوع □ شهر □ أبداً □
3.2	بطاطا	حصّة واحدة وسط		يوم □ أسبوع □ شهر □ أبداً □
3.3	رقائق البطاطا، عادي	كيس S / M / L		يوم □ أسبوع □ شهر □ أبداً □
3.4	رقائق البطاطا، لايت	كيس S / M / L		يوم □ أسبوع □ شهر □ أبداً □
4	**الخضار**			
4.1	خضار معلّبة	Side A		يوم □ أسبوع □ شهر □ أبداً □
4.2	خضار، نيئة	Side A		يوم □ أسبوع □ شهر □ أبداً □
4.3	سلطة، خضراء	Side A		يوم □ أسبوع □ شهر □ أبداً □
4.4	خضار، مطبوخة	Side A		يوم □ أسبوع □ شهر □ أبداً □
5	**الفاكهة**			
5.1a	الفاكهة الحمضيات	حصة وسط/Side A		يوم □ أسبوع □ شهر □ أبداً □
5.1 b	الفاكهة الطازجة	حصة وسط/Side A		يوم □ أسبوع □ شهر □ أبداً □
5.2	الفاكهة المعلّبة	حصة وسط/Side A		يوم □ أسبوع □ شهر □ أبداً □
5.3	الفاكهة المجفّفة	Side A		يوم □ أسبوع □ شهر □ أبداً □
5.4	الحلويات المُعدّة من الفاكهة	Side A		يوم □ أسبوع □ شهر □ أبداً □
6	**عصائر الفاكهة**			
6.1	عصائر الفاكهة المعلّبة	Side A/ مل 240علبة عصير		يوم □ أسبوع □ شهر □ أبداً □
6.2	عصائر الفاكهة الطازجة	Side A		يوم □ أسبوع □ شهر □ أبداً □

7	**اللحوم – اللحوم الباردة والمعلّبة**				
7.1	لحوم باردة باستثناء لحم الخنزير (مرتديلا - hotdog)	Side B/ حجم اللحوم الباردة الوسط/ حجم hotdog		يوم □ أسبوع □ شهر □ أبداً □	
7.2	لحم خنزير Ham/Turkey/Jambon	حجم اللحوم الباردة الوسط		يوم □ أسبوع □ شهر □ أبداً □	
7.3	لحم (بقر)، مطبوخ، قليل الدهون	Side B		يوم □ أسبوع □ شهر □ أبداً □	
7.4	لحم (بقر)، مطبوخ، معتدل/غني الدهون	Side B		يوم □ أسبوع □ شهر □ أبداً □	
7.5	لحم (غنم)، مطبوخ، غني بالدهون	Side B		يوم □ أسبوع □ شهر □ أبداً □	
8	**اللحوم – لحوم الأعضاء**				
8.1	لحوم الأعضاء	Side B		يوم □ أسبوع □ شهر □ أبداً □	
9	**اللحوم – الدواجن**				
9.1	دواجن، ذات لحم	ساق/فخذ/صدر Side B		يوم □ أسبوع □ شهر □ أبداً □	
9.2	دواجن، مغلّفة بالطحين أو الكعك (nuggets - escalope)	حجم Nuggets/ Side B		يوم □ أسبوع □ شهر □ أبداً □	
10	**اللحوم – البيض**				
10.1	بيضة كاملة	بيضة واحدة		يوم □ أسبوع □ شهر □ أبداً □	
11	**اللحوم – الأسماك وثمار البحر**				
11.1	الأسماك	Side B		يوم □ أسبوع □ شهر □ أبداً □	
11.2	الأسماك المعلّبة بالزيت (تونة - سردين)	تنكة كبيرة/ تنكة صغيرة		يوم □ أسبوع □ شهر □ أبداً □	
11.3	الأسماك المعلّبة من غير زيت (معلب بالماء)	تنكة كبيرة/ تنكة صغيرة		يوم □ أسبوع □ شهر □ أبداً □	
11.4	ثمار البحر	قريدس: 1 وسط كالماري: 1 وسط كراب: 1 أصبع		يوم □ أسبوع □ شهر □ أبداً □	
12	**بقول، مكسّرات، وبذور**				
12.1	فاصوليا، حمّص، فول، عدس، بذور	Side A		يوم □ أسبوع □ شهر □ أبداً □	
12.2	مكسّرات	Side A		يوم □ أسبوع □ شهر □ أبداً □	
12.3	فلافل	1 وسط فلافل		يوم □ أسبوع □ شهر □ أبداً □	
13	**الحليب ومنتجاته**				
13.1	جبن (قليل الدسم/لايت/بيضاء)	حصة واحدة = مثلث/مربع Side A or B		يوم □ أسبوع □ شهر □ أبداً □	
13.2	جبن (غني بالدسم/صفراء)	حصة واحدة = مثلث/مربع Side A or B		يوم □ أسبوع □ شهر □ أبداً □	
13.3	جبن (مصنّع-كريمة)	حصة واحدة = مثلث/مربع Side A or B		يوم □ أسبوع □ شهر □ أبداً □	
13.4	الحليب ومشروبات الحليب الكاملة الدسم	Side A/ كرتونة حليب وسط		يوم □ أسبوع □ شهر □ أبداً □	
13.5	الحليب ومشروبات الحليب القليلة/الخالية الدسم	Side A/ كرتونة حليب وسط		يوم □ أسبوع □ شهر □ أبداً □	

14	**اللبن ومنتجاته**				
14.1	لبنه، عادي	Side A		يوم □ أسبوع □ شهر □ أبداً □	
14.2	لبنه، لايت/ خالية الدسم	Side A		يوم □ أسبوع □ شهر □ أبداً □	
14.3	لبن، عادي - كامل الدسم	عبوة عيران /Side A		يوم □ أسبوع □ شهر □ أبداً □	
14.4	لبن، خفيف أو خالي من الدسم	عبوة عيران /Side A		يوم □ أسبوع □ شهر □ أبداً □	
15	**البيتزا والفطائر**				
15.1	مناقيش	منقوشة كبيرة / صغيرة bouchee		يوم □ أسبوع □ شهر □ أبداً □	
15.2	معجّنات، حجم صغير	حصة صغيرة		يوم □ أسبوع □ شهر □ أبداً □	
15.3	بيتزا	Side A or Side B / صغيرة bouchee		يوم □ أسبوع □ شهر □ أبداً □	
16	**الأطباق**				
16.1	أرضي شوكي، باذنجان، قرنبيط مطبوخ	Side A		يوم □ أسبوع □ شهر □ أبداً □	
16.2	هندبة، مقليّة مع البصل	Side A		يوم □ أسبوع □ شهر □ أبداً □	
16.3	باذنجان، كوسى، ملفوف، ورق عنب *محشي بالأرز واللحم	Side A/ كوسى وسط 1		يوم □ أسبوع □ شهر □ أبداً □	
16.4	يخنة (ملوخيّة، بامية، بازلاء، سبانخ) * دون رز	Side A		يوم □ أسبوع □ شهر □ أبداً □	
17	**الدهون والزيوت (المُضافة إلى الخبز، السلطات، الخ)**				
17.1	زبدة/سمنه	Side A		يوم □ أسبوع □ شهر □ أبداً □	
17.2	مايونيز، عادي	Side A		يوم □ أسبوع □ شهر □ أبداً □	
17.3	زيت زيتون	Side A		يوم □ أسبوع □ شهر □ أبداً □	
17.4	طحينة	Side A		يوم □ أسبوع □ شهر □ أبداً □	
17.5	زيت نباتي	Side A		يوم □ أسبوع □ شهر □ أبداً □	
17.6	زيتون	1 وسط زيتون		يوم □ أسبوع □ شهر □ أبداً □	
18	**الدهون والزيوت (المُستخدمة للقلي)**				
18.1	زبدة/سمنه	Side A		يوم □ أسبوع □ شهر □ أبداً □	
18.2	زيت زيتون	Side A		يوم □ أسبوع □ شهر □ أبداً □	
18.3	سمن نباتي	Side A		يوم □ أسبوع □ شهر □ أبداً □	
18.4	زيت نباتي	Side A		يوم □ أسبوع □ شهر □ أبداً □	
19	**السكّر ومشتقّاته**				
19.1	سكّر	Side A		يوم □ أسبوع □ شهر □ أبداً □	
19.2	سكاكر	حصة سكاكر صغيرة		يوم □ أسبوع □ شهر □ أبداً □	
19.3	شوكولا	حصة شوكولا وسط/ Side B		يوم □ أسبوع □ شهر □ أبداً □	
19.4	كريمة شوكولا (chocolate spread)	Side A		يوم □ أسبوع □ شهر □ أبداً □	
20	**الكيكات والحلويات**				
20.1	كيك	Side B		يوم □ أسبوع □ شهر □ أبداً □	
20.2	حلويات عربيّة	Side B		يوم □ أسبوع □ شهر □ أبداً □	
20.3	بسكويت	وسط 1 /Side B		يوم □ أسبوع □ شهر □ أبداً □	
20.4	كرواسان	كبيرة 1 /Side B		يوم □ أسبوع □ شهر □ أبداً □	
20.5	كعك الدونتس	وسط 1 /Side B		يوم □ أسبوع □ شهر □ أبداً □	

