Deanship of Graduate Studies

Al-Quds University



Age of complementary feeding introduction in infancy and growth among adolescents residing in Al-Amari refugee camp: A follow up study

Rand Shafeeq Abdulrahman Ramlawi

M. Sc. Thesis

Jerusalem – Palestine

1443-2021

Age of complementary feeding introduction in infancy and growth among adolescents residing in Al-Amari refugee camp: A follow up study

Prepared by:

Rand Shafeeq Abdulrahman Ramlawi

B. Sc. In Nutrition and food processing – Hebron University/ Palestine

Supervisor: Dr. Nuha El-Sharif

A thesis submitted in partial fulfillment of the requirements for the degree of Masters of Public Health/ School of Public Health / Deanship of Graduate Studies / Al-Quds University

1443-2021

Al-Quds University Deanship of graduate studies School of Public Health



Thesis approval

Age of complementary feeding introduction in infancy and growth among adolescents residing in Al-Amari refugee camp: A follow up study

Prepared by: Rand Shafeeq Abdulrahman Ramlawi

Registration No.: 21612999

Supervisor: Dr. Nuha El-Sharif

External examiner

Master's thesis submitted and accepted, Date: 18\12\2021.

The names and signatures of the examining committee members are as follows:

Head of the committee Dr. Nuha El-Sharif

Internal examiner Dr. Hazem Al-Agha Signature

> Dr. Hamzah Al-Zabadi Signature

Signature

Marsen Doha

Jerusalem- Palestine

1443-2021

Dedications:

To:

My great, amazing parents, who support me always and gave me faith,

My favorite person, my husband Malik, who was my strength, you are my everything,

My uncle Dr. Asaad Ramlawi,

My lovely children Bara', Jana and Nawal,

My beloved brothers and sisters,

My dear second family, my husband family,

My family and friends,

My country Palestine,

To all of them, I dedicate this work with love.

Rand Shafeeq Abdulrahman Ramlawi

Declaration

I clarify that this thesis submitted for the degree of master, is the result of my research, except where otherwise acknowledged, and that this study (or any part of the same) has not been submitted for a higher degree to any other university or institution.

Signed

Rand Shafeeq Abdulrahman Ramlawi

Date:12/1/2022.....

Acknowledgments

الحمد لله رب العالمين الذي وفقنى وأعانني على اتمام هذا العمل

As a start, I would like to thank my supervisor, Dr. Nuha El-Sharif, who was always there, available whenever I needed her, for her encouragement, guidance throughout this study.

I would like to thank everyone in the faculty of Public health at Al-Quds University with its entire staff and my colleagues with whom I spent unforgettable moments.

I would like also to thank my family for their support especially my parents, my sisters and brothers, my uncle Dr. Asad Ramlawi for his support throughout my master's degree pursuing, and my husband's family.

Finally, I owe my deepest thanks to my husband Malik for his support, inspiration, and patience throughout my master's degree pursuing.

To all, thank you from the bottom of my heart

Rand Shafeeq Abdulrahman Ramlawi

Contents

Abs	tract	VII
Cha	pter one: Introduction	1
1.1	Background	1
1.2	Study Justifications	3
1.4	Aim	4
1.5	Objectives	4
1.6	Study expected outcomes	4
1.6	Thesis structure	4
Cha	pter two: A literature review	5
2.	1. Introduction	5
2.	2. Prevalence of overweight and obesity among adolescents	5
2.	.3. Socio-demographic and economic status (SES)	8
2.	.4. Complementary feeding (CF)	
2.	.5. Breastfeeding	
2.	.6. Birth weight	16
Cha	pter three: Conceptual framework	
3.	1. Introduction	
3.	2. Study context	
3.	.3. Age of introduction of complementary feeding	
3.	.4. Study conceptual framework (figure 1)	
3.	.5. Definitions	21
3.	.6 BMI at adolescence and socio-demographic and economic factors	
3.	7 BMI at adolescence and lifestyle factors	
3.	.8 BMI at adolescence and breastfeeding	
3.	9 BMI at adolescence and time of introduction of complementary feeding	
3.	10 BMI at adolescence and Birth weight	23
3.	.11 Summary	23
Cha	pter four: study methodology	24
4.	1 Study population	24
4.	.2 Study area	
4.	.3 Study design:	
4.	.4 Study sample:	

