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INFANT AND YOUNG CHILD FEEDING PRACTICES IN LEBANON: A NATIONAL CROSS-SECTIONAL STUDY

by
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AN ABSTRACT OF THE THESIS OF

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Early nutrition is a neglected aspect of maternal and young child health in the Middle East. Data on current maternal and young child nutritional status and dietary practices in Lebanon are lacking. Therefore, this study was undertaken as part of a national project to assess the nutritional status of under two children and their mothers, and to investigate dietary practices and feeding patterns that act as strong determinants for malnutrition (under, over nutrition) and adult onset of chronic non-communicable diseases. This study also aimed at assessing maternal knowledge towards infant feeding practices.

A cross-sectional study was conducted on a nationally representative sample (n=478) of 0-2 year old infants and young children and their mothers. Subjects were recruited from randomly selected households based on a stratified cluster sampling from the six governorates of Lebanon. Socio-demographic, lifestyle, dietary and anthropometric data were collected.

Prevalence rates of ever-breastfeeding and exclusive breastfeeding for 6 months were estimated at 88.49% and 20.4% respectively. Regression analysis showed that the odds of exclusive breastfeeding increased significantly with early initiation of breastfeeding within one hour (OR=2.419) and the child being not the first child in the family (OR=2.361). The odds of exclusive breastfeeding were significantly lower amongst babies born small for gestational age (OR=0.268), mothers who reported not being breastfed as a child (OR=0.287) and mothers who scored less than the median on the overall knowledge score (OR=0.274). Among infants who were under 6 months at the interview date, maternal employment was significantly associated with lower odds of exclusive breastfeeding. Children intakes were shown to be deficient in several micronutrients and high sugar intake was also observed. Major maternal knowledge gaps were determined. The prevalence of children at risk of overweight was high (24.7%) with 3.6% being obese. The prevalence of obesity in mothers was 24.7%. The high prevalence of obesity in Lebanese mothers was significantly associated with higher odds of

overweight and obesity in infants and young children (OR=3.272). No association was found between breastfeeding and child's overweight or obesity.

This study provides new data regarding infant and young child feeding practices in Lebanon. It highlights the importance of adopting baby friendly hospital initiative, developing new policies and call for intervention strategies to spread knowledge and awareness of the benefits and the challenges of breastfeeding.

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ABBREVIATIONS

24-HR	24-hour dietary recall
%	Per Cent
/	Per
&	And
±	Plus or Minus
=	Equal
<	Less than
>	Greater than
AAP	American Academy of Pediatrics
ADA	American Dietetic Association
AI	Adequate Intake
AUB	American University of Beirut
BMI	Body mass index
CI	Confidence interval
Cm	Centimeter
DRI	Dietary Reference intake
Et al.	And others
FFQ	Food frequency questionnaire
ICC	Intraclass correlation
IRB	Institutional Review Board
Kg	Kilograms
L.L.	Lebanese Lira
MENA	"Middle East and North Africa

n	Sample size
N/A	Not applicable
NCD	Non-communicable Disease
NHANES	National Health and Nutrition Examination Survey
NFSC	Nutrition and Food Sciences Department at AUB
RDA	Recommended Dietary Allowance
SD	Standard Deviation
SPSS	Statistical Package for Social Sciences
Tbsp.	Tablespoon
Tsp.	Teaspoon
USA	United States of America
USDA	United States Department of Agriculture
W.C.	Waist circumference
WHO	World Health Organization

To My Mother

CHAPTER I

INTRODUCTION

The critical period between birth and 2 years of age is extremely important because of the need for adequate nutrition and practices to support the rapid rate of physical growth and brain development (Mukuria *et al.* 2006). Breastfeeding is the ideal source of nutrients since all the nutritional needs of infants till 6 months of age can be met completely by breastfeeding and thereafter there will be additional need for other sources to maintain adequate growth and development (WHO, 2003). Therefore, encouragement and support of proper infant and young child feeding practices is crucial to child's health and survival and consequently for reducing children under nutrition, morbidity and mortality rate (UNICEF, 2009).

The WHO endorses that the initiation of breastfeeding should be within one hour of birth and that the infant should be exclusively breastfed until 6 months old. Moreover after 6 months, infants should be safely introduced to complementary foods with continued breastfeeding up to two years of age (WHO, 2008; WHO, 2010). These adequate practices regarding breastfeeding and complementary feeding affect not only growth and development of infants' vital organs, but also play a critical role in programing health outcomes such as adult onset of non communicable diseases, morbidity risk, and quality of life in adulthood (Koletzko *et al.* 2009). Therefore, the WHO in 2007 has introduced a set of new indicators to evaluate infant and young child feeding practices focusing on both the quality and quantity of consumed foods during this critical period of life (WHO, 2007).

Although these breastfeeding and complementary feeding recommendations could lead to better infant and young child feeding practices, their proper implementation is facing many barriers delaying and suspending their application. Some of the factors that have been suggested to impact infant feeding practices include mother and father educational levels, mother's age, maternal employment, health and service utilization, socio-economical factors, maternal knowledge, support from community, hospital or husband, previous experiences and professional supports (Nguyen *et al.* 2011; Grummer-Strawn *et al.* 2006).

According to the World Bank in 2011, Lebanon, with a population of 4.425 million has an infant mortality rate of 8 per 1000 live births. Varied results were shown on the prevalence and patterns of breastfeeding in Lebanon, with 61.2% of Lebanese mothers showing a delay in the initiation of breastfeeding post delivery (Batal *et al.* 2006). In a longitudinal study, Yunis *et al.* (2004) showed that 85.9% of infants in Greater Beirut were breastfed during the first month of life irrespective of supplementation with formula, and that 56.3% were breastfed without supplementation of formula. Unfortunately, these numbers decreased to 63.2% and 24.7%, respectively, at 4 months of age (Yunis *et al.* 2004). On the other hand, the prevalence of early introduction of complementary foods was estimated at 52.9% in Lebanon (Batal e*t al.* 2010), an estimate that is comparable to KSA (81.5%) (Mouzan e*t al.* 2009), Iraq (78.6%) (Ameer *et al.* 2008) and UAE (70%) (Radwan, 2012). From a national survey done in 2006 in Lebanon, Batal *et al.* stated that the initiation rates of breastfeeding are very high (95.4%), however rates of exclusive breastfeeding are low (10.1%) and duration of breastfeeding is short (Batal *et al.* 2006).

The WHO/UNICEF Global strategies for Infant and Young Children Feeding Practices (IYCF) endorse that countries plan a comprehensive program for community-based breastfeeding promotion and support actions to improve breastfeeding practices (WHO, 2007). In order to apply appropriate interventions for improving IYCF practices in Lebanon, it is essential to have comprehensive research data about local breastfeeding and complementary feeding practices. It is therefore crucial to have baseline data on infant feeding practices, duration of breastfeeding, and prevalence of infant formula feeding among Lebanese mothers in order to support the Lebanese breastfeeding promotion strategy in accordance with global standards, strategies, and practices. Knowing that early nutrition is an neglected aspect of maternal and young child's health in the Middle East, and given the scarcity of data on current maternal and young child nutritional status and dietary practices in Lebanon, this study was undertaken as part of a national project to assess the nutritional status of under-two children and their mothers, and to investigate dietary practices and feeding patterns that act as strong determinants for malnutrition (under, over-nutrition) and adult-onset of chronic non-communicable diseases. This study also aimed at assessing maternal knowledge towards infant feeding practices.

The specific objectives of this study are:

- To evaluate and characterize infant and young child's (0-2 years old) feeding practices in Lebanon
    - To investigate and determine the prevalence of exclusive breastfeeding and the duration of breastfeeding in Lebanon.

    - To characterize complementary food use in Lebanon (age of solid food introduction, types of solid food being introduced…)
- To evaluate the nutritional status of Lebanese children aged between 0-2 years.
    - To investigate and characterize dietary intakes of Lebanese under-two children.
    - To investigate and determine the prevalence of stunting, wasting, overweight and obesity in Lebanese children
- To evaluate maternal nutritional status in Lebanon
    - To investigate and characterize dietary intakes of Lebanese mothers.
    - To assess the prevalence of overweight, obesity in Lebanese mothers.
    - To investigate maternal lifestyle patterns (smoking, alcohol drinking, etc.) and maternal knowledge related to breastfeeding.
- To investigate the associations of maternal knowledge, socio-demographic and lifestyle characteristics with infant feeding practices
- To investigate the association of infant feeding practices and dietary intakes with overweight / obesity in Lebanese infants and young children

CHAPTER II

LITERATURE REVIEW

A. First thousand days

The first '1,000 days', which include pregnancy and the first two years of life, together with early childhood, are increasingly recognized as cornerstones and fundamental years for shaping and defining a child's survival, growth, and development. The adult-onset of non-communicable diseases is increasingly being viewed as a consequence of poor nutrition in this critical period**.** A growing body of scientific evidence stresses the first '1,000 days' and early childhood as essential periods and important windows of opportunity for intervention to optimize survival, prevent malnutrition constituting of both under- and over nutrition, and curb the growing epidemic of chronic non-communicable diseases (NCDs) (Shrimpton *et al.* 2001; United Nations Childrens Fund (UNICEF, 2009). World leaders and organizations are joining efforts to support early nutrition, while evidence-based actions are being taken to guarantee optimal child's health (*1,000 Days,* 2010; Clinton, 2010; Path, 2011).

B. Programing effect in utero:

Many researchers demonstrate that major diseases occuring in adulthood, such as coronary heart disease, hypertension, and type 2 diabetes, are the result of inadequate intrauterine growth and development. All of these effects may be the consequences of "programming" which is defined as a stimulus at a critical period of life that leads to

everlasting effects on structure, development, physiology and metabolism (Godfrey *et al.* 2007).

Maternal nutrition during pregnancy is a fundamental factor for the proper growth and development of the fetus and the infant. The mother's nutritional status during this period is associated with short term and long-term health consequences for the infant. On the short term, maternal undernutrition and underweight was associated with higher risk of preterm delivery and of underweight, wasting, and stunting in infants and children, compared to women with normal weight and normal nutritional status (Black *et al.* 2008). The risk of child mortality increases with increasing severity of underweight, wasting, and stunting (Imdad *et al.* 2011). Other studies have also shown that underweight women had a higher risk of giving birth to children with birth asphyxia and diarrhea, which elevate mortality risk (Black *et al.* 2008). Wasting, an indicator of acute malnutrition is usually accompanied by inadequate energy intakes mainly caused by food shortages (Allen *et al.* 2006). Stunting, an indicator of chronic malnutrition and a predictor of child development, is associated with adverse cognitive development in childhood and adolescence, reduced school performance, and consequently, reduced productivity and income-earning capacity in adulthood (Victora *et al.* 2010). Unlike stunting, reversing wasting and under-nutrition can be achieved if handled properly. However rapid weight gain to allow for catch-up growth results in adverse metabolic programming and a growth trajectory which has been suggested to be a strong predictor of chronic adult-onset diseases including obesity, cardiovascular, psychological, neurological, hepatic, pulmonary and renal problems (Victora *et al.* 2010).

On the other hand, maternal obesity was shown to be associated with a higher risk of neural tubes defects, cardiovascular anomalies, septal anomalies, cleft lip and palate, anorectic atresia, hydrocephaly, and limb reductions anomalies (Stothard *et al.* 2009). Furthermore, several studies have shown that elevated adiposity, hypertension, higher birth weight, insulin resistance, and endothelial dysfunction in the descendants were highly linked to women who, during their pregnancy, were exposed to high fat, high energy, high glycemic index diet (Dabelea & Crume, 2011). Moreover, concerning long term health consequences, an unhealthy lipid profile in maternal nutritional status could lead to an increase in adiposity, circulating glucose, insulin, cholesterol, and triglyceride in adulthood (Bayol *et al.* 2008).

Inadequate nutrition (either under or over nutrition) during gestation, could alter the programming of the development of glucose intolerance hence increasing the risk of diabetes, obesity, hypertension, metabolic syndrome, and cardiovascular disease in descendant (Shapira, 2008; Lillycrop *et al.* 2012). Khanna et al. (2007) presented these consequences under the big hypothesis: "Fetal Origin of Adult Disease (FOAD)" according to which the origin of chronic diseases in adulthood would be determined in utero (Khanna *et al.* 2007). This hypothesis indicated that fetal brain growth was prioritized at the expense of other organs such as the abdominal viscera, which could affect the secretion of many hormones such as fetal growth hormones (insulin and IGF-1) (Khanna *et al.* 2007). All of these phenomena occur during a critical period of fetal development; that's why under-nutrition effects could become permanent and predispose the fetus to diseases in adulthood. Adulthood diseases include altered arterial composition, decreased insulin sensitivity, reduced muscle mass, nephrons number and

pancreatic beta cell, and up-regulation of sympathetic nervous system and the hypothalamo-pituitary adrenal axis (HPA) (Phillips, 1996). Moreover, higher blood pressure, insulin resistance, and altered hepatic structure were associated with protein restriction during pregnancy (Fall *et al.* 1998). It was aslo shown that low birth weight "programmed" the secretion of stress hormone such as cortisol, which could increase the risk of metabolic syndrome and cardiovascular disease (Khanna *et al.* 2007). Likewise, under or over nutrition during pregnancy may affect cellular proliferation and differentiation, which could lead to a reduction in the number of cells within an organ or tissue. As a consequence, this could cause alterations in gene expression and physiological functions (Langley-Evans & Simon, 2009). These effects would decrease nephron numbers, increase the risk of developing hypertension, and affect the balance of pancreatic alpha and beta cells which in turn would lead to impaired glucose tolerance (Langley-Evans & Simon 2009). On the other hand, leptin resistance could be induced by alterations in the neurons of the offspring, which regulate appetite hormones leading to a reduced level of proopiomelanocortin (POMC), the precursor of anorectic neuropeptide α-MSH, and increased levels of the orexigenic peptide: neuropeptide Y (NPY) (Langley-Evans & Simon 2009; Grattan & David, 2008).

Epigenetic processes such as DNA methylation and histone alterations allow the developmental environment to control gene transcription; many of these changes are than stable throughout the life course (Gluckman & Hanson, 2007; Godfrey *et al.* 2007). Regulated DNA methylation commonly occurs at a cytosine immediately 5' to a guanine (CpG sites). Such processes are involved not only in cell differentiation and parenteral genomic imprinting but also in developmental plasticity through which the environment

in early life can affect the developmental trajectory, with long term effects on gene expression and phenotypic outcome (Gluckman & Hanson, 2007; Maleszka, 2008). For instance, in rats, disturbed maternal diet during pregnancy induces changes in DNA methylation and covalent histones modifications in the 5' regulatory regions of specific nonimprinted genes (Lillycrop *et al.* 2005; Lillycrop *et al.* 2007), and affects the offspring's later body composition and metabolic phenotype. Induced changes in phenotype can be prevented by nutritional interventions during pregnancy (Lillycrop *et al.* 2008). Moreover, hypomethylation of several genes such as the peroxisome proliferator-activator receptor alpha (PPAR-alpha), glucocorticoids receptors (GR), and histone acetylation of GR increases their expression leading to elevated risks of hypertension and insulin resistance later in life. These epigenetic changes were shown to be inheritable (Langley-Evans, S.C. 2009). Over-exposure to glucocorticoids induced by maternal diet can down regulate placental 11β- hydroxysteroid dehydrogenase 2 (11βHSD2), increasing the movement of maternal glucocortecoids to the fetus, and thus affecting its organ development (Langley-Evans & Mc Mullen, 2010). These programmed effects may be aggravated by postnatal dietary insufficiency and/or overconsumption, illnesses, and lifestyle risk factors (Shapira, 2008).

C. Benefits of breast milk for the child:

Many studies have indicated that the intake of colostrum is associated with a decreased risk of infant morbidity (Duijts *et al.* 2009). Generally, breastfeeding was shown to protect against infectious diseases, gastrointestinal illnesses, and low respiratory

tract diseases (Bachrach *et al.* 2003; Oddy et al. 2003). These advantages were related to the antibacterial and immunological characteristics of breastmilk, and also to the low risk of exposure to pathogens coming from formula feeding practices (Hanson, 2000; Jones *et al.* 2003; Isaacs, 2005).

Moreover, breast milk contains tumor necrosis factor (TNFα), interleukin 1 and 6, transforming growth factor β1 and β2 (TGF-β1 and TGF-β2), chemokine growth-related oncogene proteinα, monocyte chemoattractant protein-1, IL-8, IL-1 receptor antagonist, soluble forms of the receptors for TNF-α, the antiinflammatory cytokine IL-10, and RANTES (regulated upon activation, normal T cell expressed, and secreted) (Wallace *et al.* 1997; Buescher & Koeppen, 1997). While Lysozyme present in human milk suppresses chemotaxis and respiratory burst activity in human polymorphonuclear leukocytes (Kramer & Michael, 1981), an ascorbate-like material, uric acid, α-tocopherol, and β-carotene in human milk ensures that phagocyte-produced oxidant molecules cannot persist, and this contributes to the anti-inflammatory effects of milk. Therefore human milk maintains anti-inflammatory effects and still has significant protective action against infections. Additionally, human breastmilk is a good source of polyunsaturated fatty acids, especially of α-linolenic acid, arachidonic acid, eicosapentaenoic acid, and docosahexaenoic acid (Das, 2006).

Breastfeeding has also been associated with an improvement of cognitive development and hence a higher IQ (Jain *et al.* 2002; Gomez-Sanchiz *et al.* 2004; Rey, 2003). Moreover many studies suggest an association between breastfeeding and morbidities such as childhood asthma, atopic diseases, eczema and leukemia (Chan-Yeung *et al.* 2000; Shu *et al.* 1995). It reduces these diseases even for children at high

risk (Kemp & Kakakios, 2004; Prescott & Tang, 2005). Breastmilk was shown to be associated with a decreased risk of sudden infant death (SID) (McVea *et al.* 2000; Vennemann *et al.* 2009). Furthermore, breastfeeding reduces the risk of developing chronic diseases in adulthood, such as hypertension, obesity, dyslipidemia and type 2 diabetes (Arenz *et al.* 2004; Harder *et al.* 2006; Owen *et al.* 2005; Horta *et al.* 2007).

D. Programing effect during infancy and early childhood

"Programming", defined as stimulus or insult during a critical or sensitive period of development, can have long-term or lifetime effects on an organism. In particular, nutrition has acute and long-term effects on human health. Several experimental studies showed a relationship between early nutrition and cardiovascular disease risk, bone health, and cognitive function in adulthood (Lucas, 2005). For example, breastfed children were significantly at lower risk of necrotizing enterocolitis (NEC) compared to formula fed infants (Lucas *et al.* 1990). The first researcher to prove this lifetime nutritional programing effect was McCance, but all his observations and conclusions were based on studies done on animals (McCance, 1962). Later, several studies on humans conducted to investigate nutrition in early life and its effect on blood lipids, blood pressure, body fatness, atherosclerosis, behavior, learning, and longevity in adulthood. (Ozanne & Hales, 2004). Human intervention trials documented this long term programming effect on bone health, brain development, and cardiovascular disease risk (Singhal *et al.* 2004). Observational studies showed that breastfed infants had a lower risk of cardiovascular disease, hypercholesterolemia, obesity, type 2 diabetes and high blood

pressure compared to formula fed infants (Fall *et al.* 1992; Pettitt *et al.* 1997). Several trials showed clear dose-response relationship between breastmilk and risk factors of metabolic syndrome in adolescence: the more the breastmilk intake in the neonatal period, the lower the metabolic risk factor in adolescence (Singhal *et al.* 2001; Singhal *et al.* 2002). A meta-analysis of 20 controlled studies done by James Anderson indicated that after adjustment for appropriate key cofactors, breastfeeding was associated with significantly higher scores for cognitive development (3.2 points higher) than was formula feeding (Anderson & Johnstone, 1999). Furthermore, a study done by Elizabeth Issaac (2010) showed a dose-response relationship between early breast milk intake and later IQ and whole brain volume at adolescence. This supported the hypothesis that one or more constituents of mothers' breast milk promote brain development (Isaacs *et al.* 2010). Therefore, many studies have shown relationships between white matter and measures of cognition in children (Mabbot *et al.* 2006). These relationships supported the hypothesis that the beneficial effects of breastfeeding on IQ may be mediated by ameliorating the development of white matter. In fact breastmilk contains a higher amount of cholesterol compared to infant formulas (Isaacs *et al.* 2004); in effect, full-term breastfed infants have higher total serum cholesterol at 6 months of age (Harit *et al.* 2008). Saher *et al.* (2005) reported recently that cholesterol is a basic component of myelin membranes in mice, and that cholesterol availability in oligodendrocytes is a limiting factor in brain development. The high increase in synapse number after birth might require large amounts of cholesterol, obtained by neurons from astrocytes (Pfreiger, 2002). Serum cholesterol had been related to intellectual performance in adults (Muldoon *et al.* 2004). As a consequence, dietary cholesterol intake could help explain

the impact of breast milk on white matter development and cognition through boosting glial production and myelination (Isaacs *et al.* 2010).

Moreover, some studies suggested that breastfeeding is associated with a lower risk of diabetes in later life (Pettitt *et al.* 1997). Breastfeeding was also associated with lower risk of obesity later in life (Ravelli *et al.* 2008), while other studies have reported non-significant associations (Fall *et al.* 1995) and no effect (Martin *et al.* 2005). Breastfed infants may have lower energy intake than formula fed infants (Pettitt *et al.* 1997). In addition, differences between breast milk and formula compositions, particularly in amino acids and protein or hormonal content, were shown to result in lower levels of fat deposition in breastfed infants (Lucas *et al.* 1980). Consequently, breastfeeding could possibly have a protective effect from the risk of diabetes and obesity (Gilman *et al.* 2001), which itself would be a strong risk factor for type 2 diabetes. Nevertheless, this effect on obesity remains uncertain (Owen *et al.* 2005).

Additionally, breastfed infants have higher percentage of DHA and other PUFAs in muscle phospholipids compared to formula fed infants. Higher PUFA concentrations in the skeletal muscle membrane lead to lower fasting plasma glucose concentrations, whereas low concentrations of DHA and other PUFAs can result in insulin resistance (Baur *et al.* 1998). PUFAs of breastmilk are also essential for brain growth and development (Darios & Davletov, 2006), and which in turn will lead not only to the growth and development of the brain but also to adequate numbers of insulin receptors in the brain to maintain normal glucose metabolism (Das, 2002).

Likewise, the first growth hormone to be detected in human milk was insulin, which promotes intestinal maturation (Shulman, 1990). Moreover, epidermal growth factor (EGF) has been found in human milk and has been shown to promote the development of the neonatal gastrointestinal tract (Carpenter, 1980). Many hormones such as leptin, ghrelin, and adiponectine were proven to be present in human milk (Aydin *et al.* 2006; Martin *et al.* 2006). All these hormones are involved in food intake control and body weight regulation, and their presence in breast milk could represent a possible link between early nutrition and energy balance regulation in adulthood. Therefore, breastfed children have the tendency to have a lower incidence of allergy and infectious disease, and to be leaner than formula-fed children (Klok *et al.* 2007).

Exposure to breast milk might have long-term effects on blood cholesterol later in life since lower blood cholesterol concentrations were observed in adults who were exclusively breastfed during infancy (Lucas, 1991). This is a major example of nutritional programming (Singhal *et al.* 2004). Therefore, the early exposure to high cholesterol from breast milk, could lead to a reduction in the endogenous synthesis of cholesterol, most probably by down-regulation of hepatic hydroxymethyl glutaryl coenzyme A reductase (Wong *et al.* 1993).

Recent studies have shown that a combination of exclusive breastfeeding for 6 months and optimal complementary feeding practices could lead to a 20% decrease in children's mortality in developing countries (UNICEF, 2007). At 6 months, milk alone is not sufficient for infants' growth requirements and could lead to under nutrition (PAHO/WHO, 2003). However the optimal time for introduction of complementary feeding is still a debate. The European Society of Pediatric Allergy and Clinical

Immunology (ESPACI) and the European Society of Pediatric Gastroenterology (ESPGHAN) recommend that the introduction of complementary feeding should begin at 4 months; the WHO, AAP and UNICEF recommend the initiation of complementary feeding at 6 months of age (PAHO/WHO, 2003; AAP, 2005). Adequate practices and introduction of complementary food may have lifelong programing effects that alter health, morbidity, and lifestyle in adulthood (Koletzko *et al*. 2005; Singhal *et al.* 2004).

The early introduction of complementary foods may lead to an increased prevalence of obesity and cardiovascular diseases in adulthood (Wilson *et al.* 1998). For instance, the rate of obesity at the age of 3 years was reported to increase by 6 fold in infants who were fed complementary foods before the age of 4 months (Huh *et al.* 2009). Furthermore, Kramer et al. showed that there are no benefits for introducing solid foods before the age of 6 months (Kramer *et al.* 2009). Likewise, no benefits were shown with introducing complementary food between 4 and 6 months (WHO, 2002). Consequently, several studies demonstrated the health effects of delaying the introduction of complementary foods until 6 months because of lower risk of gastro intestinal diseases such as diarrhea, and for better growth and development (Lanigan *et al.* 2001; Cohen *et al.* 1994).

The quality as well as the quantity of nutrients in early life is important. High carbohydrate infant formula and foods were shown to increase the risk of obesity and chronic diseases in adulthood. Hyper-insulinemia in adulthood may be associated with the consumption of high carbohydrate high sugar foods early in life, since they contribute to an immediate hyper-insulinemic response. This could lead to an elevated secretion of insulin, an increased mRNA levels of genes encoding for proinsulin and transcription

factors, and a reduction in mean islet size and increased number of small islet cells (Srinivasan, & Patel, 2008). These high carbohydrate formulas and foods could also lead to an increase in the activity of the parasympathetic nervous system and a decrease in the activity of the sympathetic nervous system which results in hyperinsulinemia (Srinivasan, & Patel, 2008), all of which will increase the risk of obesity in adulthood. As a consequence, the elevated risk of obesity and cardiovascular diseases and metabolic syndrome in adulthood may be associated with the early introduction of high carbohydrate formulas and high carbohydrate complementary foods (Srinivasan & Patel, 2008).

E. Economic benefits of breastfeeding:

Breastfeeding contributes to significant economic benefits to the society in general and to the family in particular. Instead of buying infant formulas, the family money would be saved (Wilmoth & Elder, 1995).

Formula-fed infants are more prone to contract diseases and get sick in adulthood; therefore, they can induce additional costs to the health system (Leon-Cava *et al.* 2002; Cattaneo *et al.* 2005). The US Department of Agriculture showed that the United States could save at least $3.6 billion annually in direct and indirect medical costs if 75% of mothers started breastfeeding, and if 50% of them breastfed the infant for 6 months (Kent, 2006). Another study found that if guidelines for breastfeeding exclusively until 6 months were followed by 90% of U.S families, the USA would save up to $13 billion each year from direct and indirect health, medical, and premature death

costs (Bartick & Reinhold, 2010). On the other hand, and since breastfeeding was found to be associated with lower risks of chronic diseases in adulthood (WHO, 2005), national income losses from strokes, diabetes, and cardiovascular diseases were estimated to $18 billion in China, $11 billions in Russia, $9 billions in India and $3 billion in Brazil.

F. Infant feeding recommendations

Sixty six per cent (66.6%) of morbidity and mortality of children under 5 years of age is due to improper feeding practices and methods during the first year after birth, involving timing, exclusivity and duration of breastfeeding, as well as complementary feeding introduction (*Global Strategy for infant and Young Child Feeding*). Compared to infants exclusively breastfed until 6 months of age, infants who were either partially or mostly breastfed were shown to be at higher risk of morbidity and mortality, especially from pneumonia and diarrhea (Black *et al.* 2008). Furthermore, these consequences were significantly higher among infants 6-23 months of age who were not breastfed (Black *et al.* 2008). Consequently, the most efficient approach to preventing all causes of mortality of children under 5 years of age was proven to be exclusive breastfeeding (13%) along with adequate complementary feeding introduction and practices (6%) (Lutter, 2003). In 1991, the World Health Organization developed various recommendations and indicators regarding breastfeeding and bottle feeding practices, including: exclusive breastfeeding until 4 or 6 months of child's age, timely introduction of complementary feeding at 5-6 months, continuation of breastfeeding till 1 and 2 years of child's age, and bottle feeding indicators (World Health Organization, 1991). However, many researchers found that

infants exclusively breastfed until 6 months of age were at significantly lower risk of developing child's morbidities especially from gastro-intestinal tract infection, pneumonia, and all-cause mortality compared to infants to whom complementary food was introduced before the age of 6 months, even though they didn't have any deficits (World Health Organization 28 - 30 March 2001).

In 2002, the WHO decided to proceed to new indicators especially that the 1991 indicators didn't mention the quantity and quality of complementary food (World Health Organization, Unicef 2007). Therefore in 2005, the WHO published a manual for assessing the feeding practices of infants and young children including 8 core* and 7 optional** validated and reliable indicators which can be obtained from household level interviews (Dewey, 2003; Lutter, 2003).

*The 8 core indicators include early initiation of breastfeeding; exclusive breastfeeding for 6 months; continued breastfeeding at 1 year; introduction of solid, semi-solid or soft foods; minimum dietary diversity; minimum meal frequency; minimum acceptable diet and consumption of iron-rich or iron-fortified foods.

**The optional indicators include children ever breastfed; continued breastfeeding at 2 years; age-appropriate breastfeeding; predominant breastfeeding under 6 months; duration of breastfeeding; bottle feeding and milk feeding frequency for non-breastfed children.

1. Breastfeeding Indicators

Exclusive and early initiation of breastfeeding effects on child's morbidity and all cause-mortality were tackled in many studies and reviews (Lopez-Alacron *et al.* 1997;

Zaman *et al.* 1997; Ahmed *et al.* 1999). They were shown to be a critical approach that significantly decreases these risks, especially that up to 50% of infant deaths takes place during the first week of child's age (Baker *et al.* 2006). In 1998, the UNICEF declared that the breast milk of a well-nourished mother could offer all the nutrients that a full term normal baby needs until 6 months of age (WHO/UNICEF, 1998). The first indicator about early initiation of breastfeeding mentions that the baby should be breastfed within the first hour after his/her birth; the second indicator about exclusive breastfeeding necessitates that until 6 months of the infant's age, he/she should get only breast milk as a main source of nutrients, and he/she could receive drops of vitamins or minerals syrups if needed. However, these indicators are not the only conditions that ensure an optimal health for the infants and young children; it was shown that the longer the duration of breastfeeding, the healthier the baby is, especially regarding reduction in the risk of obesity, type 1 and 2 diabetes, hypercholesterolemia, asthma in adulthood, and increase in infant cognition (Owen *et al.* 2005; Daniels & Adairs, 2005; American Academy of Pediatrics 2005). Breastmilk remains the most important source of many nutrients such as Vitamin A, Riboflavin, essential fatty acids, Calcium and Water (Dewey, 2003). Therefore, the WHO advises the mother to breastfeed her child until he/she is 2 years old by adopting the 2 indicators: continued breastfeeding at 1 year and at 2 years (American Academy of Pediatrics 2005).

