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OVERWEIGHT AND OBESITY AMONG PRESCHOOL- AGED CHILDREN IN LEBANON: PREVALENCE AND ASSOCIATED FACTORS

by
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AN ABSTRACT OF THE THESIS OF

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Title: Overweight and Obesity among Preschool- Aged Children in Lebanon: Prevalence and Associated Factors.

The Eastern Mediterranean region is characterized by one of the highest burdens of pediatric obesity worldwide. The present study aims at examining the prevalence and correlates of overweight and obesity in Lebanese preschool children aged 2-5 years.

A cross-sectional study was conducted on a nationally representative sample (n=531) of 2-5 year old children and their mothers. Subjects were recruited from randomly selected households based on stratified cluster sampling from the six governorates of Lebanon. Socio-demographic, lifestyle, dietary and anthropometric data were collected. Overweight and obesity were defined according to WHO 2007 growth standards.

Prevalence rates of overweight (weight for height Z core >+2) and obesity (weight for height Z score >+3) were estimated at 6.5% and 2.7%, respectively. Regression analysis showed that the odds of overweight increased significantly with increasing educational attainment of mothers (OR=5.257) and fathers (OR=9.646), and amongst those reporting the presence of a household helper (OR=2.714). The odds of obesity were significantly lower amongst those reporting a higher crowding index (OR=0.446). A positive and significant association was documented between overweight and dietary fat intake (OR=2.876). A significant correlation was found between maternal dietary intake and child's dietary intake. There was no association between history of breastfeeding and overweight in the study sample.

This study provides current estimates of obesity amongst Lebanese preschoolers and highlights positive associations between overweight and socio-economic status, measured by parental education, presence of household helper and crowding index. These findings highlight the importance of the home environment in modulating the child's lifestyle and dietary habits and call for intervention strategies targeting the family as a unit.

CONTENTS

TABLES

ABBREVIATIONS

%	Per Cent
/	Per
&	and
±	Plus or Minus
=	equal
<	less than
>	greater than
≤	Less than or equal
≥	Greater or equal
AAP	American Academy of Pediatrics
ADA	American Dietetic Association
AI	Adequate Intake
AMDR	Acceptable Macronutrients Distribution Range
AUB	American University of Beirut
BF	Breast Feeding
BIA	Bioelectrical Impedance Analysis
BMI	Body Mass Index
CDC	Center for Disease and Control Prevention
CHO	Carbohydrate
CI	Confidence Interval
Ci	Crowding Index
Cm	Centimeter

d	Day
DEXA	Dual Energy X-Ray Absorptiometry
DRI	Dietary Reference Intake
et al.	And Others
FFQ	Food Frequency Questionnaire
FTO	Fat Mass and Obesity Associated
g	Gram
GI	Glycemic Index
Ht	Height
IOTF	International Obesity Task Force
Kcal	Kilocalorie
Kg	Kilogram
L.L.	Lebanese Lira
m^2	Square meter
mcg	micrograms
mg	milligrams
MRI	Magnetic resonance imaging
MUFA	Monounsaturated Fatty Acids
n	Number
NCHS	National Center for Health Statistics
NHANES	National Health and Nutrition Examination Survey
NHES	National Health Examination Survey
NUT4	Nutritionist IV software
OR	Odd Ratio
oz	Ounce

p	P-value
PUFA	Polyunsaturated Fatty Acids
PYY	Peptide YY
r^2	Coefficient of determination
RDA	Recommended Dietary Allowance
SD	Standard Deviation
SE	Standard Error
SES	Socio-economic Status
SFA	Saturated Fatty Acids
SPSS	Statistical Package for Social Sciences
SSBs	Sugar Sweetened Beverages
TV	Television
UAE	United Arab Emirates
UK	United Kingdom
US(A)	United States (of America)
USDA	Unites States Department of Agriculture
vs.	Versus
WC	Waist Circumference
WHO	World Health Organization
Wt	Weight
Wk	Week
y	Years

To My

Beloved Family

CHAPTER I

INTRODUCTION

In recent decades, the prevalence of overweight and obesity in children has increased and has become one of the main public health challenges (De Onis *et al*. 2010). The worldwide prevalence of childhood overweight was reported to increase from 4.2% in 1990 to 6.7% in 2010 and is expected to reach 9.1% in 2020. High levels of pediatric obesity were also reported in the Middle East region (Lobstein *et al*. 2004). Obesity in childhood is linked with an increased risk of premature illness and with many serious health complications. A study conducted in Lebanon, documented a steep increase in overweight and obesity in school-aged children (6-19 years old) in the past decade. Studies investigating obesity in preschoolers (2-5 years old) are scarce worldwide and particularly in the Middle-East, but available evidence also suggests an increase in the prevalence of overweight in this age group. The preschool years have been identified as a crucial time to promote healthy lifestyle in young children as eating and physical activity habits start to get established in this critical period. Obesity is due to complex interactions between environmental and genetic factors. Obesogenic diets, growing urbanization, changes in dietary behaviors and sedentary behaviors are the major causes of the increase in childhood obesity (Malik and Bakir 2007; Must *et al*. 2009). In addition to the dietary and lifestyle factors, shorter duration of breastfeeding with early introduction of complementary food may adversely affect growth patterns in infants leading to overweight and obesity in preschool children and also later in life (Baker *et al*. 2004). Hence, adiposity in children is a strong predictor of adult obesity and approximately 30% of overweight children remain obese as adults (Pedrosa *et al*.

2009). Also, obesity in children increases the risk of metabolic syndrome, hypertension, cardiovascular disease and type 2 diabetes in adulthood (Ebbeling *et al*. 2002; Wyatt *et al*. 2006). In addition to the adverse medical complications, obesity co-morbidities constitute a heavy psychosocial and economic burden on the health care system. These findings confirm the need for effective interventions and programs to curb the escalating trend of childhood obesity.

The preschool years have been identified as a crucial time to study the determinants of childhood obesity as well as to implement preventive strategies to combat the obesity epidemic. The preschool period is an optimum time to promote healthy lifestyles amongst young children as eating and physical activity habits start to get established around this period (Wardle 2005). Preschool children are poor at internally regulating their energy intake, so their eating behavior is particularly responsive to their environment, such as the provision of snacks by caregivers (Mrdjenovic and Levitsky 2005).

A. Thesis Objectives

This study aims at investigating preschool overweight and obesity and its determinants in Lebanon. It specifically aims at:

- Determine the prevalence of overweight and obesity in Lebanese preschool children
- Investigate the association of preschool overweight and obesity with socio-demographic, lifestyle and maternal characteristics (BMI, diet, lifestyle)
- Examine the association of preschool overweight and obesity with early life feeding patterns and practices (breasfeeding duration and exclusivity; complementary feeding introduction)

- Investigate the association of preschool overweight and obesity with the child's current dietary practices, nutritional intakes and eating environment
- Investigate the association between overweight and obesity and stunting in preschool children.

CHAPTER II

LITERATURE REVIEW

A. Definition and Assessment of Obesity

Overweight and obesity recently become a major public health problem worldwide. Obesity is due to the imbalance between energy intake and energy expenditure (Daniels *et al*. 2005). It is defined as a state of excess body fat that increases cardiovascular and health risk factors. Excesses in body fat are associated with several physical, metabolic, and psychological outcomes. There are many methods that are used to assess overweight and obesity. The magnetic resonance imaging (MRI), multi-frequency bioelectrical impedance analysis (BIA), dual energy X-ray (DEXA), and underwater weighing (densitometry) are direct methods that are used to assess body fat and are often used in research (Barreira *et al*. 2012). However, for practical reasons, other indirect methods have been proposed for the assessment of obesity including anthropometric measurements such as body mass index, skin fold thickness, and waist circumference, which are extensively used in clinical and epidemiological settings (Dehgan *et al*. 2005; Lobstein *et al*. 2004).

BMI is defined as weight in kilograms divided by height in meters squared. It is the most frequently used method for classifying overweight and obesity as it was shown to be positively associated with adiposity, mortality risk and cardiovascular risk factors (Barreira *et al*. 2012; Taylor *et al*. 2010). In adults, overweight is defined as BMI between 25 and 30 and obesity is defined as BMI$\geq$30 kg/m^2 (Weisell 2002).

In growing children, it is not accurate or appropriate to use a simple cut-off point for BMI in defining overweight and obesity (Krebs *et al*. 2007). Thus, age and

gender specific references have been established and are the most used tool in identifying pediatric overweight and obesity (Jackson *et al*. 2007). The major growth charts developed to assess overweight and obesity in children are listed below.

1. World Health Organization (WHO) 1995 Reference

The WHO expert committee developed recommendations for the proper use and understanding of anthropometry in individuals and populations (WHO 1995). In children under 9 years old, the committee recommended the use of weight for height Z scores. Accordingly, children are classified as overweight when the weight for height z score is >1, and as obese when the weight for height z score exceeded >2. As for individuals aged 9 years or above; it advised the use of BMI-for age percentiles (WHO 1995) based on the reference data from Cole *et al*. (2007) and Must *et al*. (1991). The Must *et al*. (1991) reference uses the data from NHANES I and is extracted from BMI percentiles that are calculated for individuals 6–74 years of age. It classifies children and adolescents as overweight when ≥ 85th percentile and obese when ≥ 95th percentile (Must *et al*. 1991).

2. Center for Disease Control and Prevention (CDC) Reference (2000)

The CDC released growth charts from birth to 20 years of age in May 2000. These charts were based on U.S. national data gathered from 5 representative surveys (NHANES I, II, III and NHES II and III) that took place between 1963 and 1994 in the US (Onis *et al.* 2007). Accordingly, 2 to 20 year old subjects are classified as 'at risk overweight' when the BMI is between the 85th and 95th percentile, and as 'overweight' when the BMI was equal or above the 95th percentile. Yet, several organizations such as the Institute of Medicine and the American Academy of Pediatrics, adapted the

terminology of ‘obese’ rather than ‘overweight’ when BMI values exceeded the 95th percentile due to the importance, seriousness, and medical nature of childhood obesity (Krebs *et al*. 2007; Koplan *et al*. 2005). After the development of the IOTF and the WHO 2007 cutoffs, studies outside the US did not use the CDC 2000 reference anymore except for comparative purposes (Himes 2009).

3. International Obesity Task Force (IOTF) Reference (Cole et al. 2000)

The IOTF was derived from BMI data that were collected from six nationally representative cross sectional surveys of growth from Great Britain, Brazil, Hong Kong, Singapore, the Netherlands and the United States (Cole *et al*. 2000). Cole *et al*. (2000) defined overweight and obesity in 2 to 18 year old children through the development of age and gender specific BMI cutoffs that correspond to the adult cutoffs 25 kg/m^2 and 30 kg/m^2 for overweight and obesity respectively, at 18 years of age. Thus, the IOTF has become widely used in epidemiological research and for comparative purposes among different populations (Lobstein *et al*. 2004).

4. World Health Organization (WHO) 2007 Reference

The WHO 1995 growth reference had several disadvantages because it covered a relatively narrow BMI distribution range (5th to 95th percentiles) and started at the age of 9 years (De Onis *et al*. 2007b). Hence, in 2006, the WHO released new growth standards for the assessment of weight, height and BMI for age that target children from birth up to the age of 5 years (Onis *et al*. 2006). The new standards are intended to define how children should grow rather than only describing how children grew at a specified place and time (Onis *et al*. 2006). These standards were developed by combining data from the WHO Multicentre Growth Reference Study (MGRS) and from

the 1977 NCHS/WHO growth reference. The MGRS was a population-based study that took place between 1997 and 2003 in Ghana, Brazil, Norway, Oman, India and the USA. This study included a longitudinal follow-up from birth to 2 years of age and a cross-sectional component of children aged 18 to 71 months (Onis *et al*. 2006). So, the WHO classifies overweight as a BMI z-score of greater than 2 SD that is equal to a BMI of 25 kg/m^2 at 19 years old and obesity is defined as a BMI z-score greater than 3 SD which is equal to a BMI of 30 kg/m^2 at the age of 19 (De Onis *et al*. 2007b).

B. Epidemic of Childhood Obesity

The worldwide prevalence of overweight and obesity among children has been following an increasing trend in recent decades (de Onis *et al*. 2010). De Onis *et al*. (2010) showed that both developed and developing countries followed a similar pattern of increased pediatric obesity prevalence during the period extending between 1990 and 2010. In 2010, the prevalence of overweight and obesity in children under 5 years was estimated to be 6.1% in developing countries and 11.7% in developed countries. It was estimated that, in 2010, 43 million preschool children were overweight or obese of whom 35 million lived in developing countries (de Onis *et al*. 2010). By the year 2020, it is estimated that the worldwide number of overweight and obese children will be 60 million (de Onis *et al*. 2010).

Below is a discussion of the prevalence and trend in pediatric obesity rates in different parts of the world.

In the US, the rate of childhood obesity has increased dramatically since the 1960s, as shown by data provided by NHANES (Ogden *et al*. 2010). Between 1976-1980 and 2007-2008, obesity increased from 5.0% to 10.4% among 2-5 year old children (Ogden *et al*. 2010). In 2009-2010, the prevalence of overweight and obesity

was estimated at 26.7% and 12.1% respectively in the same age group, thus highlighting a further increase in preschoolers' obesity rates (Ogden *et al*. 2012).

Studies conducted in Europe have highlighted disparities in childhood obesity prevalence rates; with higher estimates being reported in Southern European countries compared to northern countries (Lobstein *et al*. 2004). However, little data is known about preschoolers (Cattaneo *et al*. 2010). Based on a recent meta-analysis from the 27 countries of the European Union, Spain reported the highest prevalence of overweight and obesity (32.3%) amongst 4 year old children using the IOTF reference, while Romania reported the lowest prevalence rates (11.8%) (Cattaneo *et al*. 2010).

In Africa, the rates of preschool overweight and obesity were shown to increase from the year 1990 till 2010 (De Onis *et al*. 2010). Northern Africa presented the highest increase in preschool obesity rates which have risen from 6.1% in 1990 to 17% in 2010 (De Onis *et al*. 2010). In contrast, a slight decrease in the prevalence of preschoolers' obesity was noted in South Africa since the 1990s (De Onis *et al*. 2010). When looking at prevalence estimates of preschoolers' obesity in Africa, discrepancies are noted with the highest being reported from Egypt (20%) and the lowest from Sudan (5%) (De Onis *et al*. 2010).

As for Asia, obesity among preschoolers was found to be the highest in western Asia (14.7%) in 2010, a value that is in stark contrast with the one reported in 1990 (3%). South Central Asia had the lowest prevalence (3.5%) in 2010 in comparison with the other Asian regions (De Onis *et al*. 2010).

In Lebanon, data on preschool obesity is scarce. A study conducted by Sibai *et al*. (2003) on 3-9 year old children showed that 16.7% of children were overweight and 4.8% were obese. Even though studies reporting on the trend in preschoolers' obesity are lacking in Lebanon, a recent study has documented a sharp increase (+4.7%) in

obesity amongst 6-9 year old children (Nasreddine *et al*. 2012), which highlights the need for further studies investigating not only obesity among children, but also among preschoolers.

Little is known about the primary causes of the increasing prevalence of obesity in Lebanon. Generally, the reduced physical activity and changes in the environment appear to be linked to pediatric obesity (Nasreddine *et al*. 2012; Sibai *et al*. 2003).

C. Risk Factors for Overweight and Obesity in Children

Although the exact mechanisms that lead to obesity are not fully understood, it is known that the basic cause of obesity is energy intake exceeding energy expenditure (Dehghan *et al*. 2005). Yet, the increase in the prevalence of obesity cannot be linked to a single etiology since there are multiple factors that may lead to energy imbalance. The state of obesity implicates both environmental and genetic interactions. However, Frye and Heinrich (2003) argued that during the last 20 years, the genetic make-up of populations around the world cannot have changed, and as such, lifestyle preferences and environmental factors seem to be the most important factors driving the obesity epidemic in the world (Dehgan *et al*. 2005). Findings related to environmental risk factors such as psychological, dietary and socioeconomic factors have been so far inconclusive due to the possible differences between studies in applied methodology, sample size, assessment tools, social and ethnic backgrounds of the study population (Hui *et al*. 2003).

1. Genetic Factors and Family History of Obesity

Many studies have shown that there is a strong association between childhood

obesity and parental adiposity (Lin et al. 2009; Whitaker 2004). The interaction of the environment with genes may affect phenotypes for energy intake and expenditure (Scaglioni *et al*. 2011). The implication of genes was underlined by familial occurrences of pediatric obesity, whereby fat mass was higher among monozygotic twins than dizygotic twins (Bradfield *et al*. 2012). In the past few years, several genetic loci have been identified and related to obesity (Bradfield *et al*. 2012). The fat mass and obesity associated gene (FTO) is amongst the genes with the strongest influence on obesity and it is mainly expressed in the appetite control areas of the hypothalamus (Scaglioni *et al*. 2011). FTO gene was shown to influence food responsiveness and satiety sensitivity in children (Scaglioni *et al*. 2011). Other obesity genes have also been identified by several studies (Bradfield *et al*. 2012). The role of genes in dictating the child's adiposity may explain the observed association between parental BMI and the offspring's BMI. However, available evidence suggests that this association is stronger for mothers than fathers (Parsons *et al*. 2001). Many cross-sectional studies showed that an obese mother was more likely to have an obese child (Whitaker 2004). By the age of 4 years, 1 in 4 of the preschoolers, who were born to obese mothers, were obese compared to less than 1 in 10 of the children who were born to normal-weight mothers (Whitaker 2004). In Lebanon, a significant association was shown between maternal BMI and overweight children (Jabre *et al*. 2005). Whether the intergenerational associations in body weight reflect genetic influences or whether they reflect the adoption of specific lifestyle and environmental patterns require further studies and investigations (Li *et al*. 2009).