21	عسل، مربّى، دبس وحلاوة				
21.1	مربّى	Side A		يوم □ أسبوع □ شهر □ أبداً □	
21.2	مشتقّات السكّر (دبس، حلاوة، عسل)	Side A		يوم □ أسبوع □ شهر □ أبداً □	
21.3	بوظة، عادي	1 scoop/ 1 stick		يوم □ أسبوع □ شهر □ أبداً □	
21.4	بوظة، قليلة الدسم	1 scoop /1 stick		يوم □ أسبوع □ شهر □ أبداً □	
21.5	بودنغ، عادي (كسترد- مهلبية)	Side A		يوم □ أسبوع □ شهر □ أبداً □	
21.6	بودنغ، قليل الدسم	Side A		يوم □ أسبوع □ شهر □ أبداً □	
22	المشروبات الكحولية				
22.1	بيرة	Side A		يوم □ أسبوع □ شهر □ أبداً □	
22.2	المشروبات الكحولية من غير النبيذ، باستثناء البيرة (ويسكي، رَم، فودكا)	Side A		يوم □ أسبوع □ شهر □ أبداً □	
22.3	نبيذ	Side A		يوم □ أسبوع □ شهر □ أبداً □	
23	المشوربات الغير كحولية				
23.1	قهوة سريعة التحضير، نسكافيه، قهوة تركية	Side A		يوم □ أسبوع □ شهر □ أبداً □	
23.2	شاي	Side A		يوم □ أسبوع □ شهر □ أبداً □	
23.3	قهوة خالية من الكافيين أو شاي بالأعشاب/زهورات	Side A		يوم □ أسبوع □ شهر □ أبداً □	
23.4	مشروب الطاقة أو الرياضة	Side A		يوم □ أسبوع □ شهر □ أبداً □	
23.5	مشروبات غازيّة	Side A		يوم □ أسبوع □ شهر □ أبداً □	
23.6	مشروبات غازيّة دايت خالية من السكر	Side A		يوم □ أسبوع □ شهر □ أبداً □	
23.7	مياه	Side A		يوم □ أسبوع □ شهر □ أبداً □	
24	متفرقات				
24.1	كاتشب	Side A		يوم □ أسبوع □ شهر □ أبداً □	
24.2	خردل	Side A		يوم □ أسبوع □ شهر □ أبداً □	
24.3	زعتر وسمسم	Side A		يوم □ أسبوع □ شهر □ أبداً □	
24.4	كبيس	1 حصة كبيس خيار/ Side A		يوم □ أسبوع □ شهر □ أبداً □	

25 هل هناك أطعمة و / أو مشروبات أخرى تتناولها عادة مرة واحدة على الأقل في الأسبوع ولم يرد ذكرها اعلاه ؟

1. نعم , حددي رجاءً:

الطعام/المشروب	حجم الحصة	كمية الإستهلاك في الاسبوع

2. كلا

91	**انعدام الأمن الغذائي العالمي (GLOBAL-FIES) - <u>للأمهات</u>** أرغب بسؤالك بعض الأسئلة عن استهلاكك للغذاء خلال الإثني عشر شهراً الماضية **خلال الإثني عشر شهراً الماضية، هل حدث وأن:**	
Q1	شعرت بالقلق بأنه لن يتوفر لك الطعام الكافي لتأكل بسبب عدم توفر النقود أو المصادر الأخرى؟	0 = لا 1 = نعم 98 = لا أعلم 99 = رفض
Q2	لم يكن باستطاعتك أكل طعام صحي ومغذي بسبب عدم توفرالنقود أو المصادر الأخرى؟	0 = لا 1 = نعم 98 = لا أعلم 99 = رفض
Q3	أكلت أنواع قليلة من الأطعمة بسبب عدم توفر النقود أو المصادر الأخرى؟	0 = لا 1 = نعم 98 = لا أعلم 99 = رفض
Q4	كان عليك أن تتخلى عن وجبة طعام بسبب نقص النقود أو المصادر الأخرى؟	0 = لا 1 = نعم 98 = لا أعلم 99 = رفض
Q5	أكلت أقل مما اعتقدت أنك يجب أن تأكل بسبب نقص النقود أو المصادر الأخرى؟	0 = لا 1 = نعم 98 = لا أعلم 99 = رفض
Q6	نفذ الطعام لدى أسرتك بسبب نقص النقود أو المصادر الأخرى؟	0 = لا 1 = نعم 98 = لا أعلم Q799 = رفض
Q7	كنت جائع اً لكنك لم تأكل لأنه لم يكن هنالك ما يكفي من النقود أو المصادر الأخرى للطعام؟	0 = لا 1 = نعم 98 = لا أعلم 99 = رفض
Q8	بقيت دون تناول الطعام ليوم كامل بسبب نقص النقود أو المصادر الأخرى؟	0 = لا 1 = نعم 98 = لا أعلم 99 = رفض
	المعرفة عن فقر الدم والغذاء الحديدي الغنية	
92	ما برأيك يمكن أن يسبب فقر الدم؟ *يرجى تحديد كل ما ينطبق* 1 = نقص الحديد في النظام الغذائي / تناول الطعام قليل جداً 2 = المرض / العدوى 3 = نزيف حاد (للنساء أثناء الحيض) 87 = آخر، حددي رجاءً: _____ 88 = لا أعلم	
93	ما هي الأطعمة التي تعتقدِ أنها مصدر غني للحديد؟ *يرجى تحديد كل ما ينطبق* 1 = لحوم الأعضاء 2 = لحوم الحمراء والدواجن 3 = الأسماك والمأكولات البحرية 4 = الخضار الخضراء الداكنة (سبانخ، ملوخية، قرنبيط، كرفس، سلق ، إلخ) 5 = البقوليات (مثل العدس والفاصوليا والخبث والحمص) 6 = حبوب الفطور المحصنة بالحديد	

	إضطراب ما بعد الصدمة (PTSD)		
94	هل سبق لك أن إختبرت أو شاهدت أو اضطررت إلى التعامل مع حادثة صادمة للغاية شملت الموت الفعلي أو الموت المهدد أو إصابة خطيرة لك أو لشخص آخر؟ *ومن الأمثلة على الأحداث الصادمة: الحوادث الخطيرة والاعتداء الجنسي أو البدني أو الاعتداء الإرهابي أو الإحتجاز أو الإختطاف أو حريق أو اكتشاف جثة أو وفاة شخص قريب منك أو حرب أو كارثة طبيعية.* إذا كان الجواب نعم، يرجى وصف الحدث الصادم: _____ _____ **إذا لا، يرجى إنهاء قسم PTSD**	لا = 0	نعم = 1
95	هل ريدت مع الخوف الشديد أو العجز أو الرعب؟ **إذا لا، يرجى إنهاء قسم PTSD**	لا = 0	نعم = 1
96	خلال الشهر الماضي، هل أعدت تجربة الحادث بطريقة مؤلمة (مثل، الأحلام، ذكريات مكثفة، فلاشباك أو ردود الفعل الجسدية)؟ **إذا لا، يرجى إنهاء قسم PTSD**	لا = 0	نعم = 1
97	خلال الشهر الماضي، a. هل تجنبت التفكير في الحدث أو الحديث عنه؟ b. هل تجنبت الأنشطة أو الأماكن أو الأشخاص الذين يذكركم بالحدث؟ c. هل واجهت مشكلة لتذكر جزء مهم من ما حدث؟ d. هل أصبحت مهتما أقل بكثير في الهوايات أو الأنشطة الاجتماعية؟ e. هل شعرت أنك منفصل أو غريب عن الآخرين؟ f. هل لاحظت أن مشاعرك مشلولة؟ g. هل شعرت أن حياتك ستقصر أو أنك سوف تموت عاجلاً قبل الأخرين؟ ***هل 3 إجابات أو أكثر مشفرة نعم؟ إذا لا، يرجى إنهاء قسم PTSD***	a. لا = 0 b. لا = 0 c. لا = 0 d. لا = 0 e. لا = 0 f. لا = 0 g. لا = 0 لا = 0	a. نعم = 1 b. نعم = 1 c. نعم = 1 d. نعم = 1 e. نعم = 1 f. نعم = 1 g. نعم = 1 نعم = 1
98	خلال الشهر الماضي، a. هل واجهت صعوبة في النوم؟ b. هل كنت منزعجاً بشكل خاص أو هل كان لديك انفجارات غضبة؟ c. هل واجهت صعوبة في التركيز؟ d. هل كنت عصبياً أو حريصاً باستمرار؟ e. هل كنت ترتعبين بسهولة؟ ***هل 2 إجابات أو أكثر مشفرة نعم؟ إذا لا، يرجى إنهاء قسم PTSD***	a. لا = 0 b. لا = 0 c. لا = 0 d. لا = 0 e. لا = 0 لا = 0	a. نعم = 1 b. نعم = 1 c. نعم = 1 d. نعم = 1 e. نعم = 1 نعم = 1
99	خلال الشهر الماضي، هل تداخلت هذه المشاكل بشكل كبير مع عملك أو أنشطتك الاجتماعية أو تسببت في محنة كبيرة؟	لا = 0	نعم = 1