3. Complementary feeding indicators

After 6 months of exclusive breastfeeding, the infant's nutritional requirements increase and breastmilk alone will not be sufficient as the sole source of nutrients. Therefore, at 6 months after birth, the introduction of complementary foods such as solid,

semi-solid and soft foods is mandatory. Moreover, and based on this, three indicators were developed which together would ensure an optimal growth and health for babies between 0 to 24 months (WHO, 2014):

The minimum dietary diversity: it refers to children between 6-23.9 months of age who receive foods from 4 or more food groups from a total of 7. The food groups include: 1. Grains, roots and tubers; 2. Legumes and nuts; 3. Dairy products (milk, yogurt, cheese); 4. Flesh foods (meat, fish, poultry and liver/organ meats); 5. Eggs; 6. Vitamin A rich fruits and vegetables; 7. Other fruits and vegetables.

Minimum meal frequency (%): it refers to breastfed and non-breastfed children 6-23.9 months of age who receive solid, semi-solid, or soft foods or milk feeds the minimum number of times or more, which is: 2 times for breastfed infants between 6 and 8 months; 3 times for breastfed children between 9 and 23 months; and 4 times for non-breastfed children between 6 and 23 months.

The minimum acceptable diet: it is a combination of both the minimum meal frequency and the minimum dietary diversity. This indicator will guarantee that the child will get the first 2 indicators.

G. Factors that influence Breastfeeding

Starting with the mother's age, multiple studies have shown that older women initiate breastfeeding, breastfeed for longer periods of time, and exclusively breastfeed in comparison to younger ones (Novotny e*t al.* 2000; Gudnadottir *et al.* 2006; Al Shehri *et*

*al.*1995; Arora *et al.* 2000; Bulk-Bunschoten *et al.* 2001). Moreover, mother's education has a major impact on breastfeeding practices. In developed countries, educated women came back to breastfeeding, while in developing countries where the incidence of educated mothers is lower, bottle-feeding remains higher (Rogers *et al.* 1997; Lande *et al.* 2003). Other studies also indicate that mothers who work are more likely to have a shorter breastfeeding duration and earlier weaning initiation (Novotny *et al.* 2000; Pechlivani *et al.* 2005), especially when the mother returns to work in less than 3 months after childbirth (Guendelman *et al.* 2009). It was proposed that a paid maternity leave for a longer period could enhance the duration of breastfeeding (Calnen, 2007). Moreover, hospital practices during the hospital stay could affect the success of breastfeeding and the duration and exclusivity of breastfeeding (Abrahams & Labbok, 2009). Likewise, if the infant stays all the time with his/her mother after his birth, it would encourage breastfeeding initiation and would increase its duration (Dennis, 2002). Breastfeeding problems, caesarian section, and nipples problems could affect the initiation, exclusivity and duration of breastfeeding (Cernades *et al.* 2003; wambach *et al.* 2005; McLeod *et al.* 2002). Furthermore, women found that health professionals' advice regarding breastfeeding practices is very useful for them to initiate, exclusively breastfeed, and increase the duration (Sheehan *et al.* 2009; Mclnnes & Chambers, 2008). Otherwise, the lack of information can lead to a discontinuation of breastfeeding and early weaning (Lewallen *et al.* 2006; Taveras *et al.* 2004). Other than health professionals' support, there is also the social support which comes from spouse, friends and family members; this was found to be very effective as it influenced the success of initiation of breastfeeding and prolonged its duration (Britton, 2007; Baranowski *et al.* 1983).

H. History of infant feeding practices

1. Developed countries

Until the 19th century, approximately all children were breastfed. Therefore, in a situation in which a mother can't breastfeed, the solution was to find a wet nurse. So breastfeeding was the main practice and any problem regarding human milk availability was resolved by looking for another breastfeeding woman not for another kind of milk (Sokol *et al.* 2007).

With the industrial revolution, women started to work and were obliged to be absent for a longer period of time. That's why breastfeeding was no longer suitable for their new lifestyle (Berg & Brems, 1989). At the beginning of the 20th century, infant formula started to be promoted as a more practical product for the mother and more beneficial for the infant (Greer & Apple, 1991). As a result, the number of mothers from developed countries who breastfed decreased significantly for several reasons: huge promotion of bottle feeding for infants; inadequate health professionals' knowledge about techniques and benefits of breastfeeding; lack of social and family support; lack of baby friendly hospitals and inadequate hospital practices; increase in number of working mothers (Wright, 2001; Labbok, 2007).

2. Developing countries

In the late nineteenth century, infant formula manufacturers raised their attention to developing countries where birth rates are high (Sokol *et al.* 2007). Because most mothers were of low educational status and of low socio-economical background, there were high risks of contaminations and use of diluted formula, and ultimately a significant

increase in morbidity and mortality rate especially because of malnutrition, pneumonia and gastrointestinal disease (Clavano, 1982; Hunter, 1996). Eventually, the use of infant formula in developing countries significantly increased the risk of infant deaths (Leon-Cava *et al.* 2002; Parashar *et al.* 2003). Many studies concluded that the perfect food for infants is breastmilk, indicating that it's a complete meal that contains all the essential nutrients the baby's body needs as well as antibodies the baby's immune system requires (Jelliffe, 1977). In 1998, UNICEF realized that a child who is formula-fed is more likely to die of diarrhea and pneumonia than a breastfed child especially if they are both exposed to an unhygienic environment.

I. Infant and young child feeding practices in the world:

In South Africa, there is a high proportion of early initiation of breastfeeding (88%); however, almost half the rate was found in Kenya (40%). Exclusive breastfeeding was found to be very low in both countries with the early introduction of complementary foods (Sibeko e*t al.* 2005, Kimani- Murage *et al.* 2011). Exclusive breastfeeding in many African countries was low: 30% in Mozambique; 38% in Mali; 19% in Congo; and 2 % in Chad (WHO, Unicef 2010). Moreover, early initiation of breastfeeding didn't exceed 50%, with 44% in Mali, 34% in Congo, and 32% in Chad (WHO, Unicef 2010). Complementary feeding indicators were also inadequate in many African countries such as Madagascar, Ghana, Ethiopia, and Mali (WHO, Unicef 2010).

Many studies were also conducted in Europe and America. The rate of infants who were breastfed varied a lot between OECD countries (Organization for Economic

Co-operation and Development), going from less than 70% in France up to 100% in Norway and Denmark (www.oecd.org/els/social/family/database). Furthermore, a significant variability concerning the time of introduction of complementary foods was shown in different countries. Some were markedly before 6 months or delayed a lot after 6 months (Agostoni *et al.* 2007). In the USA, the FIT study indicated a high rate of 0 to 2 year old children being breastfed and not introduced to complementary foods before 6 months of age (Fox et al.2004). Friel *et al.* (2010) studied the introduction of complementary food intake during the 1st year of age in children in Canada. Infants were getting adequate Macro and Micronutrient intake excluding Iron and Vitamin D. However exclusivity of breastfeeding before 6 months wasn't adequately achieved as the initiation of complementary feeding was earlier than the recommendation (Friel *et al.* 2010). Ninety one per cent (91%) of Mexican children were breastfed, while 43% are breastfed until 1 year of age. Infants between 6 and 8 months who received semi solid or solid foods were 91%, hence 77% between 6 and 23 months old children could meet the minimum dietary diversity (Flores-Huerta *et al.* 2012). Latin-american countries showed low rates of exclusive breastfeeding until 6 months, with 47% in Colombia, 30% in Honduras, and 8% in the Dominican Republic (World Health Organization, Unicef 2010); complementary feeding indicators were more favourable than those in Asian and African countries (World Health Organization, Unicef 2010).

Several studies were also conducted in Asia to investigate infant feeding practices. Unacceptable levels were shown in Bangladesh especially that only 42.5% of children below 6 months of age were exclusively breastfed (Mihrshahi e*t al.* 2010); however, only 39.6% of children were receiving the minimum acceptable diet (Kabir *et*

al. 2012). Initiation of breastfeeding in Pakistan in 2006-2007 during the first hour of birth was shown to be 27.2%, with 37.1% exclusive breastfeeding. However, introduction of solid foods was acceptable (Hanif *et al.* 2011). The time of introduction of semi-solid, soft and solid foods was 87.3% in Indonesia; the minimum meal frequency was significantly decreasing with age while more than half of the children were having adequate minimum dietary diversity, and as a consequence the minimum acceptable diet was met by a low rate of infants (44.9%) (Ng *et al.* 2011). In Nepal, 70% of children between 6 and 8 months were having soft, semi-solid and solid foods; the minimum dietary diversity was met by 33.3% of children between 6 and 23 months, 82% for the one who achieved the minimum meal frequency and 32% only received the minimum acceptable diet (Joshi *et al.* 2012).

The MENA region is having a wide nutrition and demographic transition in addition to an increased risk of diseases (Antinmo *et al.* 2009). The most important health problem that basically leads to infant and young child mortality is malnutrition (15%) (WHO, 2009). However, the prevalence of overweight, obesity, and chronic diseases is increasing at a serious rate (Antinmo *et al.* 2009). Since the most sensitive groups are infants and young children, the importance of infants and young children feeding practices and nutritional status is highlighted. Therefore, there were several studies that explored infant and young child feeding practices. Five hundred and ninety three (593) infants were studied in United Arab Emirates from which 80.6% received early initiated breastfeeding, while only 1.9% had exclusive breastfeeding for 6 months. Flu water was given to 15.3% of the infants while herbs like yansoun for 10.1% of the infants. Eighty three point five percent (83.5%) were given solids before the age of 6 months (Radwan,

2013). In the year 2000, 85% of Omani infants received early initiated breastfeeding; however, 33% in 2005 were exclusively breastfed till the age of 3 months. Furthermore, solid foods were introduced to 50.86% of 5-month-old children, and 89.4% for 7 month old children (Alasfoor *et al.* 2005). Ninety five point one percent (95.1%) of Bahraini kids were breastfed; however, only 10% were exclusively breastfed (Al-Sairafi e*t al.* 2002). The 2007 UNICEF report declared that during the period between 2000 and 2006 in MENA region, 28% of infants up to 6 months were exclusively breastfed. In Iran, 57% were exclusively breastfed until 4 months and 28% until 6 months of age (Olang *et al.* 2009). Eighteen point three percent (18.3%) of Lebanese mothers started breastfeeding within half an hour after childbirth, while 55.9% started within few hours. Exclusive breastfeeding rate was: 52.4% up to one month, 23.4% up to 4 months, and 10.1% up to 6 months of age. Solid foods were introduced before 4 months to 21.9% of infants (Batal *et al.* 2005). Early introduction of complementary foods was shown to be at its highest proportions in KSA (81.5%), Iraq (78.6%), UAE (70%) and Lebanon (52.9%), whereas Bahrain and Oman introduced complementary foods to infants at an adequate age (Nasreddine *et al.* 2012).

In Lebanon, a country where the prevalence of obesity was found to be double what it used to be in the past decade (Nasreddine *et al.* 2012), and where NCDs represent the main cause of mortality (Mehio Sibai *et al.* 2010), data on infant and young children feeding practices is lacking. Given that early nutrition, feeding practices, and their association with the risk of overweight/obesity and NCD development constitute a crucial area of research, this study comes as a holistic approach addressing key determinants of young child's nutritional status, and laying the ground for intervention strategies to

prevent future-development of chronic non-communicable diseases. The study would specifically aim at investigating infant and young child overweight and obesity, infant and young child stunting, wasting and underweight (as rapid catch up growth may increase the risk of later obesity), and their association with socio-demographic, dietary and lifestyle characteristics.

CHAPTER III

MATERIALS AND METHODS

A. Study Design

This is a cross-sectional study based on data collected as part of the national project entitled "Early Life and Health in Lebanon" (ELNAHL) that was conducted on a representative sample of 0-5 years old children and their mothers. More precisely, this study focuses on the 0-2 year old population (n=478) and their mothers.

A culture specific multi-component questionnaire was used for the collection of socio-demographic, economic, lifestyle, dietary data (nutrient intake, child dietary practices and feeding patterns), infant feeding practices (breastfeeding and complementary feeding), the eating environment, and anthropometric characteristics. The questionnaire was pilot-tested and edited. This multi-component questionnaire was administered to participating mothers by trained nutrition survey teams through face-to-face interviews. Study participants were informed of the purpose of the study and were assured confidentiality. Consent forms were filled by all mothers participating in the study.

B. Study Population

In the ELNAHL project, a nationally representative sample of under-five children of both sexes was drawn from randomly selected households based on a stratified cluster sampling. The strata were the Lebanese governorates where the clusters were selected further at the level of districts and urban/rural areas. Housing units

constituted the primary sampling units in the different districts of Lebanon. Based on a prevalence of 10.1% of exclusive breastfeeding until 6 months of age (as published by de Batal et al. 2006), a sample of 543 under-two children was needed to assess the prevalence of exclusive breastfeeding with a 2.5% error and a 95% confidence interval. The geographical sample distribution is shown in Table 1.

Table 1: Geographical distribution of the study sample in ELNAHL project, assuming a sample size of 1030 subjects

Geographical Area	**Population Distribution (%)***	**Number of subjects for the national survey**
Beirut	7.7	79
Beirut Suburbs	20.6	212
Mount Lebanon (Excl. Beirut Suburbs)	8.2	85
Akar, El-Menieh, El-Dinyeh	19.9	205
North Lebanon (Excl. Akar, El-menieh, El-Dinyeh)	10.2	105
Baalbak and El-Hermel	6.5	67
Beqaa (Excl.Baalbak and El-Hermel)	5.8	60
South Lebanon	14	144
Nabatyeh	7.1	73
Total	100	1031

* CAS and UNICEF: State of the Women and Children in Lebanon, 2009

Participants were recruited from the household unit from the six governorates of Lebanon according to the following criteria.

Mothers:

- *Inclusion Criteria:* Lebanese mothers within the age range of 19 and 40 years old, absence of hypertension and diabetes, not taking medications that may interfere

with eating and breastfeeding patterns or affect body weight, and having a healthy child between 0-5 years old, of gestational age at birth ≥ 37 weeks.

- *Exclusion Criteria:* history of chronic illness and use of medications that may interfere with eating and breastfeeding patterns or body composition.

Children:

- *Inclusion Criteria:* generally absence of chronic illness, inborn errors of metabolism, physical malformations that may interfere with feeding patterns and body composition within the age range of birth up to 5 years old, born at term (of gestational age at birth ≥ 37 weeks).
- *Exclusion Criteria:* history of chronic illness, presence of inborn errors of metabolism or physical malformations, or use of medications that may interfere with feeding patterns and body composition.

C. Ethics

This study was approved by the Institutional Review Board of the American University of Beirut. The questionnaire, the written consent form and the oral recruitment script were approved by the IRB. Every household that was chosen was informed about the study as written in the oral script. The mother was asked to read the consent form and sign it prior to starting the interview. For those who were illiterate, they were informed about the study orally by the interviewer in the presence of a witness and both the witness

and the mother were asked to sign on the consent form. Every household received a gift for the baby and a nutrition education manual.

D. Survey Instrument and Study Procedure

The questionnaire development was based on a thorough review of the literature and includes indicators proposed by the World Health Organization (WHO), Cooke et al. (2004), Wardle et al. (2001), Lakkaula et al. (2008), Skinner et al. (2002), Rockett and Wolf (1995) and Wilson, Magarey and Mastersson (2008). The different components of the questionnaire include:

- Household demographic including socio-demographic background, current and future family planning, general information about the child, access to infant nutrition services.
- Breastfeeding practices
- Complementary feeding practices including liquids other than breast milk, solid, semi-solid and soft foods.
- 24-hour recalls of the child
- Child feeding practices including eating environment, feeding practices.
- Lifestyle of the mother including smoking history, alcohol consumption and physical activity.
- Maternal knowledge related to breastfeeding.
- Anthropometric measurements of the child and the mother.
- 24-hour recall of the mother.

E. Anthropometric Measurements

Anthropometric measurements were obtained from subjects and interpreted as follows.

1. Mothers

Height: Height was measured to the nearest 0.5 cm with the person bare footed, using a wall-mounted stadiometer. Measurements were taken twice and repeated a third time if the first two measurements differed by more than 0.5 cm.

Weight: Weight was measured, after voiding, to the nearest 0.1 kg with the person in light clothes and bare footed, using a standard clinical balance (Seca balance) (Seca model 11770 Germany). Measurements were taken twice and repeated a third time if the first two measurements differed by more 0.3 kg.

BMI was calculated as weight (kg)/height (m^2) and interpreted according to the [†]WHO criteria as follows:

- *Moderate and severe underweight*: BMI < 17.0 kg/m^2
- *Underweight:* BMI < 18.5 kg/m^2
- *Normal weight:* BMI= 18.5–24.9 kg/m^2
- *Overweight:* BMI= 25.0- 29.9 kg/m^2
- *Obesity:* BMI ≥ 30.0 kg/m^2

2. Children

Mid-upper arm circumference (MUAC): was measured using a calibrated plastic strip at the mid-point between the elbow and the shoulder (acromion and olecranon) of the left arm with the arm being relaxed and hanging down the side of the body). The MUAC was

recorded to the nearest 0.1 cm. Measurements were taken twice and the average of the 2 values was used. Based on MUAC, values < 110 mm are indicative of severe under-nutrition, values between 110 and 120 mm indicate moderate malnutrition, values between 120 and 125 mm indicate a serious risk of under-nutrition, values between 125 and 135 mm indicate a moderate risk of under-nutrition while values ≥135 mm indicate a satisfactory nutritional status (*FAO, Food Security Information For Action, http://www.foodsec.org).*

Head Circumference (infants and young children < 2 years old): was measured using a flexible, non-stretchable measuring tape. The infant/young child was placed in a sitting position in the lap of the caregiver. The lower edge of the measuring tape was placed just above the child's eyebrows, above the ears and around the occipital prominence at the back of the head, to allow the measurement of the maximal head circumference. Measurements were taken twice or until two measurements agree to 0.1 cm (1/8 in). For head circumference, values that are <3rd percentile for age or > 97th percentile for age are both indicative of health or developmental risk (WHO, 2007).

Length (for infants and young children < 2 years old): was measured by placing the measuring board horizontally on a flat, level surface. The young child's shoes and any head covering was removed and the child was placed so he/she is lying down with the head positioned until it touches the head board, the knees held together while being pressed down, and the soles of the feet being flat on the foot piece, toes pointing up at right angles. Length was measured to the nearest 0.1 cm.

Weight (for infants and young children <2 years old): was measured using an electronic pan-type pediatric scale that is accurate to within 10 g (0.1 kg). All clothing including the

diaper were removed and the infant/young child was placed in the center of the weighing surface. The measurement was read to the nearest 10 g (0.1 kg). The measurements was repeated two times and the average value was used. Measurements were interpreted based on the WHO Global Database on Child Growth and Malnutrition (WHO, 2007):

- *Severe under-nutrition* (classified by severe wasting, stunting and underweight): defined as Z-score cut-off point of < -3
- *Moderate and severe under-nutrition* (classified by low weight-for-age (underweight), low height-for-age (stunted) and low weight-for-height (wasted)): defined as Z-score cut-off point of < -2
- *At risk of overweight* (classified as weight-for- height): defined as: Z-score cut-off point of > +1
- *Overweight* (classified as weight-for- height): defined as: Z-score cut-off point of > +2
- *Obese* (classified as weight-for- height): defined as: Z-score cut-off point of > +3

BMI was calculated as weight (kg)/height (m^2) and interpreted as follows:

- *Severe underweight:* is defined as sex and age-specific -3 BMI z-scores
- *Underweight:* is defined as sex and age-specific -2 BMI z-scores
- *Overweight*: defined as sex and age-specific +1 BMI z-score
- *Obesity:* defined as sex and age-specific +2 BMI z-scores

Other variables of interest that were collected/interpreted include:

- *Infant and Young Child Feeding Indicators* (WHO, 2010; WHO, 2002; APA, 2005): initiation of breastfeeding, exclusive breastfeeding for 6 months, continued breastfeeding at 1 year, duration of breastfeeding, introduction of solid, semi-solid or soft foods, minimum dietary diversity, minimum meal frequency, minimum acceptable diet and continued breastfeeding after 2 years,

- *Others:* Eating habits and dietary adequacy (consumption of breakfast and snacks, breakfast quality, snack quality).

F. Statistical Analysis

Statistical analysis was performed using the Statistical Analysis Package for Social Sciences (SPSS, version 18.0) and with the level of significance set at $p<0.05$. Frequencies and descriptive statistics were performed for the general variables and also to determine prevalence of overweight and obesity; stunting wasting and underweight; breastfeeding; anthropometric variables as well as maternal lifestyle patterns. Chi-squared test was used to compare the categorical variables in the study as well as conducting t-tests to compare the continuous variables as the mean differences. Regression analyses were used to assess the association between breastfeeding, exclusive breastfeeding and obesity in infants and young children under 2 years old. In addition, logistic regression was used to examine the association between breastfeeding and socio

demographic characteristics with analyses represented as odds ratios and 95 % confidence intervals.

CHAPTER IV

RESULTS

A. Descriptive Characteristics of the Study Population

Socio-demographic, parental and household characteristics of the 478 subjects included in the study are shown in Table 2. Mean age of the mothers was 29.96 ± 6.29 years. For the majority of participants, the mother was married (99.8%), unemployed (69.5%) and living in an owned house (59.2%). Mothers were distributed between those with less than a high school degree (9.2%), those who attained a high school degree (66.7%) and those with a university degree (24.1%). Additionally, fathers were distributed between those with less than a high school degree (18.2%), those who attained a high school degree (66.6%) and those with a university degree (15.2%). The majority of the fathers were government employee and private sector employee (61.2%). The households showed high levels of crowding, where 84.9% of the households had a crowding index greater than 1. Similarly, around one quarter of the households had a monthly family income between 600,000 and 1 million Lebanese Lira (25.2%). It was found that 17.2% of the sample population had a paid helper and 76.6% owned a car. Moreover, the majority of households had 1-2 children (62.3%).

Table 2: Sociodemographic, parental and household characteristics of a national sample of Lebanese infants and young children less than 24 months old, according to gender (n=478).

	Total (n= 478)	Boys (n=236)	Girls (n=242)	P value
	Mean ± SD			
Mother's age (years)	29.96 ± 6.29	29.85±6.00	30.08±6.59	0.376
Child's age (months)	12.03 ± 6.97	12.14±7.23	11.92±6.72	0.775
	N (%)			
Mother's education				
Primary school or less	44 (9.2)	23(9.7)	21(8.7)	0.418
Intermediate school, High school and technical diploma	319 (66.7)	150(63.6)	169(69.8)	
University degree	115 (24.1)	63(26.7)	52(21.5)	
Mothers who specialized in a health-related major	25 (5.2)	14(5.9)	11(4.5)	0.497
Mothers' employment status				
Employed	146 (30.5)	78(33.1)	68(28.1)	0.054
Housewife	332 (69.5)	158(66.9)	174(71.9)	
Type of mother's work (n=106)				
Government employee	18 (17.0)	8(14.8)	10(19.2)	0.103
Private-sector employee	59 (55.7)	36(66.7)	23(44.2)	
Self-owned business	29 (27.4)	10(18.5)	19(36.5)	
Father's education				
Primary school or less	86 (18.2)	51(21.8)*	35(14.6)*	0.015
Intermediate school, High school and technical diploma	315 (66.6)	141(60.3)	174(72.8)	
University degree	72 (15.2)	42(17.9)	30(12.6)	
Type of father's work (459)				
Government employee	120(26.1)	55(24.4)	65(27.8)	0.420
Private-sector employee	172(37.5)	85(37.8)	87(37.2)	
Self-owned business	167(36.4)	85(37.8)	82(35.0)	
The house that you live in is				
Self-owned	282(59.2)	147(62.3)	135(55.8)	0.066
Other	196(41.0)	89(37.7)	107(44.2)	
Crowding index				
>=1 person/room	406(84.9)	204(86.4)*	202(83.5)*	0.042
<1 person/room	72(15.1)	32(13.6)	40(16.5)	
Number of children in the family				
1-2	298(62.3)	148(62.7)*	150(62)*	0.045
3-5	159(33.3)	83(35.2)	76(31.4)	
>5	21(4.4)	5(2.1)	16(6.6)	
Type of school children attend (n=170)				
Private school	143(84.1)	61(83.6)	82(84.5)	0.077
Public school	22(12.9)	10(13.7)	12(12.4)	
Both	5(2.9)	2(2.7)	3(3.1)	
Infants who attend day-care	14(2.9)	8(3.4)	6(2.5)	0.420
Does the household own a car				

No	112(23.4)	59(25.0)*	53(21.9)*	0.016
Yes	366(76.6)	177(75.0)	189(78.1)	
Do you have a paid helper?				
No	395(82.8)	196(83.4)	199(82.2)	0.102
Yes	82(17.2)	39(16.6)	43(17.8)	
Monthly income				
<600,000 L.L.	46(9.6)	26(11.1)*	20(8.3)*	0.016
600,001-1,000,000 L.L.	120(25.2)	66(28.1)	54(22.3)	
1,000,001-1,500,000 L.L.	96(20.1)	50(21.3)	46(19)	
1,500,001-2,500,000 L.L.	60(12.6)	27(11.5)	33(13.6)	
2,500,001-3,000,000 L.L.	10(2.1)	3(1.3)	7(2.9)	
>3,000,000 L.L.	47(9.9)	22(9.4)	25(10.3)	
Does not know	59(12.4)	23(9.8)	36(14.9)	
Refused to answer	39(8.2)	18(7.7)	21(8.7)	

* significance at $p<0.05$

B. Infant Feeding practices

1- Breastfeeding

The proportion of infants and young children who, at the interview date, were still breastfed is shown in Table 3. From the 0-24 months old children, only 34.8% were still breastfed at the interview date. The prevalence of breastfeeding decreased from 75.4% in infants aged less than 4 months to 58.1% in infants aged 4-5.9 months, to 39.7% in 6-12 months old infants, reaching as low as 7.9% in 18-23 months old children (Table 3).

Table 5 summarizes feeding practices in Lebanon, based on mothers' recall of these practices. The percentage of infants ever breastfed was high (88.5%). But only 27.5% of infants met the WHO recommendations for exclusive breastfeeding until 6 months of age. The mean duration of breastfeeding was 4.88±4.54 months and the mean duration of exclusive breastfeeding was only 2.64±1.96 months. Around 72.5% of infants received formula milk at less than 6 months and 48.3% at less than 4 months of age. The mean age of introduction of formula milk was 1.00 ± 1.62 months. Nearby 10.5% of infants received solid or semi solid foods at less than 4 months and 45.4% at less than 6

months of age. The mean age of introduction of solid, semi solid foods was 5.00 ±1.65 months

Table 3: Proportion of Infants Being Breastfed at the Interview Date by Age Group

Age group in months of infants being breastfed at the interview date (n)	**Proportion being breastfed N (%)**
0 – 3.9 (n=61)	46 (75.4)
4 – 5.9 (n=31)	18 (58.1)
6 – 11.9 (n=136)	54 (39.7)
12 – 17.9 (n=78)	19 (24.3)
18 – 22.9 (n=88)	7 (7.9)
> or = 23 (n=22)	1 (4.5)
0-24 months (n=416)	**145 (34.8)**

Table 4: Proportion of Infants Being Exclusively Breastfed at the Interview Date by Age Group

Age group in months of infants being breastfed at the interview date (n)	**Proportion being exclusively breastfed N (%)**
0 – 1 (n=19)	7 (36.6)
1.1 – 4 (n=52)	9 (17.3)
4.1 – 6 (n=32)	5 (15.6)
0-6 months (n=103)	**21 (20.4)**

Table 5: Proportion of breastfed children, mean duration of breastfeeding and exclusive breastfeeding and mean age of introduction of formula milk and solid or semi-solid food, according to the gender (n=478).

Characteristics	Total (N= 478)	Boys (n=236)	Girls (n=242)
	N (%)		
Children who were ever breastfed	423(88.5)	208(88.1)	215(88.8)
Proportion of children who were exclusively breastfed for 4 months	160(33.5)	78(33.0)	82(33.8)
Proportion of children who meet the WHO recommendations for exclusive breastfeeding until 6 months	131(27.5)	60(25.4)	71(29.3)
Proportion of mothers introducing solid or semi-solid foods before 4 months	50(10.5)	26(11.0)	24(9.9)
Proportion of mothers introducing solid or semi-solid foods before 6 months	217(45.4)	106(44.9)	111(45.9)
Proportion of children receiving formula milk at <4 months	231(48.3)	113(47.9)*	118(48.8)*
Proportion of children receiving formula milk at <6 months	347(72.5)	176(74.6)	171(70.7)
Proportion of children receiving baby cereals in the bottle of the infant formula	75(22.7)	31(18.8)	44(26.7)
Proportion of children receiving other foods (such as sugar and honey) in the bottle of the infant formula	7(2.1)	5(3.0)	2(1.2)
Child takes vitamins or minerals supplements	195 (40.8)	101 (42.8)	94 (38.8)
	Mean±SD		
Mean duration of breastfeeding (months)	4.88±4.54	4.65±4.58	5.12±4.49
Mean duration of exclusive breastfeeding (months)	2.64±1.96	2.29±1.84	2.74±2.08
Mean age of solid or semi-solid food introduction (in months)	5.00±1.65	4.99±1.61	5.00±1.68
Mean age of introduction of formula milk (in months)	1.00±1.62	0.98±1.66	1.01±1.59

* significance at $p<0.05$

a. Assessment of Breastfeeding Practices based on the WHO breastfeeding indicators.

Breastfeeding practices based on the WHO indicators are shown in Table 6 and figure 1. These indicators are based on a 24hour recall of infants and young child feeding practices in specific age groups as shown in Table 6. Early initiation of breastfeeding was applied by only 25.7% of mothers. While the primary reason for choosing not to breastfeed was because of problems with milk production (51.8%), the most common reason for breastfeeding was the health benefits for the baby (93.8%) (Table 7). Only 20.4% of infants aged less than 6 months were exclusively breastfed according to the WHO indicator. At 1 year, 20.8% of the children were still being breastfed whereas barely 5.6% of those who reached 2 years were still being breastfed.

Table 6: Proportion of Lebanese infants and young children less than 24 months meeting the WHO Breastfeeding Indicators.