2. Socio-Economic Status

Over the past few years, numerous studies from different countries suggested

that socio-economic status (SES) affects obesity risk (Wang *et al*. 2012). This association was found to vary with age, gender and population. Wang et al (2012) explained that SES may influence lifestyle and the population's access to food and thus may have direct repercussions on energy balance. O'Dea *et al*. (2011) found that primary school children in Australia from low SES had a higher prevalence of overweight and obesity than children with higher SES. According to the USDA surveys, most low SES people spent their limited money on energy dense foods that are mainly composed of fat and sugar (Drewnowski *et al*. 2004). Another possibility is that healthy diets usually cost more and are beyond the reach of several low income families (Drewnowski *et al*. 2004). In contrast, Lobstein *et al*. (2004) has shown that SES was positively correlated to childhood obesity in developing countries. In agreement with Lobstein *et al* (2004), McDonald *et al*. (2009) reported a positive association between overweight and SES in Colombian children. Similarly, Mirmiran *et al*. (2012) and Musaiger (2011) found that obesity in the Middle East is more dominant among children that lived in urban areas and among those with higher SES. Chakar and Salameh (2006) and Nasreddine *et al*. (2009) have also found that children from high SES in Lebanon and Syria were more at risk of obesity compared to their counterparts of low SES. This could be explained by the adoption of Western lifestyles and unhealthy dietary practices (such as fast food and energy dense sweets and snacks and reliance on convenience foods) amongst those with higher SES in developing countries (Ebbeling *et al*. 2002). In addition, Anderson et al. (2003) estimated that the rise in working hours amongst mothers of high SES accounts for 11.8% to 34.6% of the increase in the risk of overweight in children in these families (Cawley *et al*. 2012). In short, data on the association between childhood obesity and socio-economic status are still inconclusive. Therefore, in order to further investigate these associations,

researchers emphasize the importance of taking into account various SES indicators including crowding index (Ci), parental education, income and working status of mothers (Melki *et al*. 2004; Stamatakis *et al*. 2010).

3. Dietary Factors

Over the past decades, the observed increase in the prevalence of pediatric obesity has implicated diet and eating habits as potential determinants of childhood obesity (Dehgan *et al*. 2005). Lobstein *et al*. (2004) explained that energy intake is one side of the energy balance equation; therefore, dietary elements are potential candidates as obesity risk factors. These dietary factors include macronutrients, food groups, and the patterns and frequency of consumption of meals. In addition, eating habits (including eating outside home, portion size, consumption of meals with family and eating while watching TV) have also been postulated as factors that may modulate obesity risk in children (Lobstein *et al*. 2004).

a. Energy Intake

Some studies showed positive associations between pediatric obesity and energy intake (Elliott *et al*. 2011; Gillis *et al.* 2002; Skinner *et al*. 2012), while others documented no correlation (Lagiou and Parava 2008) or even negative associations (Hassapidou *et al*. 2006). The Continuing Survey of Food Intake by Individuals/ National Food Consumption Survey data in the US suggest that energy intake amongst children increased by 200 calories per day during the period spanning from 1989–1991 to 1994–1996 which was paralleled by an increase in obesity rate in children (Bleich *et al*. 2011). In contrast, NHANES documented only a slight change in calorie intake from the 1970s to 1988-1994 among US children and the same pattern was reported in 1999-

2000 (Dehgan *et al*. 2005). The discrepancies between the different studies could be due to the difficulty in accurately measuring energy intake and limitations in the methods of measuring food consumption in children, particularly that in many instances parents have to act as proxy in recalling/recording their child's food intake (Dehgan *et al*. 2005; Rodriguez and Moreno 2005).

b. Fat Intake

It has been claimed for many years that a high fat intake is linked to pediatric obesity (Dehgan *et al*. 2005). Evidence suggests that high fat foods are less satiating and are of high energy density which could lead to a passive increase in energy intake (McGloin *et al*. 2002; Koletzko *et al.* 2002). Robertson *et al.* (1999) observed an increase in the measurement of skin fold thickness with higher intake of fat among 4 to 7 year old children in Texas. McGloin *et al*. (2002) have shown that participants, from Northern Ireland, with the highest intake of fat were significantly fatter compared to those with lower intakes of dietary fat. Nevertheless, many longitudinal and cross-sectional studies have obtained contradictory results (Dehgan *et al*. 2005). NHANES results showed that the consumption of fat among US children had decreased over the past few decades (Dehgan *et al*. 2005). In fact, several studies failed to find an association between dietary fat and obesity risk in children (Davies 1997; Elliott *et al*. 2011). Moreover, it has been reported that in the UK, the average intake of fat is close to the recommendation of 35% of energy among 4-18 year old children (Gregory *et al*. 2000). The inconsistency in the studies might be due to the type of fat ingested since the type of fat (such as trans, saturated, monounsaturated fatty acids) may be more important than the total intake of fat in its association with obesity (Ebbeling *et al*. 2002). Gillis *et al*. (2002) observed that a higher intake of saturated fat was linked to

obesity in children. In short, there is no strong evidence that fat intake is the primary reason behind the increasing trend of obesity in youths.

c. Carbohydrate Intake

The popular "low fat, high carbohydrate diets", that have been used to lose weight, suggest that a negative association may exist between the development of overweight and obesity and CHO intake (Newby 2007). Skinner *et al*. (2004) demonstrated a negative association between CHO intake and BMI at 8 years of age in a longitudinal study among 2 to 8 year old children in the US. However, several studies did not find any association between CHO consumption and weight change (Atkin and Davies 2000; Elliott *et al*. 2011; Grant *et al*. 2004; Newby 2003). On the other hand, some studies observed a positive relationship between the intake of CHO and children obesity. It has been shown that during the period sparring from 1981-1995, the percentage of energy coming from CHO increased among 2 to 17 year old children (Newby 2003). This increase in CHO intake could be linked to an excess in body fat, due to the increase in the consumption of high glycemic index (GI) foods (Ebbeling *et al*. 2002). In fact, high GI foods stimulate a higher secretion of insulin and provoke a decrease in satiety compared with foods of low GI (Ludwig *et al*. 2002). Additionally, the hyperinsulinemia related to high GI foods may stimulate CHO oxidation postprandial at the expense of fat oxidation, hence altering substrate oxidation that may be the cause of excess fat stores (Brand-Miller *et al*. 2002). From another perspective, Newby (2003) stated that the influence of CHO on weight and appetite depends partly on the fiber content. Daily total fiber intake among 2 to 5 year old children significantly declined from 1977 to 1988 (Newby 2003). The ingestion of fiber was shown to decrease energy intake and enhance satiety (Howarth *et al*. 2001), but the type of fiber

is also important since wheat bran was not found to affect body weight or energy intake (Newby 2003). A study by Hanley *et al*. (2000) showed that 2 to 19 year olds had a decrease in the risk of overweight with high intakes of fiber. Therefore, there are inconsistencies between the studies regarding the effect of CHO on weight change.

d. Protein Intake

Protein is known to be the most satiating of all macronutrients (Westerterp-Plantenga *et al*. 2009). The beneficial effect of a high protein intake (representing 20% to 30% of energy) on weight loss and satiety has been supported by the literature among adults (Paddon-Jones *et al*. 2008; Westerterp-Plantenga *et al*. 2009). It has been observed that energy expenditure and satiety were significantly higher after a high protein meal than after a normal protein meal (Westerterp-Plantenga *et al*. 2009). Also, high protein intake seems to increase the concentration of plasma PYY and decrease the release of glucagon-like peptide 1 (Helou *et al*. 2008; Westerterp-Plantenga *et al*. 2009).

Regarding the children population, only few studies examined the association between protein intake and satiety and weight change. Some studies didn't report any significant association between protein intake and weight change (Atkin and Davies 2000; Elliott *et al*. 2011; Grant *et al*. 2004; Magarey *et al*. 2001), while Skinner *et al.* (2004) showed a positive association between pediatric adiposity and protein intake in the US. There is a suggestion in the literature that high protein intake stimulates the production of insulin-like growth factor 1; thus, triggering adipocyte multiplication early in life (Atkin and Davies 2000; Lobstein *et al*. 2004). Huh *et al.* (2010) suggests that additional research is needed to know whether this hormone affects adiposity. As a result, further investigation is required to study the role of protein intake on the pathophysiology of pediatric obesity (Lobstein *et al*. 2004).

4. Food Groups

Food groups may reflect an individual's intake better than a single macronutrient. Many studies have examined the association between child obesity and the intake of different food groups.

a. Fruits and Vegetables

The consumption of fruits and vegetables has been proposed to be protective against adiposity (Ledoux *et al*. 2011) due to the satiating effect of fiber resulting in the consumption of fewer calories, the displacement of energy-dense foods (Rolls *et al*. 2004), and the modulation of dietary glycemic load (Ledoux *et al*. 2011). However, Faith *et al*. (2006) and Hanley *et al*. (2000) found no association between fruit and vegetable consumption and adiposity. Nicklas *et al*. (2008) also showed no correlation between 100% fruit juice and any measure of obesity in 2 to 11 year old children in the US. In contrast, Newby *et al.* (2003) found a positive association between vegetable intake and adiposity in North Dakota preschoolers. Discrepancies in the study's findings may be due to the type and methods of preparation of fruits and vegetables such as consuming canned fruits or fried vegetables.

b. Dairy Products

Several studies conducted on children showed that intakes of dairy products and calcium are protective against adiposity. Huh *et al*. (2010) reported that milk intake at the age of 2 years was not associated with the risk of overweight at the age of 3. However, a higher dairy consumption was linked with lower BMI among children aged 3 to 6 years in the Framingham study (Moore *et al*. 2006). Similarly, Carruth and Skinner (2001), showed a protective effect of dairy consumption against obesity among

US preschoolers. Heany *et al.* (2002) showed that a 300 mg increment of calcium consumption, in children from Tennessee, was linked to approximately 1 kg less body fat (Huang *et al*. 2005). A possible explanation for the inverse association between the intake of dairy products and BMI is that calcium decreases 1,25-dihydroxyvitamin D activity and intracellular calcium influx; thus, reducing pancreatic insulin secretion and decreasing fatty acid synthase transcription in adipocytes. Subsequently, lipolysis is enhanced, which results in fat loss (Huang *et al*. 2005). Finally, Zemel *et al*. (2000) assumed that other constituents of dairy products such as vitamin D and protein may cause lower adiposity. Yet, several studies reported a null association (LaRowe *et al*. 2007; Murphy *et al*. 2008; Newby *et al*. 2004; O'Conner *et al*. 2006) or even a positive correlation between adiposity and dairy product consumption (Wiley *et al*. 2010). The positive correlation reported by Wiley *et al*. (2010) could be due to energy surplus that is provided by milk.

c. Sugar Sweetened Beverages Consumption

The WHO has described the intake of sugar-sweetened beverages (SSBs) as a "probable contributor" to the epidemic of obesity (Johnson *et al*. 2007). Several studies have shown that added sugar is linked to obesity (Ariza *et al*. 2004; DeBoer *et al*. 2013; Dubois *et al*. 2007; Kosova *et al*. 2013; Kral *et al*. 2008; Welsh *et al*. 2005). The possible mechanisms proposed behind the association between SSBs consumption and adiposity are that SSBs are displacing milk (Huang *et al*. 2005; Rodriguez and Moreno 2006) and are leading to increased energy intake which leads to weight gain (Fulgoni and Quann 2012). Also, Must *et al*. (2009) reported that SSBs may act as a proxy to other eating behaviors such as the consumption of fast food meals. In contrast, O'Connor *et al*. (2006) and Newby *et al*. (2004) reported no relationship between

adiposity and SSBs.

5. Dietary Practices

In the past decades the prevalence of childhood obesity has increased with concomitant changes in the types of foods and beverages consumed (Newby 2007). Also, dietary practices have changed, with snacking and eating outside the home becoming increasingly common (Nicklaset *et al*. 1998). However, inconsistencies remain in determining whether such dietary practices represent a risk factor for obesity in youth.

a. Breakfast Skipping

Breakfast has many nutritional benefits and has been regarded as the most essential meal of the day (Deshmukh-Taskar *et al*. 2010). Skipping breakfast may increase the risk of weight gain in children (Lobstein *et al*. 2004). Studies by Dubois *et al*. (2005), Tin *et al*. (2011) and Utter *et al*. (2007) reported that children who skipped breakfast were more likely to experience a greater increase in BMI. Skipping breakfast has also been associated with lower levels of physical activity (Tin *et al*. 2011). Eating breakfast may be linked to decrease snacking later in the day and decrease intake of fat (Lobstein *et al*. 2004; Nicklas *et al*. 2001). Nevertheless, the association between breakfast and child obesity is not consistent. For instance, Stralen *et al*. (2012) found no significant association between breakfast consumption and WC or BMI.

b. Fast Food Consumption

In the last two decades, the consumption of fast food has increased by 300% among children (Lobstein *et al*. 2004). Research has indicated that fast food intake leads

to an increase in energy intake, subsequently increasing the risk of overweight and obesity (Grier *et al*. 2007). Zoumas *et al.* (2001) found that the calorie content of meals consumed by children outside the home was 55% greater than that of meals consumed at home (Grier *et al*. 2007). The consumption of fast food was significantly correlated with BMI in 3 to 17 year old children in Germany (Kleiser *et al*. 2009). Also, Bowman *et al*. (2004) suggested that fast food ingestion might be a factor behind obesity since children who consumed fast food had an average of 187 kcal/day more than children who didn't. Several factors associated with fast food consumption may cause the excess in weight gain such as high energy density, large portion size, palatability and low fiber content of such foods (Bowman *et al*. 2004; Spear *et al*. 2007).

c. Snacking

There is no precise definition of snacking. Several studies have considered snacking as eating between meals (Musaiger *et al*. 2011). In the Western World, some studies showed that the total energy intake increases as snacking increases. WHO stated that there is insufficient evidence that increased eating frequency leads to decreased or increased obesity (Musaiger *et al*. 2011). A study in the United States examined changes in diet intake among 2 to 6 year old children. Foods high in solid fats and added sugars, such as savory snacks, sweet snacks and candy, pizza and fruit juice, were the top variations in per capita consumption during the period from 1989 to 2008 (Ford *et al*. 2013). In a cross-sectional study of 3 to 11 year old French children, Lioret *et al*. (2008) showed an inverse association between overweight and the contribution of snacking to energy ($P = 0.007$). Similarly, Newby *et al*. (2003) showed a positive correlation between consuming, ice cream, fat foods, chips, and chocolate and weight alteration in preschool children. However, according to the ADA, frequency of snacking

is not probably linked to children adiposity (Davis *et al*. 2007). The discrepancies in results may be due to differences in applied methodology concerning the different definitions for snacks and the types of food consumed as snacks (Lobstein *et al*. 2004).

6. Television Viewing

Television (TV) is one of the most popular media used among preschool children (Mendoza *et al*. 2007). Many studies have examined the relationship between TV watching and risk of overweight in children (Lobstein *et al*. 2004), with several documenting a link between excess television watching and weight gain. Mendoza *et al.* (2007) found that watching more than 2 hours per day of TV among US preschoolers was correlated with being at risk of overweight or overweight. In addition, a 7 year follow up study in the US among 4 to 11 years old children found that TV viewing positively predicts changes in the sum of five skinfolds and BMI (Procter *et al*. 2003). TV viewing may create a pattern of sedentary behavior among children and thus leads to obesity (Must *et al*. 2009). In addition, studies have suggested that in families where watching TV is a normal part of meal routines, the consumption of foods like pizzas and snack foods is typically higher while the consumption of fruits and vegetables is lower (Coon *et al*. 2001). Moreover, promoting unhealthy eating behaviors through TV advertisements may have an effect of obesity development (Buijzen *et al*. 2007; Lobstein *et al*. 2004). Exposure to 30 seconds of TV food commercials can impact the subsequent food choices made by preschoolers (Lobstein *et al*. 2004). Trials by Robinson (1999 and 2000) showed that restricting TV viewing can cause beneficial effects among children and adolescents (Lobstein *et al*. 2004). The American Academy of Pediatrics (AAP) recommended limiting media use to no more than two hours per day for children aged 2 years and older (Mendoza *et al*. 2007).

7. Infant Feeding Practices

Breastfeeding (BF) is suggested to prevent obesity, but the evidence that breast-fed infants have a lower risk of later obesity is unclear (Ryan 2007). Vafa *et al.* (2012) showed that the total duration of BF was not significantly correlated with weight status in Tehrani children at 7 years of age. Hediger *et al.* (2001) didn't find a clear dose-dependent relationship between duration of full BF and being at risk of overweight or overweight among US children aged between 3 and 5 years old. The findings are consistent with other observational studies that reported null effects between BF and adiposity in children (Burdette *et al*. 2006; Reilly *et al*. 2005; Kwok *et al*. 2010). Moreover, a randomized control trial showed that the promotion of BF did not affect BMI in children aged 6.5 years old, but the duration and exclusivity of BF increased (Kramer *et al*. 2007). In contrast, some studies revealed a negative association between BF and obesity in children. In a retrospective cohort study in Ohio, Bogen *et al.* (2004) showed that BF reduced the risk of obesity only among white children at age of 4 years when BF continued for at least 4 months without the introduction of formula milk or at least 6.5 months with formula and only for children whose mothers didn't smoke during pregnancy. In addition, prolonged BF was linked to a reduction in the risk of overweight among non-Hispanic white children at the age of 4 years (Grummer-Strawn and Mei 2004). A meta-analysis on the risk of overweight and duration of BF found an inverse and linear association between duration of BF and risk of overweight (Harder *et al*. 2005).

D. Consequences of Childhood Obesity

Childhood obesity is suggested to increase the risk of obesity in adulthood. In the Bogalusa cohort study, BMI in children (aged between 2-17 years old) was

correlated with adult adiposity at the age of 18-37 year (Freedman *et al*. 2005). In addition, pediatric overweight and obesity are related to several comorbidities in children. Though the amount of information available about adults is more than that about youth, it is clear that children experience many detrimental effects of overweight and obesity similar to adults (Daniels *et al*. 2005). The Bogalusa study and the Muscatine study have shown that childhood and adolescence obesity is a determinant of many cardiovascular risk factors, including hypertension, dyslipidemia (lowered high-density lipoprotein, increased triglycerides), atherosclerosis and left ventricular hypertrophy (Daniels *et al*. 2005). In the Bogalusa study, overweight during adolescence was associated with a 3-fold increase in high LDL serum cholesterol values, a 2.4- fold increase in high total serum cholesterol values, an 8-fold increase in low HDL serum cholesterol levels and an 8.5-fold increase in hypertension, in adults aged 27–31 years (Lobstein *et al*. 2004). As for type 2 diabetes, it has been an alarming consequence of childhood obesity. In youth, the onset of diabetes increases the risk of kidney failure, cardiovascular disease and visual impairment in early adulthood. A review by the American Diabetic Association suggests that approximately 45% of the diabetic cases in children were of the type 2 non-insulin dependent form (Lobstein *et al*. 2004). Even though, many factors are correlated with type 2 diabetes in youth, the main risk factor is obesity.