	استبيان صحة المرضى (PHQ-9) للأمهات خلال الأسبوعين الماضيين، ما مدى تكرار انزعاجك اثر أي من المشاكل التالية؟ *(ضع دائرة حول الرقم داخل المربعات)*	**أبداً**	**عدّة أيام**	**أكثر من نصف الأيام**	**تقريباً كلّ يوم**
100	فقدان المتعة والفرح في تأدية كافة الأمور	0	1	2	3
101	الشعور بالحزن، أو الإكتئاب، أو اليأس	0	1	2	3
102	اضطرابات في النوم (عدم القدرة على النوم، نوم متقطّع أو نوم زائد)	0	1	2	3
103	الشعور بالتّعب أو بقلّة الطّاقة	0	1	2	3
104	ضعف في الشهية أو الإفراط في تناول الطعام	0	1	2	3
105	الشّعور السّوء حيال نفسك - أو انّك فاشل أو انّك قمت بخذل نفسك أو أسرتك	0	1	2	3
106	صعوبة في التّركيز على أمور، مثل قراءة الجريدة أو مشاهدة التلفاز	0	1	2	3
107	التحرّك أو التكلّم بغاية البطء بحيث قد يلاحظ على ذلك الأخرون. أو عكس ذلك، أن تكون بغاية التّململ أو التهيّج بحيث أنّك تتحرّك أكثر بكثير من العادة.	0	1	2	3
108	أفكار حول أنّك ستكون أفضل حالاً لو كنت ميتاً أو أن تؤذي نفسك بطريقةٍ ما	0	1	2	3
	مجموع الأعمدة - *إذا كان المجموع مساوياً أو أعلى من 10، يرجى الرجوع إلى الممرضة لإبلاغهم وإعطائهم قائمة المراكز*				
109	إن قمت بالإشارة على أي من المشاكل، حدّد إلى أي مدى أدّت هذه المشاكل إلى صعوبة في القيام بعملك، أو الاهتمام بالأمور المنزليّة، أو الانسجام مع الأخرين.	**لا صعوبات أبداً**	**صعوبات بسيطة**	**صعوبات كثيرة**	**صعوبات شديدة**
	النشاط البدني للأم				
110	**فكر في جميع الأنشطة البدنية التي تتطلب جهداً بدنياً مرتفع الشدة والتي قمت بممارستها خلال الأيام السبعة الماضية.** *الأنشطة البدنية مرتفعة الشدة هي تلك الأنشطة التي تجعل تنفسك أعلى بكثير من المعتاد، مثل رفع أشياء ثقيلة، أو حرث الأرض، أو ركوب الدراجة بسرعة عالية، أو الجري، أو ممارسة كرة القدم، أو كرة السلة، أو السباحة، أو نط الحبل. فكر فقط في الأنشطة البدنية مرتفعة الشدة التي قمت بممارستها لمدة 10 دقائق على الأقل في كل مرة.*				
	خلال الأيام السبعة الماضية، كم يوماً مارست فيه نشاطاً بدنياً **مرتفع الشدة؟** **إذا لم يكن هناك نشاطاً بدنياً مرتفع الشدة، يرجى الانتقال إلى السؤال التالي**				/_____/ يوم في الأسبوع
	في المعتاد، كم من الوقت قضيته في كل يوم مارست فيه نشاطاً بدنياً **مرتفع الشدة؟**				/_____/ ساعة في اليوم /_____/ دقيقة في اليوم 88 = لا أدري/ أو غير متأكد
111	**فكر في جميع الأنشطة البدنية التي تتطلب جهداً بدنياً معتدل الشدة والتي قمت بممارستها خلال الأيام السبعة الماضية.** *الأنشطة البدنية معتدلة الشدة هي تلك الأنشطة التي تجعل تنفسك أعلى من المعتاد إلى حدٍّ ما، ويمكن أن تتضمن رفع أشياء خفيفة، أو ركوب الدراجة بسرعة عادية، أو ممارسة كرة الطائرة، أو ممارسة تنس الطاولة، أو كنس المنزل، أو غسل الملابس يدوياً، أو غسل السيارة. لا تحسب المشي ضمن هذه الأنشطة. مرة أخرى، فكر فقط في الأنشطة البدنية معتدلة الشدة التي قمت بممارستها لمدة 10 دقائق على الأقل في كل مرة.*				
	خلال الأيام السبعة الماضية، كم يوماً مارست فيه نشاطاً بدنياً **معتدل الشدة؟** **إذا لم يكن هناك نشاطاً بدنياً مرتفع الشدة، يرجى الانتقال إلى السؤال التالي**				/_____/ يوم في الأسبوع
	في المعتاد، كم من الوقت قضيته في كل يوم مارست فيه نشاطاً بدنياً **معتدل الشدة؟**				/_____/ ساعة في اليوم /_____/ دقيقة في اليوم 88 = لا أدري/ أو غير متأكد