Breastfeeding Indicators (N)	**N (%)**
Indicator 1[a]: Early Initiation of Breastfeeding (478)	123 (25.7)
Indicator 2[b]: Exclusive Breastfeeding (103)	21 (20.4)
Indicator 3[c:] Continued Breastfeeding at 1 year (72)	15 (20.8)
Indicator 9[d]: Children ever Breastfed (478)	423(88.49)
Indicator10[e:] Continued breastfeeding at 2 years (90)	5 (5.6)

[a]Proportion of children born in the last 24 months who were put to the breast within one hour of birth.
[b]Proportion of infants 0 – 5 months of age who are fed exclusively with breast milk.
[c]Proportion of children 12 – 15 months of age who are fed breast milk.
[d]Proportion of children born in the last 24 months who were ever breastfed.
[e]Proportion of children 20 – 23 months of age who are fed breast milk.
Based on the 24h recall as per WHO recommendations (WHO,2007)

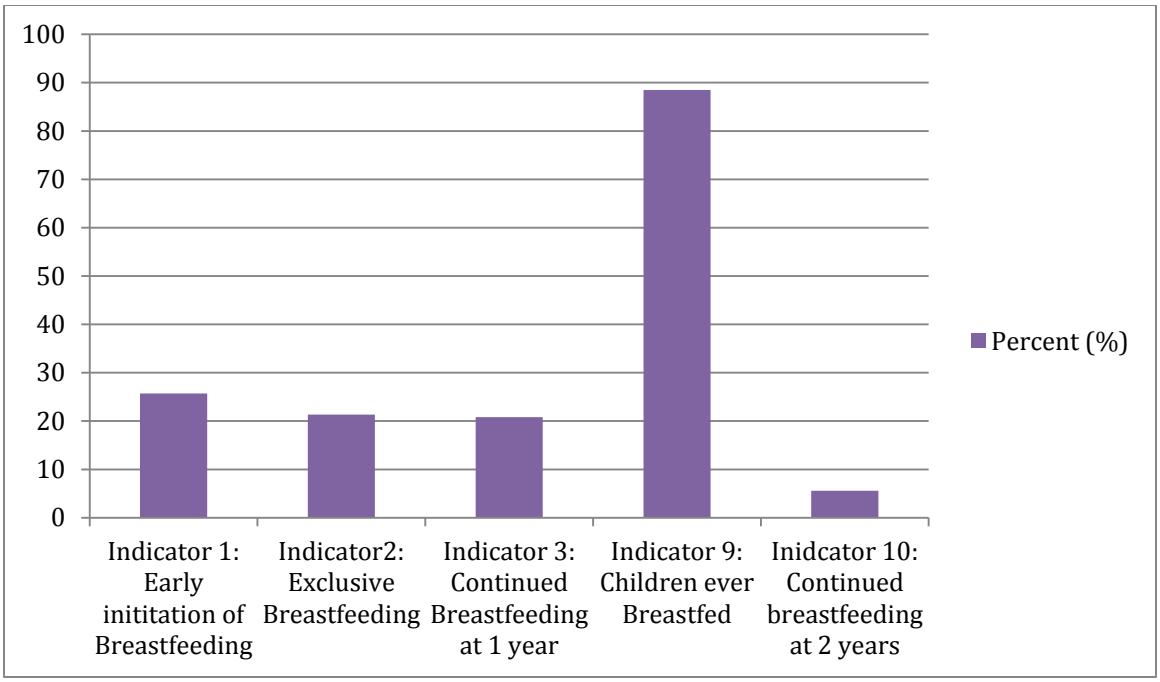


Figure 1: Proportion of Infants 0 - 24 months of Age in Lebanon Meeting the WHO Breastfeeding Indicators

Table 7: Reasons behind initiation of breastfeeding introduction and cessation of breastfeeding in a national sample of infants and young children less than 24 months.

Variable	N	Total	Boys	Girls
		N (%)		
Primary reasons for not breastfeeding	55			
1. Problems with milk production		29(51.8)	14(50.0)	15(53.6)
2. Baby didn't accept the breast		10(18.2)	5(18.5)	5(17.9)
3. Medical problems		12(21.8)	6(22.2)	6(21.4)
4. Others*		18(34.6)	11(42.3)	7(26.9)
Reasons for breastfeeding	420			
1. Health benefits for the baby		395(93.8)	195(94.2)	200(93.5)
2. Health benefits for the mother		150(35.9)	73(35.6)	77(36.2)
3. Doctor's advice		112(26.7)	53(25.7)	59(27.6)
4. Previous breastfeeding experience		71(16.9)	29(14.1)	42(19.6)
5. Others**		87(20.8)	37(18.0)	50(23.5)

Primary reasons for stopping breastfeeding				
1. Problems with milk production	273	130(47.6)	69(51.1)	61(44.2)
2. Child's age		21(7.7)	8(5.9)	13(9.4)
3. Tiredness and fatigue		32(11.7)	14(10.4)	18(13)
4. Insufficient supply of milk to adequately satisfy the baby		76(27.8)	39(28.9)	37(26.8)
5. Need help with feeding her baby		32(11.7)	15(11.1)	17(12.3)
6. Lack of sleep		13(4.8)	4(3.0)	9(6.5)
7. Promotion of infant formula feeding at hospital/clinic		7(2.6)	6(4.4)	1(0.7)
8. I had to work		19(7)	12(8.9)	7(5.1)
9. Others***		121(44.3)	57(42.2)	64(23.4)

*other reasons include: sense of embarrassment, tiredness and fatigue, need help with feeding the baby, lack of sleep, lack of breastfeeding friendly public places, lack of support from husband, promotion of infant formula feeding at the hospital/clinic.

** Other reasons for breastfeeding include: high formula cost, family advice.

***other reasons include: sense of embarrassment, pain or discomfort when breastfeeding (mastitis), lack of breastfeeding-friendly public places, lack of support from husband, lack of family support, lack of support from friends, medical problems, don't like breastfeeding, baby didn't accept the breast, mother was sick, subsequent pregnancy…

2. Feeding practices

a. Liquid introduction

Mean age of introduction of specific type of complementary liquids as well as the proportion of infant's receiving complementary food at age less than 6 months, are shown in Table 8. About 46.0 % of these infants received liquids including anis, tea, chamomile, caraway and others at age less than 6 months. Water with added sugar and rose water were introduced at age less than 6 months in 21.1% of these infants, while 72.5% of infants aged less than 6 months received infant formulas.

Table 8: Mean age of introduction of complementary liquids and the proportion of infants and young children receiving complementary liquids before 6 months of age and before 4 months of age (n=478).

	Mean Age ± SD (Months)	Proportion of infants receiving complementary liquids at age less than 6 months N (%)	Proportion of infants receiving complementary liquids at age less than 4 months N (%)
Plain Water	3.71±2.58	301(62.9)	198(41.4)
Water with added sugar, rose water..	2.12±3.01	101(21.1)	92(19.2)
Infant formulas such as similac, nestle, Enfamil…	2.08±3.69	347(72.5)	318(66.5)
Milk such as powdered or fresh animal milk	10.39±3.88	10(2.09)	3(62.7)
Juices	8.55±3.76	49(10.2)	9(1.8)
Clear broth, soup	7.15±2.73	49(10.2)	6(1.2)
Yogurt	7.91±3.45	52(10.8)	12(2.5)
Any other drink (such as anis, tea, chamomile, caraway)	2.92±4.11	220(46.0)	193(40.3)
Any other liquids	10.52±5.95	5(1.04)	4(0.8)

b. Semi solid food and solid food introduction

The mean ages of introduction of solid foods as well as the proportion of infants receiving these foods at less than 6 months of age are shown in Table 9. The food group with the lowest mean age of introduction was “baby cereals”, with a mean age of 5.46±1.79 months. Likewise, baby cereals represented the highest proportion of infants receiving it at less than 6 months (30.9%). The food group with the highest mean age of introduction was nuts or seeds with a mean age of 13.53±4.36 months. Similarly, this food group represented the lowest proportion of infants receiving it a less than 6 months (0.4%). The most common reason provided by mothers for the introduction of solid foods was the child being old enough (Table 10).

Table 9: Mean age of introduction of solid food and the proportion of infants and young children receiving solid food before 6 months of age and before 4 months of age(n=478).

	Mean Age ± SD (Months)	Proportion of infants receiving solid food at age less than 6 months N (%)	Proportion of infants receiving solid food at age less than 4 months N (%)
Bread, wheat, burghul, rice, noodles, others made from grains	7.76±3.00	54(11.2)	9(1.8)
Baby cereals	5.46±1.79	148(30.9)	24(5.0)
Carrots, squash or sweet potatoes that are yellow or orange inside	6.56±2.49	92(19.2)	6(1.2)
Potatoes	6.76±2.50	83(17.3)	8(1.6)
Any dark green-leafy vegetables	9.51±3.55	9(1.8)	0
Any other vegetables	9.13±3.62	17(3.5)	1(0.2)
Ripe mangoes, grapefruit, tomatoes, watermelon	10.07±3.83	20(4.1)	2(0.4)
Any other fruit	7.18±3.67	93(19.4)	10(2.0)
Liver, kidney, heart or other organ meats	10.97±4.03	2(0.4)	0
Meats, such as beef, pork, lamb, goat, chicken or duck	9.32±3.41	14(2.9)	2(0.4)
Eggs (whole, egg white, egg yolk)	9.97±3.48	11(2.3)	0
Fresh or canned fish, shellfish or seafood	10.86±3.02	3(0.6)	0
Legumes (beans, chickpeas, lentils etc)	9.43±3.55	11(2.3)	0
Nuts or seeds	13.53±4.36	2(0.4)	8(1.6)
Dairy (labneh, cheese, yogurt, or other milk products)	7.83±3.31	61(12.7)	0
Family foods (stews, stuffed vegetables, etc.)	9.15±3.32	18(3.7)	3(0.6)
Any oil, fats, or butter, or foods made with any of these	9.17±3.34	16(3.3)	5(1.0)
Any sugary foods such as chocolates, candies, pastries, cakes, or biscuits	9.27±3.74	38(7.9)	1(0.2)
Arab sweets	11.60±4.22	4(0.8)	9(1.8)

(baklawa, maamoul, namoura, etc)			
Other arab sweeets (mughleh, rice pudding, custard, cake, etc)	7.95±3.16	42(8.7)	5(1.0)
Jam, jello	9.51±4.209	20(4.1)	24(5.0)
Honey	7.39±4.31	41(8.5)	3(0.6)
Condiments for flavor, such as chilies, spices, or herbs, ketchup, mustard, vinegar, soy sauce, etc.	10.07±3.89	11(2.3)	0
Iron-fortified commercial foods (baby cereals, milk, etc)	7.59±4.95	44(9.2)	24(5.0)

Table 10: Reasons behind solid food introduction in the study sample (n=387).

Variable	Total	Boys	Girls
	N (%)		
Reasons for introducing solid food			
1. Child was old enough	143(37)	62(33.2)	81(40.5)
2. Child was still hungry after milk feeds	95(24.5)	38(20.3)	57(28.5)
3. Tradition in the family	78(20.2)	43(22.9)	35(17.6)
4. Child seemed interested in food	50(12.9)	26(13.9)	24(12)
5. Child was continuously crying	25(6.5)	14(7.5)	11(5.5)
6. Others****	138(35.6)	73(38.8)	65(32.5)

****other reasons include: child was sick, child was not sleeping through the night, child refused milk feeding, subsequent pregnancy, child feeding are incompatible with work schedule, no specific reason.

c. Assessment of complementary feeding practices based on WHO indicators

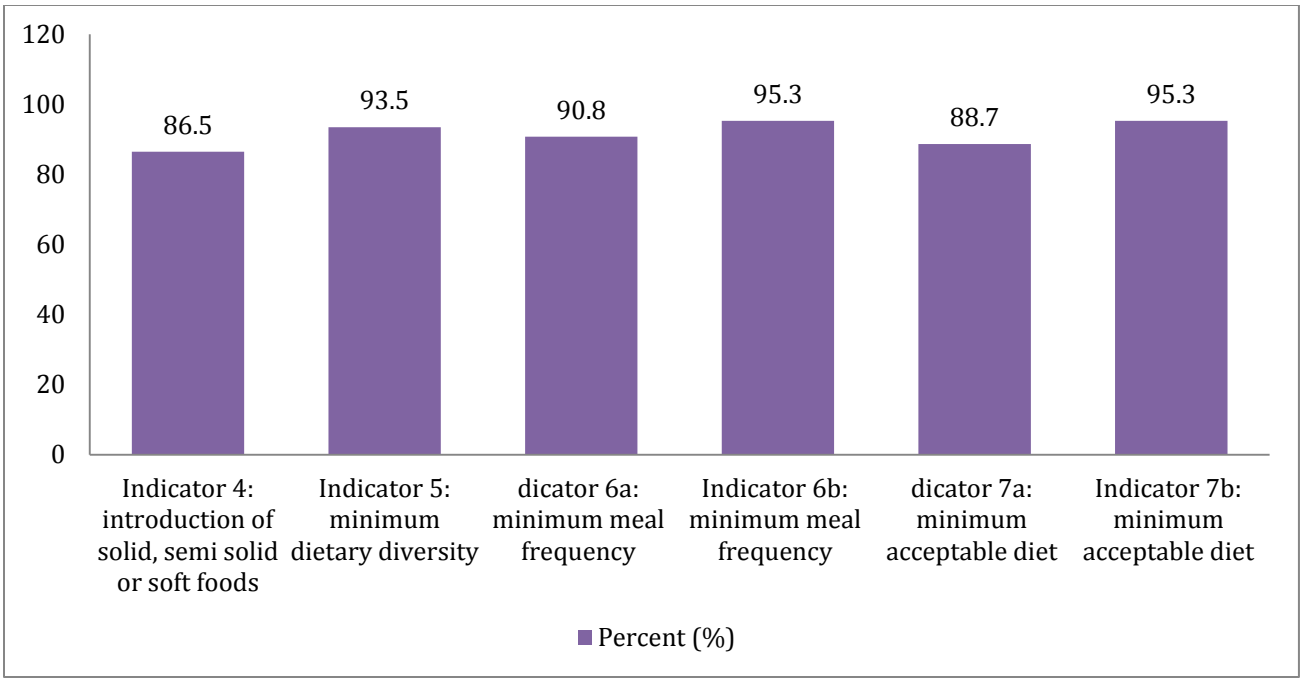
The complementary feeding practices based on the WHO indicators are shown in Table 11 and Figure 2. Accordingly, 86.5% of infants 6-8 months of age were found to be receiving solid, semi solid or soft foods according to the WHO indicator 4. In addition,

93.5% of children between 6 and 23 months of age were found to meet the minimum dietary diversity according to the WHO indicator 5. Similarly, 90.8% and 95.3% of children between 6 and 23 months of age were found to meet the minimum meal frequency for breastfed infants and non breastfed infants respectively. The minimum acceptable diet was found to be met by 88.7% and 95.3% of infants greater than 6 months who were breastfed and non breastfed respectively.

Table 11: Proportion of lebanese Infants and young children 6-24 months meeting the WHO Complementary Feeding Indicators.

Proportion of children meeting the WHO Complementary Feeding Indicators (N)	**N (%)**
Indicator 4[§]: introduction of solid, semi solid or soft foods (74)	64 (86.5)
Indicator 5[†]: minimum dietary diversity (370)	346 (93.5)
Indicator 6[‡a]: minimum meal frequency (327)	297 (90.8)
Indicator 6[‡b]: minimum meal frequency (43)	41 (95.3)
Indicator 7[$a]: minimum acceptable diet (327)	290 (88.7)
Indicator 7[$b]: minimum acceptable diet (43)	41 (95.3)

[§] Indicator4: Proportion of infants 6 – 8 months of age who receive solid, semi-solid or soft foods.
[†] Indicator5: Proportion of children 6 – 23 months of age who receive foods from 4 or more food groups
[‡] Indicator6: Proportion of breastfed and non-breastfed children 6 – 23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.
[$] Indicator7: Proportion of children 6-23 months of age who receive a minimum acceptable diet (apart from breast milk).
a. Breastfed children
b. Non-breastfed children
Based on the 24h recall as per the WHO recommendations (WHO,2007).



a. Breastfed children
b. Non-breastfed children

Figure 2: Proportion of Infants 0 - 24 months of Age in Lebanon Meeting the WHO complementary feeding Indicators

C. Dietary intake and adequacy in infants and young children less than 24 months

1. Mean intakes of food groups, snacks and beverages amongst 0-2 year old Lebanese infants and young children

Based on a short food frequency questionnaire regarding the consumption of main food groups, the mean numbers of servings per day of fruits, vegetables and red meat, fish and poultry were lower than the recommended number of serving per days (Table 12, Figure 3 and Figure 4).

The weekly frequency of the consumption of various types of snacks and beverages among infants and young children less than 24 months is shown in Table 13. It was observed that the mean weekly consumption of biscuits, cookies (4.34±5.23) and Pizza (4.19±6.91) were high among 0-2 year old infants and children.

Table 12: Daily frequency of main food groups consumption among Lebanese infants and young children between 6- 12 months and 12-24 months of age.

	Mean number of servings/day ±SD	
	Children 6-12 months	**Children 12-24 months**
Fruits	1.04±0.76	1.68±1.16
Vegetables	0.75±0.67	1.22±0.94
Breads & cereals	1.14±1.03	2.10±1.25
Red meat, fish, & poultry	0.37±0.67	0.65±0.61
Organ meats (liver, kidney, heart, etc)	0.01±0.04	0.32±0.10
Legumes (lentils, chickpeas, broad beans, etc)	0.21±0.55	0.26±0.26
Nuts (salted/ unsalted)	0.10±0.70	0.17±0.43
Dairy (milk, yogurt, cheese, labneh..)	3.28±2.47	3.92±2.13
Sweets & desserts	0.59±0.78	0.99±1.09

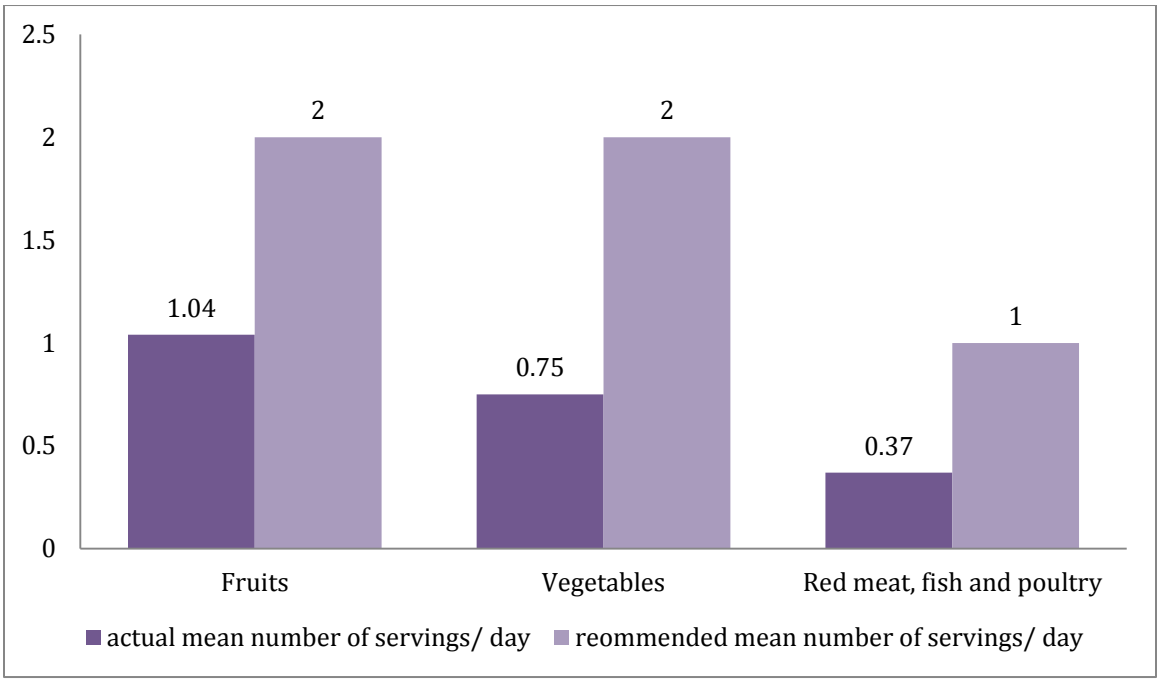


Figure 3: Mean number of consumed servings of fruits, vegetables, red meat, fish and poultry compared to the recommendations in a national sample of 6-12 months old infants and children (nutrition education services/ oregon dairy council, 2009).

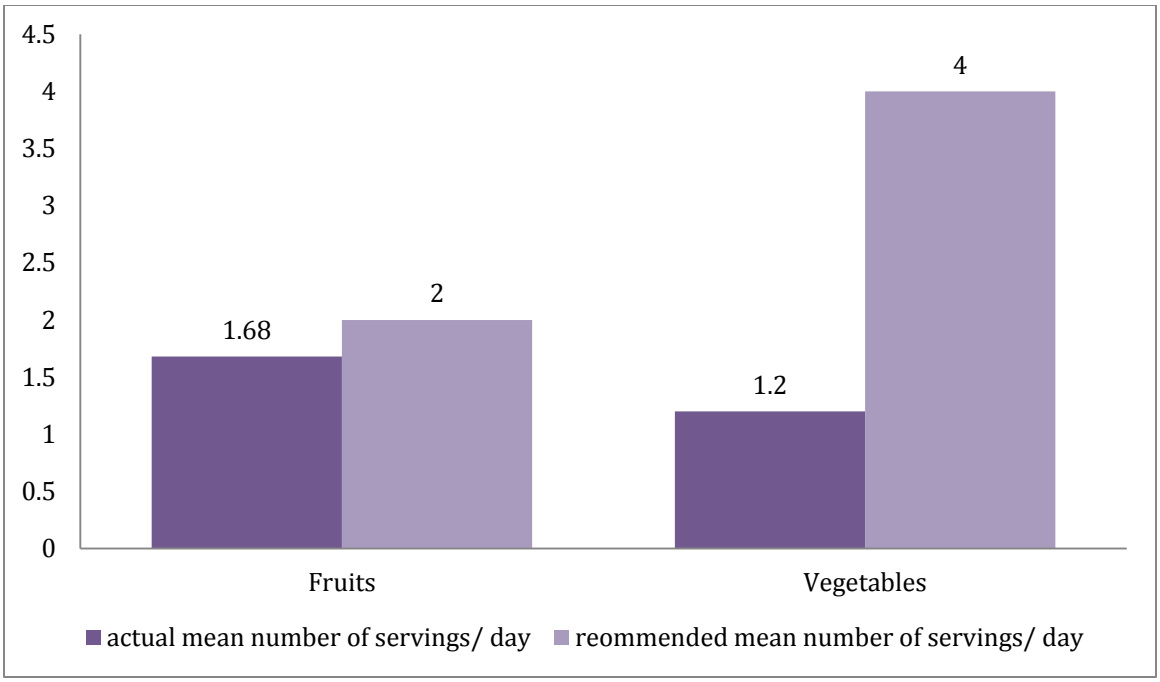


Figure 4: Mean number of consumed servings of fruits, vegetables, red meat, fish and poultry compared to the recommendations in a national sample of 12-24 months old infants and children (nutrition education services/ oregon dairy council, 2009).

Table 13: Frequency of snack and beverage consumption per week in a national sample of Lebanese infants and young children aged 6-24 months according to gender (n=478).

Variable	Total (N= 478)	Boys (n=236)	Girls (n=242)
	Mean ± SD		
Potato chips	2.65±6.62	2.87±7.30	2.44±5.88
Chocolate	2.33±4.04	2.26±4.06	2.40±4.04
Soft lollies, hard candy and lollipops	1.43±4.92	1.24±3.70	1.62±5.87
Biscuits and cookies (chocolate chip, Oreo cake etc.)	4.34±5.23	4.34±5.47	4.34±5.00
Ice cream	1.01±2.62	0.96±2.64	1.07±2.61
French fries	1.39±2.06	1.64±2.47*	1.14±1.53*
Hot dogs	0.06±0.42	0.06±0.31	0.07±0.51
Hamburgers	0.09±0.30	0.08±0.27	0.10±0.33
Pizza	4.19±6.91	3.82±6.09	4.56±7.62
Cakes and muffin	1.21±2.20	1.21±2.25	1.20±2.15
Pancakes	0.16±0.80	0.11±0.60	0.20±0.96
Doughnuts	0.06±0.30	0.05±0.26	0.07±0.34
Sweetened cereals	0.87±2.34	0.79±2.12	0.95±2.55

100% fruit juice (homemade)	2.04±3.45	2.12±3.37	1.95±3.52
100% vegetable juice (homemade)	0.41±3.31	0.34±2.06	0.49±4.19
Fruit drink (sweetened fruit juice, fruit flavored drink …)	2.45±4.34	2.32±4.15	2.57±4.53
Regular soft drinks	1.27±3.32	1.27±3.42	1.26±3.24
Diet soft drinks or tea	0.09±0.67	0.12±0.79	0.06±0.52
Full fat milk drinks (sweetened)	0.23±1.44	0.16±0.86	0.30±1.84
Reduced fat milk drinks (sweetened)	0.30±4.45	0.34±4.84	0.26±4.04

* significance at $p<0.05$

2. Macronutrients and micronutrients intakes of Lebanese infants and young children less than 24 months of age

a. Infants 0-6months

The macronutrient and micronutrient intakes of infants between 0 and 6 months of age were compared to the recommended intakes in Table 14. The intake of Linolenic Acid was below 2/3rd the DRI in 20% of infants. Mean intakes of vitamins D and A were lower than the age-specific DRIs. All other vitamins and minerals intakes were higher than the age-specific DRIs. Results showed that around 21.6% had vitamin D intake below 2/3 the AI while 16.2% had vitamin A intake below 2/3 the AI.

Table 14: Mean Intake, contribution to DRI (%) and proportion of 0-6 months old infants who are currently not breastfed and consuming less than 2/3 the DRI of macronutrients and selected vitamins and minerals.

	0-6 months old infants not breastfed			
Nutrient	**DRI**	**Total Mean±SD**	**% Subjects consuming <2/3 DRI N (%)**	**% Subjects consuming < DRI N (%)**
Energy Boys (kcal)	**570**	607.1±237.7	4(20.0)	8(40.0)
Energy Girls (Kcal)	**520**	637.0±216.9	2(11.1)	6(33.3)
Carbohydrates (g/d)	**60**	68.0±25.9	5(13.5)	13(35.1)
Protein (g/d)	**9.1**	13.0±4.7	3(8.1)	5(13.5)
Total fat (g)	**31**	33.1±12.4	7(18.9)	16(43.2)
Linoleic acid (g/d)	4.4*	6.6±2.5	13(15.1)	18(20.9)
Linolenic acid (g/d)	0.5*	0.7±0.3	17(19.8)	40(46.5)
Vitamin A (mcg/d)	400*	373.7±137.5	6(16.2)	20(54.1)
Vitamin D (mcg/d)	10*	9.0±3.3	8(21.6)	21(56.8)

Vitamin C (mg/d)	40*	56.8±21.1	3(8.1)	5(13.5)
Folate (mcg/d)	65*	95.0±35.8	3(8.1)	6(16.2)
Vitamin B12 (mcg/d)	0.4*	1.5±0.6	0(0.0)	1(2.7)
Potassium (mg/d)	400*	674.7±276.0	2(5.4)	5(13.5)
Calcium (mg/d)	200*	476.7±175.6	1(2.7)	2(5.4)
Iron (mg/d)	**0.27**	6.8±3.1	0(0.0)	0(0.0)
Zinc (mg/d)	2*	4.6±1.6	1(2.7)	2(5.4)
Magnesium (mg/d)	30*	39.1±15.4	3(8.1)	9(24.3)

This table presents Recommended dietary allowance (RDAs) in **bold type** and Adequate Intakes (AI) in regular type followed by an asterisk (*)
Data from Food and Nutrition Board, Institute of Medicine: *Dietary reference intake for calcium, magnesium, vitamin D* (1997); *dietary reference intake for folate and vitamin B12* (1998); *Dietary reference intake for vitamin C* (2000); and *dietary reference intake for vitamin A and zinc* (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

b. Infants 6 - 12 months:

The mean intakes of vitamin D and Iron were lower than the age-specific DRIs. It was observed that 28.6% of the children had intakes below 2/3 the AI for vitamin D and below 2/3 the RDA for Iron. Additionally, 27.5% of the children had intakes below 2/3 of the AI of vitamin A and 27.5% below 2/3 of the AI of Magnesium (Table 15).

Table 15: Mean Intake, contribution to DRI (%) and proportion of 6-12 months old infants who are currently not breastfed and consuming less than 2/3 the DRI of macronutrients and selected vitamins and minerals.

	6-12 months old infants			
Nutrient	**DRI**	**Total Mean±SD**	**% Subjects consuming <2/3 DRI N (%)**	**% Subjects consuming < DRI N (%)**
Energy Boys (kcal)	**743**	962.6±389.9	2(5.1)	14(35.9)
Energy Girls (Kcal)	**676**	986.5±392.1	2(3.8)	13(25.0)
Carbohydrates (g/d)	**95**	123.6±56.0	4(4.4)	35(38.5)
Protein (g/d)	**11**	24.7±13.5	0(0.0)	5(5.5)
Total fat (g)	**30**	43.4±16.5	5(5.5)	19(20.9)
Linoleic acid (g/d)	4.6*	8.5±3.5	1(1.1)	10(11.0)
Linolenic acid (g/d)	0.5*	0.7±0.3	9(9.1)	21(23.1)
Vitamin A (mcg/d)	500*	509.3±284.3	25(27.5)	55(60.4)
Vitamin D (mcg/d)	10*	8.6±3.6	26(28.6)	61 (67.0)
Vitamin C (mg/d)	50*	67.8±42.3	7(7.7)	28(30.8)
Folate (mcg/d)	80*	137.6±92.0	9(9.9)	19(20.9)
Vitamin B12 (mcg/d)	0.5*	1.7±0.9	1(1.1)	2(2.2)
Potassium (mg/d)	700*	1168.4±617.4	1(1.1)	15(16.5)
Calcium (mg/d)	260*	608.5±247.2	0(0.0)	3(3.3)

Iron (mg/d)	**11**	10.3±4.0	26(28.6)	52(57.1)
Zinc (mg/d)	3*	5.5±2.1	1(1.1)	6(6.6)
Magnesium (mg/d)	75*	82.4±56.5	25(27.5)	47(51.6)

This table presents Recommended dietary allowance (RDAs) in **bold type** and Adequate Intakes (AI) in regular type followed by an asterisk (*)
Data from Food and Nutrition Board, Institute of Medicine: *Dietary reference intake for calcium, magnesium, vitamin D* (1997); *dietary reference intake for folate and vitamin B12* (1998); *Dietary reference intake for vitamin C* (2000); and *dietary reference intake for vitamin A and zinc* (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

c. Children 12-24 months of age

The macronutrient, vitamins and minerals intake of infants between 12 – 24 months of age were compared to the recommended intakes in Table 16. The intakes of fibers, vitamin D and Calcium were below the recommended levels of intake. Results showed that 85.6%, 83.0% and 37.1% of the young children had intakes below 2/3 the AI for Fibers, vitamin D and Calcium respectively. Additionally, 21.6% of the young children had intake below 2/3 the AI of Linolenic acids and 25.3% had intakes below 2/3 the RDA of Folate.

Table 16: Mean Intake, contribution to DRI (%) and proportion of 12-24 months young children who are currently not breastfed and consuming less than 2/3 the DRI of macronutrients and selected vitamins and minerals.