CHAPTER III

MATERIALS AND METHODS

A. Study Design and Sample Population

This study is based on data collected as part of the national cross-sectional study entitled "Early Life Nutrition and Health in Lebanon" (ELNAHL) which was conducted on a nationally representative sample of 0-5years old children and their mothers.

More specifically this study focuses on the 2-5 years old population (n=531) and their mothers to assess preschoolers' overweight, obesity and associated factors.

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 13% of under-five overweight and obesity (as published by de Onis *et al.* 2010), a sample of 1,030 under-five children was needed to assess the prevalence of overweight/obesity with a 2% error and a 95% confidence interval. The geographical sample distribution is shown in Table 1.

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

Under-five Children:

- *Inclusion Criteria:* born to Lebanese mothers absence of chronic illness, inborn errors of metabolism or physical malformations that may interfere with feeding

patterns and body composition; within the age range of 2 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.

Table 1. Geographical distribution of the study sample, 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.

For the purpose of this thesis, children aged between 2 and five years old were selected from survey participants (n=531). This sample size allowed a power of 80% to detect a prevalence of obesity of 9 % with CI of 95% and an error of 2.5 %. The prevalence of 9% was chosen based on the study in Algeria (De Onis and Blossner 2000).

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 2-5 years old, of gestational age at birth ≥ 37 weeks.

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

B. Ethical Considerations

This study is based on data that was collected as part of the project entitled "Early Life Nutrition and Health in Lebanon" (ELNAHL), which was granted approval by the Institutional Review Board of the American University of Beirut. All recruited subjects have provided written informed consent prior to their enrollment in the project. As for illiterate mothers, the interviewer informed them about the study in the presence of a witness and both the mother and the witness were asked to sign the consent form. Every participating household received a toy for the child and a nutrition education manual.

C. Survey Instrument

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:

- Socio-demographic and economic characteristics
- Dietary assessment of mothers and their child (24 hour recall)
- Dietary practices (eating environment, snacks and beverage consumption,

meal preparation, meal patterns)

- Feeding practices early in life (exclusive breastfeeding, duration of breastfeeding, continued breastfeeding at 1 year, introduction of solid, semi-solid or soft foods).
- Maternal eating patterns
- Anthropometric characteristics of mother and child (head circumference, mid-upper arm circumference, weight, length/height).

Prior to its use in data collection, the questionnaire (Appendix I) was pilot-tested on a sample of 15 and modified accordingly.

D. Data Collection

The multi-component questionnaire was administered to participating mothers by trained nutritionists through face-to-face interviews. Study participants were informed of the purpose of the study and were assured confidentiality. Consent forms (Appendix II) were filled by all mothers participating in the study.

E. Anthropometric Measurements

Anthropometric measurements were obtained from subjects and interpreted as follows.

1. Children

Mid-upper arm circumference (MUAC): were 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 will be taken

twice and the average of the 2 values will be 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 2-3 years old): were measured using a flexible, non-stretchable measuring tape. The infant/young child will be placed in a sitting position in the lap of the caregiver. The lower edge of the measuring tape will be 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 will be taken twice or until two measurements agree to 0.1 cm (1/8 in). For head circumference, values that are $<3^{rd}$ percentile for age or $> 97^{th}$ percentile for age are both indicative of health or developmental risk (WHO, 2007).

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

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 differ by more 0.3 kg.

Measurements were interpreted based on the WHO Global Database on Child Growth and Malnutrition (WHO, 2007):

- At risk of overweight (classified as weight-for- height) defined as: Z-score

cut-off point of > +1 SD

- Overweight (classified as weight-for- height): is defined as: Z-score cut-off point of > +2 SD

- Obese (classified as weight-for- height): is defined as: Z-score cut-off point of > +3 SD
- Underweight (classified as weight-for-age): is defined as: Z-score cut-off point<-2
- Wasted (classified as weight-for-height): is defined as: Z-score cut-off point<-2
- Stunted (classified as height-for-age): is defined as: Z-score cut-off point<-2
- Severely Stunted (classified as height-for-age): is defined as: Z-score cut-off point<-3

2. 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

F. Dietary Intake Assessment (24 Hour Recall Data)

Dietary intake data pertinent to participating children and their mothers were collected using the 24hr multiple pass approach. The interviewers followed the 5 steps of the USDA multiple pass 24hr recall approach, which included the quick list, the forgotten food list, the occasion and time at which foods were consumed, the detail cycle and the final probe review (Moshfegh *et al*. 1999). In order to help subjects in assessing the portion of the food consumed, quantification tools such as graduated food models and household measures were used. 24hr recall data were converted to energy, macronutrients and micronutrients using the Nutritionist Pro Diet Analysis software (www.nutritionistpro.com, Axxya Systems, 2009, Stafford, TX). Macronutrient and micronutrient intake were compared to their respective DRIs.

Food group intakes were also derived from the 24hr recall data. Percent kilocalories of total energy intake were calculated for each food group. Foods were categorized into 17 groups shown in Table 2.

G. Statistical Analysis

The current study is based on a secondary data analysis of the preschool children population (2-5 years old) of the national ELNAHL project.

Data, which will be drawn from the administered questionnaires, include:

- Demographic and socio-economic characteristics of the household

- Anthropometric measurements for both the mothers and the children (2-5 years old)
- Maternal lifestyle and dietary characteristics
- Early life feeding patterns and practices (breasfeeding duration and exclusivity; complementary feeding introduction
- Lifestyle patterns, dietary intake and eating behaviors of the preschoool children (2-5 years old)

Table 2. Categorization of food groups

Food Groups	
Breads and Cereals	Dairy Products
Fruits and Fresh Juices	Vegetables
Starchy Vegetables	Meat, Poultry and Fish
Legumes	Eggs
Added Fats and Oils	Sweets and Desserts
Sweetened Beverages and Soft Drinks	Alcoholic Beverages
Fast Food	Nuts and Seeds
Traditional Dishes	Western Dishes
Baby food	

Statistical analysis will be performed using the Statistical Analysis Package for Social Sciences (SPSS, version 20) and with the level of significance set at $p<0.05$. Frequencies and descriptive statistics will be performed to determine prevalence of overweight and obesity; breastfeeding and complementary feeding; anthropometric variables as well as maternal lifestyle patterns. Chi-squared test will be used to assess the association between the categorical variables in the study as well as conducting t-tests for calculation of mean difference and standard deviation for anthropometric and dietary variables including breastfeeding duration, frequency of feeding, amount of

energy served/consumed per meal. Overweight and obesity will be defined according to the World Health Organization (WHO) child growth standards. Logistic regression will be used to investigate the association between overweight/obesity among preschool children (2 to 5 years old) and baseline covariates including socio-demographic, lifestyle and maternal characteristics as well as early life feeding patterns and practices (breasfeeding duration and exclusivity; complementary feeding introduction) and the child's current dietary habits, nutritional intakes and eating environment with analyses represented as odds ratios and 95 % confidence intervals.

H. Ethical Considerations

The proposed research is based on secondary analysis of data that was collected as part of the project entitled "Early Life Nutrition and Health in Lebanon" (ELNAHL), which was granted approval by the Institutional Review Board of the American University of Beirut. All recruited subjects have provided written informed consent prior to their enrollment in the project. As for illiterate mothers, the interview informed them about the study in the presence of a witness and both the mother and the witness were asked to sign the consent form. Every household received a toy for the child and a nutrition education manual.

I. List of Variables Used in the Analysis

Variables of interest for the present analysis were derived from the children and the adult questionnaire of the same household. A brief description of the variables used in the present study is shown in Table 3.

Table 3. List of variables

Variable	Type	Description/Coding
Demographic Variables		
Age in years	Continuous	
Age of mother at marriage	Continuous	
Sex	Categorical	Male Female
Crowding Index	Categorical	>=1 <1
Level of education of mother	Categorical	Primary or less Intermediate, high school or technical diploma University degree
Level of education of father	Categorical	Primary or less Intermediate, high school or technical diploma University degree
Marital status of mother	Categorical	Married Unmarried (separated, divorced or widowed)
Occupation status of mother	Categorical	Housewife Employed
Mothers who specialized in a health related major	Categorical	Yes No
Mothers who are interested in a health related information	Categorical	Yes No
Presence of paid helper	Categorical	Yes No
Type of school children attend	Categorical	Private Public
Whether child attended day care	Categorical	Yes No
Whether household own a car	Categorical	Yes No
Whether house is self-owned	Categorical	Self-owned Others
Early feeding practices variables		
Children who were ever breast fed	Categorical & Continuous	Yes No
Duration of exclusive breastfeeding	Categorical & Continuous	<4 months >=4 months <6 months >=6 months
Children receiving infant formula before 4 months	Categorical	Yes No
Children receiving infant formula before 6 months	Categorical	Yes No
Age of introduction of solid or semi-solid foods	Categorical & Continuous	<4 months >=4 months <6 months >=6 months

"Table 3 – *Continued*"

Variable	Type	Description/Coding
Dietary intake variables		
Average daily energy intake (kcal)	Continuous	(derived from Nutri Pro software)
Macro and micronutrient mean intakes: Carbohydrate (g), Protein (g), Sugar (g), Total Fat (g), Saturated fatty acids –SFA (g), Monounsaturated fatty acids(g), Polyunsaturated fatty acids(g), Linoleic Acid (g), α-Linolenic Acid (g), Total Dietary fibers (g), Calcium (mg), Iron (mg), Zinc (mg), Folate (mcg), Vitamin D (mcg), and Vitamin B12 (mcg), Vitamin K (mcg), Magnesium (mg), Copper (mg), Selenium (mcg), Iodine (mcg)	Continuous	(derived from Nutri Pro software)
Mean Percent kilocalories (%) of daily energy intake from selected food groups	Continuous	Food groups selected from 24hr recall and mean % kilocalories computed from total energy intake derived from Nutri Pro software
Eating behavior and lifestyle variables		
Weekly frequency of breakfast consumption	Continuous	
Weekly frequency of consuming fast food	Continuous	
Weekly frequency of dinner consumption in front of TV	Continuous	
Weekly frequency of snack consumption in front of TV	Continuous	
Weekly frequency of consuming the same meal as the family	Continuous	
Weekly frequency of consuming the main meal with the family when they are at home	Continuous	
Snack and Beverage variables		
Weekly frequency of potato chips, chocolate, soft candies, biscuits and cookies, ice cream, French fries, hot dogs, hamburgers, pizzas, cakes and muffins, pancakes, doughnuts, sweetened cereals, 100% fruit juice, 100% of vegetable juice, sweetened fruit drink, regular soft drinks, diet soft drinks or teas, full fat sweetened milk drinks, reduced fat sweetened milk drinks.	Continuous	

"Table 3 – *Continued*"

Variable	Type	Description/Coding
Anthropometry variables		
Anthropometric measurements: weight (cm), height (cm), WC (cm), head circumference (cm), MUAC (cm)	Continuous	Measured following recommended standards
BMI for age z-scores	Categorical	Underweight Normal weight At risk of overweight Overweight Obese
Height for age z-scores	Categorical	Normal Stunted
Under nutrition according to MUAC	Categorical	Normal Under nutrition

CHAPTER IV

RESULTS

A. Descriptive Data

1. Socio-Demographic Characteristics

The study population consists of 531 Lebanese mothers and their 2-5 year old children. Table 4 shows the sociodemographic, parental and household characteristics of the study subjects according to their adiposity status. Mean age of participating mothers and children was 32.78±6.03 years and 3.3±0.86 years respectively with no differences between normal weight, overweight and obese children. The majority of mothers (61.5%) attained intermediate or high school level education. Only 3.6% of mothers specialized in a health-related major, but most of participating mothers (80.7%) reported interest in the health field. The proportion of non-working mothers was high (85.1%). Amongst those who worked, 46.2% were employed in the private sector. Looking at the father's educational level, 62.8% achieved intermediate or high school level education. The proportion of fathers attaining university level education was significantly higher in obese children compared to their normal weight and overweight counterparts. The majority of fathers (57.5%) were employed in government or private sector. Of the study sample, 61.5% reported living in a self-owned house and 78.9% owned a car. Of the surveyed households, 15.9% had a paid helper, with the proportion being significantly higher among parents of obese children (42.9%) followed by parents of overweight (26.5%) and normal children (14.3%) ($p=0.004$). Using the crowding index measure, 88.5% of the households had a crowding index ≥ 1 person per room, while 72.9% of the children were reported to attend a private school. As for the monthly

income of the household, 48.1% reported earning between 600,000 and 1,500,000 L.L. (Table 4).

Table 4. Sociodemographic, parental and household characteristics of 2-5 year old Lebanese children according to their adiposity status (n=525)

	Total (n=525)	**Normal weight (n=477)**	**Overweight (n=34)**	**Obese (n=14)**	**P value**
	Mean±SD				
Mother's age (years)	32.78±6.03	32.69±5.92	33.12±6.49	35.21±6.28	0.281
Child's age (years)	3.3±0.86	3.29±0.87	3.3±0.79	3.47±0.57	0.743
	n(%)				
Mother's Marital status					
Married	514(97.9)	468(98.1)	33(97.1)	13(92.9)	0.376
Unmarried (divorced or widowed)	11(2.1)	9(1.9)	1(2.9)	1(7.1)	
Mother's education level					
Primary school or less	101(19.2)	98(20.5)	2(5.9)	1(7.1)	
Intermediate school/ High school/technical diploma	323(61.5)	292(61.2)	23(67.6)	8(57.1)	0.090
University degree	101(19.2)	87(18.2)	9(26.5)	5(35.7)	
Mothers specialized in a health-related major	18(3.6)	16(3.5)	1(3.0)	1(7.1)	0.756
Mothers reporting interest in health-related information	421(80.7)	381(80.2)	27(81.8)	13(92.9)	0.491
Mothers' employment status					
Employed	78(14.9)	68(14.3)	5(14.7)	5(35.7)	0.084
Housewife	447(85.1)	409(85.7)	29(85.3)	9(64.3)	
Type of mother's work					
Government employee	16(15.1)	15(16.3)	1(14.3)	0(0.0)	0.775
Private-sector employee	49(46.2)	41(44.6)	4(57.1)	4(57.1)	
Self-owned business	41(38.7)	36(39.1)	2(28.6)	3(42.9)	
Father's education level					0.002
Primary school or less	116(22.1)	114(24.3)	2(6.1)	0(0.0)	
Intermediate school/ high school/technical diploma	324(62.8)	290(61.8)	26(78.8)	8(57.1)	
University degree	76(14.7)	65(13.9)	5(15.2)	6(42.9)	
Type of father's work					
Government employee and private- sector employee	302(57.5)	278(58.3)	16(47.1)	8(57.1)	0.798
Self-owned business	188(35.8)	168(35.2)	15(44.1)	5(35.7)	
Unemployed/retired/refused to answer	35(6.7)	31(6.5)	3(8.8)	1(7.1)	

"Table 4 – *Continued*"

	Total (n=525)	**Normal weight (n=477)**	**Overweight (n=34)**	**Obese (n=14)**	**P value**
	n(%)				
House is:					
Self-owned	323(61.5)	288(60.4)	27(79.4)	8(57.1)	0.083
Other	202(38.5)	189(39.6)	7(20.6)	6(42.9)	
Crowding index					0.056
>=1 person/room	464(88.5)	426(89.5)	28(82.4)	10(71.4)	
<1 person/room	60(11.5)	50(10.5)	6(17.6)	4(28.6)	
Number of children in the family					
1-2	272(51.8)	236(49.5)	26(76.5)	10(71.4)	0.058
3-5	230(43.8)	218(45.7)	8(23.5)	4(28.6)	
>5	23(4.4)	23(4.8)	0(0.0)	0(0.0)	
Type of school children attend					
Private school	324(72.9)	288(71.3)	25(89.3)	11(91.7)	0.063
Public school	120(27.1)	116(28.7)	3(10.7)	1(8.3)	
Does the household own a car					
No	111(21.1)	102(21.4)	8(23.5)	1(7.1)	0.411
Yes	414(78.9)	375(78.6)	26(76.5)	13(92.9)	
Presence of paid helper					
No	439(84.1)	406(85.7)	25(73.5)	8(57.1)	0.004
Yes	83(15.9)	68(14.3)	9(26.5)	6(42.9)	
Monthly income					
<600,000 L.L.	47(9.7)	42(9.5)	5(15.2)	0(0.0)	0.095
600,001-1,000,000 L.L.	125(25.8)	119(27.0)	5(15.2)	1(8.3)	
1,000,001-1,500,000 L.L.	108(22.3)	100(22.7)	8(24.2)	0(0.0)	
1,500,001-2,500,000 L.L.	96(19.8)	83(18.9)	7(21.2)	6(50.0)	
2,500,001-3,000,000 L.L.	23(4.5)	19(4.3)	2(6.1)	1(8.3)	
>3,000,000 L.L.	40(8.2)	34(7.7)	3(9.1)	3(25.0)	
Does not know	47(9.7)	43(9.8)	3(9.1)	1(8.3)	

2. Nutritional Status of 2-5 Year Old Children as Assessed by Anthropometric Measurements

The anthropometric characteristics of the study subjects are presented in Table 5. Mean weight and mean height were significantly higher among boys (15.74±2.74 kg, 96.91±9.24 cm) compared to girls (15.22±3.28 kg, 95.86±7.82 cm). Based on the WHO 2007 growth standards (Training Course on Child Growth Assessment, Geneva, WHO

2008), wasting was not identified in any of the participating boys but was identified in 0.2% of girls. Amongst study participants, 26.3% were at risk of overweight with no significant differences between genders. The results showed that 6.5% of the samples were overweight and 2.7% were obese with no significant differences between boys and girls. In addition, 4.6% of participating children were stunted and 0.6% had a MUAC ≤ 13.5 cm.