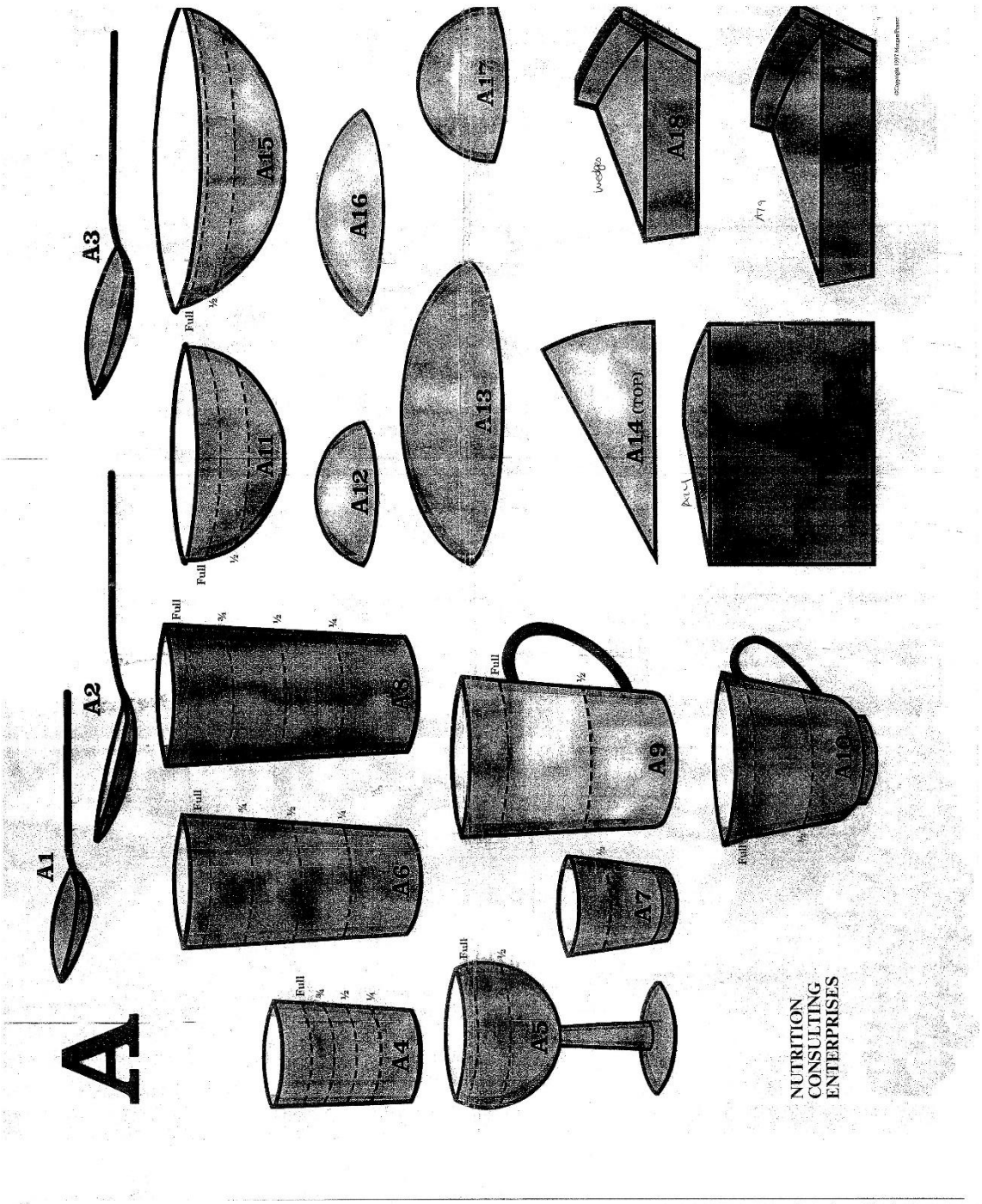
112	**فكر في الوقت الذي قضيته في المشي خلال الأيام السبع الماضية**، *ويتضمن ذلك المشي إلى العمل، والمشي أثناء العمل، وفي البيت، وخلال انتقالك من مكان لآخر، أو أي نوع من أنواع المشي بغرض الترويح أو الرياضة.*	
	خلال الأيام السبعة الماضية، كم يوماً مارست فيه **المشي** لمدة 10 دقائق على الأقل في كل مرة؟ **إذا لم يكن هناك نشاطاً بدنياً مرتفع الشدة، يرجى الانتقال إلى السؤال التالي**	/_____/ يوم في الأسبوع
	في المعتاد، كم من الوقت قضيته في كل يوم مارست فيه **المشي**؟	/_____/ ساعة في اليوم /_____/ دقيقة في اليوم 88 = لا أدري/ أو غير متأكد
113	**فكر في الوقت الذي قضيته جالساً خلال الأيام السبعة الماضية**. *أحسب وقت الجلوس في العمل، وفي المنزل، وفي الدراسة، وفي الترفيه. من الممكن أن يتضمن ذلك وقت الجلوس على المكتب، وأثناء العمل على الكمبيوتر، و أثناء زيارتك لصديق، و أثناء القراءة، و الجلوس أو الاستلقاء لمشاهدة التلفزيون.*	
	خلال الأيام السبعة الماضية، كم من الوقت قضيته **جالساً في أحد هذه الأيام من غير أيام الإجازة الأسبوعية**؟	/_____/ ساعة في الأسبوع /_____/ دقيقة في الأسبوع 88 = لا أدري/ أو غير متأكد
	نمط الحياة الأم	
114	هل تدخنِ **السجائر / النرجيلة** حالياً؟ 0 = لا 1 = نعم إذا كان الجواب **نعم**، كم مرة؟ 0 = نادراً 1 = أحياناً 2 = أسبوعياً 3 = يومياً	
115	هل أنت مدخنة سابقة (**السجائر / النرجيلة**)؟ 0 = لا 1 = نعم	
116	هل تشربِ **الكحول** حالياً؟ 0 = لا 1 = نعم إذا كان الجواب **نعم**، كم مرة؟ 0 = نادراً 1 = أحياناً 2 = أسبوعياً 3 = يومياً	
	القياس الأنثروبومتري *يرجى أخذ القياس 3 مرات وتسجيل المتوسط*	
	تقييم بدني الطفل	
117	الوزن الحالي (كغ)	/__ __ __ , __ __/
118	الطول الحالي (سم)	/__ __ __ , __ __/
119	محيط الرأس (سم)	/__ __ __ , __ __/
120	محيط منتصف الذراع العلوي (سم)	/__ __ __ , __ __/
121	إلى أي مدى تعتقدين أن طفلك مصاب بفقر الدم؟ 1 = غير مرجح 2 = غير متأكد 3 = محتمل 99 = لا جواب	
122	مستوى الهيموغلوبين (g/dL)	/__ __ __ , __ __/
	تقييم بدني الأم	
123	الوزن الحالي (كغ)	/__ __ __ , __ __/
124	الطول الحالي (سم)	/__ __ __ , __ __/
125	محيط منتصف الذراع العلوي (سم)	/__ __ __ , __ __/
126	محيط الخصر (سم)	/__ __ __ , __ __/
127	محيط الورك (سم)	/__ __ __ , __ __/
128	إلى أي مدى تعتقدين أنك مصاب بفقر الدم؟ 1 = غير مرجح 2 = غير متأكد 3 = محتمل 99 = لا جواب	
129	مستوى الهيموغلوبين (g/dL)	/__ __ __ , __ __/
130	ملاحظات للمقابلة:	

	العوامل الاقتصادية والديموغرافية (تابع)
131	ما هو الدّخل الشّهري للأسرة (بالليرة اللبنانية)؟ 0 = لا دخل 1 = أقلّ من 300،000 2 = 750،000 - 300،000 3 = 900،000 - 751،000 4 = 1،499،000 -1،000،000 5 = 1،999،999 - 1،500،000 7 = 2،000،000 - 2،499،000 8 = 3،000،000 - 2،500،000 9 = أكثر من 3،000،000 99 = لا جواب
132	**إذا سورية**، متى انتقلت إلى لبنان؟ حددي رجاءً: _____
133	**إذا سورية**، هل أنت مسجل كالجئ لدى الأمم؟ 0 = كلا 1 = نعم
134	هل تشعرين بالأمن عند التجول أو عند نقاط حواجز الأمن؟ 1 = آمن جدا 2 = آمن بشكل معقول 3 = غير آمن إلى حد ما 4 = غير آمن 5 = لا تخفْ أبدًا بعد حلول الظلام

APPENDIX III

THE 2-D PORTION SIZE FOOD VISUAL POSTER

(NOT TO SCALE)



B
Measure
B1
B2
B3
B4
B5
B6

BIBLIOGRAPHY

WHO. The global prevalence of anaemia in 2011. Geneva: World Health Organization; 2015.

Stevens, G. A., Finucane, M. M., De-Regil, L. M., Paciorek, C. J., Flaxman, S. R., Branca, F., Peña-Rosas, J. P., Bhutta, Z. A., & Ezzati, M. (2013). Global, regional, and national trends in haemoglobin concentration and prevalence of total and severe anaemia in children and pregnant and non-pregnant women for 1995–2011: A systematic analysis of population-representative data. *The Lancet Global Health*, *1*(1), e16–e25. https://doi.org/10.1016/S2214-109X(13)70001-9

De Benoist, B., World Health Organization, & Centers for Disease Control and Prevention (U.S.). (2008). *Worldwide prevalence of anaemia 1993-2005 of: WHO Global Database of anaemia*. World Health Organization. http://whqlibdoc.who.int/publications/2008/9789241596657_eng.pdf

Victora, Cesar G, Adair, L., Fall, C., Hallal, P. C., Martorell, R., Richter, L., & Sachdev, H. S. (2008). Maternal and child undernutrition: Consequences for adult health and human capital. *The Lancet*, *371*(9609), 340–357. https://doi.org/10.1016/S0140-6736(07)61692-4

Chaparro, C. M., & Suchdev, P. S. (2019). Anemia epidemiology, pathophysiology, and etiology in low- and middle-income countries. *Annals of the New York Academy of Sciences*, *1450*(1), 15–31. PubMed. https://doi.org/10.1111/nyas.14092

Organisation mondiale de la santé, WHO, & UNAIDS. (2003). *Global Strategy for Infant and Young Child Feeding*. World Health Organization.

Tawai, S. (2012). Iron and exclusive breastfeeding. *Breastfeeding Review*, *20*(1), 35–47. CINAHL Complete.

Hossain, S. M. M., Leidman, E., Kingori, J., Al Harun, A., & Bilukha, O. O. (2016). Nutritional situation among Syrian refugees hosted in Iraq, Jordan, and Lebanon: Cross sectional surveys. *Conflict and Health*, *10*(1), 26. https://doi.org/10.1186/s13031-016-0093-6

UNHCR, unicef, World Food Programme (WFP) (Eds.), 2018. Vulnerability Assessment of Syrian Refugees in Lebanon 2018.

UNHCR. (2018). *UNHCR Global Trends 2018*. UNHCR. https://www.unhcr.org/statistics/unhcrstats/5d08d7ee7/unhcr-global-trends-2018.html

UNICEF. (2017). *HOW 2016 BECAME THE WORST YEAR FOR SYRIA'S CHILDREN*. 12.

DeMaeyer E, Adiels-Tegman M. The prevalence of anaemia in the world. World Health Statistics Quarterly, 1985, 38:302–316.

WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization, 2011 (WHO/NMH/NHD/MNM/11.1) (http://www.who.int/vmnis/indicators/haemoglobin. pdf, accessed 14.06.2020).

Percy, L., Mansour, D., & Fraser, I. (2017). Iron deficiency and iron deficiency anaemia in women. *Best Practice & Research Clinical Obstetrics & Gynaecology*, *40*, 55–67. https://doi.org/10.1016/j.bpobgyn.2016.09.007

Gupta, A. (2017). *Nutritional Anemia in Preschool Children* (1st 2017). Springer Singapore. https://doi.org/10.1007/978-981-10-5178-4

Marques RF, Taddei JA, Lopez FA, Braga JA. Breastfeeding exclusively and iron deficiency anemia during the first 6 months of age. Rev Assoc Med Bras. 2014;60:18–22

Shamah, T., Villalpando, S., & De la Cruz, V. (2017). Anemia. In S. R. Quah (Ed.), *International Encyclopedia of Public Health (Second Edition)* (pp. 103–112). Academic Press. https://doi.org/10.1016/B978-0-12-803678-5.00018-7

Hwalla, N., Al Dhaheri, A. S., Radwan, H., Alfawaz, H. A., Fouda, M. A., Al-Daghri, N. M., Zaghloul, S., & Blumberg, J. B. (2017). The Prevalence of Micronutrient Deficiencies and Inadequacies in the Middle East and Approaches to Interventions. *Nutrients*, *9*(3). https://doi.org/10.3390/nu9030229

Syrian refugee crisis: Facts, FAQs, and how to help. (2019, June 21). *World Vision*. https://www.worldvision.org/refugees-news-stories/syrian-refugee-crisis-facts

Kassebaum, Nicholas J. (2016). The Global Burden of Anemia. *Hematology/Oncology Clinics of North America*, *30*(2), 247–308. https://doi.org/10.1016/j.hoc.2015.11.002

Nutritional anaemias: tools for effective prevention and control. Geneva: World Health Organization; 2017.

Strauss, R. G. (2010). Anaemia of prematurity: Pathophysiology and treatment. *Blood Reviews*, *24*(6), 221–225. https://doi.org/10.1016/j.blre.2010.08.001

Widness, J. A. (2008). Pathophysiology of Anemia During the Neonatal Period, Including Anemia of Prematurity. *NeoReviews*, *9*(11), e520. https://doi.org/10.1542/neo.9-11-e520

Orkin, S. H., & Nathan, D. G. (2009). *Nathan and Oski's Hematology of Infancy and Childhood*. Elsevier Health Sciences.

Scott, A. W., Lutty, G. A., & Goldberg, M. F. (2013). Chapter 57—Hemoglobinopathies. In S. J. Ryan, S. R. Sadda, D. R. Hinton, A. P. Schachat, S. R. Sadda, C. P. Wilkinson, P. Wiedemann, & A. P. Schachat (Eds.), *Retina (Fifth Edition)* (pp. 1071–1082). W.B. Saunders. https://doi.org/10.1016/B978-1-4557-0737-9.00057-6

Burke, R. M., Leon, J. S., & Suchdev, P. S. (2014). Identification, prevention and treatment of iron deficiency during the first 1000 days. *Nutrients*, *6*(10), 4093–4114. PubMed. https://doi.org/10.3390/nu6104093

Mukuria, A. G., Kothari, M. T., & Abderrahim, N. (2006). *Infant and Young Child Feeding Update*. 25.

Baker, R. D., & Greer, F. R. (2010). Diagnosis and Prevention of Iron Deficiency and Iron-Deficiency Anemia in Infants and Young Children (0–3 Years of Age). *Pediatrics*, *126*(5), 1040. https://doi.org/10.1542/peds.2010-2576

Carter, R. C., Jacobson, J. L., Burden, M. J., Armony-Sivan, R., Dodge, N. C., Angelilli, M. L., Lozoff, B., & Jacobson, S. W. (2010). Iron deficiency anemia and cognitive function in infancy. *Pediatrics*, *126*(2), e427-434. https://doi.org/10.1542/peds.2009-2097

Cusick, S. E., & Georgieff, M. K. (2016). The Role of Nutrition in Brain Development: The Golden Opportunity of the "First 1000 Days." *The Journal of Pediatrics*, *175*, 16–21. https://doi.org/10.1016/j.jpeds.2016.05.013

Kassebaum, N. J., Jasrasaria, R., Naghavi, M., Wulf, S. K., Johns, N., Lozano, R., Regan, M., Weatherall, D., Chou, D. P., Eisele, T. P., Flaxman, S. R., Pullan, R. L., Brooker, S. J., & Murray, C. J. L. (2014). A systematic analysis of global anemia burden from 1990 to 2010. *Blood*, *123*(5), 615–624. https://doi.org/10.1182/blood-2013-06-508325

Shander, A., Goodnough, L. T., Javidroozi, M., Auerbach, M., Carson, J., Ershler, W. B., Ghiglione, M., Glaspy, J., & Lew, I. (2014). Iron Deficiency Anemia—Bridging the Knowledge and Practice Gap. *Transfusion Medicine Reviews*, *28*(3), 156–166. https://doi.org/10.1016/j.tmrv.2014.05.001

Lozoff, B. (2007). Iron Deficiency and Child Development. *Food and Nutrition Bulletin*, *28*(4_suppl4), S560–S571. https://doi.org/10.1177/15648265070284S409

Dallman, P. R., Siimes, M. A., & Manies, E. C. (1975). Brain Iron: Persistent Deficiency following Short-term Iron Deprivation in the Young Rat. *British Journal of Haematology*, *31*(2), 209–215. https://doi.org/10.1111/j.1365-2141.1975.tb00851.x

Dallman, Peter R., & Spirito, R. A. (1977). Brain Iron in the Rat: Extremely Slow Turnover in Normal Rats May Explain Long-Lasting Effects of Early Iron Deficiency. *The Journal of Nutrition*, *107*(6), 1075–1081. https://doi.org/10.1093/jn/107.6.1075

Felt, B. T., Beard, J. L., Schallert, T., Shao, J., Aldridge, J. W., Connor, J. R., Georgieff, M. K., & Lozoff, B. (2006). Persistent neurochemical and behavioral abnormalities in adulthood despite early iron supplementation for perinatal iron deficiency anemia in rats. *Behavioural Brain Research*, *171*(2), 261–270. https://doi.org/10.1016/j.bbr.2006.04.001

Engle-Stone, R., Aaron, G. J., Huang, J., Wirth, J. P., Namaste, S. M., Williams, A. M., Peerson, J. M., Rohner, F., Varadhan, R., Addo, O. Y., Temple, V., Rayco-Solon, P., Macdonald, B., & Suchdev, P. S. (2017). Predictors of anemia in preschool children: Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) project. *The American Journal of Clinical Nutrition*, *106*(suppl_1), 402S-415S. https://doi.org/10.3945/ajcn.116.142323

Thakur, N., Chandra, J., Pemde, H., & Singh, V. (2014). Anemia in severe acute malnutrition. *Nutrition*, *30*(4), 440–442. https://doi.org/10.1016/j.nut.2013.09.011

Ngnie-Teta, I., Receveur, O., & Kuate-Defo, B. (2007). Risk Factors for Moderate to Severe Anemia among Children in Benin and Mali: Insights from a Multilevel Analysis. *Food and Nutrition Bulletin*, *28*(1), 76–89. https://doi.org/10.1177/156482650702800109

Namaste, S. M., Aaron, G. J., Varadhan, R., Peerson, J. M., Suchdev, P. S., & on behalf of the BRINDA Working Group. (2017). Methodologic approach for the Biomarkers Reflecting Inflammation and Nutritional Determinants of Anemia (BRINDA) project. *The American Journal of Clinical Nutrition*, *106*(suppl_1), 333S-347S. https://doi.org/10.3945/ajcn.116.142273

World Health Organization. Training course on child growth assessment. Module C: interpreting growth indicators. Geneva, Switzerland: World Health Organization, 2008

Food and Agriculture Organization. (2007). Nutritional Status Assessment and Analysis Lesson: Nutritional Status Indicators . Learner Notes. Retrieved from www.fao.org

UNICEF (2014), “Joint nutrition assessment Syrian refugees in Lebanon”, available at: www.unicef.org/lebanon/Lebanon_Nurition_Assessment_of_Syrian_Refugess_Report_May_2014pdf (accessed June 14, 2020).

Agho, K. E., Dibley, M. J., D’Este, C., & Gibberd, R. (2008). Factors Associated with Haemoglobin Concentration among Timor-Leste Children Aged 6–59 Months. *Journal of Health, Population, and Nutrition*, *26*(2), 200–209.