4.5 Inclusion and Exclusion criteria	
4.6 Study tools	26
4.7 Questionnaire validation	27
4.8 Questionnaire piloting	
4.9 Field work and Data collection	
4.10 Data analysis:	
4.11 Ethical considerations	
Chapter five: Results	
Part I: Descriptive analysis	
5.1 Socio-demographic and economic characteristics of the respondents	
5.2 Body mass index for age (BMI-for-Age) of participants:	
5.3 Lifestyle factors:	
5.3.2 Nutritional status in adolescence:	
Part II: Univariate analysis	40
5.4 Socio-demographic and economic data of study participants:	40
5.5 Lifestyle factors:	
5.5.2 Nutritional status at adolescence:	44
Chapter six: Discussions, conclusion, and recommendations	54
6.1 Introduction	54
6.2 Summary of the results	54
6.3 Socio-demographic and economic factors	54
6.4 Associations of infancy breastfeeding practices, complementary feeding practice in infancy on adolescence growth:	es and growth
6.5Adolescence lifestyle factors	56
6.6 Limitations and obstacles	57
6.7 Conclusion	58
6.8 Recommendations	58
Reference list:	59
Appendices	64

List of table

Table 2.1: Studies in the world about the prevalence of overweight/obesity among	
adolescents	5
Table 2.2: Studies in Palestine about the epidemiology of overweight and obesity among	
adolescents	7
Table 2.3: Studies in the world for socio-economic factors and adolescence obesity	9
Table 2.4: Studies in the world for the introduction complementary feeding and adolescend	ce
obesity	. 11
Table 2.5: Studies in Palestine for the introduction complementary feeding and adolescence	e
obesity	. 13
Table 2.6: Studies in the world for breastfeeding and adolescent obesity	. 14
Table 2.7: Studies for breastfeeding and adolescence obesity in Palestine	. 15
Table 2.8: Studies in the world for birth weight and adolescent obesity	. 16
Table 2.9: Studies in the world for lifestyle factors and adolescence obesity: physical activ	ity
	. 17
Table 2.10: Studies in the world for lifestyle factors and adolescence obesity: Diet	. 18
Table 2.11: Studies in the world for Health status and adolescence obesity: Hemoglobin le	vel
	. 19
Table 4.1: Characteristics of the missing data	. 25
Table 4.2: Anthropometric indicators to assess child nutrition status: under 5 years	. 27
Table 4.3: Anthropometric indicators to assess child nutrition status: 5-19 years of age	. 27
Table 5.1: description of study participant's Socio-economic and Demographic	
characteristics	. 31
Table 5.2: Breastfeeding and complementary feeding characteristics	. 33
Table 5.3: Nutritional status among the study participants at adolescence	. 35
Table 5.4: factors affecting food habits at adolescence	. 36
Table 5.5: adolescent food habits checklist scores of male and female participants	. 37
Table 5.6: frequency and duration of physical activity among participants at adolescence	. 38
Table 5.7: Surrounding factors effect on physical activity and food choices at adolescence.	. 38
Table 5.8: Smoking status among the study participants	. 39
Table 5.9: Hemoglobin levels of the participants	. 40
Table 5.10: Association between socio-demographic/ economic characteristics and BMI-fe	or-
age at adolescence	. 41
Table 5.11: The association between nutritional factors related to infancy and BMI-for-age	e at
adolescence.	. 43
Table 5.12: Association between nutrition factors at adolescence and BMI-for-age of	
participants	. 45
Table 5.13: Association between supplements intake and BMI-for-age at adolescence	. 46
Table 5.14: association between factors affecting food habits at adolescence and BMI	. 47
Table 5.15: Adolescent food habits checklist scores of participants	. 48

Table 5.16: Association between frequency and duration of physical activity among	
adolescence and their BMI-for-age	48
Table 5.17: Association between surrounding effects on food and physical activity during	
adolescence and their BMI-for-age	49
Table 5.18: Association between smoking and BMI-for-age of participants	50
Table 5.19: Association between health status variables and BMI-for-age of adolescence	51
Table 5.20: Association between health variables related to girls only and BMI-for-age of	
female adolescence	52
Table 5.21: association between Hemoglobin levels and BMI at adolescence	53

List of figures

Figure 3.1: Study conceptual framework	21
Figure 5.1: Body mass index before age 2 years and at adolescence	32
Figure 5.2: Change in BMI between 2 years of age and adolescence	33
Figure 5.3 Iron and vitamin intake at adolescence	35

Abstract

Age of complementary feeding introduction in infancy and growth among adolescents residing in Al-Amari refugee camp: A follow up study

Background: Obesity is becoming a global health issue and a public health challenge; due to the significant increase of obesity rates worldwide especially during adolescence and its relation with non- communicable diseases. Overfeeding during infancy leads to obesity, and studies suggest that nutrition in infancy and childhood may play an important role in adulthood obesity. However, no study in Palestine investigated the association between adolescent obesity and the time of complementary feeding introduction during infancy in Palestine.

Aim & objectives: This study aimed to determine the relationship between age of introduction of complementary foods and overweight/obesity among school children in the early adolescence age in the Al-Amari refugee camp. Its objectives were to determine the associations between socio-demographic and economic characteristics, various lifestyle aspects, birth weight, and breastfeeding with the risk of developing obesity during adolescence.