	12-24 months old young children			
Nutrient	**DRI**	**Total Mean±SD**	**% subjects consuming <2/3 DRI N (%)**	**% subjects consuming < DRI N (%)**
Energy Boys (kcal)	**1046**	1161.3±417.4	14(13.7)	45(44.1)
Energy Girls (Kcal)	**992**	1272.6±581.5	9(9.8)	31(33.7)
Carbohydrates (g/d)	**130**	151.4±64.4	25(12.9)	83(42.8)
Protein (g/d)	**13**	34.5±16.4	1(0.5)	8(4.1)
Total fat (%)	**35**	53.5±25.3	2(1.0)	52(26.8)
Linoleic acid (g/d)	7*	10.9±7.3	24(12.0)	54(27.8)
Linolenic acid (g/d)	0.7*	0.6±0.4	42(21.6)	90(46.4)
Fiber (grams/d)	19*	7.7±5.7	166(85.6)	186(95.9)
Vitamin A (mcg/d)	**300**	565.0±518.9	22(11.3)	40(20.6)
Vitamin D (mcg/d)	15*	6.5±4.0	161(83.0)	186(95.9)
Vitamin C (mg/d)	**15**	67.1±55.1	9(4.6)	12(6.2)
Folate (mcg/d)	**150**	152.0±99.3	49(25.3)	97(50.0)
Vitamin B12 (mcg/d)	**0.9**	3.8±12.8	11(5.7)	26(13.4)
Potassium (mg/d)	**300**	1631.3±887.0	158(81.4)	188(96.9)

Calcium (mg/d)	700*	575.5±357.4	72(37.1)	128(66.0)
Iron (mg/d)	**7**	8.7±9.7	24(12.4)	53(27.3)
Zinc (mg/d)	**3**	5.9±3.2	5(2.6)	19(9.8)
Magnesium (mg/d)	**80**	133.9±79.0	13(6.7)	51(26.3)

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

Data from Food and Nutrition Board, Institute of Medicine: *Dietary reference intake for calcium, magnesium, vitamin D* (1997); *dietary reference intake for folate and vitamin B12* (1998); *Dietary reference intake for vitamin C* (2000); and *dietary reference intake for vitamin A and zinc* (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

D. Anthropometric Characteristics of Infants and young children participating in the Study:

The anthropometric characteristics of the participating infants and young children, according to gender, are shown in Table 17. BMI for age z-score showed that 24.2% were at risk of overweight (> +1), 10.8% were overweight (>+2) and 3.6% were obese (>+3) with a significant differences between gender of babies. Concerning stunting, only 27 children (5.7%) were found to be stunted (z-score < - 2) and 10 children (2.1%) were found to be severely stunted (z-score < - 3).

Table 17: Anthropometric characteristics and prevalence of overweight, obesity, stunting and wasting (according to the WHO 2008 criteria) in a national sample of Lebanese infants and young children less than 24 months old, according to gender:

Child			
	Total (n= 478)	**Boys (n=236)**	**Girls (n=242)**
		Mean ± SD	
Weight (kg)	9.56±3.89	9.68±2.80	9.44±4.72
Height (cm)	72.75±10.19	73.11±11.15	72.40±9.16
Head circumference (cm)	44.98±4.62	45.55±4.97	44.43±4.21
MUAC[#] (cm)	16.04±8.30	16.53±11.06	15.57±4.25
	N (%)		
Weight for age			
Severely underweight[a]	5(1.1)	4(2.4)	1(0.6)
Underweight[b]	5(1.1)	4(1.7)	1(0.4)
Normal weight[c]	331(97.1)	158(95.2)	173(98.9)
BMI for age			
Severely wasted[d]	5(1.1)	4(1.7)*	1(0.4)*
Wasted[e]	11(2.3)	8(3.4)*	3(1.3)*
Normal weight	273(58.0)	124(52.8)*	149(63.1)*
At risk of overweight[f]	114(24.2)	56(23.8)*	58(24.6)*

Overweight[g]	51(10.8)	32(13.6)*	19(8.1)*
Obese[h]	17(3.6)	11(4.7)*	6(2.5)*
Length for age			
Severely stunted[i]	10(2.2)	6(2.6)	4(1.7)
Stunted[j]	27(5.8)	17(7.4)	10(4.3)
Normal height[k]	426(92.0)	207(90.0)	219(94.0)
Weight for height			
Severely wasted[l]	4(0.9)	3(1.3)	1(0.4)
Wasted[m]	13(2.8)	9(3.8)	4(1.7)
Normal weight[n]	278(59.1)	124(53)	154(65.3)
At risk of overweight[o]	111(23.6)	59(25.2)	52(22)
Overweight[p]	47(10)	28(12.0)	19(8.1)
Obese[q]	17(3.6)	11(4.7)	6(2.5)

World Health Organization. Training course on child growth assessment. Geneva, WHO, 2008.
a. WAZ score < -3, b. -3=<WAZ <-2, c. -2=<WAZ <=1
d. BAZ <-3, e. -3=<BAZ <-2, f. 1<BAZ <=2, g. 2<BAZ<=3, h. BAZ > +3.
i. HAZ less than – 3, j. -3=<HAZ <-2. k. -2=<HAZ<=3
l. WHZ<– 3, m.-3=<WHZ<– 2, n. -2=<WHZ<=1, o. 1=<WHZ<=2, p. 2<WHZ<=3, q. WHZ >3.
* significance at $p<0.05$
[#]midd upper arm circumference

E. Mothers' characteristics

Lifestyle characteristics of participating mothers are shown in Table 18. When looking at the population as a whole, 15.2% reported smoking during pregnancy and 15.8% reported smoking during breastfeeding. When looking at the population of smokers specifically, 39.2% reported that they continued to smoke during pregnancy and 44.4% reported that they continued to smoke during breastfeeding. Similarly, when looking at the population as a whole, 3.3% reported drinking alcohol during pregnancy and 2.1% reported drinking alcohol during breastfeeding. When looking at the population of those who drink alcohol specifically, 7.4% reported that they continued to consume alcohol during pregnancy and 15.9% reported that they continued to drink alcohol during breastfeeding. Furthermore, the majority of mothers eat breakfast everyday (58.7%). The macronutrient, vitamins and minerals intake of mothers are compared to the recommended intakes in Table 19. The results showed that the mean intakes of

carbohydrate were adequate when compared to the requirements. However, the intake of protein appeared lower than the requirements at the expense of fat, which was consumed at levels exceeding the requirements (figure 5). Mean intakes of vitamin D and Calcium were lower than the respective AIs. Similarly, the mean intake of Vitamin A, vitamin C, Folate, Zinc, Fiber and Magnesium intake levels were lower than the respective RDAs. Results showed that 100% and 74.1% had vitamin D and Calcium intakes below 2/3 the AI. Likewise, 77.9%, 69%, 79%, 64%, 58% and 74.6% had vitamin A, vitamin C, folate, zinc, magnesium and Fiber intakes below 2/3 the RDA, respectively.

The anthropometrics characteristics of mothers are shown in Table 18. Mean BMI was 26.88±5.64 years. The prevalence overweight and obesity was estimated at 32.8% and 24.7%, respectively.

Finally, the knowledge level of the mothers regarding infant feeding practices was measured according to the *Infant Feeding Knowledge Test Form* with 16 questions. Mean score was around 9 over 16 (Table 21). Around 40% of the mothers didn't know that, when they are sick, they can continue to breastfeed; 30% thought that they shouldn't try to breastfeed if they are planning to go back to work; 70% believed that they don't have an adequate amount of milk; about 30% thought that breastfeeding will change the size of their breasts; around 75% were finding difficulties in breastfeeding their baby (time consuming, lack of public places to breastfeed) and finally 70% and 40% didn't know the optimal duration of breastfeeding and exclusive breastfeeding, respectively.

Table 18: Maternal lifestyle characteristics in the study sample, according to child's gender.

	Total (n= 478)	Boys (n=236)	Girls (n=242)
	Mean±SD		
Number of meals per day	2.40±0.71	2.39±0.69	2.40±0.74
	N(%)		
Smoking during pregnancy	73 (15.2)	34 (14.4)	39 (16.1)
Smoking during breastfeeding	76 (15.8)	40 (16.9)	36 (14.8)
Drinking alcohol during pregnancy	16 (3.3)	9 (3.8)	7 (2.8)
Drinking alcohol during breastfeeding	10 (2.1)	6 (2.5)	4 (1.6)
Eat breakfast every day	277 (58.3)	136 (57.9)	141 (58.8)
Modified diet*	40 (8.4)	20 (8.5)	20 (8.3)
Vegetarian	47 (9.9)	25 (10.7)	22 (9.2)

*modified diet such as: weight loss diet, high protein diet, low fat diet..

Table 19: Mean intake, % of DRI and % of mothers consuming less than 2/3 the DRI for macronutrients and selected vitamins and minerals.

	Mother		
		Total (n=394)	
	DRIs	Mean±SD	% Subjects consuming <2/3 DRI N (%)
Carbohydrate (grams/d)	**210**	210.3±297.1	111(28.2)
Protein (grams/d)	**71**	61.7±59.0	160(40.6)
Total fat (%)	**27.5**	37.6±10.5	16(4.1)
Linoleic (g)	13*	15.8±14.2	128(32.5)
Linolenic (g)	1.3*	0.8±0.6	259(65.7)
Dietary fiber (grams/d)	**29**	15.8±15.8	294(74.6)
Vitamin A (mcg/d)	**1300**	668.6±916.6	307(77.9)
Vitamin D (mcg/d)	15*	0.9±1.7	394(100.0)
Vitamin K (mcg/d)	90*	117.6±131.8	181(45.9)
Vitamin C (mg/d)	**120**	69.1±64.0	272(69.0)
Folate (mcg/d)	**500**	220.2±191.0	313(79.4)
Vitamin B12 (mcg/d)	**2.8**	2.9±8.4	234(59.4)
Calcium (mg/d)	1000*	491.8±371.7	292(74.1)
Iron (mg/d)	**9**	11.8±17.1	126(32.0)
Zinc (mg/d)	**12**	7.6±6.7	254(64.5)

Magnesium (mg/d)	**310**	223.6±218.2	231(58.6)

This table presents Recommended dietary allowance (RDAs) in **bold type** and Adequate Intakes (AI) in regular type followed by an asterisk (*)
Data from Food and Nutrition Board, Institute of Medicine: *Dietary reference intake for calcium, magnesium, vitamin D* (1997); *dietary reference intake for folate and vitamin B12* (1998); *Dietary reference intake for vitamin C* (2000); and *dietary reference intake for vitamin A and zinc* (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

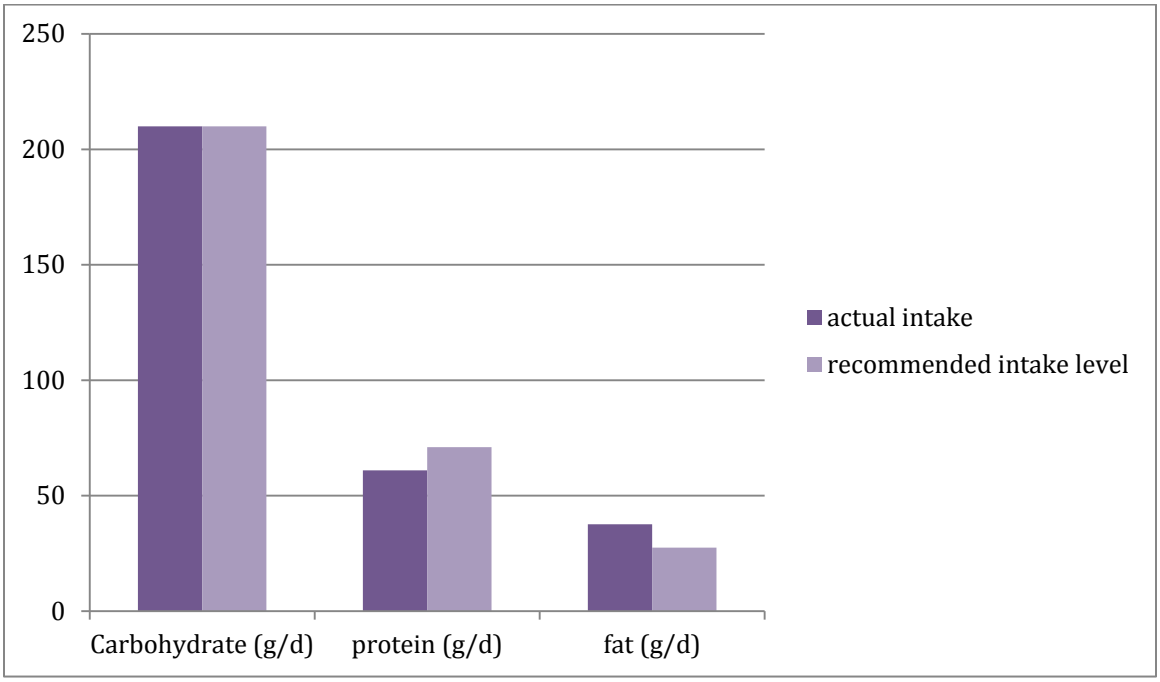


Figure 5: Average Daily Macronutrient Intake (g/day) in mothers as compared to the Recommendations.

Table 20: Anthropometric characteristics and prevalence of overweight and obesity in mothers according to child's gender:

	Total (n= 478)	**Boys (n=236)**	**Girls (n=242)**
		Mean±SD	
BMI	26.88±5.64	26.73±5.61	27.04±5.68
Weight in kg	68.22±14.58	68.04±14.54	68.39±14.65
Height in cm	159.43±5.69	159.70±5.99	159.17±5.38
Waist circumference in cm	90.79±13.12	90.48±13.48	91.09±12.79
Nutritional status according to BMI		**N (%)**	
Underweight[a]	5(1.1)	4(1.8)	1(0.4)
Normal[b]	189(41.4)	94(41.6)	95(41.1)
Overweight[c]	150(32.8)	71(31.4)	79(34.2)
Obese[d]	113(24.7)	57(25.2)	56(24.2)

a. Underweight: BMI<18.5 b. Normal: BMI 18.5-24.9 c. overweight: BMI 25.0-29.9 d. obese: BMI>= 30.

Table 21: Maternal infant feeding knowledge according to the infant feeding knowledge test.

Score	True answer N (%)
Q 1: Breastfeeding stops you from having your period.	238 (53.4)
Q 2: Breast milk makes up a complete diet for a baby.	334 (70.5)
Q 3: If your breasts are small, you might not have enough milk to feed a baby.	382 (82.2)
Q 4: When a mother is sick with the flu or a bad cold, she can continue to breastfeed.	300 (64.1)
Q 5: Babies who are breastfed tend to get fewer allergies than babies who are formula-fed.	407 (87.3)
Q 6: The pill is the best way to prevent getting pregnant while you are breastfeeding.	84 (19.2)
Q 7: You shouldn't try to breastfed if you are planning to go back to work.	334 (71.1)
Q 8: The more often you breastfeed, the more milk you will have for your baby.	438 (94.2)
Q 9: Babies who are breastfed tend to get fewer infections than babies who are formula fed.	421 (89.4)
Q 10: Many women are not able to make enough milk to feed their baby.	132 (28.3)
Q 11: The best food for a newborn is breast milk.	387 (81.6)
Q 12: When you breastfeed you may get your figure back easier.	318 (68.1)
Q 13: If you breastfeed (no one can help with the baby, more time is needed than bottle feeding, difficult to feed the baby in public place, none of the above are correct).	110 (23.3)
Q 14: Breastfeeding will probably makes no difference in the size or shape of your breasts.	207 (44.3)
Q 15: What is the optimal duration of breastfeeding?	153 (32.4)
Q 16: What is the optimal duration of exclusive breastfeeding?	281 (61.0)
Mean Score ± SD	**9.79±2.01**

F. Associations of maternal knowledge, socio-demographic and lifestyle characteristics with infant feeding practices.

The simple binary logistic analyses of the factors associated with exclusive breastfeeding for 6 months and with breastfeeding for 6 months or more, are shown in Table 22.

Exclusive breastfeeding for 6 months was significantly associated with initiating breastfeeding within 1 hour after birth (OR= 2.419; 95%CI= 1.914-4.900), with the infant

not being the first child (OR=2.361; 95%CI= 1.195-4.665) and with mothers who don't drink alcohol (OR=2.003; 95%CI=1.039-3.863).

On the other hand, if the mother was not breastfed as a child and if the baby was born small for gestational age, there were significantly lower odds for exclusively breastfeeding for 6months or more (OR=0.287; 95%CI=0.086-0.954) and (OR=0.268; 95%CI=0.087-0.830), respectively.

When looking at the infants who are currently under 6 months of age, exclusive breastfeeding for 6 months was significantly associated with unemployed mothers (OR=2.698; 95%CI=1.140-6.385).

Similarly, the odds of exclusively breastfeeding for 6 months and the odds of breastfeeding for 6 months or more were shown to be significantly lower in mothers who scored less than the median on the *Infant Feeding Knowledge Test* (OR=0.274; 95%CI=0.127-0.591). When looking at the specific questions in the *Infant Feeding Knowledge Test*, 2 questions were significantly associated with lower odds of exclusive breastfeeding: question 11 the best food for newborn is breastmilk (OR:0.148; 95%CI=0.035-0.0623) and question 14 breastfeeding will probably make no difference in the size or shape of your breasts (OR:0.541; 95%CI=0.299-0.981) (Table 23).

Table 22: Simple binary logistic regression for the predictors of exclusive breastfeeding for 6 months and of breastfeeding for 6 months or more in Lebanon.

	Exclusive breastfeeding for 6 months	Breastfeeding for 6 months or more
Mother's education		
Primary school or less	1	1
Intermediate school or high school or technical diploma	0.952(0.313-2.893)	0.810(0.324-2.022)
University degree	1.099(0.334-3.620)	0.587(0.216-1.593)
Mother's occupation		
Employed	1	1
Housewife	1.129(0.593-2.148)	1.211(0.712-2.058)
Father's education		
Primary school or less	1	1
Intermediate school or high school or technical diploma	0.745(0.345-1.609)	0.844(0.440-1.620)
University degree	0.815(0.299-2.217)	1.032 (0.446-2.389)
Crowding index		
>=1 person per room	1	1
<1 person per room	1.032(0.459-2.318)	1.484(0.767-2.873)
Do you have a paid helper?		
Yes	1	1
No	2.161(0.826-5.650)	1.250(0.628-2.490)
Infant birth order		
First child	1	1
Not first child	2.361*(1.195-4.665)	1.231(0.738-2.053)
Sex of child		
Male	1	1
Female	1.253(0.694-2.261)	1.662*(1.009-2.737)
Initiation of breastfeeding after birth		
More than 1 hour	1	1
Within 1 hour	2.419*(1.194-4.900)	1.404(0.748-2.633)
Way of breastfeeding		
One breast	1	1
Both breasts	0.653(0.350-1.217)	0.604(0.345-1.056)
Support from hospital		
Yes	1	1
No	0.849(0.380-1.896)	0.823(0.403-1.679)
Fluids within the first 3 days		
Yes	1	1
No	0.658(0.360-1.205)	0.967(0.582-1.606)
Cigarette smoking status		
Yes	1	1
No	0.708(0.392-1.278)	1.276(0.765-2.126)
Smoking during pregnancy		
Yes	1	1

No	1.131(0.468-2.735)	1.418(0.624-3.227)
Smoking during breastfeeding		
Yes	1	1
No	0.333*(0.137-0.813)	0.387(0.168-0.894)
Drinking alcohol		
Yes	1	1
No	2.003*(1.039-3.863)	1.139(0.606-2.139)
Drinking alcohol during pregnancy		
Yes	1	1
No	0.765(0.158-3.692)	0.544(0.170-1.740)
Drinking alcohol during breastfeeding		
Yes	1	1
No	1.042(0.577-1.881)	0.604(0.364-1.002)
Eat breakfast everyday		
Yes	1	1
No	1.352(0.750-2.436)	0.940(0.570-1.550)
Mother vegetarian		
Yes	1	1
No	1.402(0.478-4.114)	0.999(0.441-2.260)
Taking dietary supplements		
Yes	1	1
No	0.754(0.388-1.466)	0.936(0.484-1.808)
Breastfed as a child		
Yes	1	1
No	0.287*(0.086-0.954)	0.494(0.223-1.095)
Birth weight		
Large for gestational age	1	1
Normal weight	0.312(0.078-1.239)	4.375(0.705-27.161)
Small for gestational age	0.268*(0.087-0.830)	2.885(0.618-13.458)

Table 23: Simple binary logistic regression for the association of maternal knowledge *(infant feeding knowledge test)* **with exclusive breastfeeding for 6 months and breastfeeding for 6 months or more.**

	Exclusive breastfeeding for 6 months or more	**Breastfeeding for 6 months or more**
Q 1: Breastfeeding stops you from having your period. True answer False answer	 1 1.196(0.659-2.170)	 1 1.103(0.664-1.831)
Q 2: Breast milk makes up a complete diet for a baby. True answer False answer	 1 0.562(0.271-1.164)	 1 0.868(0.491-1.534)
Q 3: If your breasts are small, you might not have enough milk to feed a baby. True answer False answer	 1 0.441(0.169-1.153)	 1 0.724(0.372-1.421)
Q 4: When a mother is sick with the flu or a bad cold she can continue to breastfeed. True answer False answer	 1 0.701(0.373-1.316)	 1 0.640(0.379-1.082)
Q 5: Babies who are breastfed tend to get fewer allergies than babies who are formula-fed. True answer False answer	 1 0.521(0.180-1.513)	 1 0.703(0.332-1.490)
Q 6: The pill is the best way to prevent getting pregnant while you are breastfeeding. True answer False answer	 1 0.372(0.192-0.720)	 1 1.160(0.615-2.189)
Q 7: You shouldn't try to breastfed if you are planning to go back to work. True answer False answer	 1 0.590(0.292-1.195)	 1 0.633(0.360-1.115)
Q 8: The more often you breastfeed the more milk you will have for your baby. True answer False answer	 1 0.561(0.128-2.453)	 1 0.361(0.101-1.290)
Q 9: Babies who are breastfed tend to get fewer infections than babies who are formula fed. True answer False answer	 1 0.875(0.328-2.338)	 1 0.884(0.396-1.974)
Q 10: Many women are not able to make enough milk to feed their baby. True answer False answer	 1 0.706(0.376-1.327)	 1 0.601(0.346-1.046)
Q 11: The best food for a new born is breast milk. True answer False answer	 1 0.148*(0.035-0.623)	 1 0.400*(0.190-0.842)
Q 12: When you breastfeed you may get your		

figure back easier. True answer False answer	 1 0.981(0.521-1.849)	 1 0.942(0.545-1.629)
Q 13: If you breastfeed (no one can help with the baby, more time is needed than bottle feeding, difficult to feed the baby in public place, none of the above are correct). True answer False answer	 1 1.064(0.532-2.127)	 1 1.031(0.570-1.862)
Q 14: Breastfeeding will probably makes no difference in the size or shape of your breasts. True answer False answer	 1 0.541*(0.299-0.981)	 1 0.718(0.433-1.188)
Q 15: What is the optimal duration of breastfeeding? True answer False answer	 1 0.598(0.325-1.099)	 1 0.819(0.471-1.423)
Q 16: What is the optimal duration of exclusive breastfeeding? True answer False answer	 1 0.717(0.385-1.336)	 1 0.789(0.467-1.333)
Average More or equal to the median Less than the median	 1 0.274*(0.127-0.591)	 1 0.346*(0.191-0.628)

G. Association of infant feeding practices and dietary intakes with overweight/ obesity in Lebanese infants and young children.

The association of infant feeding practices and dietary intakes with overweight/ obesity in Lebanese infants and young children showed significant higher odds with higher BMI of the mothers. Overweight mothers (OR=3.608; 95%CI: 1.811-7.187) and obese mothers (OR=3.272; 95%CI:1.575-6.798) were having 3 times higher odds of overweight and obese children. Similarly, a sugar consumption at levels exceeding 10% of energy intake was associated with significantly higher odds of overweight/obesity in children (OR=2.44; 95%CI: 1.062-5.626) (Table 24).

Pearson correlation between mother's dietary intake and child's dietary intake showed a significant association for all the macronutrients and micronutrients (Table 25).

Table 24: Simple binary logistic regression for risk factors associated with overweight and obesity in Lebanese infants and young children less than 24 months old.

	Overweight/ obesity in infants and young children
BMI of the mother	
Normal	1
Overweight	3.608*(1.811-7.187)
Obese	3.272*(1.575-6.798)
Exclusive BF for 6 months and more[a]	
No	1
Yes	0.676(0.271-1.686)
BF for less than 6 months[a]	
No	1
Yes	1.621(0.777-3.380)
Exclusive BF for 4 months or more[a]	
No	1
Yes	0.559(0.249-1.254)
BF for less than 4 months[a]	
No	1
Yes	1.215(0.645-2.288)
CHO[b] (%E)	
<=45	1
>45	1.317(0.614-2.824)
Total Fat[b] (%E)	
<=30	1
>30	1.447(0.302-6.935)
Sugar[b] (%E)	
<=10	1
>10	2.444*(1.062-5.626)

a. Infants and young children more than 6 months, b. Children more than 1 year.

Table 25: Pearson correlation between mother's dietary intake and child's dietary intake.

Dietary intake	Pearson correlation
Kcal	0.140*
CHO	0.141*
Protein	0.188*
Total Fat	0.221*
Saturated fat	0.186*
Monounsaturated fat	0.264*
Polyunsaturated fat	0.306*
Linoleic acid	0.320*
Linolenic acid	0.193*
Fiber	0.375*
Sugar	0.215*

*Correlation is significant at the 0.01 level (2-tailed).

CHAPTER V

DISCUSSION

According to global health policy of the WHO (WHO, 2001), exclusive breastfeeding for 6 months and continued breastfeeding with appropriate, adequate and timely introduction of solid foods are recommended. The WHO/UNICEF Global strategies for Infant and Young Children Feeding practices (IYCF) recommend that countries plan a comprehensive program for community-based breastfeeding promotion and support actions to improve breastfeeding practices (WHO, 2007). In order to implement appropriate interventions for improving IYCF practices in Lebanon, it is important to have baseline information about local breastfeeding and complementary feeding practices. Knowing that early nutrition is a neglected aspect of young child's health in the Middle East, and given the shortage of data on current young child nutritional status and dietary practices in Lebanon, this study was undertaken as a part of a national project to address key determinants of child health, namely nutritional status and dietary practices. The results of this study document a high prevalence of breastfeeding with 88.4% of infants being ever breastfed according to the WHO indicator 9. Batal *et al.* (2005) reported comparable high prevalence, whereby, based on a national sample of 830 Lebanese mother-infant pairs, 95.4% of the mothers reported ever breastfeeding their child (Batal *et al.* 2005). Moreover, the results of this study showed that, according to the WHO indicator for exclusive breastfeeding (indicator number 2), which focuses on infants aged less than 6 months old at the time of the interview, the prevalence of exclusive breastfeeding was estimated at 20.4% (Table 26). According to the WHO global Bank Data, which pools information from national and regional surveys,

this prevalence is similar to Jordan (21.8%) and Japan (21.0%). It was higher than the prevalence of exclusive breastfeeding in Algeria (6.9%), Tunisia (6.2%), Yemen (11.5%), Canada (14.4%) and USA (13.6%). And it was lower than the prevalence of exclusive breastfeeding in Egypt (57.0%), Kuwait (38.3%), Iraq (25.1%) and Syria (28.7%) (WHO Global Data Bank on Infant and Young Child Feeding, 2014).

The low exclusive breastfeeding rate that was documented in Lebanon using the WHO indicator, was confirmed by the results stemming from maternal retrospective recall of breastfeeding practices, which was conducted on all the study sample (exclusive breastfeeding rate: 27.5%). These low rates of exclusive breastfeeding are similar to those reported by other countries in the MENA region such as Iraq (25%), Saudi Arabia (31%), Egypt (38%), Emirates (25%), and Bahrain (24%) (Radwan, 2013; Al-Sairafi *et al.* 2002). The documented prevalence rates are also comparable to those reported in Korea (26.8%), Romania (34.4%), and Czech Republic (38.4%) (Chung *et al.* 2013; Holbrook *et al.* 2013). However, they are higher than those reported in developed countries such as USA (13.3%) and Canada (13.8%) (Ruowei *et al.* 2005; Al-Sahab *et al.* 2010). Moreover, almost 48% of infants included in the study received formula milk before the age of 4 months, and 72.5% before the age of 6 months. Approximately, 21.1% of infants received water with added sugar at age less than 6 months, 63% received plain water and 30.9% received baby cereals at age less than 6 months. This was also reported in the Lebanese study done by Batal *et al.* (2005), where 41.8 % of the infants received tea, 37.6% received sweetened water, and 36.3 % received water before reaching 6 months of age. Likewise, Radwan (2013) reported in her study on Emirati women that 15.3%, 10%, and 2.5% of infants received grippe water, anis, and tea respectively during the first three

months of age.

The results of this study showed that early initiation of breastfeeding, represented by the WHO indicator 1, and defined as the proportion of children born in the past 24 months who were put to the breast within one hour after birth, was met by 25.7% of the mothers. Batal *et al.* (2006) reported that 55.9% of 830 Lebanese mothers started breastfeeding their newborns within few hours after birth and 18.3% within half an hour, while 21.2% waited for few days after birth to initiate breastfeeding. Other countries in the region such as Oman, UAE, as well as countries from other parts of the world such as Nepal and Kenya showed higher levels of early initiation of breastfeeding with 84.8%, 80.6%, 57%, and 63% respectively (Radwan, 2013; Alasfoor, 2005; Ulak *et al.* 2012; Kimani- Murage *et al.* 2011). The binary logistic regression analysis conducted in the present study showed that early initiation of breastfeeding within one hour significantly increased the odds of exclusive breastfeeding for 6 months by 2 times. These results confirm the importance of proper breastfeeding initiation and encouragement during the hospital stay, and the importance of adopting the Baby Friendly Hospital Initiative (BFHI). An evidence of the effect of the level of encouragement on the early initiation of breastfeeding is the improvement achieved in Oman, from 26.8% in 1992 to 84.8% in 2000 after the adoption of the Baby Friendly Hospital Initiative (BFHI) (Alasfoor *et al*. 2000).

The results of the present study also showed that infant birth order was associated with exclusive breastfeeding for 6 months. More specifically, a mother was more likely to exclusive breastfeed if her child was not the first. In fact, new and younger mothers are usually less experienced and less knowledgeable about infant feeding,

whereas mothers with more than one child may be more equipped to adopt adequate feeding practices. Maternal age may also play a role as several previous studies have shown that a higher maternal age was associated with a higher duration of exclusive breastfeeding and breastfeeding (Gudnadottir *et al.* 2006; Novotny *et al.* 2000; Arora *et al.* 2000). It will therefore be interesting to target new moms in future interventions, aiming at promoting breastfeeding and healthy infant feeding practices.

In the present study, having a child who was born small for gestational age was significantly associated with lower odds of exclusive breastfeeding for 6 months. This result was also shown with Verd *et al.* (2013) where the chance of exclusive breastfeeding continuation by Spanish mothers within 4 weeks of life was less in infants whose birth weight was below 2780 g. This could be explained by maternal misconception about the quantity of breast milk whereby women tend to believe that breastmilk may not be sufficient for their baby (Nabulsi, 2011). This maternal concern may get exaggerated when babies are small for gestational age. Likewise, mothers who themselves were not breastfed as children showed significantly lower odds of exclusively breastfeeding their infants for 6 months.

When taking pool of infants who were under 6 months of age at the time of the interview, it was shown that mothers who were not employed were 2 times more likely to exclusively breastfeed their infant. This was also reported by Kok Leong (2011), where exclusive breastfeeding for infants under 6 months of age, was positively associated with non-working status amongst Malaysians mothers.