Table 5. Anthropometric characteristics and prevalence of overweight, obesity, stunting (according to WHO 2007 criteria) and under nutrition in a national sample of Lebanese 2-5 year old children, according to gender

	Total (n= 531)	**Boys (n= 284)**	**Girls (n=247)**	**P value**
Mean ± SD				
Weight (kg)	15.50±3.02	15.74±2.74	15.22±3.28	0.049*
Height (cm)	96.43±8.62	96.91±9.24	95.86±7.82	0.043*
Head circumference (cm)	49.62±3.55	49.91±4.04	49.31±2.87	0.056
MUAC (cm)	16.84±2.59	16.79±2.43	16.89±2.77	0.639
n(%)				
BMI for age[1] (WHO 2007)				0.752
Wasted	1(0.4)	0(0.0)	1(0.2)	
Normal	338(64.4)	177(63)	161(66)	
Risk of overweight	138(26.3)	78(27.8)	60(24.6)	
Overweight	34(6.5)	18(6.4)	16(6.6)	
Obese	14(2.7)	8(2.8)	6(2.5)	
Overweight and obese	48(9.1)	26(9.3)	22(9.1)	
Height for age (WHO 2007)				0.168
Normal	501(95.4)	269(95.7)	232(95.1)	
Stunted	24(4.6)	12(4.3)	12(4.9)	
Under nutrition according to MUAC (less than 13.5 cm)[2]	3(0.6)	3(1.1)	0(0.0)	0.105

[1] World Health Organization. Training Course on Child Growth Assessment. Geneva, WHO,2008: cut-off points based on BMI for age z-score (z>1 is at risk of overweight; z>2 is overweight; z>3 is obese; z<-2 is wasted)

[2]Mid-Upper Arm Circumference is used for rapid screening of acute malnutrition from the 12-59 month age range. FAO, Food Security Information For Action, http://www.foodsec.org

*p value<0.05 is significant.

3. Comparison of the Prevalence of Overweight and Obesity Using 4 Different International References

In addition to the WHO 2007 growth standards, data were reanalyzed using the WHO 1995, CDC and IOTF definitions (ref), for comparability purposes (Table 6). The lowest rates of obesity were observed using the WHO 2007 growth standard (2.8% for males and 2.5% for females), while the highest were obtained using the CDC (11.1% for males and 10.2% for females).

Table 6. Prevalence of overweight and obesity in the study sample: comparison between four international definitions (WHO 2007; WHO 1995; CDC; IOTF)

	WHO 2007 n(%)	**WHO 1995 n(%)**	**CDC n(%)**	**IOTF n(%)**
Male				
Normal weight	255(90.8)[a]	253(90.0)	207(74.2)	242(85.8)
Overweight	18(6.4)	17(6.0)	41(14.7)	31(11.0)
Obese	8(2.8)	11(3.9)	31(11.1)	9(3.2)
Overweight & obese	26(9.3)	28(10)	72(25.8)	40(14.2)
Female				
Normal weight	221(90.6)	211(86.5)	176(72.1)	198(81.1)
Overweight	16(6.6)	24(9.8)	43(17.6)	34(13.9)
Obese	6(2.5)	9(3.7)	25(10.2)	12(4.9)
Overweight & obese	22(9.0)	33(13.5)	68(27.9)	46(18.8)

[a] the proportion of children who were classified as 'at risk of overweight' according to the WHO 2007 criteria, were grouped with the 'normal weight' in order to compare them with the WHO 1995, CDC and IOTF.

4. Infant Feeding Characteristics

The study sample's infant feeding practices are shown in Table 7 according to adiposity status. The proportion of children who were "ever breastfed" was 90.3% with no statistically significant differences between normal weight, overweight or obese children. As for the mean duration of breastfeeding, it was 8.9±8.7 months in study sample and it was higher in the normal weight group (9.1±8.9) compared to the others

(7.9±7.0 for overweight group and 4.9±3.9 for obese group), but the difference did not reach statistical significance. Mean duration of exclusive breastfeeding was 3.92±3.2 months in the study sample, and the proportion of exclusive BF for less than 4 months was higher in obese children (92.3%) compared to normal children (67.2%) but without reaching statistical significance. At 2 years of age, 10.9% of the children were still being breastfed, whereby 11.5% of normal children were still being breastfed compared to 0.0% of obese children.

Table 7. Early feeding characteristics according to adiposity status of the study sample (n=531): Proportion of breastfed and exclusively breastfed children, mean duration of breastfeeding and exclusive breastfeeding and mean age of introduction of formula milk, solid or semi-solid foods

Early Feeding Characteristics	**Total**	**Normal weight**	**Overweight**	**Obese**
	n(%)			
Proportion of Children who were ever breastfed	474(90.3)	430(90.1)	31(91.2)	13(92.9)
Proportion of children who were exclusively breastfed for <4 months	319(67.3)	289(67.2)	18(58.1)	12(92.3)
Proportion of children who were exclusively breastfed for <6 months	393(82.9)	358(83.3)	23(74.2)	12(92.3)
Proportion of children who meet the recommendation of continued breast feeding till 2 years of age	57(10.9)	55(11.5)	2(5.9)	0(0.0)
Proportion of children receiving solid or semi-solid foods before 4 months	40(7.6)	38(8.0)	2(5.9)	0(0.0)
Proportion of children receiving solid or semi-solid foods before 6 months	216(41.1)	202(42.3)	10(29.4)	4(28.6)
Proportion of children receiving formula milk at <4 months	202(38.5)	180(37.7)	13(38.2)	9(64.3)
Proportion of children receiving formula milk at <6 months	228(43.4)	204(42.8)	15(44.1)	9(64.3)
Proportion of children receiving mixed feeding (formula milk in addition to breast milk at <6 months)	234(49.4)	209(48.6)	16(51.6)	9(69.2)

"Table 7 – *Continued*"

Early Feeding Characteristics	Total	Normal weight	Overweight	Obese
	n(%)			
Proportion of children currently receiving added baby cereals to the infant formula	66(27.8)	63(29.7)	2(12.5)	1(11.1)
Proportion of children currently receiving added sugar or honey in infant formula	12(5.1)	12(5.6)	0(0.0)	0(0.0)
Mean±SD				
Mean duration of breastfeeding (months)	8.9±8.7	9.1±8.9	7.9±7.0	4.9±3.9
Mean duration of exclusive breastfeeding (months)	3.92±3.2	3.9±3.2	4.0±2.3	2.8±2.1
Mean age of solid or semi-solid food introduction (in months)	5.8±2.5	5.8±2.5	6.5±2.6	5.9±1.5
Mean age of introduction of formula milk (in months)	1.3±1.7	1.3±1.7	1.7±2.1	0.7±0.9

Looking at children who received infant formula before the age of 6 months, the results showed that the proportion was higher in obese children (64.3%) compared to normal children (42.8%). Also, the proportion of children who received formula milk in addition to breast milk before 6 months of age was higher in obese children (69.2%) compared to normal children (48.6%), but these results did not reach statistical significance. As for the introduction of solid or semi-solid foods, 7.6% of the participating children had received solid foods at less than 4 months of age and 41.1% at less than 6 months of age.

5. Dietary Intake Data

a. Energy and Macronutrients Intake According To Adiposity Status among 2-5 Year Old Children

Mean energy intake was 1621.6±681.8 kcal/d and it was higher in obese children (1880.9±840.0) compared to overweight (1604.4±639.4) or normal

(1615.1±679.8) children (Table 8) without reaching statistical significance. Concerning macronutrients, the % of energy from CHO was significantly higher in normal weight children (49.0%±9.1) compared to obese children (43.2%±9.1), while the % of energy from fat was significantly higher in the obese group (44.1%±7.6) compared to normal weight group (38.5%±8.4). Similarly the intake of PUFA (g/d) was significantly higher in obese subjects compared to their normal weight counterparts, with the contribution of linoleic acid and linolenic acid to energy intake being significantly higher in obese subjects compared to normal weight subjects.

b. Nutrient Adequacy in 2-3 Year Old Children

The intakes of macronutrients and selected vitamins and minerals amongst children aged 2 to 3 years were compared to the DRIs in Table 9. The results showed that the mean intakes of carbohydrate, protein and total fat were adequate in 2-3 year old children when compared to the requirements. However, the intake of total dietary fiber and linolenic acid appeared lower than the requirements and the percentage of children consuming less than 2/3 of the DRI of fiber and linolenic acid were 63.2% and 83.4% respectively. As for the minerals, 84.1% of children had copper intakes below two thirds of the RDA, while only 6.6% had zinc intakes below two thirds the RDA. As for vitamin intake, the intakes of vitamin K, B12 and A exceeded the DRIs whereas the intake of vitamin D was below the recommended levels of intake, with 89.5% of subjects consuming below 2/3 of the RDA.

c. Nutrient Adequacy in 4-5 Year Old Children

Similar to the 2-3 year old children, 4 to 5 year old children had adequate intakes of carbohydrate, protein and total fat (Table 10). However, 79.3% and 74.1% of

the children respectively had linolenic acid and total dietary fiber intakes below 2/3 the RDA. As for minerals, intakes of iodine, calcium and copper showed that 63.2%, 62.9% and 80.2% of the children had intakes below 2/3 the RDA respectively. The intakes of vitamins B12 and K exceeded the DRIs whereas the intakes of vitamins D and A were below the recommended levels of intake. The proportion of subjects consuming less than 2/3 RDA of vitamin D was 95.7%.

Table 8. Mean daily energy, macro and micronutrient intakes in a national sample of Lebanese 2-5 year old children according to adiposity status

Daily Macronutrient Intake	**Total Mean±SD**	**Normal Mean±SD**	**Overweight Mean±SD**	**Obese Mean±SD**
Energy (Kcal)	1621.6±681.8	1615.1±679.8	1604.4±639.4	1880.9±840.0
Carbohydrates(grams)	195.1±83.3	195.7±83.6	184.4±76.1	199.5±95.2
CHO (%E)	48.7±9.1	49.0±9.1[b]	46.3±8.7[ab]	43.2±9.1[a]
Protein (grams)	53.6±26.8	53.3±26.6	57.2±28.2	60.4±31.7
Protein (%E)	13.5±4.4	13.5±4.4	14.2±3.5	13.0±2.9
Fat (grams)	71.3±37.2	70.6±36.9[a]	72.9±33.4[a]	94.0±49.2[b]
Fat (%E)	38.8±8.4	38.5±8.4[a]	40.6±7.6[a]	44.1±7.6[b]
Monounsaturated fatty acids (MUFA)	25.7±15.7	25.3±15.7	27.7±13.8	32.9±18.8
MUFA (%E)	13.9±5.1	13.7±5.2	15.5±4.6	15.4±4.5
Polyunsaturated fatty acids (PUFA)	14.5±11.5	14.5±11.4[ab]	12.6±7.7[a]	20.3±18.7[b]
PUFA (%E)	7.6±4.0	7.6±3.9	7.1±3.0	9.3±6.5
Linoleic acid	13.4±11.1	13.3±11.0[ab]	11.6±7.7[a]	17.9±18.5[b]
Linolenic acid	0.2±0.5	0.2±0.5[a]	0.1±0.3[a]	0.5±0.9[b]
Fiber in grams	13.0±12.2	13.2±12.5	11.1±8.2	11.6±7.4
Fiber (%E)	3.1±2.0	3.2±2.1	2.8±1.7	2.5±1.5
Sugar in grams	78.0±42.9	78.4±42.8	76.4±44.1	68.9±47.9
Sugar (%E)	19.9±8.2	20.1±8.2	19.1±6.2	15.8±8.7
Iron (mg/d)	8.6±8.2	8.6±8.4	8.8±6.1	9.6±6.4
Calcium (mg/d)	714.8±477.9	707.2±440.7	834.2±834.2	675.9±513.4
Selenium (mcg)	58.0±45.1	57.6±46.0	61.7±35.0	63.7±39.4
Zinc (mg/d)	6.4±3.9	6.2±3.6[a]	7.7±4.7[ab]	8.7±6.6[b]
Copper (mg/d)	0.2±0.8	0.2±0.9	0.2±0.5	0.3±0.5
Magnesium (mg/d)	197.2±102.1	196.8±102.0	198.3±110.0	206.5±91.6
Vitamin K (mcg/d)	71.1±98.4	70.6±100.6	74.9±76.8	78.6±72.5
Vitamin B12 (mcg/d)	3.0±7.2	2.9±7.5	3.2±3.6	3.7±3.7
Vitamin D (mcg/d)	3.8±4.7	3.7±4.1	3.2±3.9	3.8±4.7
Vitamin A (mcg/d)	355.3±756.5	259.1±789.7	339.9±297.8	266.1±179.0

*Different superscripts are significant at $p<0.05$.

Table 9. Mean Intake, contribution to DRI (%) and proportion of 2-5 year old children consuming less than 2/3 the DRI of macronutrients and selected vitamins and minerals

	2-3 year old children				4-5 year old children			
Nutrient	**DRI**	**Total Mean ± SD**	**Contribution to DRI [Mean(%)± SD]#**	**Proportion of children consuming < 2/3 DRI n(%)#**	**DRI**	**Total Mean ± SD**	**Contribution to DRI [Mean(%)± SD]#**	**Proportion of children consuming < 2/3 DRI n(%)#**
Carbohydrates (g/d)	130ß	190.5±82.2	146.4±62.9	28(7.2)	130ß	207.2±84.9	158.32±65.5	8(6.9)
Protein (g/d)	13ß	53.3±26.5	408.9±202.9	1(0.3)	19ß	56.7±28.8	299.2±150.4	2(1.7)
Total fat (%)	35Δ	39.0±8.2	111.4±23.5	15(3.8)	30Δ	38.4±8.8	128.3±29.9	3(2.6)
MUFA	-	25.2±15.5	-	-	-	26.7±14.8	-	-
PUFA	-	13.8±10.5	-	-	-	17.4±14.5	-	-
Linolenic acid (g/d)	0.7ß	0.2±0.5	28.5±71.8	326(83.4)	0.9ß	0.2±0.5	26.5±59.9	92(79.3)
Linoleic acid (g/d)	7ß	12.6±10.1	179.7±143.5	81(20.7)	10ß	16.2±14.2	161.8±141.4	28(24.1)
Fiber (grams/d)	19ß	12.3±10.5	64.8±55.1	247(63.2)	25ß	15.4±17.2	60.9±68.3	86 (74.1)
Iron (mg/d)	7ß	8.1±6.5	114.9±92.7	127(32.5)	10ß	10.3±12.6	102.7±124.9	49(42.2)
Folate (mcg/d)	150ß	212.5±183.7	141.2±121.9	83(21.2)	200ß	250.6±264.1	124.5±130.9	37(31.9)
Iodine (mcg/d)	90ß	8.8±14.5	9.8±16.1	130(33.2)	90ß	1.3±1.3	1.4±1.4	74(63.8)
Calcium (mg/d)	700ß	755.4±510.7	107.7±72.7	113(28.9)	1000ß	601.4±347.3	60.3±34.5	73(62.9)
Selenium (mcg/d)	20ß	56.6±46.1	282.4±229.4	12(3.1)	30ß	63.1±42.8	211.0±141.9	12(10.3)
Zinc (mg/d)	3 ß	6.3±3.8	209.2±125.7	26(6.6)	5ß	6.9±4.2	137.9±83.7	27(23.3)
Copper (mg/d)	0.34 ß	0.2±0.9	61.7±253.9	329(84.1)	0.44ß	0.3±0.8	60.3±177.1	93(80.2)
Magnesium (mg/d)	80ß	196.1±101.4	244.7±126.2	8(2.0)	130ß	202.7±105.2	155.5±80.3	8(6.9)
Vitamin K (mcg/d)	30ß	61.9±60.8	206.0±201.8	90(23.0)	55ß	101.9±175.3	183.0±316.4	47(40.5)
Vitamin B12 (mcg/d)	0.9ß	3.0±7.4	332.8±818.6	46(11.8)	1.2ß	3.1±7.2	258.1±595.9	22(19.0)
Vitamin D (mcg/d)	15ß	4.3±5.0	28.5±33.1	350(89.5)	15ß	2.6±3.5	17.7±23.4	111(95.7)
Vitamin A (mcg/d)	300ß	376.2±826.6	125.2±274.2	140(35.8)	400ß	311.5±520.3	78.8±129.1	65(56.0)

*values with different superscripts are significantly different from each other at $p<0.05$.

Based on the total sample

ß SOURCE for DRIs: Dietary reference intakes for carbohydrate, fiber, protein and fatty acids Washington, DC, 2002, The National Academies Press; Dietary reference intakes for Calcium, Magnesium and Vitamin D (1997); Dietary reference intakes for Selenium (2000); Dietary reference for folate and vitamin B12 (1998) and Dietary reference intakes for Vitamin A, Vitamin K, Copper, Iodine, Iron and Zinc (2001). These reports may be accessed via www.nap.edu.

ΔSOURCE for AMDR: Dietary reference intakes for protein, Washington, DC, 2002, The National Academies Press. This report may be accessed via www.nap.edu.

Total Fat, Fiber and Vitamin K have an Adequate Intake. All other nutrients have an RDA.

Table 10. Child's eating behavior according to adiposity status (n=528)

	Total Mean ± SD	**Normal Weight Mean ± SD**	**Overweight Mean ± SD**	**Obese Mean ± SD**
Weekly frequency of eating breakfast	6.8±2.5	6.8±2.6	6.9±0.5	6.2±2.0
Weekly frequency of eating dinner in front of the TV	3.6±3.6	3.6±3.7	3.4±3.2	4.8±4.2
Weekly frequency of snacking in front of the TV	4.8±6.0	4.6±6.0	6.7±9.9	7.1±6.6
Weekly frequency of eating fast foods (burger king, McDonald, KFC, Manaeech, Hot dogs, etc)	1.3±1.6	1.3±1.6	1.1±1.6	1.0±0.7
Weekly frequency of eating the main meal with the family when they are at home	9.9±6.5	10.0±6.6[a]	9.3±5.5[ab]	6.4±4.2[b]
Weekly frequency of eating the same meal as the family	10.9±6.7	11.1±6.7	9.6±5.6	7.6±5.5

*values with different superscripts are significantly different from each other at $p<0.05$.

6. Child's Eating Behavior according To Adiposity Status

The weekly frequency of breakfast consumption was high (6.8±2.6), and no differences were observed between BMI categories. As for the weekly frequency of consuming dinner or snacks in front of the TV, it was reported to be 3.6±3.6 and 4.8±6.0 respectively. Approximately children consumed fast foods once per week. Obese children were found to have a significantly lower frequency of consuming the main meal with the family, compared to normal weight subjects. Similarly, the weekly frequency of eating the same meal as the family was lower in obese subjects, without reaching statistical significance (Table 10).