Study methodology: The study is a follow-up cohort study of 97 adolescents who participated in a previously conducted study 10 years earlier. A structured interview-questionnaire that covers all study objectives was used for data collection. Also, anthropometric measurements (height and weight) and hemoglobin levels were measured for the participants.

Statistical analysis: SPSS version 25 was used for data entry and analysis. Descriptive analyses were done for the collected data at adolescence and infancy. Frequencies means and standard deviations were calculated. For the univariate analysis, chi-square test and t-test were used to study the associations between adolescences' growth indicators and their determinants. Also, diet and infant growth indicators were examined for any association with adolescent growth at a significant p-value of 0.1.

Ethical considerations: The study was approved by Al-Quds University Research ethical committee. Permission to conduct the study was obtained from the UNRWA. Furthermore, participants' parents signed a consent form that confirmed their acceptance to include their children in this study.

Results: Analysis of the study participant's data showed that the range of participant's age was 13-14 years, 57% of them were males, 45% of them have a family income of more than 3000 NIS and 56% of them were overweight/ obese. Only 5.2% who were of normal weight before 2 years of age stayed normal at adolescence and 40% stayed overweight or obese.

However, 50% had a change in their BMI by the time either to become normal weight (38%) or overweight/obesity (16.5%).

The univariate analysis of the study data showed positive associations for overweight/obesity with gender –male-(p-value <0.1), being the first or second child in the family (p-value <0.1), mother education level (p-value <0.1), monthly income (p-value >0.1), eating or drinking after dinner (p-value >0.1) ; being family members the source of nutrition information; buying sandwich or cake from school canteen (p-value >0.1). However, a negative association between overweight/obesity and birth weight of the participants (p-value >0.1), eating or drinking while watching TV (p-value <0.1); satisfying with appearance (p-value <0.1), effect of school curriculum on food consumption and with Hemoglobin level (p-value >0.1). Lower frequency of physical activity is associated with a higher percentage of overweight/obesity (p-value>0.1). Finally, higher frequency of breastfeeding (p-value >0.1) was found to be protective factor against overweight/obesity.

Conclusion: Obesity in adolescence is a predictor for obesity during adulthood. Therefore, adolescents should be directed to maintain normal weight by increasing their awareness of the determinants of obesity. Several factors have been investigated in this study either related to infancy or adolescence. Unfortunately, the small sample size prevented us from obtaining significant results as expected. But, the results showed a trend toward protective effect against overweight/obesity for higher frequency of BF.

العلاقة بين عمر ادخال الأغذية التكميلية في مرحلة الطفولة والنمو لدى المراهقين في مخيم الأمعري للاجئين-رام الله: دراسة متابعة

إعداد: رند شفيق عبد الرحمن رملاوي

إشراف: الدكتورة نهى الشريف

ملخص الدراسة

أصبحت السمنة مشكلة صحية عالمية وتحدي للصحة العامة ؛ بسبب الزيادة الكبيرة في معدلات السمنة في جميع أنحاء العالم خاصة خلال فترة المراهقة بالاضافة الى علاقتها بالأمراض غير المعدية. ان التغذية المفرطة أثناء الطفولة قد تؤدي إلى السمنة، وتشير الدر اسات إلى أن التغذية في مرحلة الرضاعة والطفولة قد تلعب دورًا مهمًا في الاصابة بالسمنة عند البلوغ. ومع ذلك، لم تبحث أي در اسة في فلسطين العلاقة بين السمنة لدى المراهقين و عمر ادخال الأغذية التكميلية خلال مرحلة الطفولة.

هدف الدراسة الرئيسي: تهدف هذه الدراسة الى تحديد العلاقة بين عمر ادخال الاغذية التكميلية للأطفال و زيادة الوزن\ السمنة لدى طلبة المدارس في سن المراهقة المبكرة في مخيم الأمعري للاجئين الفلسطينيين. و تتمثل أهدافها الفرعية في تحديد العلاقة بين العوامل الاجتماعية والديمو غرافية والاقتصادية, العوامل المتعلقة بنمط حياة المراهقين, الوزن عند الولادة والرضاعة الطبيعية مع خطر الاصابة بالسمنة خلال فترة المراهقة.

منهجية الدراسة: هذه الدراسة عبارة عن دراسة تتبع مبنية على دراسة سابقة (حول الرضاعة الطبيعية والاغذية التكميلية). 97 مراهق تم ايجادهم من أصل 199 طفل حيث قام المشاركون في الدراسة بالاجابة على أسئلة الاستبيان المعد خصيصا لأهداف هذه الدراسة عن طريق مقابلتهم جميعا, بالإضافة إلى قياسات الوزن والطول وفحص مستوى الهيموجلوبين.