The prevalence of breastfeeding among infants who were still being breastfed at

the time of the interview decreased from 75.4% at 3 months to 39.7% at 6 months, to 24.3% at 1 year, reaching 4.5% at 23 months or greater. The main reported reasons behind cessation of breastfeeding were problems with milk production (47.6%) and insufficient supply of milk to adequately satisfy the baby (27.8%). These reasons were also reported by Batal *et al.* (2005) with 26.2% of mothers reporting having stopped breastfeeding because they believed that breast milk was insufficient, while 6.1% of the mothers reported having lactation problems. A number of studies in western countries such as the USA (Houghton & Graybeal, 2001), Australia (Scott *et al.* 2001), and New Zealand (Health *et al.* 2002) reported that the most common reason to stop breastfeeding was also the belief of an insufficient breast milk supply. Meedya *et al.* (2010) reported that this is a perceived rather than a real problem, and it has psychological correlates. When infant demand increases, maternal milk production increases (Daly & Hartmann, 1995). Therefore, frequent and exclusive breastfeeding is critical for stimulating optimal milk production. At this time, mothers need support and should be taught about adequate infant feeding practices and breastfeeding advantages.

The proportion of mothers introducing solid, semi-solid, or soft foods before 6 months of age was 45.4%, with mainly baby cereals being the first choice. Batal e*t al.* (2005) found higher prevalence with 74.7% of infants receiving solid foods at 5 months or less. Moreover, in the MENA region, 81.5%, 78.6%, and 70% of the infants in Saudi Arabia, Iraq, and UAE respectively received complementary foods before 6 months of age (Mouzzan *et al.* 2009; Abdul *et al.* 2008; Radwan, 2012). The main reported reasons for introducing solid food was that the child was old enough, that he felt hungry after the milk feeds and that it was a tradition in the family. Early introduction of solid foods may

be linked with negative health implications, especially that it was shown to be associated with the risk of overweight, diabetes, and cardiovascular diseases later in life (Baker, 2004). However, postponing the introduction of solid foods more than 6 months of age could also lead to another set of health problems, since breast milk at this stage of life is no longer sufficient to meet the nutritional needs of the growing infant (Dewey, 2003). Considering the WHO indicator 4, which refers to the proportion of infants between 6 and 8 months of age who receive solid, semi-solid, or soft foods, it was found that 86.5% of infants met this indicator. This rate was very close to that reported in Jordan (85%); however, it was higher than that reported in many Asian countries such as Nepal (70%), Pakistan (39%), and Bangladesh (71%) (Kabir *et al.* 2012; Joshi *et al.* 2012; World Health Organization, Unicef 2010).

Proper growth amongst infants is not only determined by the time of introduction of solids foods, but also by the quality and quantity of foods which are crucial for proper growth and development. Therefore, to represent these two factors, the WHO suggested three indicators: Minimum dietary diversity, Minimum meal frequency, and Minimum acceptable diet (WHO, 2010). Few studies in the literature have used these indicators, which may limit comparison of our findings with other countries. The results of the current study have shown that the proportion of children meeting the minimum dietary diversity, defined as the proportion of children 6-23 months of age who received foods from 4 or more food groups, was shown to be 93.5%. This rate was found to be higher than that reported in other countries in the region such as Jordan (75%) and Egypt (55%) (World Health Organization, Unicef 2010). On the other hand, the 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, represented by the WHO indicator 6 (Minimum Meal Frequency) was found to be met by 90.8% of breastfed children and 95.3% of non breastfed children. This proportion is higher than those reported in Nepal (82 %) and Bangladesh (81%). Similarly, the minimum acceptable diet, defined as the proportion of children 6-23 months of age who receive a minimum acceptable diet apart from breast milk, was found to be 88.7% for breastfed children and 95.3% for non-breastfed children. These rates are higher than those reported for breastfed children in Egypt (38%) and Jordan (46%) (World Health Organization, Unicef 2010).

Nutrient intakes and dietary adequacy of infants and young children, who were not receiving breast milk, were determined. For all three age groups (0-6 months, 6-12 months and 12-24 months), the results showed inadequate intake of vitamin D. vitamin D deficiency is strongly associated with risk of acute lower respiratory infections and health implications such as rickets (Roth *et al.* 2010; Manaseki-Holland, 2010). In Ethiopia, 42% of children with pneumonia had rickets, or severe vitamin D deficiency (Muhe *et al.* 1997). Deficient intakes in vitamin D were reported by another study done in the Beirut area on infants and young children up to 15 months of age (Kallas, 2005) and in a study on Canadian infants below 1 year of age (Kallas, 2005; Friel *et al.* 2010). This low intake might be attributed to the nature of the foods that infants consume and that are low in vitamin D (Friel *et al.* 2010), thus the importance of encouraging the consumption of foods fortified with vitamin D. Likewise, inadequate vitamin A intake was reported in infants between 0 and 6 months of age. The WHO in 2009 had stated that, in developing countries, vitamin A deficiency begins during infancy, when infants do not receive adequate supplies of colostrum or breast milk. The prevalence of vitamin A deficiency, in

developing countries, begins to increase in young children just after they stop breastfeeding (Ross, 2006). Vitamin A deficiency is one of the top causes of preventable blindness in children and it also increases the severity and mortality risk of infections (particularly diarrhea and measles) (WHO, 2009). Moreover, inadequate Iron intake was reported in children between 6 and 12 months of age. This was also documented by the study of Kallas (2005) on infants and children less than 15 months in Beirut and by another study conducted in Canada by Friel *et al.* (2010) on infants and children up to one year of age. Infants and young children are at risk of developing iron deficiency anaemia because of their increased requirements for rapid growth and because of the diets that are often lacking in sufficient absorbable iron. Iron deficiency is therefore an important health consequence for young children, and could include increased prenatal mortality, delayed mental and physical development, negative behavioral consequences, reduced auditory and visual function, and impaired physical performance (Zimmermann & Hurell, 2007). Some of the negative effects of iron deficiency during early childhood are also irreversible and can lead to poor school performance, reduced physical work capacity, and decreased productivity later in life (WHO, 2011). This deficiency can be attributed to the low intake of animal foods (0.37 serving per day in the present study), which are the highest sources of the most bio-available form of iron. Therefore, adequate complementary feeding is needed to meet nutritional requirements in order to decrease the risk of developing iron deficiency and consequently adverse outcomes of neurodevelopment. Furthermore, in children above 1 year of age, both calcium and dietary fiber intake were below the requirements. Calcium deficiency and vitamin D deficiency increase the risk of rickets, which results from a combination of the two

factors. Therefore, ensuring adequate intake of milk and dairy products is necessary not only to avoid rickets but also to establish healthy dietary practices that will be associated with adequate calcium intake later in life (Greer & Krebs, 2006). The observed low intake of dietary fiber might be attributed to the low intake of vegetables shown in our study (1.2 servings per day). For the three age groups, the level of Linolenic acid was not adequate. Around 20% of 0-6 months infants, 9.1% of children 6-12 months and 21.6% of children 12-24 months had intakes lower than 2/3 AIs. This essential fatty acid was shown to have a crucial role in the function and the development of nervous system and cognition of the child (Uauy *et al.* 1996). Regarding sugar consumption, the mean intake of children 12-24 months (16.42%) was higher than the WHO 2002 recommendation that indicates that sugar intake should be less than 10% of the total energy intake. However, the new draft guideline proposes that sugar intake must be reduced to below 5% of total energy intake per day in order to have positive impacts on health and decrease the risk of weight gain (WHO, 2014). The current levels of intake of children 12-24 months old in this study, are 3 times higher than the new WHO limit, thus highlighting unhealthy practices in this age group which may cause negative effects on health. Efforts should be done to ensure adequate intake of nutrients in children.

One of the key determinants in preventing childhood malnutrition, and which is a highly influential factor in the outcome of a child's health, is maternal nutrition (United Nations Childrens Fund (UNICEF, 2009). Maternal health and nutrition before, during, and after pregnancy is part of the WHO global strategy on diet in addressing non-communicable diseases (World Health Organization, 2004). Therefore, the nutrient intake of mothers was also analyzed in the present study. The results showed that the intake of

protein was lower than the requirements at the expense of fat, which was consumed at levels exceeding the requirements. It was also shown that maternal intakes were deficient in vitamins A, D, C and Folate and in minerals Calcium, Zinc, magnesium. In fact, among women of childbearing age, inadequate intakes of calcium, iron, folate, zinc, and vitamins A and D remain too common. Among these, iron, folate, vitamin D, and zinc are of greatest concern due to high losses and requirements; these low dietary intakes can be linked to an inadequate consumption of fruits, vegetables, meat, and animal sources of food (Bartley *et al.* 2005). Dawodu and Wagner (2007) have also reported a high prevalence of vitamin D deficiency, ranging between 26-84% of women, in Lebanon, Saudi Arabia, UAE, Bangladesh, Japan, and Finland. This deficiency was also shown in nursing women in USA, where the vitamin D content of human milk was aslo shown to be directly related to the lactating mother's vitamin D status (Hollis & Wagner, 2004). There are overlapping reproductive and developmental consequences of maternal micronutrient inadequacies, including impaired maternal immunity, adverse reproductive outcomes and maternal health problems, in addition to: impaired cognitive development, suboptimal learning ability, an abnormal bone matrix and distorted skeletal formations among infants and children (Bartley *et al.* 2005). Maternal micronutrient deficiencies during lactation can also cause a major reduction in the concentrations of some of these nutrients in breast milk with subsequent infant depletion (Allen & Graham, 2003). A 1991 Institute of Medicine report (Nutrition During Lactation) stated that well-nourished breastfeeding women do not need routine vitamin or mineral supplementation but that an adequate well-balanced diet is needed to ensure optimal nutritional intake.

The assessment of maternal knowledge regarding infant feeding practices

highlighted several knowledge gaps among Lebanese mothers including misconceptions regarding insufficiency of milk supply, effect of breastfeeding on the size of their breasts, inadequacy of breastfeeding during flu and lack of knowledge about optimal duration of breastfeeding and exclusive breastfeeding. These misconceptions have been highlighted by previous studies conducted among Lebanese mothers, suggesting that several of these misconceptions are deeply embedded in the local culture (Osman *et al.* 2009; Nabulsi, 2011). In a longitudinal study conducted among 353 mothers in Beirut, the quantity of breast milk that a mother produces was described as a common concern (Osman *et al.* 2009). Likewise, Nabulsi (2011) reported that insufficiency of breast milk was one of the common reasons for early discontinuation of breastfeeding of 36 Lebanese mothers (Nabulsi, 2011). Batal *et al.* (2006) noted this to be the primary reason for early introduction of formula. The high prevalence of mothers who believed that they should not breastfeed when they were sick, was also documented by Osman *et al.* (2009). Nabulsi (2011) also showed that the belief that maternal illness would cause bad or harmful milk was among those associated with early discontinuation of breastfeeding by Lebanese mothers. Moreover, a high rate of mothers in this study thought that breastfeeding affect their breast shape, this reason was also one of Nabulsi's finding where the fear of breast drooping was identified as one of the main reasons for early cessation of breastfeeding (Nabulsi, 2011). Maternal knowledge gains all the more importance as it was shown to be associated with breastfeeding in the study sample. In fact, the odds of exclusively breastfeeding for 6 months and the odds of breastfeeding for 6 months or more were shown to be significantly lower in mothers who scored less than the average on the *infant feeding knowledge test*. This confirms the need for educational

interventions targeting Lebanese women and aiming to promote adequate infant feeding practices. Therefore, the findings of this study support the importance of tackling knowledge as a first step toward behavior change and highlight the need for programs aiming at addressing breastfeeding misconceptions and enhancing breastfeeding knowledge and awareness among mothers (Swanson *et al.* 2006; Trrant & Dogson, 2007; Osman *et al.* 2009; Nasreddine *et al.* 2014).

About 15% of the mothers participating in this study smoked during pregnancy and 15.8% during breastfeeding. Several studies have shown that maternal smoking during pregnancy increases the prevalence of asthma attacks in the offspring, not only in the first year but also later in childhood. Prenatal smoking, specifically nicotine component, may alter intrauterine pulmonary development and function or the newborn's immune system (Souef, 2006; Alati *et al.* 2006). Some studies have also suggested that smoking while breastfeeding may decreases milk production, alters milk composition and exhibit behaviors as colic and crying, that may promote early weaning (Menella, 2007).

In the present study, anthropometric assessment was also performed to evaluate maternal and child nutritional status. The results showed low rates of severely stunting (2.2%), stunting (5.8%) and wasting (2.3%) in infants and young children. The prevalence of infants and young children at risk of overweight is high (24.2%), which according to the WHO global database on child growth and malnutrition, is lower than the majority of the countries such as Canada (47.0%). Around 11% were shown to be overweight, this prevalence was also comparable to Argentina (10.4%), lower than Canada but higher than Germany (3.3%). About 3.6% were shown to be obese, this rate was comparable to Algeria (3.8%), lower than Canada but higher than Gemrnany

(0.25%) and Jordan (0.6%) (Table 27).

The results of the present study showed an obesity prevalence of 24.7% amongst Lebanese mothers. This prevalence estimate is similar to the one recently reported by Nasreddine *et al.* (2012) based on a nationally representative survey. The high prevalence of obesity in Lebanese mother gains all the more importance as it was shown to be significantly associated with higher odds of overweight (OR=3.608; 95%CI: 1.811-7.187) and obesity (OR=3.272; 95%CI: 1.575-6.798) in infants and young children in the study sample. These results are in agreement with those reported by Nasreddine *et al.* (2014) where parental obesity was associated with approximately a 3-fold increase in the odds of overweight (OR= 3.01; 95% CI: 1.61-5.63) and obesity (OR= 2.93; 95% CI: 1.09-7.86) amongst 6-11-year-old-children, showing that maternal obesity is a risk factor for childhood obesity. Maternal BMI has also been proposed as significant determinant of obesity in young children (Madise *et al.* 1999), with the Global Strategy of infants and young child feeding affirming that infants and mothers are inseparable biological and social units, and the health of one cannot be separated from the health of the other (*Global strategy for infant and young child feeding*). Intervention programs must be put in place to obstruct the progress of obesity among mothers and associated-non-communicable diseases in Lebanon and its direct association with overweight and obesity in infants and young children. Mothers and children may also be sharing environmental lifestyle and dietary factors that could increase adiposity risk (steward *et al.* 2004). In fact, in the present study, maternal dietary intakes in terms of macro and micronutrients, were significantly associated with dietary intakes in infants and young children, highlighting the important role mothers could play in modulating their children's diet and

eating habits. In addition, the results of the present study showed that, a high intake of sugar is positively associated with overweight and obesity in children 12-24 months of age (OR=2.444; 95%CI: 1.062-5.626). This is in agreement with study in Sweden where a high intake of sugar had been suggested to contribute to the increasing prevalence of obesity in 1-year-old children (Brekke *et al*. 2007).

In this study, no protective association was found between breastfeeding and child's overweight or obesity. This was also shown in a study done by Hediger *et al.* 2001 on US-born children under 5 years where no association was found between breastfeeding and overweight in those children (Hediger *et al.* 2001). Similarly, O'Callaghan *et al.* studied 4062 children at 5 years old in Australia and did not find a significant association between duration of breastfeeding and overweight (O'Callaghan *et al.* 1997). This could be related to the low rate of overweight and obese children in our study or because they didn't reach yet the adiposity rebound.

One important limitation of this study is recall bias due to the retrospective nature approach to data collection. It should also be noted that epidemiological studies of this kind do not establish causality but may suggest associations. The characteristics of the individuals who were not enrolled in the study could not be determined as well. This might increase the possibility of our sample not being representative of the target population.

Table 26: Comparison between our data and the data of several countries based on the WHO global data bank on infant and young child feeding practices

Survey year	Country	Children ever breastfed	Early initiation of breastfeeding*	Exclusive breastfeeding‡	Continued breastfeeding at 1 year	Continued breastfeeding at 2 years	Introduction of solid, semi solid or soft foods§
		N(%)					
2012	**Lebanon**	88.49	25.7	20.4	20.8	5.6	86.5
2006	**Algeria**	-	-	6.9	46.5	22.2	38.0
2002	**Bahrain**	95.1	-	-	-	-	-
2000	**Egypt**	95.5	57.0	57.0	79.9	30.1	71.4
1987	**Kuwait**	88.0	-	38.3	-	-	-
2006	**Iraq**	-	-	25.1	67.6	35.7	51.0
2000	**Oman**	98.8	-	-	95.0	72.7	91.1
2006	**Syria**	-	-	28.7	63.9	16.3	36.5
2007	**Jordan**	93.1	38.8	21.8	46.0	10.9	-
2004	**Morocco**	95.1	52.0	31.0	58.5	14.7	90.9
2006	**Tunisia**	95.8	-	6.2	48.1	15.4	61.1
2003	**Yemen**	96.6	40.0	11.5	-	-	-
2006	**Bosnia**	-	-	17.6	25.6	9.6	29.0
2007	**Canada**	90.3	-	14.4	-	-	-
2008	**USA**	73.9	-	13.6	-	-	-
2002	**Japan**	-	-	21.0	-	-	-

*Proportion of children born in the last 24 months who were put to the breast within one hour of birth.
‡Proportion of infants 0 – 5 months of age who are fed exclusively with breast milk.
§ Indicator4: Proportion of infants 6 – 8 months of age who receive solid, semi-solid or soft foods.
WHO Global Data Bank on Infant and Young Child Feeding, 2014

Table 27: Comparison between our data and the data of several countries based on the WHO global database on child growth and malnutrition

		Severely stunted[a]	Stunted[b]	Wasted[c]	Risk of overweight[d]	Overweight[e]	Obese[f]
Survey date	**Country**	**%**					
2012	**Lebanon**	2.2	5.8	2.3	24.2	10.8	3.6
2002	**Argentina**	6.1	17.0	3.5	32.3	10.4	2.3
2004	**Afghanistan**	29.7	52.4	14.5	16.7	6.5	3.2
1992	**Algeria**	10.4	30.8	6.0	43.9	18.3	3.8
2010	**Armenia**	9.7	18.2	2.2	53.5	22.6	9.2
2012	**Bosnia**	6.1	13.8	2.0	53.1	26.2	9.2
2010	**China**	3.0	10.9	2.5	32.3	9.3	2.2
1972	**Canada**	2.4	5.4	0.9	47.0	14.1	4.2
2006	**Germany**	0.3	1.5	0.9	23.8	3.3	0.2
2006	**India**	27.6	54.1	16.6	10.6	3.5	1.1
2006	**Iraq**	15.3	30.5	5.3	47.1	21.0	7.8
2012	**Jordan**	2.7	11.0	1.5	29.2	7.2	0.6
2012	**Kuwait**	1.8	4.6	2.3	40.1	13.9	2.3
2011	**Yemen**	23.6	49.3	11.0	9.2	1.8	0.6

WHO global database on child growth and malnutrition, 2014

a. HAZ less than – 3, b. -3=<HAZ <-2, c. -3=<BAZ <-2, d.1<BAZ <=2, e. 2<BAZ<=3, f. BAZ > +3.

CHAPTER VI

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, this study showed that, even though the prevalence of "ever breastfeeding" was high in Lebanon, the prevalence of exclusive breastfeeding for six months was low, not exceeding 20% based on the WHO indicator. The factors that were found to increase the likelihood of exclusive breastfeeding in the study sample included early initiation of breastfeeding within one hour and the child being not the first child in the family. Moreover, decreased odds of exclusive breastfeeding were shown for babies born small for gestational age, which highlights maternal misconceptions about breast milk not meeting the needs of their baby. Likewise, the odds of exclusive breastfeeding for 6 months decreased significantly when mothers reported not being breastfed as a child, which also confirms the impact of the culture on breastfeeding practices. Similarly, maternal employment was found to be associated with significantly lower odds of exclusive breastfeeding among the pool of infants who were under 6 months of age at the time of the interview. Regarding the prevalence of breastfeeding, it was found to decrease from 75.4% at 3 months to only 4.5% at 23 months. The study showed a high proportion of mothers who reported introducing solid, semi solid, or soft foods before 6 months of age (45.4%), but the minimum dietary diversity and minimum meal frequency were found to be met by a high proportion of Lebanese infants and young children. After analyzing the nutrient intakes, it was shown that a high proportion of Lebanese infants and young children do not meet the nutritional recommendations for Vitamin D, Vitamin A, Iron, Calcium and Fiber. High sugar intake was also observed amongst children with a mean intake being double as compared to the WHO limit of 10%. Maternal intakes were

also found to be deficient in vitamins A, D, C and Folate and in minerals Calcium, Zinc, magnesium with the intake of protein being lower than the requirements at the expense of fat. The assessment of maternal knowledge regarding infant feeding practices highlighted several knowledge gaps among Lebanese mothers including misconceptions regarding insufficiency of milk supply, effect of breastfeeding on breast shape, inadequacy of breastfeeding during flu or sickness and lack of knowledge about optimal duration of breastfeeding and exclusive breastfeeding.

The prevalence of infants and young children at risk of overweight was found to be high (24.2%), with about 3.6% being obese. The prevalence of obesity in mothers was estimated at 24.7%. The high prevalence of obesity in Lebanese mother gains all the more importance as it was shown to be significantly associated with higher odds of overweight and obesity in infants and young children in the study sample. Maternal dietary intakes in terms of macro and micronutrients were shown to be significantly associated with dietary intakes of infants and young children, and a high intake of sugar among children was found to be positively associated with overweight and obesity. Based on the study's findings, the following recommendations and interventions are suggested:

- Encouraging early initiation of breastfeeding at the hospital by for instance adopting the Baby Friendly Hospital Initiative (BFHI).
- Encouraging adequate complementary feeding to meet nutritional requirements of infants.
- Ensuring maternal optimal nutritional intake by providing adequate well-balanced diet.

- Educating Lebanese women about adequate infant feeding practices, and the need for implementation of knowledge and awareness campaigns as a first step toward behavior change aiming at addressing breastfeeding misconceptions and enhancing breastfeeding knowledge and awareness among women.
- Targeting new mothers in future educational interventions aiming at promoting breastfeeding and healthy infant feeding practices.
- Targeting young women during the school years to spread awareness of the benefits and the challenges of breastfeeding by revising the school curricula and updating undergraduate and graduate training programs (Nasreddine *et al.* 2014).
- Using media as a breastfeeding awareness vehicle and aiming at addressing the issue of breastfeeding in public (Nasreddine *et al.* 2014).
- Developing policies to support day-care facilities at work, allowing for lactation breaks and extending maternity leave (Nasreddine *et al.* 2014).
- Developing intervention programs to obstruct the progress of obesity among mothers and its direct association with overweight and obesity in infants and young children.
- Encouraging supplementation of vitamin D and Iron for young children under 2 years old
- Highlighting the role of pediatricians in encouraging proper infant and young child feeding practices.

APPENDIX I

Arabic questionnaire

كلّية العلوم الزراعيّة والغذائيّة
قسم التغذية وعلوم الغذاء

برنامج تغذوي مبني على أدلّة للأمّهات، الرّضّع، والأطفال

(الجزء الأوّل من مشروع التّغذية المبكرة والصّحة في لبنان ELNAHL)

إستبيان ١: عُمر ٠-٢ سنوات

٢٠١٢

رقم الاستمارة:					

العينة الوطنية

البيانات التعريفية															
1.	المحافظة:			*											
2.	القضاء:		*	*											
3.	اسم المنطقة		*	*											
4.	رقم الجزيرة														

نتيجة الزيارة	الزيارة الأولى	الزيارة الثانية	الزيارة الثالثة		نتيجة الزيارة	الزيارة الأولى	الزيارة الثانية	الزيارة الثالثة	
1. تمت المقابلة	1	2	3		6. مغلق دائم	1	2	3	
2. تمت جزئياً	1	2	3		7. خالي	1	2	3	
4. لا يوجد شخص مؤهل	1	2	3		9. رفض المقابلة				
5. مغلق مؤقت	1	2	3		10. أخرى (حدد)_____				
3. أرجئت	1	2	3		8. مستعمل لغير السكن	1	2	3	

مراحل العمل		
اسم الباحث:	التاريخ: / / 2012	رقم الباحث : ____
اسم المراقب:	التاريخ: / / 2012	رقم المراقب: ____
اسم المرمز:	التاريخ: / / 2012	
اسم مدخل البيانات:	التاريخ: / / 2012	رقم مدخل البيانات: ____

نتيجة الزيارة:

1. تمت المقابلة ____
2. رفض المقابلة
3. أخرى (حدد): _____

جدول المحتويات

برنامج تغذوي مبني على أدلّة للأمّهات، الرّضّع، والأطفال

إستبيان ١: ٠-٢ سنوات

رقم الإستمارة: ..... **إسم المُقابِل:** .....

التاريخ: ..... **النّهار:** .....

المنطقة: ..... **وقت بداية الإستمارة:** .....

الخصائص الدّيمغرافيّة للأسرة

الخلفيّة الإجتماعيّة والدّيمغرافيّة

يضمّ هذا القسم أسئلة عامّة تتعلّق بكِ وبعائلتك.

1. **ما هو تاريخ ميلادك؟ (اليوم/ الشّهر/ السّنة):** _____

2. **ما هو وضعك العائلي (الحالة الإجتماعيّة)؟**
   1) متزوّجة (يرجى تحديد العمر عند الزّواج): _____ سنة
   2) منفصلة عن زوجي
   3) مُطلّقة
   4) أرملة
   5) لا أريد الإجابة

3. **هل عشت في بلد آخر لفترة طويلة من الزّمن؟**
   1) نعم، يُرجى تحديد:
      البلد _____
      المدّة _____
   2) كلا

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4. ما هو المستوى التعليمي الأعلى الذي حقّقتِه؟
   1) أميّة
   2) أقرأ وأكتب
   3) المدرسة الابتدائيّة
   4) المدرسة المتوسطة
   5) المدرسة الثانويّة
   6) دبلوم تقني/فنّي
   7) الشهادة الجامعيّة
   8) لا أريد الإجابة

5. هل تخصّصتِ في إحدى المجالات المتعلّقة بالصحة (الطبّ، علم الأحياء (البيولوجيا)، الصحّة العامّة، الصيدلة، إلخ.)؟
   1) نعم (إنتقل إلى السؤال 7)
   2) كلا

6. هل تستمعين/تشاهدين/تقرأين معلومات متعلّقة بالصحة (الطبّ، علم الأحياء (البيولوجيا)، الصحّة العامّة، الصيدلة، إلخ.)؟
   1) نعم (يرجى إعطاء تفاصيل): _____
   2) كلا

7. ما هي المهنة التي تقومين بها؟
   1) موظّفة، دوام كامل
   2) موظّفة، دوام جزئي
   3) عاطلة عن العمل، ولكن أبحث عن عمل
   4) عاطلة عن العمل، وغير قادرة على العمل
   5) لا أعمل
   6) غير، يرجى التحديد (ربّة منزل، تلميذة، إلخ) : _____

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8. ما هو نوع العمل الذي تقومين به؟
   1) موظّفة حكوميّة
   2) موظّفة في القطاع الخاص
   3) صاحبة مصلحة أو مؤسّسة خاصّة، يرجى التّحديد: _____

9. ما هو المستوى التعليمي الأعلى الذي حقّقه زوجك؟ (إنتقل إلى السؤال رقم 11 إذا كانت الأم مطلّقة، منفصلة عن زوجها، أو أرملة)
   1) أمّي
   2) يقرأ ويكتب
   3) المدرسة الابتدائيّة
   4) المدرسة المتوسطة
   5) المدرسة الثانويّة
   6) دبلوم تقني/فنّي
   7) الشهادة الجامعيّة
   8) لا أريد الإجابة

10. ما هو نوع العمل الذي يقوم به زوجك؟
   1) لا يعمل
   2) موظّف حكومي
   3) موظّف في القطاع الخاص
   4) صاحب مصلحة أو مؤسّسة خاصّة، يرجى التّحديد: _____
   5) متقاعد
   6) عاطل عن العمل، ولكن يبحث عن عمل
   7) عاطل عن العمل، وغير قادر على العمل
   8) لا أعرف
   9) لا أريد الإجابة

11. كم هي عدد السيارات التي تملكونها؟ _____

12. البيت الذّي تعيشون فيه معظم أوقات السّنة (أيّ البيت الثّتوي) هو:

1) مِلك خاصّ (لك و/أو لزوجك)
2) إيجار
3) مِلك أحد الأقارب
4) مِلك أحد الأصحاب
5) لا أعرف
6) لا أريد الإجابة

13. كم هو عدد الغرف في البيت الذّي تعيشون فيه معظم أوقات السّنة (باستثناء المطبخ، الحمام، الكاراج، أو الشرفات (البلكون) المفتوحة)؟ _____

14. ما هو العدد الإجمالي للأفراد في منزلك (وهذا يشمل مساعدة المنزل، الأقارب، أو أفراد العائلة التي تعيش معكم على أساس دائم أو شبه دائم) ؟ _____

وضع تنظيم الأسرة

15. عدّدي أولادك مع تحديد العمر(بالأشهر أو بالسّنين)، بلد الولادة، وما إذا كانوا يرتادون المدرسة (رسميّة أو خاصة) أو الحضانة، أو يبقون في المنزل (الجدول 1).

الجدول 1: قائمة الأولاد في الأسرة

رقم الطفل	إسم الطّفل	بلد الولادة	العمر (بالأشهُر/بالسّنين)	المدرسة		غير	
				خاصة	رسمية	الحضانة	المنزل

تأكّد من تدوين كل المعلومات المتعلّقة بكل طفل قبل الإنتقال إلى طفل آخر. عند إنتهاء تدوين الأطفال في العائلة، يرجى وضع خطّ.

16. هل أنت حامل؟
1) نعم
2) كلا

17. هل تستخدمين أي وسيلة لمنع الحمل؟
1) نعم (يُرجى تحديد الوسيلة المستخدمة): _____
2) كلا

معلومات عامّة عن طفلك

يضمّ هذا القسم أسئلة تتعلّق بطفلكِ الذي يتراوح عمره بين ٠ - ٢ سنوات. (إذا كان هناك أكثر من ولد واحد في هذه الشريحة العمرية (بين ٠ - ٢ سنوات)، يجب الإستفسار عن الأصغر سناً).

18. إسم الطّفل: _____

19. ما هو جنس الطّفل؟
1) ذكر
2) أنثى

20. ما هو تاريخ ميلاده/ها؟ _____ (اليوم/ الشّهر/ السّنة)

21. ما كان وزنه/ها عند الولادة؟ _____كلغ

22. كم كان طوله/ها عند الولادة؟ _____ سنتم

23. ما هي طريقة ولادة طفلك؟
1) ولادة طبيعيّة
2) ولادة قيصريّة

24. عندما لا يكُن طفلك مريضاً، ما هي عدد المرّات التي تُخضعينه للمعاينة الطبيّة العاديّة؟

1) أبداً
2) مرّة في السّنة
3) مرّتين في السّنة
4) أكثر من ثلاث مرّات في السّنة

الحصول على خدمات التغذية للرّضّع

25. من برأيك هو أكثر شخص مناسب/ موثوق به ليعطيك نصائح حول تغذية طفلك؟

1) أفراد العائلة
2) الطّبيب
3) الممرّضة
4) أخِصّائي التّغذية
5) نفسي
6) لا أعرف
7) غير، يرجى التّحديد: _____

26. هل تعتقدين أن وجود قائمة للمراجع والموارد المتاحة حول الخدمات المتعلّقة بالرّضّع مفيدة للأمّهات الجُدُد؟

1) نعم
2) كلا

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ممارسة الرّضاعة الطبيعيّة

27. هل قمتِ بارضاع طفلكِ رضاعة طبيعيّة؟
1) نعم (الرّجاء الإنتقال إلى السؤال 29)
2) كلا

28. يرجى تحديد الأسباب الرّئيسيّة لعدم ممارسة الرّضاعة الطّبيعيّة مع طفلك. (الجدول 2) ومن ثم إنتقلي إلى السّؤال 38) .