7. Snack and Beverage Consumption amongst Lebanese 2-5 Year Old Children

The weekly frequency of the consumption of various types of snacks and

beverages among 2-5 year old children is shown in Table 11. It was observed that obese children had a significantly higher consumption of chocolate and ice cream compared to the other two categories (normal weight and overweight). Similarly, obese children consumed significantly more diet soft drinks than normal or overweight subjects. The mean weekly consumption of fruit drink (6.1±0.3) was high among 2-5 year old children with no differences between BMI categories.

Table 11. Weekly frequency of snack and beverage consumption among 2-5 year old Lebanese children

Variable	**Total**	**Normal Weight**	**Overweight**	**Obese**
	Mean ± SE			
Potato chips	5.6±0.3	5.6±0.3	5.2±0.2	6.2±0.3
Chocolate	7.4±0.3	7.2±0.3[a]	7.9±0.3[a]	12.6±0.5[b]
Soft lollies, hard candy and lollipops	5.8±0.5	5.8±0.5	4.3±0.5	9.7±0.5
Biscuits and cookies (chocolate chip, oreo cake etc)	5.5±0.2	5.4±0.2	5.6±0.2	6.6±0.3
Ice cream	4.4±0.3	4.3±0.3[a]	4.5±0.2[a]	8.0±0.3[b]
French fries	2.8±0.2	2.9±0.2	2.3±0.1	2.0±0.1
Hot dogs	0.3±0.2	0.3±0.2	0.3±0.0	0.03±0.0
Hamburgers	0.7±0.2	0.7±0.2	0.4±0.0	0.6±0.0
Pizza	0.7±0.2	0.5±0.0[a]	3.3±0.7[b]	0.6±0.0[a]
Cakes and muffin	1.8±0.1	1.9±0.1	1.7±0.1	0.8±0.0
Pancakes	0.2±0.0	0.2±0.0	0.1±0.0	0.1±0.0
Doughnuts	0.2±0.0	0.2±0.0	0.4±0.0	0.1±0.0
Sweetened cereals	2.6±0.2	2.5±0.2	3.3±0.1	2.9±0.2
100% fruit juice (homemade)	2.3±0.2	2.3±0.2	2.3±0.1	2.0±0.1
100% vegetable juice (homemade)	0.3±0.0	0.3±0.0	0.1±0.0	0.2±0.0
Fruit drink (sweetened fruit juice, fruit flavored drink …)	6.1±0.3	6.1±0.3	5.6±0.3	7.1±0.5
Regular soft drinks	4.0±0.2	4.0±0.2	4.5±0.3	4.4±0.3
Diet soft drinks or tea	0.5±0.1	0.4±0.1[a]	0.5±0.1[a]	2.4±0.2[b]
Full fat milk drinks (sweetened)	0.7±0.1	0.7±0.1	0.6±0.1	0.8±0.0
Reduced fat milk drinks (sweetened)	0.1±0.0	0.1±0.0	0.0±0.0	0.0±0.0

*different superscripts are significant at $p<0.05$.

8. Maternal Characteristics

a. Anthropometric Data amongst Mothers of 2-5 Year Old Children according To Child's Adiposity Status

The anthropometric characteristics of participating mothers are presented in Table 12. Mean BMI was 26.74±5.16. Mothers of obese children had a higher body weight (71.50±14.03) compared to mothers of normal or overweight children. Overall, the prevalence of overweight and obesity among mothers was 34.5% and 24.3% respectively. The prevalence of overweight and obesity was higher in mothers of overweight children compared to mothers of normal or obese children, but without reaching statistical significance.

Table 12. Anthropometric characteristics and prevalence of overweight and obesity amongst mothers of Lebanese 2-5 year old children, according to child's adiposity status

	Total n=493	**Normal Weight n=445**	**Overweight n=34**	**Obese n=14**
	Mean ± SD			
BMI	26.74±5.16	26.62±5.15	28.00±5.64	27.52±4.41
Weight in kg	67.92±13.33	67.55±13.20	71.29±14.36	71.50±14.03
Height in cm	159.22±7.06	159.14±7.09	159.71±6.68	160.90±6.90
Waist circumference in cm	89.4±12.17	89.19±12.07	92.82±13.18	91.0±12.1
Nutritional status according to BMI	**n(%)**			
Underweight	10(2.0)	10(2.2)	0(0.0)	0(0.0)
Normal	193(39.1)	177(39.8)	11(32.4)	5(35.7)
Overweight	170(34.5)	152(34.2)	13(38.2)	5(35.7)
Obese	120(24.3)	106(23.8)	10(29.4)	4(28.6)

b. Maternal Food Group Consumption According To The Child's Adiposity Status

As shown in Table 13, higher energy intake from "added fats and oils, sweets and traditional dishes" was found among mothers of obese children (5.7±11.6,

12.2±15.1 and 24.3±22.6) compared to mothers of normal weight or overweight children (Table 10). Mothers of obese children had lower intake of milk and dairy products (2.8±4.5) than mothers of normal or overweight children. However, none of these differences reached statistical difference.

c. Nutrient Intake of Mothers of 2-5 Year Old Children

The intakes of macronutrients and selected vitamins and minerals of participating mothers (non-pregnant) were compared to the recommended intakes in above Table 14. The results showed that maternal mean intakes of carbohydrate, protein and total fat were adequate when compared to the requirements. However, the intake of total dietary fiber and linolenic acid appeared lower than the requirements and the % of mothers consuming less than 2/3 of the DRI of fiber and linolenic acid were 70.9% and 74.0% respectively. As for minerals, the intake of iron, folate, calcium, iodine, zinc, copper and magnesium were found to be below two thirds the DRI. As for vitamin intake, mothers had intakes below 2/3 of the DRI for vitamins D, A and B12 (95.0%, 88.6% and 58.8% respectively). Vitamin A and D intakes were lower among mothers of obese children compared to mothers of normal and overweight children, but without reaching statistical significance.

B. Association between Dietary Intake in Mothers and Dietary Intake in Children

Pearson correlation was carried out to show the association between dietary intake in mothers and dietary intake in children. As can be seen in Table 15, energy, macronutrients and sugar intakes of mothers were significantly associated with the dietary intake in children. In addition, there was a significant correlation between maternal BMI and the child's BMI z-score (0.134).

Table 13. Intake (g/day) and contribution (%) of various food groups to daily energy intake amongst mothers of 2-5 year old Lebanese children, according to child's adiposity status

	Contribution to energy intake (%) Mean±SD				**Intake (g/day) Mean±SD**			
Food group	**Total n=514**	**Normal weight n=467**	**Overweight n=33**	**Obese n=14**	**Total n=514**	**Normal weight n=467**	**Overweight n=33**	**Obese n=14**
Bread & Toast	14.1±12.7	14.2±12.8	14.7±12.8	11.0±8.3	217.1±254.7	218.1±259.2	220.4±230.2	178.0±139.9
Milk & dairy products	5.8±7.7	5.8±7.7	6.7±8.7	2.8±4.5	86.1±118.5	86.3±119.4	100.9±121.8	44.4±70.0
Fruits and fresh juices	5.0±7.1	5.0±6.8	5.9±7.7	5.3±11.1	71.2±93.8	70.1±89.4	78.5±105.0	87.2±181.2
Raw vegetables	0.6±1.8	0.6±1.2	0.7±1.2	0.7±1.0	9.0±18.0	8.9±18.2	10.1±16.7	10.7±13.5
Starchy vegetables	1.0±3.9	1.0±4.0	1.3±3.3	0.2±0.6	12.1±43.5	12.0±44.4	16.5±39.0	3.1±9.3
Meat/poultry/fish	7.3±11.2	7.0±10.7	10.6±16.2	7.2±12.4	104.7±162.5	103.5±161.5	120.2±175.3	110.5±174.5
Legumes	0.2±2.1	0.2±2.1	0.2±1.3	0.0±0.0	4.0±36.7	4.0±37.4	6.0±34.3	0.0±0.0
Eggs	0.6±2.5	0.7±2.6	0.0±0.0	0.0±0.0	9.0±41.5	9.8±43.5	0.0±0.0	0.0±0.0
Added fats and oils	3.0±6.1	2.9±5.8	3.5±6.4	5.7±11.6	45.2±90.5	43.6±86.3	46.9±80.6	94.9±193.8
Sweets	10.0±12.5	10.0±12.5	9.0±11.6	12.2±15.1	163.8±231.3	163.4±230.4	152.1±230.5	205.3±274.0
Sweetened beverages (carbonated beverages and packed juices)	6.8±8.5	6.9±8.7	5.9±6.4	6.4±7.3	99.7±131.1	100.9±133.9	85.8±97.5	91.8±104.4
Alcoholic beverages	0.4±2.9	0.4±3.0	0.2±0.9	0.5±1.7	6.6±40.5	6.6±41.7	5.5±24.7	8.3±31.0
Fast food	15.2±19.1	15.3±19.3	13.7±17.1	14.3±19.7	235.7±318.0	236.3±315.4	239.4±374.4	207.7±277.3
Nuts	2.7±8.3	2.6±8.3	4.1±9.5	2.3±5.8	55.3±193.4	53.8±194.1	86.1±217.2	30.6±84.7
Traditional mixed dishes	20.5±21.2	20.6±21.1	17.2±21.1	24.3±22.6	348.9±461.8	350.9±470.6	300.7±354.2	398.1±399.9
Western dishes	6.5±13.9	6.6±13.6	6.1±17.9	6.9±14.6	114.5±247.8	115.4±246.4	89.2±244.6	144.2±310.0

*Significant difference by BMI z-score < 0.05(Using Anova); There were no significant differences between mothers' of normal weight, overweight and obese children in relation to all studied variables.

Table 14. Mean intake, contribution to DRI (%) and proportion of mothers* consuming less than 2/3 the DRI for macronutrients and selected vitamins and minerals, according to child's adiposity status

	Normal Weight Mean±SD	**Overweight Mean±SD**	**Obese Mean±SD**	**Total Mean±SD**	**Contribution to DRI [Mean(%)± SD] #**	**Proportion of mothers consuming <2/3 DRI N(%)#**	**DRI**
Carbohydrate (g/d)	189.5±99.1	174.0±87.7	182.0±58.6	188.2±97.5	143.7±76.8	55(11.4)	130[a]
Protein (g/d)	55.4±34.5	59.8±43.8	50.4±21.8	55.5±34.9	118.9±75.9	120(24.8)	46[a]
Total fat (%)	37.8±10.6	38.7±9.6	43.0±10.3	38.0±10.5	127.0±35.1	24(5.0)	30[b]
MUFA (g/d)	26.6±19.0	27.1±18.9	31.6±12.7	26.8±18.9	-	-	-
PUFA (g/d)	16.3±15.0	14.0±10.4	18.8±15.4	16.2±14.8	-	-	-
Linolenic acid (g/d)	0.3±0.7	0.3±0.6	0.4±0.5	0.3±0.7	31.2 ± 61.8	358(74.0)	1.1[a]
Linoleic acid (g/d)	15.2±14.7	12.9±9.9	16.6±14.9	15.1±14.4	124.3±118.9	189(39.0)	12[a]
Dietary fiber (g/d)	15.3±15.6	13.3±9.8	15.1±8.4	15.2±15.2	61.0±62.3	343 (70.9)	25[a]
Iron (mg/d)	10.8±15.9	9.0±6.2	10.2±5.2	10.7±15.3	59.5 ± 87.5	348(74.0)	18[a]
Folate (mcg/d)	231.8±251.8	180.9±141.7	189.3±103.3	227.4±243.4	56.7 ± 62.2	357(73.8)	400[a]
Vitamin D (mcg/d)	0.7±1.7	0.5±1.5	0.4±0.9	0.7± 1.6	13.9 ± 33.4	460(95.0)	5[a]
Vitamin A (mcg/d)	343.9±917.8	220.1±230.3	158.2±96.8	330.8±874.4	42.9± 106.3	429(88.6)	700[a]
Calcium (mg/d)	469.1±336.8	450.5±338.6	358.1±208.9	464.9±334.1	45.0 ± 31.5	387(80.0)	1000[a]
Vitamin K (mcg/d)	108.0±156.7	114.1±100.7	127.4±132.9	109.0±152.9	118.5± 166.9	223(46.1)	90[a]
Vitamin B12 (mcg/d)	2.8±9.4	2.3±2.9	3.2±3.0	2.8±9.0	105.2± 315.3	284(58.8)	2.4[a]
Iodine (mcg/d)	1.7±1.4	1.3±0.6	1.7±1.2	1.7±1.3	1.1±0.9	295(61.1)	150[a]
Selenium (mcg/d)	62.6±46.6	68.1±54.5	53.6±25.9	62.7±46.7	112.2± 85.1	151(31.2)	55[a]
Zinc (mg/d)	6.4±5.7	7.5±9.1	7.4±4.7	6.5±5.9	80.3±75.1	254(52.5)	8[a]
Copper (mg/d)	0.4±1.1	0.3±0.6	0.2±0.4	0.3±1.1	35.4±102.9	380(78.5)	0.9[a]
Magnesium (mg/d)	206.4±145.4	208.7±146.2	196.9±65.0	206.3±143.7	66.2± 47.2	309(63.8)	310[a]

based on the total sample

*pregnant mothers excluded.

[a] SOURCE for DRIs: Dietary reference intakes for carbohydrate, fiber, protein and fatty acids Washington, DC, 2002, The National Academies Press; Dietary reference intakes for Calcium, Magnesium and Vitamin D (1997); Dietary reference intakes for Selenium (2000); Dietary reference for folate and vitamin B12 (1998) and Dietary reference intakes for Vitamin A, Vitamin K, Copper, Iodine, Iron and Zinc (2001). These reports may be accessed via www.nap.edu.

[b]SOURCE for AMDR: Dietary reference intakes for protein, Washington, DC, 2002, The National Academies Press. This report may be accessed via www.nap.edu

Table 15. Pearson correlation coefficients for the association between dietary intake in mothers and dietary intake in children

Dietary intake	Pearson correlation
Energy (Kcal)	0.355*
CHO	0.309*
Protein	0.375*
Total Fat	0.391*
Saturated fat	0.369*
Monounsaturated fat	0.376*
Polyunsaturated fat	0.479*
Linoleic acid	0.484*
Linolenic acid	0.325*
Fiber	0.546*
Sugar	0.299*

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

C. Association between Overweight in 2-5 year old Children and Socio-demographic Characteristics, Early Feeding Practices, Dietary Intake and Eating Behavior

Simple binary logistic regression was carried out to show the association of overweight and obesity (weight for height z-score>2) as the dependent variable with baseline covariates such as demographic factors, socio-economic status, early feeding practices, dietary intake, frequency of snack and beverage consumption and eating behavior (Table 16).

The logistic regression showed significant associations between mother's education level, father's education level, crowding index and presence of paid helper (OR=2.714; CI=1.400-5.262) with overweight and obesity in children. The odds of overweight and obesity were higher among children whose mothers were working (OR=1.516; CI=0.710-3.236) and among children whose mothers were obese (OR=1.441; CI=0.746-2.785), but without reaching statistical significance. As for the early feeding practices of the children, there was no significant associations between "duration of exclusive BF, age of introduction of infant formula or introduction of semi-

solid foods" and prevalence of overweight and obesity in children.

A positive significant association between % energy derived from total fat and overweight and obesity was reported with higher OR observed for children who consumed ≥35% energy from fat (OR=2.876; CI=1.249-6.619) (Table 16). As for saturated fatty acid intake, the odds were higher (OR=1.815; CI=0.892-3.691) when children consumed ≥10% of energy from SFA, but without reaching statistical significance. Regarding carbohydrate intake, the odds of overweight and obesity were lower when children consumed >48% of energy from CHO (OR=0.491; CI=0.263-0.916). Concerning the frequency of eating "chocolate and hard candy" per week, the odds of overweight and obesity were higher for children in the third tertile (OR=1.217; CI=0.564-2.626) compared to those in the first tertile. Also, a positive association between weekly frequency consumption of "biscuits/ pastries and ice cream" and overweight and obesity was observed. Higher odds were reported for children who consumed high intakes of biscuits/pastries and ice cream (OR=1.386; CI=0.693-2.769, OR=2.149; CI=0.699-6.603 respectively) compared to children who had low intakes of such snacks, without reaching statistical significance. Moreover, the prevalence of overweight and obesity was higher among children with high intake of sweetened cereals and diet drinks (OR=2.154; CI=1.140-4.070, OR=2.477; CI=1.190-5.157) reaching statistical significance. Finally, the odds of overweight and obesity were higher among children who frequently eat snacks in front of the TV (OR=1.999; CI=0.984-4.062) although statistical significance was not reached.