Ali, S. N., & Zuberi, R. W. (2003). LATE WEANING: THE MOST SIGNIFICANT RISK FACTOR IN THE DEVELOPMENT OF IRON DEFICIENCY ANAEMIA AT 1–2 YEARS OF AGE. *Journal of Ayub Medical College Abbottabad*, *15*(2), Article 2. http://www.ayubmed.edu.pk/jamc/index.php/jamc/article/view/3943

American Academy of Pediatrics. (2007). Breastfeeding and Maternal and Infant Health Outcomes In Developed Countries. *AAP Grand Rounds*, *18*(2), 15–16. https://doi.org/10.1542/gr.18-2-15

Assis, A. M. O., Gaudenzi, E. N., Gomes, G., Ribeiro, R. de C., Szarfarc, S. C., & Souza, S. B. de. (2004). Hemoglobin concentration, breastfeeding and complementary feeding in the first year of life. *Revista de Saúde Pública*, *38*, 543–551. https://doi.org/10.1590/S0034-89102004000400010

Austin, A. M., Fawzi, W., & Hill, A. G. (2012). Anaemia among Egyptian Children between 2000 and 2005: Trends and predictors. *Maternal & Child Nutrition*, *8*(4), 522–532. https://doi.org/10.1111/j.1740-8709.2011.00339.x

Bachrach, V. R. G., Schwarz, E., & Bachrach, L. R. (2003). Breastfeeding and the Risk of Hospitalization for Respiratory Disease in Infancy: A Meta-analysis. *Archives of Pediatrics & Adolescent Medicine*, *157*(3), 237–243. https://doi.org/10.1001/archpedi.157.3.237

Bagchi, K. (2004). Iron deficiency anaemia – an old enemy. *Eastern Mediterranean Health Journal*, *10*(6), 7.

Baker, E. J., Sanei, L. C., & Franklin, N. (2006). Early Initiation of and Exclusive Breastfeeding in Large-scale Community-based Programmes in Bolivia and Madagascar. *Journal of Health, Population, and Nutrition*, *24*(4), 530–539.

Balarajan, Y., Ramakrishnan, U., Özaltin, E., Shankar, A. H., & Subramanian, S. (2011). Anaemia in low-income and middle-income countries. *The Lancet*, *378*(9809), 2123–2135. https://doi.org/10.1016/S0140-6736(10)62304-5

Boo, H. A. D., & Harding, J. E. (2006). The developmental origins of adult disease (Barker) hypothesis. *Australian and New Zealand Journal of Obstetrics and Gynaecology*, *46*(1), 4–14. https://doi.org/10.1111/j.1479-828X.2006.00506.x

Bucak, I. H., Almis, H., Benli, S., & Turgut, M. (2017). An overview of the health status of Syrian refugee children in a tertiary hospital in Turkey. *Avicenna Journal of Medicine*, *7*(3), 110–114. https://doi.org/10.4103/ajm.AJM_17_17

Burke, R. M., Rebolledo, P. A., Fabiszewski de Aceituno, A. M., Revollo, R., Iñiguez, V., Klein, M., Drews-Botsch, C., Leon, J. S., & Suchdev, P. S. (2016). Early deterioration of iron status among a cohort of Bolivian infants. *Maternal & Child Nutrition*, *13*(4). https://doi.org/10.1111/mcn.12404

Cao, C., & O'Brien, K. O. (2013). Pregnancy and iron homeostasis: An update. *Nutrition Reviews*, *71*(1), 35–51. https://doi.org/10.1111/j.1753-4887.2012.00550.x

Castejon, H. V., Ortega, P., Amaya, D., Gomez, G., Leal, J., & Castejon, O. J. (2004). Co-existence of Anemia, Vitamin A Deficiency and Growth Retardation among Children 24-84 Months Old in Maracaibo, Venezuela. *Nutritional Neuroscience*, *7*(2), 113–119. https://doi.org/10.1080/10284150410001704534

Clark, K. M., Li, M., Zhu, B., Liang, F., Shao, J., Zhang, Y., Ji, C., Zhao, Z., Kaciroti, N., & Lozoff, B. (2017). Breastfeeding, Mixed, or Formula Feeding at 9 Months of Age and the Prevalence of Iron Deficiency and Iron Deficiency Anemia in Two Cohorts of Infants in China. *The Journal of Pediatrics*, *181*, 56–61. https://doi.org/10.1016/j.jpeds.2016.10.041

Clemens, J. D., Elyazeed, R. A., Rao, M. R., Mph, M. G. de la H., Savarino, S., Morsy, B. Z., Kim, Y., Wierzba, T., Naficy, A. B., & Lee, Y. J. (1999). Early Initiation of Breastfeeding and the Risk of Infant Diarrhea in Rural Egypt. *Pediatrics*. https://doi.org/10.1542/peds.104.1.e3

Conway, J. M., Ingwersen, L. A., & Moshfegh, A. J. (2004). Accuracy of dietary recall using the USDA five-step multiple-pass method in men: An observational validation study. *Journal of the American Dietetic Association*, *104*(4), 595–603. https://doi.org/10.1016/j.jada.2004.01.007

Conway, J. M., Ingwersen, L. A., Vinyard, B. T., & Moshfegh, A. J. (2003). Effectiveness of the US Department of Agriculture 5-step multiple-pass method in assessing food intake in obese and nonobese women. *The American Journal of Clinical Nutrition*, *77*(5), 1171–1178. https://doi.org/10.1093/ajcn/77.5.1171

Danaei, G., Andrews, K. G., Sudfeld, C. R., Fink, G., McCoy, D. C., Peet, E., Sania, A., Smith Fawzi, M. C., Ezzati, M., & Fawzi, W. W. (2016). Risk Factors for Childhood Stunting in

137 Developing Countries: A Comparative Risk Assessment Analysis at Global, Regional, and Country Levels. *PLoS Medicine*, *13*(11). https://doi.org/10.1371/journal.pmed.1002164

Debes, A. K., Kohli, A., Walker, N., Edmond, K., & Mullany, L. C. (2013). Time to initiation of breastfeeding and neonatal mortality and morbidity: A systematic review. *BMC Public Health*, *13*(3), S19. https://doi.org/10.1186/1471-2458-13-S3-S19

Domellöf, M., Lönnerdal, B., Dewey, K. G., Cohen, R. J., Rivera, L. L., & Hernell, O. (2002). Sex Differences in Iron Status During Infancy. *Pediatrics*, *110*(3), 545–552. https://doi.org/10.1542/peds.110.3.545

El Kishawi, R. R., Soo, K. L., Abed, Y. A., & Wan Muda, W. A. M. (2015). Anemia among children aged 2–5 years in the Gaza Strip- Palestinian: A cross sectional study. *BMC Public Health*, *15*(1), 319. https://doi.org/10.1186/s12889-015-1652-2

Faber, M. (2007). Dietary intake and anthropometric status differ for anaemic and non-anaemic rural South African infants aged 6-12 months. *Journal of Health, Population, and Nutrition*, *25*(3), 285–293. PubMed.

Felt, B. T., & Lozoff, B. (1996). *Brain Iron and Behavior of Rats are Not Normalized by TDreevaetmloepnmtento1f'2Iron Deficiency Anemia during Early*. 9.

Fledderjohann, J., Agrawal, S., Sukumar Vellakkal, Basu, S., Campbell, O., Doyle, P., Shah, E., & Stuckler, D. (2014). Do Girls Have a Nutritional Disadvantage Compared with Boys? Statistical Models of Breastfeeding and Food Consumption Inequalities among Indian Siblings. *PLoS One*, *9*(9). ProQuest Central. https://doi.org/10.1371/journal.pone.0107172

Gasseer, N. A., Dresden, E., Keeney, G. B., & Warren, N. (2004). Status of Women and Infants in Complex Humanitarian Emergencies. *Journal of Midwifery & Women's Health*, *49*(S1), 7–13. https://doi.org/10.1016/j.jmwh.2004.05.001

Gebreegziabiher, G., Etana, B., & Niggusie, D. (2014). Determinants of Anemia among Children Aged 6–59 Months Living in Kilte Awulaelo Woreda, Northern Ethiopia. *Anemia*, *2014*, 245870. https://doi.org/10.1155/2014/245870

Gosdin, L., Martorell, R., Bartolini, R. M., Mehta, R., Srikantiah, S., & Young, M. F. (2018). The co-occurrence of anaemia and stunting in young children. *Maternal & Child Nutrition*, *14*(3), e12597. https://doi.org/10.1111/mcn.12597

Hailemariam, T. W., Adeba, E., & Sufa, A. (2015). Predictors of early breastfeeding initiation among mothers of children under 24 months of age in rural part of West Ethiopia. *BMC Public Health*, *15*(1), 1076. https://doi.org/10.1186/s12889-015-2420-z