الجدول 2. الأسباب لعدم ممارسة الرّضاعة الطّبيعيّة

الأسباب الرّئيسيّة	نعم	كلا
1) الإحراج		
2) الخوف من الألم أو الإزعاج		
3) التعب والإرهاق		
4) الحاجة الى المساعدة في تغذية طفلي		
5) قلّة النوم		
6) قلّة الأماكن العامّة التي تُتيح الإرضاع		
7) عدم وجود دعم من زوجي		
8) عدم وجود دعم من العائلة		
9) عدم وجود دعم من الأصدقاء		
10) التشجيع على استخدام حليب البودرة من قِبل العاملين في المستشفى (الأطبّاء، مقدّمي الرّعاية الصّحيّة، والممرّضات)		
11) مشاكل في إنتاج الحليب		
12) مشاكل طبيّة (ولادة قيصرية، سكّري، الخ.)		
13) لا تحبّين الإرضاع من الثّدي		
14) لم يقبل الطّفلُ الثّدي		
15) كان عليكِ أن تعملي		
16) غير، يُرجى التّحديد: _____		

29. خلال مرحلة رضاعة طفلك، ماذا حصل لدورتك الشّهريّة؟

1) توقّفت كلّياً (يرجى تحديد الفترة): _____ أشهر
2) توقّفت لفترة محدودة، ولكنها قد عاودت حاليّاً (يرجى تحديد الفترة): _____ أشهر
3) لم تتوقّف ابداً

30. لماذا اخترتِ الرّضاعة الطبيعيّة؟ (اختاري كلّ ما ينطبق عليكِ)

1) فوائد صحيّة لنفسي
2) فوائد صحيّة لطفلي
3) شجّعتني تجاربي السابقة في الرّضاعة الطبيعيّة
4) إرتفاع كلفة حليب البودرة للأطفال
5) نصيحة الطبيب
6) نصيحة العائلة
7) جميع الخيارات الواردة أعلاه

31. كم من الوقت إنتظرت قبل أن وضعتِ طفلك على الثّدي بعد الولادة؟

1) مباشرةً (بعد أن مضى أقلّ من ساعة بعد الولادة)
2) ساعة
3) أقلّ من 24 ساعة (_____ ساعة)
4) _____ أيام
5) لا أتذكّر

32. كم من الوقت قام طفلكِ:

1) بالرّضاعة الطبيعيّة المطلقة _____ (أشهر)
2) بالرّضاعة الطّبيعيّة _____ (أشهر)
3) لا زلتُ أرضّع (إنتقلي إلى السّؤال 34)

33. لماذا توقفت عن إرضاع طفلك من الثّدي؟ (اختاري كلّ ما ينطبق في الجدول 3)

الجدول 3. الأسباب لوقف الرّضاعة الطّبيعيّة

الأسباب الرّئيسيّة	نعم	كلا
1) الإحراج		
2) الألم أو الإزعاج (من إلتهاب الثّدي مثلاً)		
3) التعب والإرهاق		
4) الحاجة الى المساعدة في تغذية طفلي		
5) قلّة النوم		
6) قلّة الأماكن العامّة التي تُتيح الإرضاع		
7) عدم وجود دعم من زوجي		
8) عدم وجود دعم من العائلة		
9) عدم وجود دعم من الأصدقاء		
10) التشجيع على استخدام حليب البودرة من قِبل العاملين في المستشفى (الأطبّاء، مقدّمي الرّعاية الصّحيّة، والممرّضات)		
11) مشاكل في إنتاج الحليب		
12) مشاكل طبيّة (ولادة قيصرية، سكّري، الخ.)		
13) لا تحبّين الإرضاع من الثّدي		
14) لم يقبل الطّفلُ الثّدي		
15) كنتِ مريضة		
16) كان عليكِ أن تعملي		
17) حملتِ ثانيةً		
18) حليب الثّدي غير كافٍ لاشباع طفلي		
19) عُمر الطّفل، يرجى التّحديد:		
20) غير، يُرجى التّحديد:		

34. كل مرّة تمارسين الرّضاعة الطبيعيّة، هل:

1) تعطي طفلك حليب من ثدي واحد فقط
2) تحاولي أن تعطي طفلك حليب من الثّديين
3) تعطي طفلك حليب من الثديين فقط إذا إنتهى الطفل من الثّدي الأوّل وما يزال جائعاً

35. كيف يحصل طفلك على حليب الثّدي؟

1) من الثّدي مباشرةً (فترة الرّضاعة من الثدي الواحد _____دقائق)
2) من قنّينة (عدد القناني في اليوم _____ . الرجاء تحديد مقدار القنّينة _____ ملل)
3) من ملعقة (عدد الملاعق في اليوم _____)
4) من كوب (عدد الأكواب في اليوم _____. الرجاء تحديد مقدار الكوب _____ ملل)

36. عندما كان طفلك يبلغ أقلّ من 6 أشهر من العمر، هل كنتِ تعطيه/ها حليب البودرة الخاص بالأطفال بالإضافة إلى الرّضاعة الطّبيعيّة؟

1) نعم
   i. متى بدأت بإعطاء حليب البودرة الخاص بالأطفال _____(عمر الطفل بالأشهر)
   ii. عدد وجبات حليب البودرة المُعطاة في القنّينة في اليوم الواحد_____
   iii. عدد مرّات الرضاعة الطبيعيّة في اليوم الواحد_____
2) كلّا

37. عندما أعطيت طفلك حليب البودرة الخاص بالأطفال، هل قمت بإضافة أي من المواد التالية أدناه:

1) حبوب الإفطار الخاصّة بالأطفال (سيريلاك، Blédine، بودرة الأرز، الخ.)
2) السكر
3) بودرة الشوكولا
4) العسل
5) غير، يرجى التحديد: _____
6) لم أضف شيئاً
7) لا أتذكّر

38. هل وفّر/ يوفّر لكِ زوجك الدعم الإيجابي (إنتقل إلى السؤال رقم 39 إذا كانت الأم مطلّقة، أو منفصلة عن زوجها، أو أرملة)

1) نعم
2) كلا

39. كيف وفّرت لكِ المستشفى أو العيادة الدّعم بخصوص إرضاع طفلكِ؟

1) أنجبتُ طفلي في المنزل
2) تشجيع إيجابي من قبل العاملين في المستشفى (الأطبّاء، مقدّمي الرّعاية الصّحّية، والممرّضات)
3) مُحايدة
4) عدم تشجيع من قبل العاملين في المستشفى (الأطبّاء، مقدّمي الرّعاية الصّحّية، والممرّضات)
5) تشجيع على تغذية طفلي من حليب البودرة الخاص بالأطفال

40. بعد الولادة وخلال وجودك في المستشفى، هل أُعطي طفلك أي سوائل خلال ٣ أيّام من بعد الولادة؟

1) نعم
2) كلا

التّغذية التّكميليّة

سوائل غير حليب الثدي

41. من السّوائل التي سنذكرها، أشيري إلى السّوائل التي يتناولها طفلك، وأذكري الوقت الذي بدأتِ بإدخال هذه السّوائل.(الجدول 4).

الجدول 4: إدخال سوائل التّغذية التكميليّة

السّوائل	نعم	كلا	لا أعرف	وقت إدخال السّوائل إلى النظام الغذائي (عمر الطفل بالأشهر)
1) الماء العادي				
2) الماء العادي (مع إضافة السكّر، ماء الورد، وغيرها) الرّجاء التّحديد:				
3) حليب البودرة الخاص بالأطفال				
4) حليب البقر (البودرة، أو السائل) الرّجاء تحديد النّوع:				
5) العصير أو مشروبات العصير				
6) المرقة				
7) اللبن				
8) أي سوائل أخرى (مثل اليانسون، الشاي، البابونج، الكراويا)				
9) أي سوائل أخرى، الرّجاء التّحديد:				

42. هل قمتِ بادخال الأطعمة الصلبة والشبه صلبة؟
   1) نعم
   2) كلا (انتقلي الى سؤال 49)

43. ما كان أوّل طعام صلب قدّمته لطفلك؟ _____

44. متى قدّمته لأول مرّة؟ (عمر الطفل بالأشهر): _____

45. لماذا بدأتِ بتقديم الأطعمة الصلبة في ذلك الوقت؟ (ينبغي إختار كل ما ينطبق)
   1) التقليد العائلي
   2) كان طفلي لا يزال يشعر بالجوع بعد تناول الحليب
   3) كان طفلي يبكي باستمرار
   4) كان طفلي في السنّ المناسب لذلك
   5) لم يكن طفلي ينام خلال الليل
   6) كان طفلي مريضاً
   7) كان طفلي يرفض الحليب
   8) كان طفلي مهتماً بالأطعمة/ فطم نفسه
   9) لم يكن وقت إطعام طفلي يتلائم مع جدول العمل الخاصّ بي
   10) حملتِ ثانيةً
   11) ما من سبب محدّد غير، يُرجى التّحديد: _____

46. من الأطعمة التي سوف نذكرها، يرجى تحديد اذا كنتِ قد بدأتِ بإدخال أي من الأطعمة إلى النظام الغذائي الخاصّ بطفلكِ. يُرجى تحديد الوقت الذي بدأتِ بإدخال هذه الأطعمة. (الجدول 5).

الجدول 5: توقيت إدخال الأطعمة التكميليّة الصّلبة

الأطعمة التكميليّة الصّلبة	نعم	كلا	لا أعرف	وقت إدخال الطعام إلى النظام الغذائي (عمر الطفل بالأشهر)
1) الخبز، القمح، البرغل، الأرزّ، المعكرونة، أو غيرها من الأطعمة المصنوعة من الحبوب				
2) حبوب الإفطار الخاصّة بالأطفال (سيريلاك، بليدين، الخ.)				
3) الجزر، الكوسى، البطاطا الحلوة (الصفراء أو البرتقالية من الدّاخل)، اليقطين				
4) البطاطا				
5) أي من الخضار الورقية الخضراء الداكنة (سبانخ، ملوخيّة، إلخ)				
6) أي من أنواع الخضار الأخرى				
7) المانجو، الجريب فروت، البندورة، البطيخ				
8) أي من أنواع الفواكه الأخرى				
9) لحوم الكبد، الكِلى، القلب، وغيرها من لحوم الأعضاء				
10) اللحوم مثل لحم البقر، الخنزير، الخروف، الماعز، الدّجاج				
11). البيض				
12) السمك، المحار أوالمأكولات البحرية الطازجة أوالمجفّفة				
13) البقول (عدس، حمص، فول، فاصوليا، وغيرها)				
14) المكسّرات والبذور				
15) الجبن، اللبن، أو غيرها من منتجات الحليب				
16) أطعمة الأسرة (اليخنات، الخضار المحشوّة، الخ.)				
17) الزيوت، الدّهون، أو الزّبدة، أو الأطعمة المصنوعة منها				
18) أي أطعمة سكّريّة مثل الشوكولا، الحلويات، الكيك، أو البسكويت				
19) الحلويات العربية (بقلاوة، معمول، نمّورة، إلخ)				
20) حلويات أخرى (مغلي، أرز بالحليب، مهلبيّة، كسترد،إلخ)				
21) المربّى، الجلو				
22) العسل				
23) توابل للنّكهة مثل الفلفل الحار، البهارات، الأعشاب، بالإضافة إلى الخردل، الكتشاب، وصلصة الصّويا				
24) المواد الغذائية المدعّمة بالحديد (حبوب الإفطار، الحليب، الخ.)				

47. أذكري عدد الحصص لكل من المجموعات الغذائيّة التالية التي يتم استهلاكها من قبل طفلك (في اليوم، في الأسبوع، أو في الشّهر) (الجدول 6)

الجدول 6: نظرة عامة على إستهلاك الطفل للمجموعات الغذائيّة الرئيسيّة

المجموعة الغذائيّة	عدد الحصص			
	في اليوم	في الأسبوع	في الشهر	أبداً
1) الفواكه				
2) الخضار				
3) الخبز والحبوب				
4) اللحوم (أي اللحوم الحمراء، السمك، والدّجاج)				
5) لحوم الأعضاء (أي الكبد، الكلى، القلب، الخ.)				
6) البقول (أي الفاصوليا، العدس، الحمّص، إلخ.)				
7) المكسّرات (المملّحة والغير مملّحة)				
8) الحليب ومنتجاته (أي الحليب، اللّبن، الجبنة، واللّبنة)				
9) الحلويات				

48. أذكري عدد المرّات (في اليوم، في الأسبوع، في الشّهر) التي يستهلك فيها طفلك أحد الأصناف التالية (الجدول 7).

الجدول 7: وتيرة إستهلاك الوجبات الخفيفة والمشروبات من قبل الأطفال

الأصناف	وتيرة الإستهلاك		
	في اليوم	في الأسبوع	في الشّهر
1) رقائق البطاطا (شيبس)			
2) شوكولا			
3) بون بون			
4) بسكويت/كوكيز			
5) بوظة/آيس كريم/ بوظة على ثلج			
6) بطاطا مقلية			
7) هوت دوغ			
8) همبرغر			
9) بيتزا			
10) كيك، كيك المافين، الكابكيك			
11) بانكيك			
12) دونتس			
13) حبوب الافطار المحلاة			
14) عصير الفاكهة 100 % طبيعي (بالإضافة إلى العصير المُحضّر في المنزل)			
15) عصير الخضار 100% طبيعي (بالإضافة إلى العصير المُحضّر في المنزل مثل عصير البندورة والجزر،الخ.)			
16) مشروبات الفواكه (عصير الفواكه المحلى، عصير بطعم الفواكه-طبيعي أو اصطناعي، أو مشروب مع بعض الفاكهة)			
17) المشروبات الغازيّة العادية			
18) مشروبات الدايت/القليلة بالسعرات الحرارية = المشروبات الغازية الدايت، الشاي أو المشروبات الغازية المحلاة بواسطة المحلّي			
19) الحليب المحلى (أعطي مثالاً)			
1) كامل الدسم			
2) قليل الدسم			

المأخوذ الغذائي للطّفل

الرجاء تذكّر ما أكله الطفل وشربه منذ أن استيقظ أمس حتّى صباح اليوم التالي (قبل الإفطار). تحديد توقيت تناول الوجبات بما فيها:

- الإرضاع من الثّدي
- حليب البودرة الخاص بالأطفال
- حليب البقر
- السّوائل الأخرى
- الأطعمة الصّلبة

الوقت	الطعام	الكمية	طريقة التحضير

هل هذا هو نمط طفلكِ المُعتاد لتناول الطّعام؟

1) نعم
2) كلا

إذا كان الجواب كلا، لماذا؟ _____

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الممارسات المتعلّقة بتغذية الطّفل

بيئة تناول الطّعام

49. هل لديكِ مساعِدة في المنزل؟

1) نعم
2) كلا

50. في العادة، تقع مسؤولية إطعام (تغذية) طفلكِ:

1) عليك أنتِ
2) على زوجك
3) على والدَيكِ
4) على والدي زوجكِ
5) على مساعدتكِ
6) غير، يُرجى التّحديد _____

51. ما هي الوجبة الرّئيسيّة التي يتناولها أفراد العائلة سويّاً؟

1) وجبة الفطور
2) وجبة الغذاء
3) وجبة العشاء
4) لا تتشارك العائلة في أي وجبة

52. هل يتناول طفلكِ الوجبة الرّئيسيّة مع العائلة؟

1) دائماً
2) أحياناً
3) أبداً

53. عندما تُطعِمين طفلكِ، هل يكون التلفزيون شغّالاً في الغرفة نفسها؟

1) دائماً
2) غالباً
3) أحياناً
4) نادراً
5) أبداً

أسلوب حياة الأمّ

التّدخين

59. هل تدخّنينَ الآن أو سبقَ لك أن دخّنت سابقاً؟

1) نعم، أدخّن حالياً
2) كنتُ أدخّن وتوقّفت
3) كلا (إنتقلي الى السؤال رقم 64)
4) لا أريد الإجابة

60. كم كان عمرك عندما بدأت التدخين؟

1) العمر بالسّنوات:_____
2) لا أعرف
3) لا أريد الإجابة

61. إذا كنتِ تدخّنين حالياً، كم من الخيارات التالية تدخّنين؟

1) سيجارة في اليوم الواحد _____
2) سيجار في اليوم الواحد _____
3) ساعة من تدخين النرجيلة في اليوم الواحد _____

62. هل دخّنتِ خلال فترة الحمل؟ (حملك بطفلك المشارك في هذه الدّراسة)

1) نعم
2) كلا

63. هل دخّنتِ خلال فترة إرضاع طفلكِ رضاعة طبيعيّة (طفلك المشارك في هذه الدّراسة)؟

1) نعم
2) كلا
3) لم أرضّع طفلي رضاعة طبيعيّة

إستهلاك الكحول

64. هل تشربين الكحول حالياً؟

1) نعم
2) كلا

65. هل شربتِ الكحول خلال فترة الحمل؟ (حملك بطفلك المشارك في هذه الدّراسة)

1) نعم، (يُرجى تحديد كمّية الكحول المستهلكة): _____(/اليوم أو /الأسبوع)
2) كلا

66. هل شربتِ/ هل تشربين الكحول عند إرضاع طفلك المشارك في هذه الدّراسة؟

1) توقّفتُ عن إستهلاك الكحول خلال فترة الرّضاعة
2) خفّفت من إستهلاك الكحول خلال فترة الرّضاعة
3) تابعت إستهلاك الكحول كالعادة،حتّى ولو إنني مُرضِعَة

النّشاط البدني

يضمّ هذا القسم أسئلة تتعلّق بنشاطك البدني.

67. خلال الأيام السّبعة الماضية، كم عدد المرّات في اليوم التي قمتِ بممارسة نشاط بدني مكثّف (مثل رفع الأشياء الثّقيلة، الحفر في الحديقة، تمارين الأيروبيك ، أو ركوب الدراجة بسرعة)؟ فكرِ في الأنشطة البدنيّة التي مارستيها لفترة لا تقل عن 10 دقائق كل مرة. وهذه الأنشطة البدنيّة يمكن أن تشمل لقطات قصيرة من النشاط البدني خلال النهار، مثل تسلق الدرج، تنظيف المنزل، القيام بالغسيل، واللّعب مع الأولاد.

1) _____ أيّام في الأسبوع
2) لم أمارس أي نشاط بدني مكثّف (إنتقلي الى السؤال رقم 69)

68. كم من الوقت قمت بممارسة نشاط بدني مكثّف في إحدى تلك الأيام؟

1) _____ ساعة في اليوم
2) _____ دقيقة في اليوم
3) لا أدري / غير متأكّدة

69. خلال الأيام السّبعة الماضية، كم عدد المرّات في اليوم التي قمتِ بممارسة نشاط بدني معتدل (مثل رفع الأشياء الخفيفة، تسلق الدرج، تنظيف المنزل، القيام بالغسيل، اللّعب مع الأولاد، ركوب الدراجة بوتيرة منتظمة، أو لعب التّنيس. لا تشملِ المشي في جوابك)؟ فكرِ في الأنشطة البدنيّة التي مارستيها لفترة لا تقل عن 10 دقائق كل مرة.

1) _____ أيّام في الأسبوع
2) لم أمارس أي نشاط بدني معتدل (إنتقلي الى السؤال رقم 71)

70. كم من الوقت قمت بممارسة نشاط بدني معتدل في إحدى تلك الأيام؟

1) _____ ساعة في اليوم
2) _____ دقيقة في اليوم
3) لا أدري / غير متأكّدة

71. خلال الأيام السّبعة الماضية، كم عدد المرّات في اليوم التي قمتِ بممارسة المشي (وهذا يشمل في المنزل وفي العمل، المشي للتنقّل من مكان إلى مكان، وأي نشاط قائم على المشي لهدف الرّياضة أو الإستجمام)؟ فكرِ في فترات المشي التي مارستيها لفترة لا تقل عن 10 دقائق كل مرة.

1) _____ أيّام في الأسبوع
2) لم أمارس المشي (إنتقلي الى السؤال رقم 73)

72. كم من الوقت قمت بممارسة المشي في إحدى تلك الأيام؟

1) _____ دقيقة/ساعة في اليوم.
2) لا أدري / غير متأكّدة

73. خلال الأيام السّبعة الماضية، كم من الوقت قضيتيه جالسة خلال أيام الأسبوع؟ (وهذا يشمل الوقت في المكتب، في المنزل إثناء القراءة أو مشاهدة التّلفزيون ، أوعند زيارة الأصدقاء).(لا يشمل هذا النّوم)

1) _____ ساعة في اليوم
2) _____ دقيقة في اليوم
3) لا أدري / غير متأكّدة

النّمط الغذائي لدى الأم

74. هل تتناولين الإفطار كل يوم؟

1) نعم
2) كلا

75. كم وجبة طعام تتناولين في اليوم من أصل وجبات الطعام الرئيسيّة الثلاث؟

_____ وجبة/وجبات في اليوم

76. هل تتّبعين حالياً حمية غذائيّة معيّنة؟

1) نعم
   i. نوع الحمية الغذائيّة _____
   ii. سبب متابعة هذه الحمية الغذائية _____
2) كلا

. هل أنتِ نباتيّة؟

1) نعم
2) كلا

. من يُعِدّ معظم وجبات الطّعام في منزلك؟

1) أنا
2) زوجي
3) أهلي
4) أهل زوجي
5) مساعِدتي
6) غير، يُرجى التّحديد: _____

كم مرّة في الأسبوع تقومين أنت وعائلتك:

1) بشراء الوجبات الجاهزة (الوجبات السّريعة، المناقيش، إلخ.)_____
2) بتناول الطّعام في المطاعم _____

ما هي الدّهون/ الزّيوت الّتي تستعملينها عادة في الطّبخ (يمكن إختيار أكثر من إجابة):

1) زبدة _____
2) المارجرين _____
3) السمن (النباتي أو الحيواني) _____
4) زيت النخيل/ زيت جوز الهند _____
5) زيت الزيتون _____
6) زيت الكانولا _____
7) زيوت نباتيّة أخرى _____

ل تتناولين أي من المكمّلات الغذائيّة؟

1) نعم، يرجى تحديد ما هي المكمّلات الغذائيّة التي تتناولين

i. الفيتامينات: الإسم: _____ الكمية المُستهلكة/اليوم: _____
ii. المعادن: الإسم: _____ الكمية المُستهلكة/اليوم: _____
iii. الأعشاب: الإسم: _____ الكمية المُستهلكة/اليوم: _____

2) كلا

معلومات الأم حول الرّضاعة الطّبيعيّة

82. هل تمّ إرضاعكِ من الثّدي عندما كنت طفلة؟

1) نعم
2) كلا

الجدول 8. معلومات الأمّ حول الرّضاعة الطبيعيّة

الأسئلة	نعم	كلا
1. الرّضاعة الطّبيعيّة تؤدّي الى إنقطاع الدّورة الشّهريّة		
2. يشكّل حليب الثّدي غذاءً كاملاً للطّفل. وليس هناك حاجة إلى أي مواد غذائيّة إضافية، أو سوائل وفيتامينات، إلخ. إلا عندما يصبح الطّفل على مقربة من السنة الأولى من العمر		
3. إذا كانت لديك ثديان صغيران، من الممكن أن يكون حليبك غير كافٍ لرضاعة طفلك		
4. إذا أصيبت الأم بالمرض (مثل الزكام أو الإنفلونزا)، يمكنها متابعة ممارسة الرضاعة الطّبيعيّة مع طفلها		
5. الأطفال الذين يتمّ إرضاعهم من الثّدي هم أقلّ عرضة للحساسيّة من الأطفال الذين يستهلكون حليب البودرة الخاص بالأطفال		
6. حبوب منع الحمل هي الطريقة المثلى لتجنّب الحمل خلال فترة الرّضاعة الطّبيعيّة		
7. يجب أن لا تحاولي رضاعة طفلك رضاعة طبيعيّة إن كنت عازمة على العودة إلى العمل أو الدّراسة، إذ أنّك لن تستطيعين التواجد دائماً مع طفلك لرضاعته/ها		
8. كلّما مارست الرّضاعة الطّبيعيّة، كلّما زادت كميّة الحليب لرضاعة طفلك		
9. الأطفال الذين يتمّ إرضاعهم من الثّدي هم أقلّ عرضة للإلتهابات من الأطفال الذين يستهلكون حليب البودرة الخاص بالأطفال		
10. الكثير من النساء غير قادرين على تأمين كميّات كافية لأطفالهن		

إختاري الجواب الأنسب للأسئلة التّالية:

إنّ أفضل غذاء للطفل المولود هو:

1) حليب الثّدي (حليب الأمّ)
2) حليب البودرة الخاص بالأطفال
3) حليب الثّدي والمياه
4) حليب الثّدي مع حليب البودرة المخصّص للأطفال

عندما تمارسين الرضاعة الطبيعيّة:

يمكنك إسترجاع شكل جسمك الأساسي قبل الحمل بسهولة أكثر
على الأرجح سوف تزيد نسبة وزنك
قد تشعرين بتعب (ضعف)

إذا مارست الرضاعة الطبيعيّة:

لا أحد يستطيع مساعدتك مع طفلك لأنك ملزمة برضاعته/ها
سوف تقضين وقتاً أطول بإطعام طفلك مقارنة مع إذا أعطيت طفلك حليب البودرة الخاص بالأطفال
سوف تواجهين مشكلة بإطعام طفلك في الأماكن العامة
كل الخيارات أعلاه غير صحيحة

الرضاعة الطبيعيّة:

قد تؤدّي إلى إرتخاء الثّديين
قد تؤدّي إلى إرتفاع في حجم الثّديين بعد التوقف عن الرضاعة الطبيعيّة
لا تؤثّر على حجم أو شكل الثّديين

ما هي المدّة المثلى للرّضاعة الطبيعيّة (بالأشهر)؟

1) 3 أشهر
2) 6 أشهر
3) 12 شهر
4) حتّى السّنتين من العمر

المأخوذ الغذائي للأم

تذكّري من فضلكِ ماذا اكلتِ وشربتِ منذ أن استيقظتِ حتّى صباح اليوم التّالي.

الوقت	الطعام	الكمية	طريقة التحضير

لمزيد من المعلومات، يُرجى الاتصال بمن يلي:

الباحثون الرّئيسيون:

الدكتورة نهلا حولا، كلية العلوم الزراعية والغذائية، الجامعة الأميركية في بيروت

هاتف: 961-1-350000، تحويلة (4400)، **البريد الإلكتروني:** nahla@aub.edu.lb

الدكتورة لارا نصر الدين، كلية العلوم الزراعية والغذائية، الجامعة الأميركية في بيروت

هاتف: 961-1-350000، تحويلة (4547)، **البريد الإلكتروني:** ln10@aub.edu.lb

الباحثون المساعدون:

الدكتورة فرح نجا، كلية العلوم الزراعية والغذائية، الجامعة الأميركية في بيروت

هاتف: 961-1-350000، تحويلة (4504)، **البريد الإلكتروني:** fn14@aub.edu.lb

الدكتورة دينا زيبان، كلية العلوم الزراعية والغذائية، الجامعة الأميركية في بيروت

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المراجع:

Grossman, LK, Harter, C & Hasbrouck, C 1990, 'Testing mothers' knowledge of breastfeeding: instrument development and implementation and correlation with infant feeding decision', *J Pediatr Perinat Nutr*, vol. 2, no. 2, pp. 43-63.

APPENDIX II

Consent form

"Evidence –Based Nutrition Program for Women, Infants and Young Children"

Protocol number:

Script to be used for the recruitment of **mother and child (under-five)** pair.

Hello, my name is_____, I am part of a research team at the American University of Beirut. We are conducting a research study that investigates the nutrition status of Lebanese children (under-five) and their mothers; this includes feeding and dietary lifestyle patterns. Your participation in this study involves answering some questions through an interview that will take around 60 minutes from your time. You have the right to refuse to participate in this study and to decline to answer particular questions. Please understand that your participation is voluntary and you have the right to refuse or discontinue participation at any time without penalty. All the information that I receive from you will be treated with strict confidentiality and will be kept under lock and key.

Would you like to consider participating in this study? Yes/No
If the answer is no, can you please tell us why?_____

For you to be eligible to participate in this study, we have a couple of questions to ask you.

Questions	Yes	No	Comments
Do you hold a Lebanese passport?			
Do you have a child aged under-five years old?			
Was your child's gestational age at birth ≥ 37 weeks			
Does the child have any medical problems that may affect his/her normal growth? (GI complications, respiratory illness, inborn errors, malformations or others)			
Is your child present in the house today?			
Are you taking medications that may interfere with your eating patterns or body weight?			
Do you have any chronic illness (Diabetes; CVD etc)?			

Contact Information and Questions
If you have any questions or concerns about the research you may contact:

Dr. Lara Nasreddine, Faculty of Agricultural & Food Sciences-AUB
Tel: 961-1-350000 (Ext 4547) **E-mail**: ln10@aub.edu.lb

Dr. Farah Naja, Faculty of Agricultural & Food Sciences-AUB
Tel: 961-1-350000 (Ext 4504) **E-mail**: fn14@aub.edu.lb

Dr. Dina Zebian, of Agricultural & Food Sciences-AUB
Tel: 961-1-350000 (Ext 4429) **E-mail**: dz12@aub.edu.lb

If you have any questions, concerns or complaints about your rights as a participant in this research, you can contact the following office at AUB:
Social & Behavioral Sciences Institutional Review Board
Address: American University of Beirut; Riad El Solh, Beirut 1107 2020, Lebanon
Tel: 00961 1 374374, ext: 5445 **Email:** irb@aub.edu.lb

(9).

Copies 1 for us 1 for the mother.

إستمارة موافقة

عنوان الدّراسة البحثية: برنامج تغذية للرُّضّع، الأطفال وأمّهاتهم.

الجزء الأوّل: من مشروع "التغذية والصحة المبكّرة في الحياة في لبنان"

الباحثون الرّئيسيون:

الدكتورة لارا نصر الدين- قسم التغذية وعلوم الغذاء، الجامعة الأميركية في بيروت.

الدكتورة نهلا حولّا- قسم التغذية وعلوم الغذاء، الجامعة الأميركية في بيروت.

الباحثون المساعدون:

الدكتورة فرح نجا- قسم التغذية وعلوم الغذاء، الجامعة الأميركية في بيروت.

الدكتورة دينا زبيان- قسم التغذية وعلوم الغذاء، الجامعة الأميركية في بيروت.