Table 16. Association of socio-demographic characteristics, early feeding practices, dietary intake and eating behavior with overweight and obesity (BMI Z score >+2) in 2-5 year old children (Simple binary logistic regression)

Variable	OR (95% CI)
Parental and household characteristics	
Mother's education	
Primary school or less	1
Intermediate school or high school or technical diploma	3.468* (1.037-11.595)
University degree	5.257*(1.462-18.905)
Mother's occupation	
Housewife	1
Employed	1.516 (0.710-3.236)
Father's education	
Primary or less	1
Intermediate school, high school or technical diploma	6.683* (1.579-28.275)
University degree	9.646* (2.074-44.866)
Crowding index	
<1 person per room	1
>=1 person per room	0.446* (0.209-0.950)
Do you have a paid helper?	
No	1
Yes	2.714* (1.400-5.262)
Is the child stunted?	
No	1
Yes	0.420 (0.055-3.180)
Maternal obesity (BMI >=30kg/m^2)	
No	1
Yes	1.441 (0.746-2.785)
Early feeding characteristics	
Child being ever breastfed	
Yes	1
No	0.933 (0.314-2.776)
Duration of exclusive breastfeeding	
<4 months	1
>=4 months	1.062 (0.539-2.095)
Duration of exclusive breastfeeding	
<6 months	1
>=6 months	1.279 (0.589-2.775)
Children receiving infant formula before 6 months of age	
No	1
Yes	1.391 (0.744-2.601)
Children receiving infant formula before 4 months of age	
No	1
Yes	1.257 (0.684-2.308)
Age of introduction of solid or semi-solid foods	
<4 months	1
>=4 months	1.991 (0.465-8.521)
Age of introduction of solid or semi-solid foods	
<6 months	1
>=6 months	1.784 (0.933-3.411)

"Table 16 – *Continued*"

Variable	OR (95% CI)
Duration of breastfeeding	
<=2 months	1
3-5 months	1.343 (0.555-3.252)
>=6 months	1.125 (0.552-2.296)
Daily Dietary Intake	
Average daily energy intake (%)	
Low (<1290 kcal)	1
Medium (1290-1780 kcal)	0.959 (0.442-2.079)
High (>1780 kcal)	1.325 (0.641-2.741)
CHO(%E)	
<=48	1
>48	0.491* (0.263-0.916)
Total Fat(%E)	
<35	1
>=35	2.876* (1.249-6.619)
Saturated fat(%)	
<10	1
>=10	1.815 (0.892-3.691)
Dietary Fiber (%E)	
Low	1
High	0.620 (0.327-1.178)
Sugar (%E)	
<=10	1
>10	0.698 (0.274-1.776)
Milk and dairy products(%E)	
Low	1
High	0.802 (0.436-1.475)
Fruits and fresh juices(%E)	
Low	1
High	0.692 (0.377-1.271)
Vegetables (%E)	
Low	1
High	0.976 (0.414-2.299)
Sweets (%E)	
Low	1
High	0.801 (0.436-1.471)
Added fats and oils(%E)	
Low	1
High	0.695 (0.323-1.496)
Fast food(%E)	
Low	1
High	0.891 (0.486-1.633)
Sweetened beverages(%E)	
Low	1
High	0.811 (0.442-1.489)
Nuts(%E)	
Low	1
High	1.050 (0.444-2.482)
Weekly Frequency of Snack and Beverage Consumption	
Frequency of drinking sugar sweetened beverages per week	

"Table 16 – *Continued*"

Variable	OR (95% CI)
Low	1
Medium	0.752 (0.378-1.495)
High	0.912 (0.419-1.987)
Frequency of eating chocolate and hard candy per week	
Low	1
Medium	0.808 (0.392-1.665)
High	1.217 (0.564-2.626)
Frequency of eating fast-food per week	
Low	1
Medium	0.713 (0.344-1.477)
High	0.777 (0.374-1.613)
Frequency of eating biscuits and pastries per week	
Low	1
Medium	0.710 (0.316-1.595)
High	1.386 (0.693-2.769)
Frequency of eating ice cream per week	
Low	1
Medium	1.349 (0.606-3.004)
High	2.149 (0.699-6.603)
Frequency of eating sweetened cereals per week	
Low	1
High	2.154* (1.140-4.070)
Frequency of drinking diet drinks per week	
Low	1
High	2.477* (1.190-5.157)
Frequency of drinking fruit and vegetable juice per week	
Low	1
High	1.008 (0.556-1.826)
Eating Behavior	
Breakfast consumption	
Yes	1
No	0.000 (0.000-.)
Frequency of eating dinner in front of TV	
No	1
Yes	1.041 (0.553-1.959)
Frequency of eating snack in front of TV	
No	1
Yes	1.999 (0.984-4.062)
Frequency of eating the same meal as the family	
No	1
Yes	0.347 (0.065-1.843)

CHAPTER V

DISCUSSION

A. Prevalence of Overweight and Obesity among 2-5 Year Old Children

This study has included obesity in the definition of overweight (overweight was classified as weight for height z-score >+2 SD and obesity as weight for height z-score >+3 SD) (WHO 2008). In order to compare with findings reported from other countries in the world, data were reanalyzed according to WHO 1995, CDC and IOTF criteria. Using the WHO 2008 criteria, 9.2% of children were found to be overweight (and obesity). Current prevalence rates of overweight among preschoolers in Lebanon are comparable to those observed in Algeria (9.2%) (De Onis and Blossner 2000), Brazil (9%) (Granville-Garcia *et al*. 2008) and Egypt (8.6%) (De Onis and Blossner 2000), higher than those reported from Oman (1.9%) (Alasfoor and Mohammed 2009), and Kuwait (8.2%) (Al-Issa and Moussa 1998), while being lower than those observed in Uzbekistan (14.4%) (De Onis and Blossner 2000). Based on the CDC 2000 definition, the prevalence of overweight (16%) and obesity (10.7%) in Lebanese preschoolers appears higher than that reported from Iran (10.6; 7.6% respectively) (Fatemeh *et al*. 2012), while being considerably similar to overweight estimates reported in Canada (15.2%) (Olstad and McCargar 2009). The obesity prevalence in our study was 11.1% among boys and 10.2% among girls which is lower than those reported in Greece (16% in boys and 15.5% in girls) (Manios *et al*. 2007).

The prevalence of overweight in Lebanon is lower than the prevalence reported for the region of Western Asia (14.7%) in 2010 and was found to be higher than the global prevalence of overweight and obesity (6.7%) in children aged 0-5 years (De Onis

et al. 2010).

B. Association between Preschool Overweight and Socioeconomic Characteristics in Lebanon

The results of the present study document a significant positive association between preschooler's overweight and socioeconomic background. Pediatric adiposity was in fact shown to be positively associated with father's educational level, mother's educational level, crowding index and the presence of paid helper, all of which are indicators of higher SES. It was shown that socioeconomic status was positively associated with pediatric obesity in developing countries (Lobstein *et al*. 2004). Our findings are in fact in agreement with previous studies conducted in Lebanon and Syria that found that children from high SES were more at risk of obesity (Chakar and Salameh 2006; Nasreddine *et al*. 2009). This could be explained by the adoption of Western lifestyles and unhealthy dietary practices (such as fast food and energy dense sweets and snacks and reliance on convenience foods) amongst those with higher SES in developing countries (Ebbeling *et al*. 2002). Similarly, among school aged children in Saudi Arabia, mothers of high educational level were found to have a higher risk of having obese children compared to those of low educational level (Al Alwan *et al*. 2013). The positive association between pediatric obesity and maternal education could be due to the fact that mothers of high educational level tend to be employed and may subsequently have less control over their children's diet (Anderson *et al*. 2003). Also, it is estimated that the rise in working hours amongst mothers of high SES accounts for 11.8% to 34.6% of the increase in the risk of overweight in children (Anderson *et al*. 2003). This highlights the role of parental education in modifying the family's lifestyle and eating behaviors that will decrease obesity risk in children (Lazzeri *et al*. 2011).

This finding is in disagreement with that reported from many developed countries where socioeconomic status is inversely related to obesity in children (Gupta *et al*. 2012). For instance, a study conducted in Northwest Germany showed that a low SES was a strong risk factor of overweight and obesity among 5-7 year old children (Danielzik *et al*. 2004).

C. Association between Overweight and History of Infant Feeding Practices Lebanese Preschoolers

No significant association was found between history of breastfeeding and overweight amongst Lebanese preschoolers. Our results are in agreement with findings by Burdette *et al.* (2006) in Ohio; Hediger *et al.* (2001) in the US; Kramer *et al*. (2007) in Russia and Reilly *et al.* (2005) in the United Kingdom. The lack of protective association between breast feeding and overweight in preschoolers may be the result of maternal recall bias and particularly over reporting the duration and exclusive of breastfeeding. For instance, a study conducted in the Brazil showed that highly educated mothers tend to overestimate the duration of breastfeeding (Huttly *et al*. 1990). Mothers overestimated the duration of exclusive breastfeeding to reflect their adherence to national guidelines (Burnham *et al*. 2014). Such recall bias underestimates the measure of association, thus, reduces the probability of reporting a significant association. In addition, the inverse relationship between breastfeeding and adiposity at 1 year of age attenuated or even disappeared later in childhood (Vafa *et al*. 2012).

Even though our study didn't find any association between breast feeding and adiposity in children, some studies found a correlation between breast feeding and decreased risk of overweight (Bogen *et al*. 2004; Harder *et al*. 2005). There is a proposed hypothesis that bottle feeding may affect the development of appetite

regulation in children (Bogen *et al*. 2004).

The WHO recommends the introduction of solid foods at 6 months of age in order to promote exclusive breastfeeding. As for the American Academy of Pediatrics Committee on Nutrition, it states that solid foods can be introduced between the age of 4 and 6 months (Huh *et al*. 2011). In the present study, the risk of preschool overweight was 2 times higher in children who were introduced to solid foods at 4 months or older (OR=1.991; CI=0.465-8.521). This result is in contrast to the finding of Huh *et al.* (2011) who reported increased odds of obesity at 3 years of age among children who were introduced to solid foods before 4 months of age. In contrast, Burdette *et al.* (2006) showed no association between child adiposity and timing of solid food introduction.

D. Association of Preschool Overweight and Eating Practices among 2-5 Year Old Lebanese Children

Watching TV and sedentary behavior are suggested to be important modulators of childhood obesity. In the present study, a borderline significant association (OR=1.999; CI=0.984-4.062) was found between frequency of eating snacks in front of TV and higher odds of overweight in preschoolers. This is in agreement with several studies that showed that eating while watching

TV is linked to increased weight status in children (Phillips *et al*. 2004 and Francis *et al*. 2003). Moreover, Liang *et al.* (2012) reported that having supper while watching TV was associated with a higher percentage energy intake from sugar and fat and more soft drink consumption in grade 5 Canadian students. Furthermore, eating while watching TV was positively correlated with overweight (Liang *et al*. 2012). Therefore, health care providers must work with families to encourage family meals,

emphasizing turning the TV off at meals (Feldman *et al*. 2007).

In addition, significant associations were found between the weekly frequency of intake of sweetened cereals, diet drinks and risk of overweight among study participants. Even though several studies showed that cereal intake was protective against adiposity in children, in our study, the types of cereals consumed were sweetened and low in fiber. Albertson *et al*. (2003) reported that children (aged 4 to 12 years old) who consumed ready to eat cereals had the healthiest BMI and were least likely to be at risk of overweight. This could be explained by the fact that cereals are rich in fiber, iron and folic acid and low in fat (Cho *et al*. 2013). Also, the impact of cereals to BMI may be due to calcium rich foods (such as milk) that are often consumed with cereal (Barton *et al*. 2005). As for the intake of sweetened cereals, many studies reported that added sugar is linked to obesity (Ariza *et al*. 2004; DeBoer *et al*. 2013; Dubois *et al*. 2007).

Regarding sugar intake, the mean intake of the whole population (19.9 % of energy intake) was higher than the WHO 2002 recommendation that states that sugar intake should be less than 10% of the daily caloric intake. This is in agreement with studies in the U.S. and Australia where sugar intake exceeded the WHO limit of 10% of daily energy intake (Somerset 2003; Kranz and Riz 2002). 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 health benefits and decrease the risk of weight gain and noncommunicable diseases (WHO 2014). The current levels of intake among Lebanese preschoolers (19.9%) are 4 times higher than the new WHO limit, thus highlighting unhealthy practices in this age group which may have health implications and ramifications.

As for diet drinks, the lower intake of diet drinks amongst obese preschoolers

may be a mere reflection of maternal/parental efforts aiming at decreasing sugar and energy intake in their overweight children. Alternatively, recent evidence suggests that the consumption of diet drinks may be associated with subsequent energy overconsumption. A diet soft drink can leads to a decrease of 100 kcal per 8 oz serving when compared to a regular soft drink, but it causes an alteration in hunger and appetite later in the day that results in an additional 50 to 200 kcal of intake (Gardner *et al*. 2012). So, drinking diet drinks may lead to tricking the body into thinking that it is consuming real sugar which might lead to metabolic changes and overconsumption (Bellisle and Drewnowski 2007; Gardner *et al*. 2012). A study among 2-5 year old children observed energy compensation and ate more after an aspartame-sweetened drink than after a sugar-containing preload (Birch and Deysher *et al*. 1986).

Moreover, the intake of chocolate and ice cream were found to be significantly higher in obese subjects (12.6±11.1; 8.0±7.9) as compared to normal weight children (7.2±6.1; 4.3±6.9). This is in agreement with Newby *et al*. (2003) that showed a positive correlation between consuming chocolate and ice cream and changes in weight among preschool children.

E. Association between Overweight and Dietary Intake (Including Macronutrients, Micronutrients and Food Groups) Among 2-5 Year Old Lebanese Children

In this study, no association was reported between child adiposity and total energy intake. This finding is in agreement with Lagiou and Parava (2008). This could be due to difficulty in accurately measuring energy intake, particularly that parents have to act as proxy in recalling their child's food intake (Dehgan *et al*. 2005; Rodriguez and Moreno 2005). Thus, it may be due to underestimating of energy intake. When comparing macronutrients intakes between BMI groups, a significantly higher

consumption of carbohydrate was found among normal weight children as compared to their obese counterparts. Also, there was a significant negative association between overweight in children and the intake of carbohydrate (OR=0.491; CI=0.263-0.916). This negative association between CHO intake and child's BMI is in concordance with the longitudinal study by Skinner *et al* (2004). Also, other studies reported an association between low intake of carbohydrates and weight gain in children and adolescents (Maillard *et al*. 2000; Guillaume *et al*. 1998; Huang *et al*. 2004). This correlation might be due to the type of carbohydrates consumed rather than the amount. Resistant starch or dietary fiber may prolong satiety and can limit food intake by lowering the energy density of the food (Astrup 1999).

This negative association can be due to the replacement of carbohydrates with fat which are more energy dense. The mechanism that can explain the lower adiposity in subjects who consumed a high intake of CHO is that when CHO consumptions exceeds the dietary recommendations, energy expenditure is increased and lipogenesis remains low in non-obese subjects (Maillard *et al*. 2000).

A significant association was observed between fat intake (≥35% of Energy intake) and adiposity in children (OR=2.876; CI=1.249-6.619). This finding is supported by Robertson *et al* (1999) and McGloin *et al* (2002) who reported higher adiposity in children who had higher intakes of fat. Evidence suggests that high fat foods are less satiating and are of high energy density which could lead to a passive increase in energy intake (McGloin *et al*. 2002; Koletzko *et al.* 2002). Our finding of a positive and significant association between fat intake and overweight and obesity in children is in disagreement with other studies that failed to find an association (Elliott *et al*. 2011 and Davies PSW 1997). Studies that failed to report an association between fat intake and obesity may be due to the fact that fatty foods are underreported by people,

whereas low fat foods are usually over reported.

When studying food groups, the contribution of "fruits and fresh juices" to daily energy intake was significantly higher among normal weight children as compared to their obese counterparts. It has been proposed that fruits may be protective against adiposity (Ledoux *et al*. 2011) due to the satiating effect of fiber resulting in the consumption of fewer calories and the displacement of energy-dense foods (Rolls *et al*. 2004).

Even though several previous studies have shown a positive association of sweetened beverages, fast foods and sweets intake with childhood overweight and obesity (Ariza *et al*. 2004; Bowman *et al*. (2004); DeBoer *et al*. 2013; Kosova *et al*. 2013; Kleiser *et al*. 2009), these associations did not reach significance in the present study. This may be due to the fact that fast food consumers may not exceed their caloric requirements throughout the day and thus maintain their weight (Poti *et al*. 2014). Another reason is the low prevalence of obesity in our study sample. As for intake of nuts, obese children had lower intake (0.0±0.0) as compared to normal children (1.4±4.8). Although nuts are rich in fat, they are a good source of protein and are low in trans and saturated fat that have a strong association with the risk of weight gain (Matthews *et al*. 2011). Peanuts were linked to suppression of hunger and negatively influenced subsequent food intake (Matthews *et al*. 2011) (Palcic Moreno *et al*. 2013).

Apart from the associations between dietary factors and the risk of preschool overweight and obesity, this study's findings have highlighted specific nutrient inadequacies in this population group. The majority of preschoolers aged 2-3 years old were found to have low intakes of fiber, linolenic acid, copper and Vitamin D which compromise their nutrient status. These findings are in parallel with several studies conducted among children around the world (Champagne *et al*. 2004 and Biro *et al*.

2007). Newby (2003) showed that the total daily fiber intake among preschoolers in North Dakota significantly declined from 1977 to 1988. Also, inadequacy of fiber intake was observed by Gharib and Rasheed (2011) in Bahrain and Galloway (2007) in Ontario. The low intake of fiber could be due to low consumption of fruits, vegetables, legumes and whole grains by the study population. The inadequate intake of linolenic acid (mean intake 0.2±0.5 g/d) is in agreement with Madden *et al.* (2009) that showed that almost 40% of children, aged 2-8 years old, didn't have adequate intake of linolenic acid. Vitamin D inadequacy could be due to the fact that few foods naturally contain vitamin D such as oily fish and cod liver oil (Holick and Chen 2008) and fortified foods are scarce in Lebanon. The Institute of Medicine recommended that all children require 200 IU of vitamin D per day. Interestingly, calcium and iodine intake were also low in 4-5 year old children. This is in agreement with Fleming and Heimbach (1994) were a large proportion of the US population was found to consume less calcium than the RDA. Low intakes of calcium could be due to low intake of dairy products which are being replaced by sugar sweetened beverages (Huang *et al*. 2005).

In our study, few study participants had low intake of zinc. It was shown that the intake was higher among obese children (8.7±6.6) as compared to normal children (6.2±3.6). This is in agreement with the US where most preschool children had dietary zinc intakes that exceeded the DRI (Arsenault and Brown 2003).The high intake of zinc does not seem to pose a health problem, but if the intake continues to increase, it may become excessive and toxic (Arsenault and Brown 2003).

F. Association between Overweight and Maternal Characteristics among 2-5 Year Old Lebanese Children

In the present study, there was a significant positive correlation between

mother's BMI and her child's BMI (r=0.134). Though not significant, higher odds of overweight and obesity were found for children whose mothers were obese (1.441 (0.746-2.785)). This finding corroborates with studies that highlight the importance of genetic factors in modulating obesity risk (Danielzik *et al*. 2004). A study by Lin *et al* 2004 showed that among school aged children in the US, mother's BMI were significantly correlated with the child's BMI. Furthermore, a recent study reported that parental obesity was linked to a 3 fold increase in the odds of overweight among Lebanese children and adolescents (Nasreddine *et al*. 2014).

Interestingly and in agreement with Oliveria *et al*. (1992) and Vereecken *et al*. (2010), preschooler's dietary intakes were significantly correlated with maternal nutrient intakes. This highlights the role of maternal diet in influencing child's diet and food choices. Parents must be guided to improve their own diets in order to maintain a healthy diet for their children. Research specifies that parental modeling and parental control are important factors in influencing a child's eating behavior (Dickens and Ogden 2014).