Hassan, K., Sullivan, K. M., Yip, R., & Woodruff, B. A. (1997). Factors Associated with Anemia in Refugee Children. *The Journal of Nutrition*, *127*(11), 2194–2198. https://doi.org/10.1093/jn/127.11.2194

Horwood, L. J., & Fergusson, D. M. (1998). Breastfeeding and Later Cognitive and Academic Outcomes. *Pediatrics*, *101*(1), e9–e9. https://doi.org/10.1542/peds.101.1.e9

Howie, P. W., Forsyth, J. S., Ogston, S. A., Clark, A., & Florey, C. D. (1990). Protective effect of breast feeding against infection. *British Medical Journal*, *300*(6716), 11. https://doi.org/10.1136/bmj.300.6716.11

Huang, Y., Wang, L., Huo, J., Wu, Q., Wang, W., Chang, S., & Zhang, Y. (2019). Prevalence and causes of anaemia in children aged 6–23 months in rural Qinghai, China: Findings from a cross-sectional study. *BMJ Open*, *9*(9), e031021. https://doi.org/10.1136/bmjopen-2019-031021

Institute of Medicine (U.S.) Panel on Micronutrients. (2001). *DRI dietary reference intakes for vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc: A report of the Panel on Micronutrients. [Et al.], Standing Committee on the Scientific Evaluation of Dietary Reference Intakes, Food and Nutrition Board, Institute of Medicine*. National Academy Press.

Jaeggi, T., Moretti, D., Kvalsvig, J., Holding, P. A., Tjalsma, H., Kortman, G. A. M., Joosten, I., Mwangi, A., & Zimmermann, M. B. (2013). Iron status and systemic inflammation, but not gut inflammation, strongly predict gender-specific concentrations of serum hepcidin in infants in rural Kenya. *PLoS ONE*, *8*(2), e57513. https://doi.org/10.1371/journal.pone.0057513

Khan, J., Vesel, L., Bahl, R., & Martines, J. C. (2015). Timing of Breastfeeding Initiation and Exclusivity of Breastfeeding During the First Month of Life: Effects on Neonatal Mortality and Morbidity—A Systematic Review and Meta-analysis. *Maternal and Child Health Journal*, *19*(3), 468–479. https://doi.org/10.1007/s10995-014-1526-8

Khatib, I. M. D., & Elmadfa, I. (2009). High Prevalence Rates of Anemia, Vitamin A Deficiency and Stunting Imperil the Health Status of Bedouin Schoolchildren in North Badia, Jordan. *Annals of Nutrition and Metabolism*, *55*(4), 358–367. https://doi.org/10.1159/000258632

Koura, K. G., Ouédraogo, S., Cottrell, G., Port, A. L., Massougbodji, A., & Garcia, A. (2012). Maternal Anaemia at Delivery and Haemoglobin Evolution in Children during Their First 18 Months of Life Using Latent Class Analysis. *PLOS ONE*, *7*(11), e50136. https://doi.org/10.1371/journal.pone.0050136

Kuziga, F., Adoke, Y., & Wanyenze, R. K. (2017). Prevalence and factors associated with anaemia among children aged 6 to 59 months in Namutumba district, Uganda: A cross-sectional study. *BMC Pediatrics*, *17*(1), 25. https://doi.org/10.1186/s12887-017-0782-3

Ladomenou, F., Moschandreas, J., Kafatos, A., Tselentis, Y., & Galanakis, E. (2010). Protective effect of exclusive breastfeeding against infections during infancy: A prospective study. *Archives of Disease in Childhood*, *95*(12), 1004. https://doi.org/10.1136/adc.2009.169912

Legesse, M., Demena, M., Mesfin, F., & Haile, D. (2014). Prelacteal feeding practices and associated factors among mothers of children aged less than 24 months in Raya Kobo district, North Eastern Ethiopia: A cross-sectional study. *International Breastfeeding Journal*, *9*(1), 189. https://doi.org/10.1186/s13006-014-0025-2

Lönnerdal, B., & Kelleher, S. L. (2007). Iron Metabolism in Infants and Children. *Food and Nutrition Bulletin*, *28*(4_suppl4), S491–S499. https://doi.org/10.1177/15648265070284S402

Lutter, C. K. (2008). Iron Deficiency in Young Children in Low-Income Countries and New Approaches for Its Prevention. *The Journal of Nutrition*, *138*(12), 2523–2528. https://doi.org/10.3945/jn.108.095406

Ma, G., Jin, Y., Li, Y., Zhai, F., Kok, F. J., Jacobsen, E., & Yang, X. (2008). Iron and zinc deficiencies in China: What is a feasible and cost-effective strategy? *Public Health Nutrition*, *11*(6), 632–638. Cambridge Core. https://doi.org/10.1017/S1368980007001085

Madu, A. J., & Ughasoro, M. D. (2017). Anaemia of Chronic Disease: An In-Depth Review. *Medical Principles and Practice*, *26*(1), 1–9. https://doi.org/10.1159/000452104

Means, R. T. (2000). The anaemia of infection. *Best Practice & Research Clinical Haematology*, *13*(2), 151–162. https://doi.org/10.1053/beha.1999.0065

Meinzen-Derr, J. K., Guerrero, M. L., Altaye, M., Ortega-Gallegos, H., Ruiz-Palacios, G. M., & Morrow, A. L. (2006). Risk of Infant Anemia Is Associated with Exclusive Breast-Feeding and Maternal Anemia in a Mexican Cohort. *The Journal of Nutrition*, *136*(2), 452–458. https://doi.org/10.1093/jn/136.2.452

Melku, M., Alene, K. A., Terefe, B., Enawgaw, B., Biadgo, B., Abebe, M., Muchie, K. F., Kebede, A., Melak, T., & Melku, T. (2018). Anemia severity among children aged 6–

59 months in Gondar town, Ethiopia: A community-based cross-sectional study. *Italian Journal of Pediatrics*, *44*(1), 107. https://doi.org/10.1186/s13052-018-0547-0

Menon, K. C., Ferguson, E. L., Thomson, C. D., Gray, A. R., Zodpey, S., Saraf, A., Das, P. K., & Skeaff, S. A. (2016). Effects of anemia at different stages of gestation on infant outcomes. *Nutrition*, *32*(1), 61–65. https://doi.org/10.1016/j.nut.2015.07.009

Mhanna, R. G., Rahal, M., Iskandarani, M., & Hammoudi, D. (2016). Incidence and risk factors associated with iron deficiency anaemia among hospitalised Lebanese infants. *International Journal of Pharmacy Practice*, *24*(3), 203–208. https://doi.org/10.1111/ijpp.12236

Mitchell, P. C., Jonnlaadda, S. S., Smlciklas, H., Meaker, W. K. B., & Kris-Etherton, P. M. (1996). Accuracy of portion size estimation using the 2-dimensional food portion visual. *FASEB Journal*, *10*(3). https://pennstate.pure.elsevier.com/en/publications/accuracy-of-portion-size-estimation-using-the-2-dimensional-food-

Müller, O., & Krawinkel, M. (2005). Malnutrition and health in developing countries. *CMAJ : Canadian Medical Association Journal*, *173*(3), 279–286. https://doi.org/10.1503/cmaj.050342

Naylor, A. J., & Morrow, A. L. (2001). *Developmental Readiness of Normal Full Term Infants To Progress from Exclusive Breastfeeding to the Introduction of Complementary Foods: Reviews of the Relevant Literature Concerning Infant Immunologic, Gastrointestinal, Oral Motor and Maternal Reproductive and Lactational Development*. LINKAGES Project, Academy for Educational Development, 1825 Connecticut Avenue, N. https://eric.ed.gov/?id=ED479275

Novaes Oliveira, Martorell, Reynaldo, & Nguyen, Phuong. (2010). Risk factors associated with hemoglobin levels and nutritional status among Brazilian children attending daycare centers in Sao Paulo city, Brazil. *Archivos Latinoamericanos de Nutrición*, *60*(1). ProQuest Central. https://search.proquest.com/docview/2082149776?accountid=8555

Oddy, W. H., Sly, P. D., Klerk, N. H. de, Landau, L. I., Kendall, G. E., Holt, P. G., & Stanley, F. J. (2003). Breast feeding and respiratory morbidity in infancy: A birth cohort study. *Archives of Disease in Childhood*, *88*(3), 224–228. https://doi.org/10.1136/adc.88.3.224

Onyangore F. O., Were G. M., & Mwamburi, L. A. (2016). PREVALENCE OF IRON DEFICIENCY ANAEMIA AND DIETARY IRON INTAKE AMONG INFANTS AGED SIX TO NINE MONTHS IN KEIYO SOUTH SUB COUNTY, KENYA. *African Journal of Food, Agriculture, Nutrition & Development*, *16*(2), 10884–10897. Academic Search Ultimate.