أنتِ مدعوّة للمشاركة في دراسة بحثيّة يُجريها قسم التغذية وعلوم الغذاء في الجامعة الأميركية في بيروت. من المهمّ أن تقرأي المعلومات المذكورة أدناه بعناية قبل الموافقة على المشاركة في الدّراسة، من أجل فهم الأهداف، الإجراءات، الفوائد والأخطار المرتبطة بمشاركتكِ بهذا المشروع. 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 الدّراسة إلى تقييم الوضع الغذائي للأطفال دون سنّ الخامسة وأمّهاتهم. من خلال استخدام استبيانات معيّنة، سيهدف المشروع إلى تقييم النظام الغذائي المُعتاد والممارسات الغذائية وأنماط الحياة الخاصّة بالرُّضّع والأطفال والأمّهات. ويُعدّ هذا أمراً مهمّاً لأنّ الدراسات التي أجريت مؤخراً أظهرت أن الوضع الغذائي للأم والتغذية في وقت مبكّر في الحياة يمكن أن يأثران بشكلٍ كبيرٍ على مخاطر الإصابة بأمراض مُزمنة في وقت لاحق في الحياة. وبالتالي، ستسمح لنا هذه الدراسة بتحديد القضايا الغذائية الأساسية في مرحلة الطفولة المبكّرة. كما ستساهم في تطوير استراتيجيات موجّهة نحو معالجة النقص الغذائي لدى الأم والرضيع والطفل الصغير، ونحو معالجة الممارسات الغذائية الخاطئة والسائدة في وقت مبكّر في الحياة (والتي تشكّل مرحلة حاسمة لبقاء الطفل على قيد الحياة ونشأته ونموّه بشكل سليم وصحّي في المستقبل).

وصف المشروع ومدّته

سيتمّ تنفيذ هذا المشروع من خلال جمع عيّنة مُمثّلة للسكان على الصعيد الوطني ومؤلفة من ~~1030~~ 1200 أمّ وأطفالهنّ دون سنّ الخامسة (~~1030~~ 1200 ثنائي مؤلّف من أمّ وطفل) من أسر من المحافظات الستّة في لبنان.

إذا وافقتِ على المشاركة في هذه الدّراسة، ستتمّ مقابلتكِ في منزلكِ أو في مكان آخر إذا كنتِ ترغبين بذلك. سوف تستغرق المقابلة حوالي ساعة واحدة من وقتك.

سيتمّ طرح أسئلة عليكِ تتعلّق بالممارسات الغذائية الخاصة بطفلك (الرضاعة والتّغذية التكميلية)، النظام الغذائي الخاصّ بكِ، بالاضافة الى معلومات متعلّقة بإعداد وجبة الطعام ومدى معرفتك حول تغذية الطفل وأنماط الحياة.

سوف يُطلب منكِ أيضاً تقديم إستمارة عن النظام الغذائي الخاصّ بكِ وبطفلك على مدى 24 ساعة، يقضي بذكر ما تمّ استهلاكه من أطعمة ومشروبات خلال ال24 ساعة الماضية.

سيتمّ أيضاً الحصول على قياس وزنكِ، طولكِ ومحيط خصركِ فضلاً عن قياس وزن طفلكِ، طوله، محيط رأسه ومحيط النّصف الأعلى من ذراعه.

المخاطر، المشاكل والفوائد

ليس هناك مخاطر كبيرة ناتجة عن مشاركتكِ في هذه الدّراسة. قد تزعجكِ بعض الأسئلة التي سنطرحها عليكِ ويمكنكِ ألّا تُجيبي عليها إذا أردتِ. ستحصلين على استشارة غذائية خاصّة بكِ وبطفلكِ عند الإنتهاء من المقابلة. كما سيحصل طفلك على لعبة لمشاركته في هذه الدّراسة. وسوف يحصل طفلك على هذه اللّعبة حتّى إذا قرّرت التوقف عن إكمال الدّراسة.

السّرّية

إنّ المعلومات التي ستوفّرينها ستبقى في غاية السريّة. لن يُسجَّل اسمكِ على الاستبيان. فقط أعضاء فريق البحث سيتمكّنون من الحصول على الإستبيانات التي ستُستعمل لأهداف بحثيّة فقط لا غير. لن يتمّ الإبلاغ عن اسمكِ عند نشر نتائج البحث. وسيتمّ خزن الإستبيانات التي تمّ ملؤها في خزانة في مكتب المسؤول. كما سيتمّ حفظ نسخ إلكترونية من البيانات والتأمين عليها بكلمة سرّ.

الرجاء أن تعلمي بأنّ مشاركتكِ في هذه الدّراسة طوعيّة تماماً ويحقّ لكِ التوقف عن ذلك في أي وقت من دون الخضوع لأي عقوبة. وإذا قرّرتِ عدم المشاركة، فلن يؤثّر ذلك بأي شكل من الأشكال على علاقتكِ بالجامعة الأميركية في بيروت. ومع ذلك، فإنّ مشاركتكِ ستساعدنا في وضع الأساس لمزيد من الدّراسات والإستراتيجيات حول تغذية الرُّضّع والأطفال في لبنان التي لها تأثير كبير على بقاء الطفل على قيد الحياة، ونموّه وصحّته في المستقبل.

دراسات مستقبلية ومُتابعة

هناك احتمال أنّ المعلومات التي نحصل عليها من خلال هذه الدراسة قد تخلق الحاجة إلى دراسات مُتابعة لها دور مهمّ في تحديد نتائج متعلّقة بتغذية الرضيع والطفل في مرحلة مبكّرة من عمره وبنشأته في وقت لاحق. هناك أدلّة تشير إلى أن أوّل 1000 يوم من حياة الطفل يمكن أن تحدّد مسبقاً مدى بقاءه على قيد الحياة ونموّه ونشأته وتطوّر الأمراض المُزمنة في مرحلة البلوغ، ممّا يعزّز دور كلّ من النظام الغذائي وأنماط التغذية. نحن نسعى لموافقتكِ على الاتصال بكِ فقط في حال تمّ إنشاء هذه الدراسات المُتابعة. لستِ مُلزمة بالمشاركة

في الدراسات إذا وافقتِ على أن نتّصل بكِ. وإذا كنتِ ترفضين أن نتّصل بكِ، فإنّ هذا لن يؤثر على مشاركتكِ في هذه الدراسة. سوف يتمّ الاحتفاظ بالمعلومات الخاصّة بكِ بسرّيّة. فقط الباحثون الرئيسيون والمساعدون في هذا البحث سوف يتمكّنون من الحصول على المعلومات الخاصّة بكِ والتي ستوجد في خزانة مُقفلة في مكتب الباحث الرئيسي.

هل يمكننا الاتصال بك مرةً أخرى في حال تمّ إنشاء المزيد من الدراسات المُتابعة (يُرجى وضع دائرة)؟

نعم كلّا

إذا كانت الإجابة نعم، يرجى تزويدنا برقم الهاتف الخاص بكِ_____

لمزيد من المعلومات والأسئلة حول البحث، يُرجى الإتّصال بالأشخاص المذكورين أدناه:

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هاتف: 961-1-350000، تحويلة (4400)، **البريد الإلكتروني**: nahla@aub.edu.lb

إذا كانت لديكِ أي أسئلة، مخاوف أو شكاوى حول حقوقكِ كمشاركة في هذا البحث، يمكنكِ الإتّصال بالمكتب التالي في الجامعة الأميركية في بيروت:

مجلس مراجعة مؤسّسي العلوم الإجتماعية والسّلوكية

العنوان: الجامعة الأميركية في بيروت؛ شارع رياض الصّلح، بيروت 2020 1107، لبنان

هاتف: 374374 1 00961، تحويلة: 5445، البريد الإلكتروني: irb@aub.edu.lb

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موافقة المشاركة:

لقد قرأتُ وفهمتُ المعلومات الواردة أعلاه.

أوافق طوعاً على المشاركة في هذه الدّراسة البحثية وأسمح لكم بالحصول على القياسات الخاصّة بطفلي ☐

اسم المشاركة: _____ التاريخ: _____

توقيع المشاركة: _____

الشهادة على الموافقة (في حال كانت المشاركة أميّة):

أشهد على أنّ المقابل قرأ النّص الوارد أعلاه للمشاركة، وها أنا أوقع نيابة عن المشتركة التي وافقت طوعاً على المشاركة في الدّراسة.

اسم الشّاهِد: _____ التّاريخ: _____

توقيع الشّاهِد: _____

علاقة الشّاهد بالمشاركة: _____

APPENDIX III

Tables

Table A.1 : Simple binary logistic regression for the predictors of exclusive breastfeeding, of breastfeeding for 6 months in Lebanon for infants under 6 months of age at the time of the interview.

	Information from 24 dietary recall	
	Exclusive breastfeeding for 6 months	**Breastfeeding for 6 months**
Mother's education		
Primary school or less	1	1
Intermediate or high school or technical diploma	1.75(0.20-15.5)	1.23(0.27-5.64)
University degree	1.61(0.17-15.7)	0.73(0.15-3.60)
Mother's occupation		
Employed	1	1
Housewife	3.09 (0.84-11.40)	2.70*(1.14-6.38)
Father's education		
Primary school or less	1	1
Intermediate or high school or technical diploma	1.29(0.26-6.54)	1.60(0.44-5.76)
University degree	0.59(.07-4.85)	1.04(0.23-4.70)
Crowding index		
>=1 person per room	1	1
<1 person per room	0.56(0.12-2.70)	0.97(0.32-2.92)
Do you have a paid helper?		
Yes	1	1
No	1.08(0.32-3.61)	1.07(0.40-2.87)
Infant birth order		
First child	1	1
Not first child	1.50(0.55-4.14)	1.27(0.57-2.84)
Sex of child		
Male	1	1
Female	1.02(0.39-2.71)	1.15(0.51-2.55)
Initiation of breastfeeding after birth		
More than 1 hour	1	1
Within 1 hour	1.56(0.49-4.94)	1.11(0.40-3.07)
Way of breastfeeding		
One breast	1	1
Both breasts	0.84(0.29-2.37)	0.36(0.12-1.08)
Support from hospital		
Yes	1	1
No	0.82(0.17-4.08)	0.65(0.18-2.30)
Fluids within the first 3 days		
Yes	1	1
No	0.94(0.35-2.50)	1.15(0.51-2.60)
Cigarette smoking status		
Yes	1	1
No	2.64(0.71-9.77)	0.80(0.33-1.96)
Smoking during pregnancy		
Yes	1	1
No	0.22(0.18-2.69)	0.48(0.11-2.18)

Drinking alcohol		
Yes	1	1
No	2.53(0.35-21.03)	5.51*(1.36-22.27)
Drinking alcohol during breastfeeding		
Yes	1	1
No	0.46(0.14-1.49)	0.92(0.39-2.14)
Eat breakfast everyday		
Yes	1	1
No	0.45(0.14-1.47)	0.41*(0.17-0.97)
Mother vegetarian		
Yes	1	1
No	1.77(0.37-8.52)	1.03(0.34-3.10)
Taking dietary supplements		
Yes	1	1
No	0.86(0.32-2.33)	0.57(0.24-1.35)
Breastfed as a child		
Yes	1	1
No	1.33(0.38-4.67)	0.85(0.31-2.36)
Birth weight		
Large for gestational age	--	1
Normal weight	--	0.50(0.03-8.95)
Small for gestational age	--	0.88(0.08-10.09)

Table A.2 : Simple binary logistic regression for the association of maternal knowledge *(infant feeding knowledge test)* with exclusive breastfeeding, breastfeeding for 6 months for infants under 6 months of age at the time of the interview.

	Information from 24 dietary recall	
	Exclusive breastfeeding for 6 months	**Breastfeeding for 6 months**
Q 1: Breastfeeding stops you from having your period. True answer False answer	 1 2.20(0.71-6.80)	 1 1.21(0.51-2.89)
Q 2: Breast milk makes up a complete diet for a baby. True answer False answer	 1 1.36(0.50-3.70)	 1 1.27(0.54-2.97)
Q 3: If your breasts are small, you might not have enough milk to feed a baby. True answer False answer	 1 1.23(0.36-4.22)	 1 1.48(0.48-4.58)
Q 4: When a mother is sick with the flu or a bad cold she can continue to breastfeed. True answer False answer	 1 0.88(0.28-2.71)	 1 0.42*(0.17-1.02)
Q 5: Babies who are breastfed tend to get fewer allergies than babies who are formula-fed. True answer False answer	 1 1.06(0.21-5.40)	 1 0.21*(0.05-0.86)
Q 6: The pill is the best way to prevent getting pregnant while you are breastfeeding. True answer False answer	 1 2.43(0.29-20.27)	 1 1.38(0.43-4.49)
Q 7: You shouldn't try to breastfed if you are planning to go back to work. True answer False answer	 1 0.97(0.33-2.84)	 1 0.39(0.17-0.93)
Q 8: The more often you breastfeed the more milk you will have for your baby. True answer False answer	 1 0.72(0.08-6.38)	 1 0.79(0.17-3.74)
Q 9: Babies who are breastfed tend to get fewer infections than babies who are formula fed. True answer False answer	 --- ---	 1 1.15(0.20-6.59)
Q 10: Many women are not able to make enough milk to feed their baby. True answer False answer	 1 0.23*(0.08-0.64)	 1 0.49(0.19-1.25)
Q 11: The best food for a new born is breast milk. True answer False answer	 --- ---	 1 0.62(0.21-1.88)

Q 12: When you breastfeed you may get your figure back easier. True answer False answer	 1 0.65(0.19-2.16)	 1 0.71(0.30-1.70)
Q 13: If you breastfeed (no one can help with the baby, more time is needed than bottle feeding, difficult to feed the baby in public place, none of the above are correct). True answer False answer	 1 1.54(0.41-5.86)	 1 0.50(0.16-1.49)
Q 14: Breastfeeding will probably makes no difference in the size or shape of your breasts. True answer False answer	 1 0.91(0.33-2.50)	 1 0.60(0.26-1.40)
Q 15: What is the optimal duration of breastfeeding? True answer False answer	 1 0.77(0.26-2.25)	 1 0.81(0.32-2.04)
Q 16: What is the optimal duration of exclusive breastfeeding? True answer False answer	 1 1.05(0.38-2.88)	 1 0.55(0.24-1.24)
Average More or equal to the median Less than the median	 1 0.45(0.11-1.83)	 1 0.35*(0.13-0.93)

References

1,000 Days, 2010, <http://www.thousanddays.org>

Abrahams, S., & Labbok, M. (2009). Exploring the impact of the baby-friendly hospital initiative on trends in exclusive breastfeeding. *International Breastfeeding Journal, 4*(1), 11.

Abrams, B., & Newman, V. (1991). Small-for-gestational-age birth: Maternal predictors and comparison with risk factors of spontaneous preterm delivery in the same cohort. *American Journal of Obstetrics and Gynecology, 164*(3), 785-790.

Agostoni, C., Decsi, T., Fewtrell, M., Goulet, O., Kolacek, S., Koletzko, B., et al. (2008). Complementary feeding: A commentary by the ESPGHAN committee on nutrition. *Journal of Pediatric Gastroenterology and Nutrition, 46*(1), 99-110.

Agras, W. S., Hammer, L. D., McNicholas, F., & Kraemer, H. C. (2004). Risk factors for childhood overweight: A prospective study from birth to 9.5 years. *The Journal of Pediatrics, 145*(1), 20-25.

Ahmed, S., Parveen, S. D., & Islam, A. (1999). Infant feeding practices in rural bangladesh: Policy implications. *Journal of Tropical Pediatrics, 45*(1), 37-41.

Alasfoor, D. Trends in breastfeeding rates in oman; impact of the baby friendly hospitals initiative.

Alasfoor, M. D., Rawas, M. S., Al-Farsi, M. Y., & Alshishtawi, M. (2000). National study on the role of care in the nutritional status of children under 2 years old in oman. *Muscat: Ministry of Health, ,* 30.

Alati, R., Al Mamun, A., O'Callaghan, M., Najman, J. M., & Williams, G. M. (2006). In utero and postnatal maternal smoking and asthma in adolescence. *Epidemiology (Cambridge, Mass.), 17*(2), 138-144.

Al-Frayh, A. (1989). Current trends in infant feeding in saudi society. *Journal of Obstetrics & Gynecology, 10*(S1), S21-S22.

Allen, L. H., De Benoist, B., Dary, O., Hurrell, R., & World Health Organization. (2006). Guidelines on food fortification with micronutrients/edited by lindsay allen...[et al.].

Allen, L. H., & Graham, J. M. (2004). Assuring micronutrient adequacy in the diets of young infants.

Allen, L. H. (2006). Causes of nutrition-related public health problems of preschool children: Available diet. *Journal of Pediatric Gastroenterology and Nutrition, 43 Suppl 3,* S8-12.

Al-Sahab, B., Lanes, A., Feldman, M., & Tamim, H. (2010). Prevalence and predictors of 6-month exclusive breastfeeding among canadian women: A national survey. *BMC Pediatrics, 10,* 20-2431-10-20.

Al-Sairafi, M., Al-Dallal, Z., & Moosa, K. (2003). Breastfeeding patterns & practices in the kingdom of bahrain (children aged 0–24 months). *Breastfeeding patterns and*

practice in the kingdom of bahrain (children aged 0-24 months) () Kingdom of Bahrain. Ministry of Health.

Al-Shehri, S. N., Farag, M. K., Baldo, M. H., Al-Mazrou, Y. Y., & Aziz, K. M. (1995). Overview on breastfeeding patterns in saudi arabia. *Journal of Tropical Pediatrics, 41*(Supplement 1), 38-44.

Ameer, A., Al-Hadi, A., & Abdulla, M. (2008). Knowledge, attitudes and practices of iraqi mothers and family child-caring women regarding breastfeeding. *Eastern Mediterranean Health Journal, 14*(5)

American Academy of Pediatrics. (2005). Breastfeeding and the use of human milk, *115*, 496.

Anderson, J. W., Johnstone, B. M., & Remley, D. T. (1999). Breast-feeding and cognitive development: A meta-analysis. *The American Journal of Clinical Nutrition, 70*(4), 525-535.

Arenz, S., Rückerl, R., Koletzko, B., & von Kries, R. (2004). Breast-feeding and childhood obesity—a systematic review. *International Journal of Obesity, 28*(10), 1247-1256.

Arora, S., McJunkin, C., Wehrer, J., & Kuhn, P. (2000). Major factors influencing breastfeeding rates: Mother's perception of father's attitude and milk supply. *Pediatrics, 106*(5), e67-e67.

Atinmo, T., Mirmiran, P., Oyewole, O. E., Belahsen, R., & Serra-Majem, L. (2009). Breaking the poverty/malnutrition cycle in africa and the middle east. *Nutrition Reviews, 67*(s1), S40-S46.

Aydin, S., Aydin, S., Ozkan, Y., & Kumru, S. (2006). Ghrelin is present in human colostrum, transitional and mature milk. *Peptides, 27*(4), 878-882.

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.

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.

Baranowski, T., Bee, D. E., Rassin, D. K., Richardson, C. J., Brown, J. P., Guenther, N., et al. (1983). Social support, social influence, ethnicity and the breastfeeding decision. *Social Science & Medicine, 17*(21), 1599-1611.

Barker, D. J. P., & Robinson, R. J. (1992). *Fetal and infant origins of adult disease* British Medical Journal London.

Bartick, M., & Reinhold, A. (2010). The burden of suboptimal breastfeeding in the united states: A pediatric cost analysis. *Pediatrics, 125*(5), e1048-56.

Bartley, K. A., Underwood, B. A., & Deckelbaum, R. J. (2005). A life cycle micronutrient perspective for women's health. *The American Journal of Clinical Nutrition, 81*(5), 1188S-1193S.

Batal, M., Boulghourjian, C., & Akik, C. (2010). Complementary feeding patterns in a developing country: A cross-sectional study across lebanon. *Eastern Mediterranean Health Journal, 16*(2)

Batal, M., Boulghourjian, C., Abdallah, A., & Afifi, R. (2006). Breast-feeding and feeding practices of infants in a developing country: A national survey in lebanon. *Public Health Nutrition, 9*(03), 313-319.

Baur, L. A., O'Connor, J., Pan, D. A., Kriketos, A. D., & Storlien, L. H. (1998). The fatty acid composition of skeletal muscle membrane phospholipid: Its relationship with the type of feeding and plasma glucose levels in young children. *Metabolism, 47*(1), 106-112.

BAXTER, R. C., ZALTSMAN, Z., & TURTLE, J. R. (1984). Immunoreactive somatomedin-C/Insulin-like growth factor I and its binding protein in human milk*. *The Journal of Clinical Endocrinology & Metabolism, 58*(6), 955-959.

Bayol, S., Simbi, B., Bertrand, J., & Stickland, N. (2008). Offspring from mothers fed a ‘junk food’diet in pregnancy and lactation exhibit exacerbated adiposity that is more pronounced in females. *The Journal of Physiology, 586*(13), 3219-3230.

Berg, A., & Brems, S. (1989). *A case for promoting breastfeeding in projects to limit fertility* World Bank.

Black, R. E., Allen, L. H., Bhutta, Z. A., Caulfield, L. E., De Onis, M., Ezzati, M., et al. (2008). Maternal and child undernutrition: Global and regional exposures and health consequences. *The Lancet, 371*(9608), 243-260.

Brekke, H. K., van Odijk, J., & Ludvigsson, J. (2007). Predictors and dietary consequences of frequent intake of high-sugar, low-nutrient foods in 1-year-old children participating in the ABIS study. *British Journal of Nutrition, 97*(01), 176-181.

Britton, C., McCormick, F., Renfrew, M., Wade, A., & King, S. (2007). Support for breastfeeding mothers. *Cochrane Database Syst Rev, 1*(1)

Buescher, E. S., & Koeppen, P. M. (1997). Soluble tnfα receptors in colostrum bind to and neutralize tnfα.♦ 468. *Pediatric Research, 41*, 80-80.

Bulk-Bunschoten, A., Bodegom, S., Reerink, J., Jong, P., & Groot, C. (2001). Reluctance to continue breastfeeding in the netherlands. *Acta Paediatrica, 90*(9), 1047-1053.

Calnen, G. (2007). Paid maternity leave and its impact on breastfeeding in the united states: An historic, economic, political, and social perspective. *Breastfeeding Medicine, 2*(1), 34-44.

Carpenter, G. (1980). Epidermal growth factor is a major growth-promoting agent in human milk. *Science (New York, N.Y.), 210*(4466), 198-199.

Casabiell, X., Pineiro, V., Tome, M., Peino, R., Dieguez, C., & Casanueva, F. (1997). Presence of leptin in colostrum and/or breast milk from lactating mothers: A potential role in the regulation of neonatal food intake. *Journal of Clinical Endocrinology & Metabolism, 82*(12), 4270-4273.

Cattaneo, A., Yngve, A., Koletzko, B., & Guzman, L. R. (2005). Protection, promotion and support of breast-feeding in europe: Current situation. *Public Health Nutrition, 8*(01), 39-46.

Caulfield, L. E., de Onis, M., Blossner, M., & Black, R. E. (2004). Undernutrition as an underlying cause of child deaths associated with diarrhea, pneumonia, malaria, and measles. *The American Journal of Clinical Nutrition, 80*(1), 193-198.

Centers for Disease Control and Prevention (CDC). (2006). Racial and socioeconomic disparities in breastfeeding--united states, 2004. *MMWR.Morbidity and Mortality Weekly Report, 55*(12), 335-339.

Cernadas, J. M., Noceda, G., Barrera, L., Martinez, A. M., & Garsd, A. (2003). Maternal and perinatal factors influencing the duration of exclusive breastfeeding during the first 6 months of life. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association, 19*(2), 136-144.

Chan-Yeung, M., Manfreda, J., Dimich-Ward, H., Ferguson, A., Watson, W., & Becker, A. (2000). A randomized controlled study on the effectiveness of a multifaceted intervention program in the primary prevention of asthma in high-risk infants. *Archives of Pediatrics & Adolescent Medicine, 154*(7), 657-663.

Chung, M., Raman, G., Chew, P., Magula, N., Trikalinos, T., & Lau, J. (2007). Breastfeeding and maternal and infant health outcomes in developed countries. *Evid Technol Asses (Full Rep), 153*, 1-186.

Chung, S., Kim, H., Choi, Y., & Bae, C. (2013). Trends of breastfeeding rate in korea (1994-2012): Comparison with OECD and other countries. *Journal of Korean Medical Science, 28*(11), 1573-1580.

Clavano, N. R. (1982). Mode of feeding and its effect on infant mortality and morbidity. *Journal of Tropical Pediatrics, 28*(6), 287-293.

Clement, D. (1978). Infant formula malnutrition: Threat to the third world. *The Christian Century [Online], Pg, 209*

Cohen, R., Brown, K., Dewey, K., Canahuati, J., & Landa Rivera, L. (1994). Effects of age of introduction of complementary foods on infant breast milk intake, total energy intake, and growth: A randomised intervention study in honduras. *The Lancet, 344*(8918), 288-293.

Dabelea, D., & Crume, T. (2011). Maternal environment and the transgenerational cycle of obesity and diabetes. *Diabetes, 60*(7), 1849-1855.

Daly, S. E., & Hartmann, P. E. (1995). Infant demand and milk supply. part 1: Infant demand and milk production in lactating women. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association, 11*(1), 21-26.

Daniels, M. C., & Adair, L. S. (2005). Breast-feeding influences cognitive development in filipino children. *The Journal of Nutrition, 135*(11), 2589-2595.

Darios, F., & Davletov, B. (2006). Omega-3 and omega-6 fatty acids stimulate cell membrane expansion by acting on syntaxin 3. *Nature, 440*(7085), 813-817.

Das, U. (2002). Is type 2 diabetes mellitus a disorder of the brain? *Nutrition, 18*(7), 667-672.

Das, U. (2003). Can perinatal supplementation of long-chain polyunsaturated fatty acids prevent diabetes mellitus? *European Journal of Clinical Nutrition, 57*(2), 218-226.

Das, U. N. (2002). Insulin and the critically ill. *Critical Care, 6*(3), 262.

Das, U. N. (2006). Essential fatty acids: Biochemistry, physiology and pathology. *Biotechnology Journal, 1*(4), 420-439.

Dawodu, A., & Wagner, C. L. (2007). Mother-child vitamin D deficiency: An international perspective. *Archives of Disease in Childhood, 92*(9), 737-740.

Deeb, M. E. (1997). *Beirut: A health profile, 1984-1994* American University of Beirut.

Dennis, C. (2002). Breastfeeding peer support: Maternal and volunteer perceptions from a randomized controlled trial. *Birth, 29*(3), 169-176.

Dewey, K. (2003). Guiding principles for complementary feeding of the breastfed child.

Dewey, K. G. (2003). Is breastfeeding protective against child obesity? *Journal of Human Lactation : Official Journal of International Lactation Consultant Association, 19*(1), 9-18.

Duijts, L., Ramadhani, M. K., & Moll, H. A. (2009). Breastfeeding protects against infectious diseases during infancy in industrialized countries. A systematic review. *Maternal & Child Nutrition, 5*(3), 199-210.

El Mouzan, M. I., Al Omar, A. A., Al Salloum, A. A., Al Herbish, A. S., & Qurachi, M. M. (2009). Trends in infant nutrition in saudi arabia: Compliance with WHO recommendations. *Annals of Saudi Medicine, 29*(1), 20-23.

Fall, C., Stein, C., Kumaran, K., Cox, V., Osmond, C., Barker, D., et al. (1998). Size at birth, maternal weight, and type 2 diabetes in south india. *Diabetic Medicine, 15*(3), 220-227.

Fall, C., Yajnik, C., Rao, S., & Coyaji, K. (1999). The effects of maternal body composition before pregnancy on fetal growth: The pune maternal nutrition study. *Fetal Programming Influences on Development and Disease in Later Life, ,* 231-245.

Fall, C. H., Barker, D. J., Osmond, C., Winter, P. D., Clark, P. M., & Hales, C. N. (1992). Relation of infant feeding to adult serum cholesterol concentration and death from ischaemic heart disease. *BMJ (Clinical Research Ed.), 304*(6830), 801-805.

Fall, C. H., Goggin, P. M., Hawtin, P., Fine, D., & Duggleby, S. (1997). Growth in infancy, infant feeding, childhood living conditions, and helicobacter pylori infection at age 70. *Archives of Disease in Childhood, 77*(4), 310-314.

Fall, C. H., Osmond, C., Barker, D. J., Clark, P. M., Hales, C. N., Stirling, Y., et al. (1995). Fetal and infant growth and cardiovascular risk factors in women. *BMJ (Clinical Research Ed.), 310*(6977), 428-432.

Flores-Huerta, S., Klünder-Klünder, M., & Muñoz-Hernández, O. (2012). Feeding practices and nutritional status of mexican children affiliated to the medical insurance for a new generation. *Salud Pública De México, 54*, s20-s27.

Fox, M. K., Pac, S., Devaney, B., & Jankowski, L. (2004). Feeding infants and toddlers study: What foods are infants and toddlers eating? *Journal of the American Dietetic Association, 104*, 22-30.

Friedman, G., & Goldberg, S. J. (1975). Concurrent and subsequent serum cholesterol of breast- and formula-fed infants. *The American Journal of Clinical Nutrition, 28*(1), 42-45.

Friel, J. K., Hanning, R. M., Isaak, C. A., Prowse, D., & Miller, A. C. (2010). Canadian infants' nutrient intakes from complementary foods during the first year of life. *BMC Pediatrics, 10*(1), 43.

Gartner, L. M., Morton, J., Lawrence, R. A., Naylor, A. J., O'Hare, D., Schanler, R. J., et al. (2005). Breastfeeding and the use of human milk. *Pediatrics, 115*(2), 496-506.

Gillman, M. W., Rifas-Shiman, S. L., Camargo Jr, C. A., Berkey, C. S., Frazier, A. L., Rockett, H. R., et al. (2001). Risk of overweight among adolescents who were breastfed as infants. *Jama, 285*(19), 2461-2467.

Gluckman, P. D., Hanson, M. A., & Beedle, A. S. (2007). Early life events and their consequences for later disease: A life history and evolutionary perspective. *American Journal of Human Biology, 19*(1), 1-19.

Godfrey, K. M., Lillycrop, K. A., Burdge, G. C., Gluckman, P. D., & Hanson, M. A. (2007). Epigenetic mechanisms and the mismatch concept of the developmental origins of health and disease. *Pediatric Research, 61*, 5R-10R.

Godfrey, K. M., & Barker, D. J. (2000). Fetal nutrition and adult disease. *The American Journal of Clinical Nutrition, 71*(5 Suppl), 1344S-52S.

Gomez-Sanchiz, M., Canete, R., Rodero, I., Baeza, J. E., & Gonzalez, J. A. (2004). Influence of breast-feeding and parental intelligence on cognitive development in the 24-month-old child. *Clinical Pediatrics, 43*(8), 753-761.

Grattan, D. R. (2008). Fetal programming from maternal obesity: Eating too much for two? *Endocrinology, 149*(11), 5345-5347.

Greer, F. R., & Apple, R. D. (1991). Physicians, formula companies, and advertising: A historical perspective. *American Journal of Diseases of Children, 145*(3), 282-286.