G. Strengths and Limitations

The findings of this study must be considered in light of the following limitations. The cross-sectional design of this study prevents us from drawing causalities in the associations between the different factors studied and overweight and obesity among preschoolers. A cohort study on obesity in children might be more helpful in determining and understating the etiology of pediatric obesity. In addition, a recall bias might have resulted from the study since data on children were collected from mothers and under-reporting/over-reporting might have taken place. It should be noted that only one 24-hr recall was collected in this study, which may not be

representative of the usual diet of the study sample. A 24-hr recall has several drawbacks such as day to day variation in diet and reliance on memory (Livingstone and Robson 2000). However, it may estimate accurately energy intake at the population level (Livingstone and Robson 2000). In this study, the recalls were taken by nutritionists who were trained extensively prior to data collection in order to decrease interviewer errors. In addition, inter-observer error was minimized in anthropometric measurement since nutritionists were well trained.

This study is the first to address prevalence of overweight and obesity and its risk factors among 2 to 5 year old children in Lebanon. The strength of this study relies on its national representative and the use of standardized international guidelines in dietary and anthropometric assessment as well as in defining overweight and obesity in preschool children which allowed us to compare with studies conducted in other countries. Furthermore, dietary intake of children was compared to the international guideline (DRI) in which we were able to have an idea of nutritional status of children aged between 2 to 5 years old.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

The prevalence of overweight and obesity among children increased in the past few decades. The etiology behind this increase remains unknown and complex. Lebanon is one of the countries undergoing the nutrition transition, thus children and adolescents are the most important age group that suffers from the adoption of western lifestyle (characterized by TV viewing and reliance on fast food) all of which are predictors of obesity (Livingstone and Robson 2000). This study showed that specific socioeconomic, lifestyle and dietary factors may increase the risk of overweight and obesity among children. High socioeconomic status, TV viewing, high fat intake were the major predictors of adiposity among 2 to 5 year old Lebanese children. This raises questions on the implications and consequences of obesity in children since pediatric adiposity is associated with dyslipidemia, diabetes, hypertension and psychosocial problems (Ebbeling *et al*. 2002). This study evaluated the nutritional status of preschool children by comparing their nutrient intake with the DRIs. Lebanese children's diet was deficient in linolenic acid, fiber, copper and vitamin D. Finally, this pinpoints the importance of preventing obesity in young children and the early identification of children that are 'at risk of obesity' is much important in the early preventative strategies.

Thus, behavioral strategies and modification in the home environment are needed in order to modulate the child's dietary habits. Environmental support and system level approaches across all segments of the society are needed to achieve dietary changes (Hoelscher *et al*. 2013). Consequently, this will decrease the prevalence of

obesity and will ensure a healthy lifestyle early in life. Accordingly, recommendations aiming at decreasing pediatric obesity in Lebanon include educating parents (particularly mothers) about the seriousness of pediatric obesity and instructing them on introducing healthy eating practices. Behavioral strategies and family-focused interventions are needed to introduce healthy dietary habits and lifestyle early in life (Hoelscher *et al*. 2013). Also, a nutrition educational campaign should be developed in Lebanon in order to adopt healthy dietary practices and ensure that all children are maintaining a healthy weight. Therefore, this study represents a guide for further research since it focused on the major predictors of adiposity in children.

This study highlights the importance of promoting healthy eating behaviors among children and their parents and sheds the light on the strategies that must be implemented regarding the obesity epidemic among children in Lebanon.

APPENDIX I

ARABIC QUESTIONNAIRE

كلّية العلوم الزراعيّة والغذائيّة
قسم التغذية وعلوم الغذاء

برنامج تغذوي مبني على أدلّة للأمّهات، الرّضّع، والأطفال

(الجزء ٢ من مشروع التغذية والصحة المبكرة في الحياة في لبنان ELNAHL)

إستبيان ٢: ٢-٥ سنوات

٢٠١٢

جدول المحتويات

الملاحظات

م: ملاحظة للشّخص الذّي ينفّذ المقابلة

إ: إقرأ الجملة بالإضافة إل السّؤال للأم

برنامج تغذية للأمهات، الرّضع والأطفال مُستند على أدلّة

إستبيان 2: 2-5 سنوات

رقم بطاقة الهويّة:..... **إسم المُقابِل:**.....

التاريخ:..... **النهار:**.....

المنطقة:.....

الخصائص الدّيمغرافيّة للأسرة

الخلفيّة الإجتماعيّة والدّيمغرافيّة

إ: يضمّ هذا القسم أسئلة عامّة تتعلّق بكِ وبعائلتك.

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

2. ما هو وضعك العائلي (الحالة الإجتماعيّة)؟
   a. متزوّجة (يرجى تحديد العمر عند الزّواج): _____ سنة
   b. منفصلة عن زوجي
   c. مُطلّقة
   d. أرملة

3. ما هو أعلى مستوى تعليمي قد حقّقتِه؟
   a. لم ألتحق بالمدرسة
   b. المدرسة الإبتدائيّة
   c. المدرسة المتوسّطة
   d. المدرسة الثانويّة
   e. دبلوم فنّي
   f. الشهادة الجامعيّة

4. هل تخصّصتِ في إحدى المجالات المتعلّقة بالصّحة (الطبّ، علم الأحياء (البيولوجيا)، الصحّة العامّة، الصيدلة، إلخ.)؟
   a. نعم
   b. كلا

5. هل تُهمّكي المجالات المتعلّقة بالصّحة (الطبّ، علم الأحياء (البيولوجيا)، الصحّة العامّة، الصيدلة، إلخ.)؟
   a. نعم (يرجى إعطاء تفاصيل): _____
   b. كلا

6. هل أنت حاليّاً في عمل مأجور؟
   a. نعم
   b. كلا، يرجى التّوضيح: (م: إنتقل إلى السّؤال رقم 8)
      i. توقّفتُ عن العمل للإهتمام بعائلتي
      ii. غير، يرجى تحديد السّبب: _____

7. ما هي المهنة التي تقومين بها؟ (إ: إقرأ الخيارات)
   a. موظّفة، دوام كامل
   b. موظّفة، دوام جزئي
   c. أعمل لحسابي الخاص (يرجى تحديد المجال):_____

8. ما هو أعلى مستوى تعليمي قد حقّقه زوجكِ؟ (م: إنتقل إلى السؤال رقم 10 إذا كانت الأم غير متزوجة، مطلّقة، أو منفصلة عن زوجها)
   a. لم يلتحق بالمدرسة
   b. المدرسة الإبتدائيّة
   c. المدرسة المتوسّطة
   d. المدرسة الثانوية
   e. دبلوم فنّي
   f. الشهادة الجامعية

9. ما نوع العمل الذي يفعله زوجكِ؟
   a. لا يعمل
   b. موظّف بدوام كامل
   c. موظّف بدوام جزئي
   d. يعمل لحسابه الخاصّ، (يرجى تحديد المجال):_____

10.كم هي عدد الغرف في منزلك (بإستثناء المطبخ، الحمام، الكاراج، أو الشرفات (البلكون) المفتوحة)؟_____

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

12. ما هو الدّخل الشّهري لأسرتك (بالليرة اللبنانيّة): (م: إقرأ الخيارات)

a. أقلّ من 600,000
b. 600,001- 999,999
c. 1,000,000- 1,499,000
d. 1,500,000- 1,999,000
e. 2,000,000- 2,499,000
f. 2,500,000- 3,000,000
g. أكثر من 3,000,000

13.كم هي عدد السيارات التي تملكونها؟ _____

14.هل تملكون (أنت و/ أو زوجك) المنزل الذي تعيشين فيه خالياً؟ (م: هذا السؤال لا يستفسر خصّصيصاً عمّا إذا كانت الأم هي مالكة المنزل)

a. نعم
b. كلا

إ: تهدف الأسئلة التّالية إلى جمع المعلومات عن جميع أطفالك.

15. عدّدي أولادك مع تحديد العمر(بالأشهر)، 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	بلد الولادة	العمر (بالأشهُر)	المدرسة		غير	
			خاصة	رسمية	الحضانة	المنزل
مثال 1	*مثال* لبنان	*مثال* ٣٦	*مثال* X			
~~مثال~~						

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

معلومات عامة عن طفلكِ

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

16.ما هو جنس طفلكِ؟

a. ذكر
b. أنثى

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

18. من الجدول 1، يرجى تحديد الولد الذي نتكلم عنه/ها:

a. رقم الولد: _____
b. تاريخ ميلاده/ها بالأشهر: _____
c. طريقة الولادة: _____ (م: ولادة طبيعيّة أو قيصريّة)

19. كم كان وزنه\ها عند الولادة؟ _____كلغ

20. كم كان طوله\ها عند الولادة؟ _____سنتم

21. عندما لا يكُن طفلك مريضاً، ما هي عدد المرّات التي هل تُخضعينه للمعاينة الطبيّة العاديّة ؟
   a. أبداً
   b. مرّة واحدة في السنة
   c. مرّتين في السنة
   d. أكثر من ثلاث مرات في السنة

22. هل قمتِ بإرضاع طفلكِ رضاعة طبيعيّة؟
   a. نعم
      i. مدّة الرّضاعة الطّبيعيّة: _____(بالأشهر)
      ii. مدّة الرّضاعة الطّبيعيّة المُطلقة: _____(بالأشهر)
   b. كلا (م: الرّجاء الإنتقال إلى السؤال 25)

23. لماذا اخترتِ الرّضاعة الطبيعيّة؟ (م: اختاري كلّ ما ينطبق عليكِ)
   a. فوائد صحيّة لنفسي
   b. فوائد صحيّة لطفلي
   c. شجّعتني تجاربي السابقة في الرّضاعة الطبيعيّة
   d. إرتفاع كلفة حليب البودرة للأطفال
   e. نصيحة الطبيب
   f. نصيحة العائلة
   g. كل الخيارات الواردة أعلاه
   h. أسباب أخرى (يُرجى التّحديد): _____

24. لماذا توقفت عن إرضاع طفلك من الثّدي؟ (م: اختاري كلّ ما ينطبق). (الجدول 2).
الجدول 2. الأسباب لوقف الرّضاعة الطّبيعيّة

الأسباب الرّئيسيّة	نعم	كلا
a. الإحراج		
b. الألم أو الإزعاج (من إلتهاب الثّدي مثلاً)		
c. التعب والإرهاق		
d. الحاجة الى المساعدة في تغذية طفلي		
e. قلّة النوم		
f. قلّة الأماكن العامّة التي تُتيح الإرضاع		
g. عدم وجود دعم من زوجي		
h. عدم وجود دعم من العائلة		
i. عدم وجود دعم من الأصدقاء		
j. التشجيع على استخدام حليب البودرة من قِبل العاملين في المستشفى		

(الأطبّاء، مقدّمي الرّعاية الصّحيّة، والممرّضات)		
k. مشاكل في إنتاج الحليب		
l. مشاكل طبيّة (ولادة قيصرية، سكّري، الخ.)		
m. لا تحبّين الإرضاع من الثّدي		
n. لم يقبل الطّفلُ الثّدي		
o. كنتِ مريضة		
p. كان عليكِ أن تعملي		
q. حملتِ ثانيةً		
r. حليب الثّدي غير كافٍ لاشباع طفلي		
s. غير، يُرجى التّحديد: _____		

25. يرجى تحديد الأسباب الرّئيسيّة لعدم ممارسة الرّضاعة الطّبيعيّة مع طفلك. (الجدول 3).

الجدول 3. الأسباب لعدم ممارسة الرّضاعة الطّبيعيّة

الأسباب الرّئيسيّة	نعم	كلا
a. الإحراج		
b. الألم أو الإزعاج (من إلتهاب الثّدي مثلاً)		
c. التعب والإرهاق		
d. الحاجة الى المساعدة في تغذية طفلي		
e. قلّة النوم		
f. قلّة الأماكن العامّة التي تُتيح الإرضاع		
g. عدم وجود دعم من زوجي		
h. عدم وجود دعم من العائلة		
i. عدم وجود دعم من الأصدقاء		
j. التشجيع على استخدام حليب البودرة من قِبل العاملين في المستشفى (الأطبّاء، مقدّمي الرّعاية الصّحيّة، والممرّضات)		
k. مشاكل في إنتاج الحليب		
l. مشاكل طبيّة (ولادة قيصرية، سكّري، الخ.)		
m. لا تحبّين الإرضاع من الثّدي		
n. لم يقبل الطّفلُ الثّدي		
o. كنتِ مريضة		
p. كان عليكِ أن تعملي		
q. حملتِ ثانيةً		
r. حليب الثّدي غير كافٍ لاشباع طفلي		
s. غير، يُرجى التّحديد: _____		

26. متى قمتِ لأول مرّة بادخال الأطعمة الصلبة، الشبه صلبة، أو الطرية (غير الحليب) على غذاء طفلك؟
عمر الطفل:_____(بالأشهر)

27. ما كان أوّل طعام صلب قدّمته لطفلكِ؟ _____

28. من أثّر على قراركِ بإدخال الأطعمة الصّلبة إلى نظام طفلكِ الغذائي؟ (م: اختاري كلّ ما ينطبق)

a. زوجكِ
b. الطبيب
c. الأصدقاء
d. لا أحد، قرار شخصي
e. أفراد العائلة (يُرجى التّحديد): _____
f. وسائل الإعلام
g. غير (يُرجى التّحديد): _____

المعرفة الغذائيّة

29. ما هو مصدر المعلومات الغذائيّة التي تتعلّق بكِ وبطفلك؟ (م: اختاري كل ما ينطبق)

a. الزوج
b. الطبيب
c. أخصّائي التغذية
d. الأصدقاء والجيران
e. لا أحد، قرار شخصي
f. أفراد العائلة (يُرجى التحديد): _____
g. المجلاّت
h. الإنترنت
i. وسائل الإعلام
j. كل الخيارات الواردة اعلاه
k. غير (يُرجى التحديد): _____

30. أذكري عدد الحصص لكلّ من المجموعات الغذائيّة التالية التي تعتقدين أنه يجب أن يستهلكها الطفل كلّ يوم (الجدول 4).

الجدول 4. نظرة عامة على معرفة الأم بعدد الحصص من المجموعات الغذائيّة الرئيسيّة الموصى بإستهلاكها من قبل الطفل

المجموعة الغذائيّة	عدد الحصص الموصى بها (في اليوم)
الفواكه	
الخضار	
الخبز والحبوب	
اللّحوم (اللّحوم الحمراء، الأسماك، الدجاج)	
لحوم الأعضاء (الكبد، الكلى، القلب)	
البقول (الحمص، العدس، الفاصوليا) والمكسّرات	
الحليب ومشتقّاته (الحليب، اللّبن، الجبنة، اللّبنة)	
الحلويات	

م: ينبغي إعطاء أمثلة عن الحصص المتعلّقة بالأطفال (2-5 سنوات).

وجبات الطعام العائليّة وإعدادها

أنماط وجبات الطّعام- الأم

31. هل تتناولين الإفطار كلّ يوم؟
    a. نعم
    b. كلا

32. كم وجبة طعام تتناولين في اليوم من أصل وجبات الطعام الرئيسيّة الثلاث؟
    _____ وجبة/وجبات في اليوم

المساعدة في التّغذية

33. هل لديكِ مساعِدة في المنزل؟
    a. نعم
    b. كلا (م: إنتقلِ إلى السؤال رقم 35)

34. الواجبات الرئيسيّة التي تقوم بها المساعدة والتي لها علاقة مباشرة بطفلك تنطوي على: (م: الرجاء وضع علامة على كلّ ما ينطبق)
    a. التنظيف
    b. إطعام الطفل
    c. وضع الطفل في السرير للنّوم
    d. اللعب مع الطفل

35. في العادة، تقع مسؤولية إطعام (تغذية) طفلكِ:
    a. عليك أنتِ
    b. على زوجك
    c. على والدَيكِ
    d. على والدي زوجكِ
    e. على مساعدتكِ
    f. غير، يُرجى التّحديد _____

إعداد الوجبات

36. من يُعِدُّ معظم الوجبات في منزلكِ؟
    a. أنا
    b. زوجي
    c. أهلي
    d. أهل زوجي
    e. مساعدتي
    f. غير، يُرجى التحديد: _____

37. كم مرّة في الأسبوع تقومين أنت وعائلتك:
    a. بشراء الوجبات الجاهزة (الوجبات السّريعة، السّلطة الجاهزة ، المناقيش، إلخ.)_____
    b. بتناول الطّعام في المطاعم _____

طرق الطهي

38. كم مرّة في الأسبوع تستعملين الدّهون/ الزّيوت التالية في الطّبخ:
    a. زبدة _____
    b. المارجرين _____

c. السمن (النباتي أو الحيواني) _____
d. زيت النخيل/ زيت جوز الهند_____
e. زيت الزيتون _____
f. زيت الكانولا _____
g. زيوت نباتيّة أخرى _____

السلوك الغذائي للطّفل

التفاعلات الإجتماعية

39. هل تستمرّين في إطعام طفلكِ إلى أن يستهلك كلّ ما في الصّحن؟
a. نعم
b. كلا

40. متى تتوقّفين عن إطعام طفلكِ؟
a. ما من بقايا طعام في الطّبق
b. يُبطِىء الطّفل الأكل
c. يُبدي الطفل بوادر الرّفض
d. بُكاء الطفل
e. عدم توفّر المزيد من الطّعام
f. غير، يُرجى التّحديد: _____

41. هل تسمحين لطفلكِ أن يتناول الطّعام وحده؟
a. نعم
b. كلا

42. كيف تصفين سلوك طفلك الغذائي من خلال الجدول التالي؟ (الجدول 5).