Pacey, A., Weiler, H., & Egeland, G. M. (2011). Low prevalence of iron-deficiency anaemia among Inuit preschool children: Nunavut Inuit Child Health Survey, 2007-2008. *Public Health Nutrition*, *14*(8), 1415–1423. ProQuest Central. https://doi.org/10.1017/S1368980010002429

Pasricha, S.-R., Armitage, A. E., Prentice, A. M., & Drakesmith, H. (2018). Reducing anaemia in low income countries: Control of infection is essential. *BMJ*, *362*, k3165. https://doi.org/10.1136/bmj.k3165

Paudel, R., Pradhan, B., Wagle, R. R., Pahari, D. P., & Onta, S. R. (2012). Risk Factors for Stunting Among Children: A Community Based Case Control Study in Nepal. *Kathmandu University Medical Journal*, *10*(3), 18–24. https://doi.org/10.3126/kumj.v10i3.8012

Pinhas-Hamiel, O., Newfield, R. S., Koren, I., Agmon, A., Lilos, P., & Phillip, M. (2003). Greater prevalence of iron deficiency in overweight and obese children and adolescents. *International Journal of Obesity*, *27*(3), 416–418. https://doi.org/10.1038/sj.ijo.0802224

Position of the American Dietetic Association: Promoting and Supporting Breastfeeding. (2009). *Journal of the American Dietetic Association*, *109*(11), 1926–1942. https://doi.org/10.1016/j.jada.2009.09.018

Rahman, M. S., Mushfiquee, M., Masud, M. S., & Howlader, T. (2019). Association between malnutrition and anemia in under-five children and women of reproductive age: Evidence from Bangladesh Demographic and Health Survey 2011. *PLoS One*, *14*(7). ProQuest Central. https://doi.org/10.1371/journal.pone.0219170

Rawat, R., Saha, K. K., Kennedy, A., Rohner, F., Ruel, M., & Menon, P. (2014). Anaemia in infancy in rural Bangladesh: Contribution of iron deficiency, infections and poor feeding practices. *British Journal of Nutrition*, *111*(1), 172–181. https://doi.org/10.1017/S0007114513001852

Reinbott, A., Jordan, I., Herrmann, J., Kuchenbecker, J., Kevanna, O., & Krawinkel, M. B. (2016). Role of Breastfeeding and Complementary Food on Hemoglobin and Ferritin Levels in a Cambodian Cross-Sectional Sample of Children Aged 3 to 24 Months. *PLoS One; San Francisco*, *11*(3), e0150750. http://dx.doi.org.ezproxy.aub.edu.lb/10.1371/journal.pone.0150750

Richards, M., Hardy, R., & Wadsworth, M. E. (2002). Long-term effects of breast-feeding in a national birth cohort: Educational attainment and midlife cognitive function. *Public Health Nutrition*, *5*(5), 631–635. Cambridge Core. https://doi.org/10.1079/PHN2002338

Riordan, J., & Auerbach, K. G. (2001). *Pocket Guide to Breastfeeding and Human Lactation*. Jones & Bartlett Learning.

Roba, K. T., O'Connor, T. P., Belachew, T., & O'Brien, N. M. (2016). Anemia and undernutrition among children aged 6-23 months in two agroecological zones of rural Ethiopia. *Pediatric Health, Medicine and Therapeutics*, *7*, 131–140. PubMed. https://doi.org/10.2147/PHMT.S109574

Rohner, F., Bradley, A. W., Grant, J. A., Elizabeth, A. Y., Lebanan, M. A. O., Rayco-Solon, P., & Saniel, O. P. (2013). Infant and Young Child Feeding Practices in Urban Philippines and Their Associations with Stunting, Anemia, and Deficiencies of Iron and Vitamin A. *Food and Nutrition Bulletin*, *34*(2_suppl1), S17–S34. https://doi.org/10.1177/15648265130342S104

Saarinen, U. M., Siimes, M. A., & Dallman, P. R. (1977). Iron absorption in infants: High bioavailability ofbreast milk iron as indicated by the extrinsic tag method of iron absorption and by the concentration of serum ferritin. *The Journal of Pediatrics*, *91*(1), 36–39. https://doi.org/10.1016/S0022-3476(77)80439-3

Seal, A. J., Creeke, P. I., Mirghani, Z., Abdalla, F., McBurney, R. P., Pratt, L. S., Brookes, D., Ruth, L. J., & Marchand, E. (2005). Iron and Vitamin A Deficiency in Long-Term African Refugees. *The Journal of Nutrition*, *135*(4), 808–813. https://doi.org/10.1093/jn/135.4.808

Singla, P. N., Gupta, V. K., & Agarwal, K. N. (1985). Storage Iron in Human Foetal Organs. *Acta Paediatrica*, *74*(5), 701–706. https://doi.org/10.1111/j.1651-2227.1985.tb10017.x

Van Nhien, N., MD MSc, Khan, N. C., MD PhD, Ninh, N. X., MD PhD, Van Huan, P., MSc, Hop, L. T., MD PhD, Lam, N. T., MD PhD, Ota, F., MD PhD, Yabutani, T., PhD, Hoa, V. Q., MD, Motonaka, J., PhD, Nishikawa, T., MD PhD, & Nakaya, Y., MD PhD. (2008). Micronutrient deficiencies and anemia among preschool children in rural Vietnam. *Asia Pacific Journal of Clinical Nutrition*, *17*(1), 48–55. ProQuest Central.

Victora, C. G., de Onis, M., Hallal, P. C., Blossner, M., & Shrimpton, R. (2010). Worldwide Timing of Growth Faltering: Revisiting Implications for Interventions. *PEDIATRICS*, *125*(3), e473–e480. https://doi.org/10.1542/peds.2009-1519

Victora, Cesar G., Barros, F. C., Horta, B. L., & Lima, R. C. (2005). Breastfeeding and school achievement in Brazilian adolescents. *Acta Paediatrica*, *94*(11), 1656–1660. https://doi.org/10.1080/08035250500252658

Wang, J., Wang, H., Chang, S., Zhao, L., Fu, P., Yu, W., Man, Q., Scherpbier, R., Pan, L., Duan, Y., & Shi-an, Y. (2015). The Influence of Malnutrition and Micronutrient Status on

Anemic Risk in Children under 3 Years Old in Poor Areas in China. *PLoS One*, *10*(10). ProQuest Central. https://doi.org/10.1371/journal.pone.0140840

WHO. (2009). *Complementary feeding*. World Health Organization. https://www.ncbi.nlm.nih.gov/books/NBK148957/

Wieringa, F. T., Berger, J., Dijkhuizen, M. A., Hidayat, A., Ninh, N. X., Utomo, B., Wasantwisut, E., & Winichagoon, P. (2007). Sex differences in prevalence of anaemia and iron deficiency in infancy in a large multi-country trial in South-East Asia. *The British Journal of Nutrition*, *98*(5), 1070–1076. ProQuest Central. https://doi.org/10.1017/S0007114507756945

World Health Organization, & Food and Agriculture Organization of the United Nations (Eds.). (2004). *Vitamin and mineral requirements in human nutrition* (2nd ed). World Health Organization ; FAO.

World Health Organization (WHO). (2008). *Indicators for assessing infant and young child feeding practices: Conclusions of a consensus meeting held 6-8 November 2007 in Washington D.C., USA.* World Health Organization (WHO).

Yang, W., Li, X., Li, Y., Zhang, S., Liu, L., Wang, X., & Li, W. (2012). Anemia, malnutrition and their correlations with socio-demographic characteristics and feeding practices among infants aged 0–18 months in rural areas of Shaanxi province in northwestern China: A cross-sectional study. *BMC Public Health*, *12*(1), 1127. https://doi.org/10.1186/1471-2458-12-1127

Zimmermann, M. B., Zeder, C., Muthayya, S., Winichagoon, P., Chaouki, N., Aeberli, I., & Hurrell, R. F. (2008). Adiposity in women and children from transition countries predicts decreased iron absorption, iron deficiency and a reduced response to iron fortification. *International Journal of Obesity*, *32*(7), 1098–1104. https://doi.org/10.1038/ijo.2008.43

UNICEF/WFP Global Nutrition Strategy January 2006, “Acute Malnutrition in Protracted Refugee Situation: A Global Strategy”, available at:www.unicef.org (accessed June 14, 2020).

Most Vulnerable Localities In Lebanon March 2015, ”, available at:www.unhcr.org (accessed June 14, 2020).