Greer, F. R., Krebs, N. F., & American Academy of Pediatrics Committee on Nutrition. (2006). Optimizing bone health and calcium intakes of infants, children, and adolescents. *Pediatrics, 117*(2), 578-585.

Gudnadottir, M., Sigurdur Gunnarsson, B., & Thorsdottir, I. (2006). Effects of sociodemographic factors on adherence to breastfeeding and other important infant dietary recommendations. *Acta Paediatrica, 95*(4), 419-424.

Guendelman, S., Kosa, J. L., Pearl, M., Graham, S., Goodman, J., & Kharrazi, M. (2009). Juggling work and breastfeeding: Effects of maternity leave and occupational characteristics. *Pediatrics, 123*(1), e38-46.

Hanif, H. M. (2011). Trends in breastfeeding and complementary feeding practices in pakistan, 1990-2007. *International Breastfeeding Journal, 6*, 15-4358-6-15.

Hanson, L. (2000). The mother-offspring dyad and the immune system. *Acta Paediatrica, 89*(3), 252-258.

Harder, T., Bergmann, R., Kallischnigg, G., & Plagemann, A. (2005). Duration of breastfeeding and risk of overweight: A meta-analysis. *American Journal of Epidemiology, 162*(5), 397-403.

Harit, D., Faridi, M., Aggarwal, A., & Sharma, S. (2008). Lipid profile of term infants on exclusive breastfeeding and mixed feeding: A comparative study. *European Journal of Clinical Nutrition, 62*(2), 203-209.

Hediger, M. L., Overpeck, M. D., Kuczmarski, R. J., & Ruan, W. J. (2001). Association between infant breastfeeding and overweight in young children. *Jama, 285*(19), 2453-2460.

Holbrook, K. E., White, M. C., Heyman, M. B., & Wojcicki, J. M. (2013). Maternal sociodemographic characteristics and the use of the iowa infant attitude feeding scale to describe breastfeeding initiation and duration in a population of urban, latina mothers: A prospective cohort study. *International Breastfeeding Journal, 8*(1), 7-4358-8-7.

Hollis, B. W., & Wagner, C. L. (2004). Vitamin D requirements during lactation: High-dose maternal supplementation as therapy to prevent hypovitaminosis D for both the mother and the nursing infant. *The American Journal of Clinical Nutrition, 80*(6 Suppl), 1752S-8S.

Hop, L. T., Gross, R., Giay, T., Sastroamidjojo, S., Schultink, W., & Lang, N. T. (2000). Premature complementary feeding is associated with poorer growth of vietnamese children. *The Journal of Nutrition, 130*(11), 2683-2690.

Horta, B. L., & World Health Organization. (2007). *Evidence on the long-term effects of breastfeeding* WHO Geneva.

Houseknecht, K. L., McGuire, M. K., Portocarrero, C. P., McGuire, M. A., & Beerman, K. (1997). Leptin is present in human milk and is related to maternal plasma leptin concentration and adiposity. *Biochemical and Biophysical Research Communications, 240*(3), 742-747.

Huh, S. Y., Feldman, H. A., Cox, J. E., & Gordon, C. M. (2009). Prevalence of transient hyperphosphatasemia among healthy infants and toddlers. *Pediatrics, 124*(2), 703-709.

Huh, S. Y., Rifas-Shiman, S. L., Taveras, E. M., Oken, E., & Gillman, M. W. (2011). Timing of solid food introduction and risk of obesity in preschool-aged children. *Pediatrics, 127*(3), e544-51.

Hunter, I. (1996). The papers of cicely williams (1893-1992) in the contemporary medical archives centre at the wellcome institute. *Social History of Medicine : The Journal of the Society for the Social History of Medicine / SSHM, 9*(1), 109-116.

Imdad, A., Sadiq, K., & Bhutta, Z. A. (2011). Evidence-based prevention of childhood malnutrition. *Current Opinion in Clinical Nutrition and Metabolic Care, 14*(3), 276-285.

Isaacs, E. B., Fischl, B. R., Quinn, B. T., Chong, W. K., Gadian, D. G., & Lucas, A. (2010). Impact of breast milk on intelligence quotient, brain size, and white matter development. *Pediatric Research, 67*(4), 357-362.

Isaacs, C. E. (2005). Human milk inactivates pathogens individually, additively, and synergistically. *The Journal of Nutrition, 135*(5), 1286-1288.

Isaacs, E. B., Edmonds, C. J., Chong, W. K., Lucas, A., Morley, R., & Gadian, D. G. (2004). Brain morphometry and IQ measurements in preterm children. *Brain : A Journal of Neurology, 127*(Pt 12), 2595-2607.

Jain, A., Concato, J., & Leventhal, J. M. (2002). How good is the evidence linking breastfeeding and intelligence? *Pediatrics, 109*(6), 1044-1053.

Jelliffe, D. B., & Patrice Jelliffe, E. (1977). The infant food industry and international child health. *International Journal of Health Services, 7*(2), 249-254.

Jones, G., Steketee, R. W., Black, R. E., Bhutta, Z. A., & Morris, S. S. (2003). How many child deaths can we prevent this year? *The Lancet, 362*(9377), 65-71.

Joshi, N., Agho, K. E., Dibley, M. J., Senarath, U., & Tiwari, K. (2012). Determinants of inappropriate complementary feeding practices in young children in nepal: Secondary data analysis of demographic and health survey 2006. *Maternal & Child Nutrition, 8*(s1), 45-59.

Kabir, I., Khanam, M., Agho, K. E., Mihrshahi, S., Dibley, M. J., & Roy, S. K. (2012). Determinants of inappropriate complementary feeding practices in infant and young children in bangladesh: Secondary data analysis of demographic health survey 2007. *Maternal & Child Nutrition, 8*(s1), 11-27.

Kallas, L. S. (2005). *Infant Feeding Practices in Greater Beirut Impact on Nutritional and Health Status-by Lara Salim Kallas,*

Kemp, A., & Kakakios, A. (2004). Asthma prevention: Breast is best? *Journal of Paediatrics and Child Health, 40*(7), 337-339.

Kent, G. (2006). WIC's promotion of infant formula in the united states. *International Breastfeeding Journal, 1*(1), 8.

Khanna, S. B., Dash, K., & Swasti, K. D. (2007). Fetal origin of adult disease. *JK Sci, 9*(4), 206-210.

Kimani-Murage, E. W., Kahn, K., Pettifor, J. M., Tollman, S. M., Dunger, D. B., Gómez-Olivé, X. F., et al. (2010). The prevalence of stunting, overweight and obesity, and metabolic disease risk in rural south african children. *BMC Public Health, 10*(1), 158.

Kimani-Murage, E. W., Madise, N. J., Fotso, J. C., Kyobutungi, C., Mutua, M. K., Gitau, T. M., et al. (2011). Patterns and determinants of breastfeeding and complementary feeding practices in urban informal settlements, nairobi kenya. *BMC Public Health, 11*, 396-2458-11-396.

Klok, M., Jakobsdottir, S., & Drent, M. (2007). The role of leptin and ghrelin in the regulation of food intake and body weight in humans: A review. *Obesity Reviews, 8*(1), 21-34.

Koletzko, B. (2005). *Early nutrition and its later consequences: New opportunities* Springer.

Koletzko, B., Goulet, O., Hunt, J., Krohn, K., Shamir, R., & Parenteral Nutrition Guidelines Working Group. (2005). 1. guidelines on paediatric parenteral nutrition of the european society of paediatric gastroenterology, hepatology and nutrition (ESPGHAN) and the european society for clinical nutrition and metabolism (ESPEN), supported by the european society of paediatric research (ESPR). *Journal of Pediatric Gastroenterology and Nutrition, 41*, S1-S4.

Koletzko, B., von Kries, R., Monasterolo, R. C., Subías, J. E., Scaglioni, S., Giovannini, M., et al. (2009). Infant feeding and later obesity risk. *Early nutrition programming and health outcomes in later life* (pp. 15-29) Springer.

Kramer, M. S. (1981). Do breast-feeding and delayed introduction of solid foods protect against subsequent obesity? *The Journal of Pediatrics, 98*(6), 883-887.

Kramer, M. S., Matush, L., Vanilovich, I., Platt, R. W., Bogdanovich, N., Sevkovskaya, Z., et al. (2009). A randomized breast-feeding promotion intervention did not reduce child obesity in belarus. *The Journal of Nutrition, 139*(2), 417S-21S.

Labbok, M. H. (2007). Breastfeeding and baby-friendly hospital initiative: More important and with more evidence than ever. *Jornal De Pediatria, 83*(2), 99-101.

Lande, B., Andersen, L., Baerug, A., Trygg, K., Lund-Larsen, K., Veierød, M., et al. (2003). Infant feeding practices and associated factors in the first six months of life: The norwegian infant nutrition survey. *Acta Pædiatrica, 92*(2), 152-161.

Langley-Evans, S. C. (2009). Nutritional programming of disease: Unravelling the mechanism. *Journal of Anatomy, 215*(1), 36-51.

Langley-Evans, S. C., & McMullen, S. (2010). Developmental origins of adult disease. *Medical Principles and Practice : International Journal of the Kuwait University, Health Science Centre, 19*(2), 87-98.

Lanigan, J. A., Bishop, J., Kimber, A. C., & Morgan, J. (2001). Systematic review concerning the age of introduction of complementary foods to the healthy full-term infant. *European Journal of Clinical Nutrition, 55*(5), 309-320.

Le Souef, P. N. (2006). Adverse effects of maternal smoking during pregnancy on innate immunity in infants. *The European Respiratory Journal, 28*(4), 675-677.

Leeson, C. P., Kattenhorn, M., Deanfield, J. E., & Lucas, A. (2001). Duration of breast feeding and arterial distensibility in early adult life: Population based study. *BMJ (Clinical Research Ed.), 322*(7287), 643-647.

León-Cava, N., Lutter, C., Ross, J., & Martin, L. (2002). *Quantifying the benefits of breastfeeding: A summary of the evidence* PAHO Washington^ eDC DC.

Lewallen, L. P., Dick, M. J., Flowers, J., Powell, W., Zickefoose, K. T., Wall, Y. G., et al. (2006). Breastfeeding support and early cessation. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 35*(2), 166-172.

Li, R., Darling, N., Maurice, E., Barker, L., & Grummer-Strawn, L. M. (2005). Breastfeeding rates in the united states by characteristics of the child, mother, or family: The 2002 national immunization survey. *Pediatrics, 115*(1), e31-7.

Lillycrop, K. A., & Burdge, G. C. (2012). Epigenetic mechanisms linking early nutrition to long term health. *Best Practice & Research Clinical Endocrinology & Metabolism, 26*(5), 667-676.

Lillycrop, K. A., Phillips, E. S., Torrens, C., Hanson, M. A., Jackson, A. A., & Burdge, G. C. (2008). Feeding pregnant rats a protein-restricted diet persistently alters the methylation of specific cytosines in the hepatic PPARα promoter of the offspring. *British Journal of Nutrition, 100*(02), 278-282.

Lillycrop, K. A., Slater-Jefferies, J. L., Hanson, M. A., Godfrey, K. M., Jackson, A. A., & Burdge, G. C. (2007). Induction of altered epigenetic regulation of the hepatic glucocorticoid receptor in the offspring of rats fed a protein-restricted diet during pregnancy suggests that reduced DNA methyltransferase-1 expression is involved in impaired DNA methylation and changes in histone modifications. *British Journal of Nutrition, 97*(06), 1064-1073.

Lillycrop, K. A., Phillips, E. S., Jackson, A. A., Hanson, M. A., & Burdge, G. C. (2005). Dietary protein restriction of pregnant rats induces and folic acid supplementation prevents epigenetic modification of hepatic gene expression in the offspring. *The Journal of Nutrition, 135*(6), 1382-1386.

Lopez-Alarcon, M., Villalpando, S., & Fajardo, A. (1997). Breast-feeding lowers the frequency and duration of acute respiratory infection and diarrhea in infants under six months of age. *The Journal of Nutrition, 127*(3), 436-443.

Lucas, A., Blackburn, A., Aynsley-Green, A., Sarson, D., Adrian, T., & Bloom, S. (1980). Breast vs bottle: Endocrine responses are different with formula feeding. *The Lancet, 315*(8181), 1267-1269.

Lucas, A., Morley, R., Cole, T., Lucas, P., Gore, S., Crowle, P., et al. (1990). Early diet in preterm babies and developmental status at 18 months. *The Lancet, 335*(8704), 1477-1481.

Lucas, A. (1991). Programming by early nutrition in man. *The Childhood Environment and Adult Disease, 1991*, 38-55.

Lucas, A. (2005). Long-term programming effects of early nutrition—implications for the preterm infant. *Journal of Perinatology, 25,* S2-S6.

Lutter, C. (2003). Meeting the challenge to improve complementary feeding. *SCN News,* (27), 4-9.

Mabbott, D. J., Noseworthy, M., Bouffet, E., Laughlin, S., & Rockel, C. (2006). White matter growth as a mechanism of cognitive development in children. *Neuroimage, 33*(3), 936-946.

Madise, N. J., Matthews, Z., & Margetts, B. (1999). Heterogeneity of child nutritional status between households: A comparison of six sub-saharan african countries. *Population Studies, 53*(3), 331-343.

Madise, N. J., Matthews, Z., & Margetts, B. (1999). Heterogeneity of child nutritional status between households: A comparison of six sub-saharan african countries. *Population Studies, 53*(3), 331-343.

Maleszka, R. (2008). Epigenetic integration of environmental and genomic signals in honey bees. *Epigenetics, 3*(4), 188-192.

Manaseki-Holland, S., Qader, G., Isaq Masher, M., Bruce, J., Zulf Mughal, M., Chandramohan, D., et al. (2010). Effects of vitamin D supplementation to children diagnosed with pneumonia in kabul: A randomised controlled trial. *Tropical Medicine & International Health, 15*(10), 1148-1155.

Martin, L. J., Woo, J. G., Geraghty, S. R., Altaye, M., Davidson, B. S., Banach, W., et al. (2006). Adiponectin is present in human milk and is associated with maternal factors. *The American Journal of Clinical Nutrition, 83*(5), 1106-1111.

Martin, R. M., Gunnell, D., & Smith, G. D. (2005). Breastfeeding in infancy and blood pressure in later life: Systematic review and meta-analysis. *American Journal of Epidemiology, 161*(1), 15-26.

McCance, R. (1962). Food, growth, and time. *The Lancet, 280*(7257), 621-626.

McInnes, R. J., & Chambers, J. A. (2008). Supporting breastfeeding mothers: Qualitative synthesis. *Journal of Advanced Nursing, 62*(4), 407-427.

McLeod, D., Pullon, S., & Cookson, T. (2002). Factors influencing continuation of breastfeeding in a cohort of women. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association, 18*(4), 335-343.

McVea, K. L., Turner, P. D., & Peppler, D. K. (2000). The role of breastfeeding in sudden infant death syndrome. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association, 16*(1), 13-20.

Mennella, J. A., Yourshaw, L. M., & Morgan, L. K. (2007). Breastfeeding and smoking: Short-term effects on infant feeding and sleep. *Pediatrics, 120*(3), 497-502.

Mihrshahi, S., Kabir, I., Roy, S., Agho, K. E., Senarath, U., & Dibley, M. J. (2010). Determinants of infant and young child feeding practices in bangladesh: Secondary data analysis of demographic and health survey 2004. *Food & Nutrition Bulletin, 31*(2), 295-313.

Muhe, L., Lulseged, S., Mason, K. E., & Simoes, E. A. (1997). Case-control study of the role of nutritional rickets in the risk of developing pneumonia in ethiopian children. *The Lancet, 349*(9068), 1801-1804.

Mukuria, A. G., Kothari, M. T., & Abderrahim, N. (2006). Infant and young child feeding update.

Muldoon, M. F., Ryan, C. M., Sereika, S. M., Flory, J. D., & Manuck, S. B. (2004). Randomized trial of the effects of simvastatin on cognitive functioning in hypercholesterolemic adults. *The American Journal of Medicine, 117*(11), 823-829.

Nabulsi, M. (2011). Why are breastfeeding rates low in lebanon? a qualitative study. *BMC Pediatrics, 11*(1), 75.

Nasreddine, L., Mehio-Sibai, A., Mrayati, M., Adra, N., & Hwalla, N. (2010). Adolescent obesity in syria: Prevalence and associated factors. *Child: Care, Health and Development, 36*(3), 404-413.

Nasreddine, L., Zeidan, M., Naja, F., & Hwalla, N. (2012). Complementary feeding in the MENA region: Practices and challenges. *Nutrition, Metabolism and Cardiovascular Diseases, 22*(10), 793-798.

Nasreddine, L., Naja, F., Akl, C., Chamieh, M. C., Karam, S., Sibai, A., et al. (2014). Dietary, lifestyle and socio-economic correlates of overweight, obesity and central adiposity in lebanese children and adolescents. *Nutrients, 6*(3), 1038-1062.

Nasreddine, L., Hamade, H., Naja, F., Keyrouz, S., Hwalla, N., Karam, J., et al. (2014). Breastfeeding knowledge, attitude, perceived behaviour, and intention among female undergraduate university students in the Middle East: The case of Lebaon and Syria. *Nutrients* , In press.

Nguyen, P. H., Menon, P., Ruel, M., & Hajeebhoy, N. (2011). A situational review of infant and young child feeding practices and interventions in viet nam. *Asia Pacific Journal of Clinical Nutrition, 20*(3)

Novotny, R., Hla, M. M., Kieffer, E. C., Park, C., Mor, J., & Thiele, M. (2000). Breastfeeding duration in a multiethnic population in hawaii. *Birth, 27*(2), 91-96.

Oakley, J. R. (1977). Differences in subcutaneous fat in breast- and formula-fed infants. *Archives of Disease in Childhood, 52*(1), 79-80.

O'callaghan, M., Williams, G., Andersen, M., Bor, W., & Najman, J. (1997). Prediction of obesity in children at 5 years: A cohort study. *Journal of Paediatrics and Child Health, 33*(4), 311-316.

Oddy, W. H., Sly, P. D., de Klerk, N. H., Landau, L. I., Kendall, G. E., Holt, P. G., et al. (2003). Breast feeding and respiratory morbidity in infancy: A birth cohort study. *Archives of Disease in Childhood, 88*(3), 224-228.

Olang, B., Farivar, K., Heidarzadeh, A., Strandvik, B., & Yngve, A. (2009). Breastfeeding in iran: Prevalence, duration and current recommendations. *Int Breastfeed J, 4*(8)

Oliveira, A. M., Oliveira, A. C., Almeida, M. S., Oliveira, N., & Adan, L. (2007). Influence of the family nucleus on obesity in children from northeastern brazil: A cross-sectional study. *BMC Public Health, 7*(1), 235.

Osman, H., El Zein, L., & Wick, L. (2009). Cultural beliefs that may discourage breastfeeding among lebanese women: A qualitative analysis. *International Breastfeeding Journal, 4*, 12-4358-4-12.

Owen, C. G., Martin, R. M., Whincup, P. H., Smith, G. D., & Cook, D. G. (2005). Effect of infant feeding on the risk of obesity across the life course: A quantitative review of published evidence. *Pediatrics, 115*(5), 1367-1377.

Owen, C. G., Martin, R. M., Whincup, P. H., Smith, G. D., & Cook, D. G. (2006). Does breastfeeding influence risk of type 2 diabetes in later life? A quantitative analysis of published evidence. *The American Journal of Clinical Nutrition, 84*(5), 1043-1054.

Owen, C. G., Whincup, P. H., Odoki, K., Gilg, J. A., & Cook, D. G. (2002). Infant feeding and blood cholesterol: A study in adolescents and a systematic review. *Pediatrics, 110*(3), 597-608.

Ozanne, S. E., & Hales, C. N. (2004). Lifespan: Catch-up growth and obesity in male mice. *Nature, 427*(6973), 411-412.

Parashar, U. D., Bresee, J. S., & Glass, R. I. (2003). The global burden of diarrhoeal disease in children. *Bulletin of the World Health Organization, 81*(4), 236-236.

Pechlivani, F., Vassilakou, T., Sarafidou, J., Zachou, T., Anastasiou, C. A., & Sidossis, L. S. (2005). Prevalence and determinants of exclusive breastfeeding during hospital stay in the area of athens, greece. *Acta Paediatrica, 94*(7), 928-934.

Pettitt, D. J., Forman, M. R., Hanson, R. L., Knowler, W. C., & Bennett, P. H. (1997). Breastfeeding and incidence of non-insulin-dependent diabetes mellitus in pima indians. *The Lancet, 350*(9072), 166-168.

Pfrieger, F. W. (2002). Role of glia in synapse development. *Current Opinion in Neurobiology, 12*(5), 486-490.

Phillips, D. I. (1996). Insulin resistance as a programmed response to fetal undernutrition. *Diabetologia, 39*(9), 1119-1122.

Prescott, S. L., & Tang, M. (2005). The australasian society of clinical immunology and allergy position statement: Summary of allergy prevention in children. *Med J Aust, 182*(9), 464-467.

Radwan, H. (2012). Influences and determinants of breastfeeding and weaning practices of emirati mothers.

Radwan, H. (2013). Patterns and determinants of breastfeeding and complementary feeding practices of emirati mothers in the united arab emirates. *BMC Public Health, 13*(1), 171.

Ravelli, A. C., Eskes, M., Tromp, M., van Huis, A. M., Steegers, E. A., Tamminga, P., et al. (2008). Perinatal mortality in the netherlands 2000-2006; risk factors and risk selection. [Perinatale sterfte in Nederland gedurende 2000-2006; risicofactoren en risicoselectie] *Nederlands Tijdschrift Voor Geneeskunde, 152*(50), 2728-2733.

Ravelli, A. C., van der Meulen, J. H., Osmond, C., Barker, D. J., & Bleker, O. P. (2000). Infant feeding and adult glucose tolerance, lipid profile, blood pressure, and obesity. *Archives of Disease in Childhood, 82*(3), 248-252.

Rey, J. (2003). Breastfeeding and cognitive development. *Acta Paediatrica, 92*(s442), 11-18.

Rogers, I., Emmett, P., & Golding, J. (1997). The incidence and duration of breast feeding. *Early Human Development, 49*, S45-S74.

Roth, D., Shah, R., Black, R., & Baqui, A. (2010). Vitamin D status and acute lower respiratory infection in early childhood in sylhet, bangladesh. *Acta Paediatrica, 99*(3), 389-393.

Saher, G., Brügger, B., Lappe-Siefke, C., Möbius, W., Tozawa, R., Wehr, M. C., et al. (2005). High cholesterol level is essential for myelin membrane growth. *Nature Neuroscience, 8*(4), 468-475.

Shapira, N. (2008). Prenatal nutrition: A critical window of opportunity for mother and child.

Sheehan, A., Schmied, V., & Cooke, M. (2003). Australian women's stories of their baby-feeding decisions in pregnancy. *Midwifery, 19*(4), 259-266.

Shrimpton, R., Victora, C. G., de Onis, M., Lima, R. C., Blossner, M., & Clugston, G. (2001). Worldwide timing of growth faltering: Implications for nutritional interventions. *Pediatrics, 107*(5), E75.

Shu, X. O., Clemens, J., Zheng, W., Ying, D. M., Ji, B. T., & Jin, F. (1995). Infant breastfeeding and the risk of childhood lymphoma and leukaemia. *International Journal of Epidemiology, 24*(1), 27-32.

Shulman, R. J. (1990). Oral insulin increases small intestinal mass and disaccharidase activity in the newborn miniature pig. *Pediatric Research, 28*(2), 171-175.

Sibeko, L., Dhansay, M. A., Charlton, K. E., Johns, T., & Gray-Donald, K. (2005). Beliefs, attitudes, and practices of breastfeeding mothers from a periurban community in south africa. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association, 21*(1), 31-38.

Siega-Riz, A. M., Kinlaw, A., Deming, D. M., & Reidy, K. C. (2011). New findings from the feeding infants and toddlers study 2008. *Nestle Nutrition Workshop Series.Paediatric Programme, 68*, 83-100; discussion 100-5.

Singhal, A., Cole, T. J., & Lucas, A. (2001). Early nutrition in preterm infants and later blood pressure: Two cohorts after randomised trials. *The Lancet, 357*(9254), 413-419.

Singhal, A., & Lucas, A. (2004). Early origins of cardiovascular disease: Is there a unifying hypothesis? *The Lancet, 363*(9421), 1642-1645.

Singhal, A., Cole, T. J., Fewtrell, M., Deanfield, J., & Lucas, A. (2004). Is slower early growth beneficial for long-term cardiovascular health? *Circulation, 109*(9), 1108-1113.

Singhal, A., Farooqi, I. S., Cole, T. J., O'Rahilly, S., Fewtrell, M., Kattenhorn, M., et al. (2002). Influence of leptin on arterial distensibility: A novel link between obesity and cardiovascular disease? *Circulation, 106*(15), 1919-1924.

Sokol, E., Aguayo, V., & Clark, D. (2007). Protecting breastfeeding in west and central africa: 25 years implementing the international code of marketing of breast milk substitutes. *UNICEF Regional Office for West and Central Africa,*

Srinivasan, M., & Patel, M. S. (2008). Metabolic programming in the immediate postnatal period. *Trends in Endocrinology & Metabolism, 19*(4), 146-152.

Stothard, K. J., Tennant, P. W., Bell, R., & Rankin, J. (2009). Maternal overweight and obesity and the risk of congenital anomalies: A systematic review and meta-analysis. *Jama, 301*(6), 636-650.

Suresh, Y., & Das, U. (2003). Long-chain polyunsaturated fatty acids and chemically induced diabetes mellitus: Effect of ω-3 fatty acids. *Nutrition, 19*(3), 213-228.

Swanson, V., Power, K., Kaur, B., Carter, H., & Shepherd, K. (2006). The impact of knowledge and social influences on adolescents' breast-feeding beliefs and intentions. *Public Health Nutrition, 9*(03), 297-305

Tan, K. L. (2011). Factors associated with exclusive breastfeeding among infants under six months of age in peninsular malaysia. *Int Breastfeed J, 6*(2), 1-7.

Tarrant, M., & Dodgson, J. E. (2007). Knowledge, attitudes, exposure, and future intentions of hong kong university students toward infant feeding. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 36*(3), 243-254.

Taveras, E. M., Li, R., Grummer-Strawn, L., Richardson, M., Marshall, R., Rêgo, V. H., et al. (2004). Mothers' and clinicians' perspectives on breastfeeding counseling during routine preventive visits. *Pediatrics, 113*(5), e405-e411.

Uauy, R., Peirano, P., Hoffman, D., Mena, P., Birch, D., & Birch, E. (1996). Role of essential fatty acids in the function of the developing nervous system. *Lipids, 31*(1), S167-S176.

Ulak, M., Chandyo, R. K., Mellander, L., Shrestha, P. S., & Strand, T. A. (2012). Infant feeding practices in bhaktapur, nepal: A cross-sectional, health facility based survey. *Int Breastfeed J, 7*(1), 1.

UNICEF. (2007). Progress for children: A world fit for children statistical review (no. 6). *New York, USA, UNICEF* *Http://www.Unicef.org/progressforchildren/2007n6/index_4140.Html*,

UNICEF. Division of Communication. (2009). *Tracking progress on child and maternal nutrition: A survival and development priority* UNICEF.

Vennemann, M. M., Bajanowski, T., Brinkmann, B., Jorch, G., Yucesan, K., Sauerland, C., et al. (2009). Does breastfeeding reduce the risk of sudden infant death syndrome? *Pediatrics, 123*(3), e406-10.

Verd, S., Barriuso, L., Gich, I., Gutiérrez, A., Nadal-Amat, J., & Carreras, E. (2013). Risk of early breastfeeding cessation among symmetrical, small for gestational age infants. *Annals of Human Biology, 40*(2), 146-151.

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), e473-80.

Wallace, J. M., Ferguson, S. J., Loane, P., Kell, M., Millar, S., & Gillmore, W. S. (1997). Cytokines in human breast milk. *British Journal of Biomedical Science, 54*(2), 85-87.

Wambach, K., Campbell, S. H., Gill, S. L., Dodgson, J. E., Abiona, T. C., & Heinig, M. J. (2005). Clinical lactation practice: 20 years of evidence. *Journal of Human Lactation : Official Journal of International Lactation Consultant Association, 21*(3), 245-258.

WHO Working Group on the Growth Reference Protocol. WHO Task Force on Methods for the Natural Regulation of Fertility. (2002). Growth of healthy infants and the timing, type, and frequency of complementary foods. *The American Journal of Clinical Nutrition, 76*(3), 620-627.

Wilmoth, T. A., & Elder, J. P. (1995). An assessment of research on breastfeeding promotion strategies in developing countries. *Social Science & Medicine, 41*(4), 579-594.

Wilson, A. C., Forsyth, J. S., Greene, S. A., Irvine, L., Hau, C., & Howie, P. W. (1998). Relation of infant diet to childhood health: Seven year follow up of cohort of children in dundee infant feeding study. *BMJ (Clinical Research Ed.), 316*(7124), 21-25.

Wong, W. W., Hachey, D. L., Insull, W., Opekun, A. R., & Klein, P. D. (1993). Effect of dietary cholesterol on cholesterol synthesis in breast-fed and formula-fed infants. *Journal of Lipid Research, 34*(8), 1403-1411.

World Health Organization. (28 - 30 March 2001). *The optimal duration of exclusive breastfeeding.* (Report of An Expert Consultation). Geneva – Switzerland

World Health Organization. (2005). Guiding principles for feeding non-breastfed children 6-24 months of age.

World Health Organization. (2008). Indicators for assessing infant and young child feeding practices: Part 1: Definitions: Conclusions of a consensus meeting held 6-8 november 2007 in washington DC, USA.

World Health Organization. (2009). *Global health risks: Mortality and burden of disease attributable to selected major risks* World Health Organization.

World Health Organization. (2009). Global prevalence of vitamin A deficiency in populations at risk 1995-2005: WHO global database on vitamin A deficiency

World Health Organization. (2010). Indicators for assessing infant and young child feeding practices part 3: Country profiles.

World Health Organization, & UNICEF. (2003). *Global strategy for infant and young child feeding* World Health Organization.

World Health Organization (2007). Indicators for assessing infant and young child feeding practices, Part 1: Definitions. Washington, DC, USA

WHO Global Data Bank on Infant and Young Child Feeding, 2014 < http://www.who.int/nutrition/databases/infantfeeding/en/>

WHO global database on child growth and malnutrition, 2014 < http://www.who.int/nutgrowthdb/database/en/>

Wright, A. L. (2001). The rise of breastfeeding in the united states. *Pediatric Clinics of North America, 48*(1), 1-12.

Wright, A., & Schanler, R. (2001). The resurgence of breastfeeding at the end of the second millennium. *The Journal of Nutrition, 131*(2), 421S-5S.

Zaman, K., Baqui, A. H., Yunus, M., Sack, R. B., Bateman, O. M., Chowdhury, H. R., et al. (1997). Acute respiratory infections in children: A community-based longitudinal study in rural bangladesh. *Journal of Tropical Pediatrics, 43*(3), 133-137.

Zimmermann, M. B., & Hurrell, R. F. (2007). Nutritional iron deficiency. *The Lancet, 370*(9586), 511-520.