الجدول 5: محددات السلوك الغذائي للأطفال

الإستجابة للشبع	أبداً (0)	أحياناً (1)	دائماً (2)
1. يتمتع طفلي بشهية كبيرة			
2. يترك طفلي بعض الطعام في طبقه في نهاية وجبة الطعام			
3. لا يمكن لطفلي أن يأكل وجبة إذا كان قد تناول قبلها وجبة خفيفة			
الإستجابة لإشارات الأكل\ الأكل فوق الشّبع			
4. طفلي يطلب الطعام دائماً			
5. إذا أتيحت لطفلي الفرصة، هناك دائما طعام في فمه			
6. إذا سمح لطفلي، يأكل كثيراً			
7. حتّى وإن كان طفلي يشعر بالشبع، يجد دائما مكانا لطعامه المفضّل			
الأكل العاطفي			
8. يتناول طفلي كميات أقلّ من الطعام عندما يكون منزعجاً			
9. يتناول طفلي كميات أقلّ من الطعام عندما يكون مُتعَباً			
10.يتناول طفلي كميات أكبر من الطعام عندما يكون قلِقاً			
11.يتناول طفلي كميات أكبر من الطعام عندما لا يكون لديه شيء آخر يقوم به			
الإهتمام العام بتناول الطعام			
12.يتمتّع طفلي بالأكل			
13.يحبّ طفلي الكل			
14.طفلي يهتمّ بالطعام			
15.ينتظر طفلي وجبات الطعام بحماس			
16.إذا أتيحت لطفلي الفرصة، يتناول دائماً الشراب			
السرعة في تناول الطعام			
17.يأكل طفلي ببطء			
18.يحتاج طفلي إلى أكثر من 30 دقيقة للإنتهاء من تناول وجبة الطعام			
طباع الطفل فيما يتعلّق بالأطعمة			
19.يتمتّع طفلي بتذوّق أطعمة جديدة			
20.يتمتّع طفلي بتناول مجموعة متنوّعة من الأطعمة			
21.يحبّ طفلي تذوّق أطعمة لم يتذوّقها من قبل			
22.يرفض طفلي الأطعمة الجديدة في البداية			
23.يقرّر طفلي أنّه لا يحبّ الطعام حتّى من دون تذوّقه			
24.يصعب إرضاء طفلي بوجبات الطعام			

الممارسات الغذائيّة

الممارسات الغذائيّة الحالية

43. هل يتناول طفلك حالياً حليب البودرة الخاص بالأطفل؟
   a. نعم، _____(قنينة/اليوم) (يرجى تحديد مقدار القنينة بالملل)
   b. كلا

44. ما هي الكمية التي يتناولها طفلكِ يوميا من المنتجات التالية:
   a. حليب البقر (كامل الدسم) _____(أكواب/اليوم)
   b. حليب البقر (مخفّض الدّسم، 2%) _____(أكواب/اليوم)
   c. حليب البقر (قليل الدسم، 1%) _____(أكواب/اليوم)

45. هل تُضيفين شيئاً إلى الحليب؟
   a. نعم
   b. كلا (م: الرّجاء الإنتقال إلى السّؤال 47)

46. يُرجى تحديد أي من المواد الغذائيّة الواردة أدناه تقومين بإضافتها إلى الحليب:
   a. حبوب الافطار الخاصة بالأطفال (سيريلاك cérélac، بليدين blédine، الخ.)
   b. السكّر
   c. بودرة الشوكولا
   d. العسل
   e. غير، يُرجى التحديد: _____

بيئة الطّعام

47. كم عدد المرّات في اليوم، الأسبوع، أو الشّهر، يتّبع طفلكِ السّلوكيّات الغذائيّة التالية؟ (الجدول 6).

الجدول 6. وتيرة السلوك الغذائي للطّفل في بيئة الطّعام

السلوك الغذائي	عدد المرات			
	في اليوم	في الأسبوع	في الشهر	أبداً
يتناول وجبة الإفطار				
يحمل معه أثناء النّهار قنينة المياه الخاصّة به				
يتناول العشاء أمام التلفزيون				
يتناول الوجبات الخفيفة أمام التلفزيون				

يتناول الوجبات السّريعة (برجر كينغ، ماكدونالد، KFC، مناقيش، الخ)				
يتناول الطعام في المطاعم (اللّبنانيّ، الإيطالي، الياباني، الصّيني، إلخ.)				
يأكل وجبة متوازنة				
يتناول الوجبة الرّئيسيّة مع العائلة عندما يكون في المنزل				
يتناول الوجبة الرّئيسيّة نفسها التي تتناولها العائلة				

48. كم وجبة من الوجبات الثلاث الأساسيّة يتناول طفلك يومياً؟

_____ وجبات في اليوم

إستهلاك الوجبات الخفيفة والمشروبات

49. كم عدد المرّات (في الأسبوع أو في الشّهر) يستهلك طفلكِ أي من الوجبات الخفيفة المذكورة أدناه (الجدول 7)؟ (م: إقرأ جميع الخيارات ودوّن وتيرة الإستهلاك)

الجدول 7: وتيرة استهلاك الوجبات الخفيفة والمشروبات من قبل الأطفال

المواد الغذائيّة	وتيرة الإستهلاك		
	في الأسبوع	في الشّهر	أبداً
المواد الغذائية الغير أساسيّة			
رقائق البطاطس			
شوكولا			
بون بون			
البسكويت (رقائق الشوكولا، أوريو، الخ.)			
الآيس كريم، بوظة على ثلج			
بطاطا مقلية			
هوت دوغ			
همبرغر			
بيتزا			
كيك، كيك المافين، الكابكيك			
البانكيك			
دونات			
حبوب الإفطار المحلاة			
المشروبات المحلاة			
عصير الفاكهة 100 % طبيعي (بالإضافة إلى العصير			

			المُحضّر في المنزل)
			عصير الخضار 100% طبيعي (بالإضافة إلى العصير المُحضّر في المنزل مثل عصير البندورة والجزر،الخ.)
			عصير الفواكه (عصير الفواكه المُحَلّى، المشروبات المُنكّهة بالفواكه- طبيعية أو اصطناعية أو مع بعض الفاكهة)
			المشروبات الغازية العادية (المحلاة)
			المشروبات الدايت = المشروبات الغازية الدايت، شاي أو مشروبات غازية محلاة بمحلّي
			الحليب المحلّى (م: أعطي مثالاً)
			كامل الدسم
			مُخَفّض الدّسم

كمية الأطعمة المُستهلكة من المجموعات الغذائيّة الرّئيسيّة

50.أذكري عدد الحصص لكل من المجموعات الغذائيّة التالية التي يتم استهلاكها من قبل طفلك في اليوم، الأسبوع، أو الشهر (الجدول 8)

الجدول 8: نظرة عامة على إستهلاك الطفل للمجموعات الغذائيّة الرئيسيّة

المجموعة الغذائيّة	الحصص ووتيرة الاستهلاك			
	في اليوم	في الأسبوع	في الشهر	أبداً
الفواكه				
الخضار				
الخبز والحبوب				
اللّحوم (اللّحوم الحمراء، السمك، الدّجاج)				
لحوم الأعضاء (الكبد، الكِلى، القلب، الخ.)				
البقول (الفاصوليا، العدس، الحمّص، إلخ.)				
مثال: المكسّرات (المملّحة/ الغير مملّحة)	*مثال:* 3			
المكسّرات (المملّحة/ الغير مملّحة)				
الحليب ومنتجاته (الحليب، اللّبن، الجبنة، اللّبنة)				
الحلويات				

م: عند تواجد خيارات بين قوسين، يُرجى تحويق الخيارات المُستهلكة. أنظر المثال أعلاه.

51.هل يتناول طفلكِ المكمّلات الغذائيّة (الفيتامينات والمعادن)؟

a. كلا

b. نعم

i. الفيتامينات المتعدّدة _____ (يرجى تحديد الإسم والكميّة في اليوم)

ii. المعادن _____(يرجى تحديد الإسم والكميّة في اليوم)

الأمّ

52. الوزن (كلغ).....
53. الطول (سم).....
54. محيط الخصر (سم).....

الطفل

55. "لقد قيل لي أن وزن طفلي هو ... "
a. أعلى بكثير من المعدل الطبيعي
b. أعلى من المعدّل الطبيعي
c. طبيعي
d. اقلّ من المعدّل الطبيعي
e. اقلّ بكثير من المعدّل الطبيعي

56."أشعر أنّ وزن طفلي هو... " (Manios et al. 2009)
a. أعلى بكثير من المعدل الطبيعي
b. أعلى من المعدّل الطبيعي
c. طبيعي
d. اقلّ من المعدّل الطبيعي
e. اقلّ بكثير من المعدّل الطبيعي

57. الوزن الحالي (غ) .....
58. الطول الحالي (سم) .....
59. محيط منتصف الجزء الأعلى من الذّراع (سم).....

المأخوذ الغذائي

المأخوذ الغذائي على مدى 24 ساعة (الطفل)

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

الوقت	الطعام	الكمية	طريقة التحضير

هل هذا هو النّمط الغذائي المُعتاد لطفلك؟

a. نعم
b. كلا

إذا أجبتِ بكلا، يرجى ذكر السبب: .....

المأخوذ الغذائي على مدى 24 ساعة (الأمّ)

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

الوقت	الطعام	الكمية	طريقة التحضير

هل هذا هو نمطكِ الغذائي الإعتيادي؟

a. نعم
b. كلا

إذا أجبتِ بكلا، يرجى ذكر السبب:.....

توقيت نهاية الإستمارة: _____

لمزيد من المعلومات، يُرجى الاتصال بمن يلي:

الباحثون الرّئيسيون:

الدكتورة نهلا حولا، كلية العلوم الزراعية والغذائيّة، الجامعة الأمريكية في بيروت

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

الدكتورة لارا نصر الدين، كلية العلوم الزراعية والغذائيّة ، الجامعة الأمريكية في بيروت

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

الباحثون المساعدون:

الدكتورة فرح نجا، كلية العلوم الزراعية والغذائيّة ، الجامعة الأمريكية في بيروت

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

الدكتورة دينا زبيان، كلية العلوم الزراعية والغذائيّة، الجامعة الأمريكية في بيروت

هاتف: 961-1-350000، تحويلة (4429)، **البريد الإلكتروني:** dz12@aub.edu.lb

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APPENDIX II

CONSENT FORM

عنوان الدّراسة البحثية: برنامج تغذية للرُّضّع، الأطفال وأمّهاتهم.
عنصر البحث: ثنائي مكوّن من أمهاتّ وأطفالهنّ الذين يتراوح أعمارهم بين 0 و5 سنوات

رقم البروتوكول:

مرحباً، اسمي _____ ، وأنا عضو في فريق البحث في الجامعة الأمريكية في بيروت.
نحن نُجري دراسة بحثيّة للتحقّق من الحالة الغذائية للأطفال (دون الخامسة من العمر) وأمهاتهم في لبنان ؛ بما في ذلك انماط التغذية والحياة. تشمل مشاركتكم في هذه الدّراسة الإجابة على بعض الأسئلة من خلال مقابلة ستأخذ 60 دقيقة من وقتكم. يحقّ لكم رفض المشاركة في هذه الدّراسة والإجابة عن أسئلة معيّنة. يُرجى ان تفهموا أنّ مشاركتكم طوعية ويحقّ لكم رفض المشاركة أو التوقّف عن المشاركة في اي وقت من دون عقوبة. جميع المعلومات التي سأحصل عليها منكم ستتمّ معالجتها بسرّيّة تامّة وسيتمّ خزنها تحت القفل والمفتاح.

هل ترغبين في التّفكير بالمشاركة في هذه الدّراسة؟ نعم\ كلا
إذا أجبت بالنّفي، هل يمكن أن تخبرنا لماذا؟ _____

لتكوني مؤهّله للمشاركة في هذه الدّراسة، سنطرح بضعة الأسئله عليك.

الأسئلة	نعم	كلا	تعليقات (ملاحظات)
هل جنسيتك لبنانية؟			
هل لديك طفل يقلّ عمره عن خمس سنوات؟			
هل كان عمر طفلك عند الولادة ≤ 37 أسبوع؟			
هل يعاني طفلك من مشاكل صحية قد تؤثّر على نموّه الطبيعي؟ (مضاعفات الجهاز الهضمي، أمراض الجهاز التنفّسي، أخطاء وِراثية، تشوّهات أو غيرها)			
هل طفلك موجود في المنزل اليوم؟			
هل تتناولين أدوية قد تتداخل مع أنماط تناول الطّعام أو تكوين الجسم؟			
هل تعانين من امراض مزمنه (السكّري، القلب)			

معلومات الإتّصال

إذا كان لديكِ أي أسئلة او استفسارات حول هذا البحث، يُرجى الإتّصال ب:

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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 حولا- قسم التغذية وعلوم الغذاء، الجامعة الأميركية في بيروت.

الباحثون المساعدون:

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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 يأثّران 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 ومؤلّفة من 1030 أمّ وأطفالهنّ دون سنّ الخامسة (1030 ثنائي مؤلّف من أمّ وطفل) من أسر من المحافظات السّتّة 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 وقتكِ.

سيتمّ طرح أسئلة عليكِ تتعلق بالممارسات الغذائية الخاصة بطفلك (الرضاعة والتغذية 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.

السرّية

إنّ المعلومات التي ستوقرينها 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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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: _____

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 جزنياً	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): _____

APPENDIX III

IOTF BMI-FOR-AGE CUT-OFFS TABLE

Table 4 International cut off points for body mass index for overweight and obesity by sex between 2 and 18 years, defined to pass through body mass index of 25 and 30 kg/m² at age 18, obtained by averaging data from Brazil, Great Britain, Hong Kong, Netherlands, Singapore, and United States

	Body mass index 25 kg/m²		Body mass index 30 kg/m²	
Age (years)	Males	Females	Males	Females
2	18.41	18.02	20.09	19.81
2.5	18.13	17.76	19.80	19.55
3	17.89	17.56	19.57	19.36
3.5	17.69	17.40	19.39	19.23
4	17.55	17.28	19.29	19.15
4.5	17.47	17.19	19.26	19.12
5	17.42	17.15	19.30	19.17
5.5	17.45	17.20	19.47	19.34
6	17.55	17.34	19.78	19.65
6.5	17.71	17.53	20.23	20.08
7	17.92	17.75	20.63	20.51
7.5	18.16	18.03	21.09	21.01
8	18.44	18.35	21.60	21.57
8.5	18.76	18.69	22.17	22.18
9	19.10	19.07	22.77	22.81
9.5	19.46	19.45	23.39	23.46
10	19.84	19.86	24.00	24.11
10.5	20.20	20.29	24.57	24.77
11	20.55	20.74	25.10	25.42
11.5	20.89	21.20	25.58	26.05
12	21.22	21.68	26.02	26.67
12.5	21.56	22.14	26.43	27.24
13	21.91	22.58	26.84	27.76
13.5	22.27	22.98	27.25	28.20
14	22.62	23.34	27.63	28.57
14.5	22.96	23.66	27.98	28.87
15	23.29	23.94	28.30	29.11
15.5	23.60	24.17	28.60	29.29
16	23.90	24.37	28.88	29.43
16.5	24.19	24.54	29.14	29.56
17	24.46	24.70	29.41	29.69
17.5	24.73	24.85	29.70	29.84
18	25	25	30	30

Source: Cole, T.J., Bellizzi, M.C., Flegal, K.M.,…, *et al*. (2000). "Establishing a standard definition for child overweight and obesity worldwide: international survey". *British Medical Association* 320: 1240–1243.

APPENDIX IV

TABLES

Table A1. Reasons behind breastfeeding practices and introduction of semi-solid or solid foods for the infant

Variable	**Total n(%)**	**Normal n(%)**	**Overweight n(%)**	**Obese n(%)**	**P value**
Primary reasons for not breastfeeding					
Problems with milk production	33(66)	29(87.9)	3(9.1)	1(3.0)	0.326
Baby didn't accept the breast	10(20)	9(90.0)	1(10.0)	0(0.0)	0.745
Medical problems	8(16)	7(87.5)	1(12.5)	0(0.0)	0.643
Reasons for breastfeeding					
Health benefits for the baby	442(84.2)	400(90.5)	30(6.8)	12(2.7)	0.936
Health benefits for the mother	146(27.8)	121(82.9)	17(11.6)	8(5.5)	0.003
Doctor's advice	113(21.5)	103(91.2)	8(7.1)	2(1.8)	0.946
Previous breastfeeding experience	79(15.0)	72(91.1)	6(7.6)	1(1.3)	0.896
Others**	100(18.0)	89(89.0)	7(6.7)	4(4.3)	0.855
Primary reasons for stopping breastfeeding					
Problems with milk production	158(33.7)	142(89.9)	11(7.0)	5(3.2)	0.909
Child's age	112(23.9)	101(90.2)	8(7.1)	3(2.7)	0.965
Tiredness and fatigue	66(14.1)	61(92.4)	3(4.5)	2(3.0)	0.763
Insufficient supply of milk to adequately satisfy the baby	110(23.5)	100(90.9)	6(5.5)	4(3.6)	0.712
Need help with feeding her baby	64(13.5)	60(93.8)	2(3.1)	2(3.1)	0.478
Lack of sleep	36(7.7)	33(91.7)	0(0.0)	3(8.3)	0.031
Promotion of infant formula feeding at hospital/clinic	9(1.9)	7(77.8)	0(0.0)	2(22.2)	0.001
I had to work	21(4.5)	16(76.2)	2(9.5)	3(14.3)	0.004
Others***	246(66.5)	221(89.8)	15(6.1)	10(4.1)	0.407
Reasons for introducing solid-food at that time					
Child was old enough	219(41.7)	194(88.6)	19(8.7)	6(2.7)	0.220
Child was still hungry after milk feeds	128 (24.1)	118(92.2)	9(7.0)	1(0.8)	0.306
Tradition in the family	104(19.8)	97(93.3)	5(4.8)	2(1.9)	0.635
Child seemed interested in food	51(9.7)	44(86.3)	4(7.8)	3(5.9)	0.289
Others*	61(11.7)	59(96.7)	2(3.3)	0(0.0)	0.850

*other reasons include: child was sick, child was continuously crying, child was not sleeping through the night, child refused milk feeding, subsequent pregnancy.
** other reasons for breastfeeding include: high formula cost, family advice.
***other reasons include: sense of embarrassment, mother was sick, medical problems, pain when breastfeeding, baby didn't accept the breast, lack of breastfeeding-friendly public places, subsequent pregnancy.

Table A2. Duration of exclusive breastfeeding

Duration of exclusive breastfeeding	**n(%)**
1 month	238(49.6)
2 months	42(8.8)
3 months	43(9.0)
4 months	48(10.0)
5 months	25(5.2)
6 months	56(11.7)
> 6 months	28(5.8)

Table A3. Duration of breastfeeding

Duration of breastfeeding	**n(%)**
1 month	58(12.1)
2 months	50(10.5)
3 months	41(8.6)
4 months	35(7.3)
5 months	15(3.1)
6 months	30(6.3)
> 6 months	249(52.1)

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