التحليل الاحصائي: تم ادخال جميع البيانات وتحليلها باستخدام الاصدار 25 من برنامج SPSS-IBM ففي المرحلة الأولى تم حساب التكرارات المتوسط والانحراف المعياري لجميع المتغيرات الخاصة بمرحلتي الطفولة والمراهقة, وقد عرضت البيانات في جداول و أشكال بيانية, أما في المرحلة الثانية فتم فحص العلاقة بين مؤشر كتلة الجسم لدى المراهقين والعوامل المراد دراستها بواسطة فحص العامل المستقل (t-test) وفحص كاي تربيع (Chi-square) بالاضافة الى فحص علاقة مؤشرات النمو للرضع وتغذيتهم مع نموهم في مرحلة المراهقة عند مستوى الدلالة الاحصائية (P<0.1).

الاعتبارات الأخلاقية: قدمت هذه الدراسة للجنة البحث العلمي والدراسات العليا في جامعة القدس. تم الحصول على اذن لاجراء الدراسة من وكالة الأمم المتحدة لإغاثة و تشغيل اللاجئين الفلسطينيين في الشرق الأدنى (الأونروا) بالاضافة الى الحصول على توقيع من أهالي المشاركين على نموذج موافقة أكدوا من خلاله على موافقتهم بانضمام أبنائهم للدراسة بعد ابلاغهم بأهدافها.

النتائج: أظهر تحليل بيانات المشاركين في الدراسة أن عمر المشاركين كان 13-14 سنة، 57٪ منهم من الذكور، 56٪ منهم يعانون زيادة الوزن\ السمنة و 45٪ لديهم دخل عائلي أكثر من 3000 شيكل. 5.2% منهم لديهم اوزان طبيعية قبل عمر السنتين و حافظو على أوزانهم الطبيعية في سن المراهقة, بينما 40% منهم كانوا يعانون من زيادة الوزن\السمنة قبل عمر السنتين واستمروا كذلك في سن المراهقة. بالمقابل, حدث تغير في الوزن لدى 50% منهم فأصبحت أوزانهم طبيعية 38% أو العكس 16.5%.

وقد أظهر التحليل علاقة ايجابية لزيادة الوزن\ السمنة مع الجنس (نكر) (p <0.1), الترتيب في الأسرة (الطفل الأول أو الثاني) (p <0.1), مستوى تعليم الأم (ot p), دخل الأسرة الشهري (ot p), تناول الطعام والمشروبات بعد العشاء (P>0.1), تلقي المعلومات المتعلقة بالتغذية من قبل أفراد الأسرة, بالاضافة الى شراء الأغذية من مقصف المدرسة (P>0.1). بالمقابل, أظهر التحليل علاقة عكسية للأوزان غير الطبيعية مع وزن الطفل عند الولادة (p>0.1), تناول الطعام والشراب أثناء مشاهدة التلفاز (O.1) p), مستوى الرضى عن المظهر الخارجي (O.2) p), تأثير المناهج الدراسية على استهلاك الغذاء بالاضافة الى مستوى الهيموجلوبين (O.2) p). بالاضافة الى ذلك, أظهرت نتائج التحليل أن زيادة تكرار الرضاعة الطبيعية (O.2) يعتبر عامل وقائي ضد زيادة الوزن/ السمنة. وأخيرا, أظهرت النتائج أن قلة ممارسة النشاط البدنى مرتبط بارتفاع نسبة زيادة الوزن والسمنة لدى المراهقين (O.2) p).

الخلاصة: ان زيادة الوزن في مرحلة المراهقة تعتبر مؤشر لزيادة الوزن في الكبر. وبالتالي, يجب أن يتم توجيه المراهقين للحفاظ على أوزانهم ضمن النطاق الطبيعي لحماية أنفسهم من مضاعفات السمنة وذلك يتم من خلال زيادة الوعي لديهم بمخاطر السمنة و مسبباتها. لقد تم في هذه الدراسة البحث في كثير من العوامل المتوقع ارتباطها بالسمنة لدى المراهقين سواء في مرحلة الطفولة أو في مرحلة المراهقة. لسوء الحظ, صغر حجم عينة الدراسة منعتنا من الوصول للنتائج المتوقعه منها ولكن النتائج أظهرت اتجاها نحو تأثير وقائي للرضاعة الطبيعية ضد زيادة الوزن والسمنة في عمر المراهقة.

List of abbreviations

Adolescents food habits checklist
Breast feeding
Body Mass Index
Complementary feeding
Global School-based Student Health Survey
Health Behavior in school-aged children
Non-communicable diseases
Physical activity
Socio-economic status
The United Nations Relief and Works Agency for Palestine Refugee
World health organization

1.1 Background

Due to the increasing rates of significant morbidity and mortality from non- communicable diseases (NCDs), obesity has become an argent global health issue and a public health priority both in low and middle-income countries especially when occurs during childhood and adolescence, which is considered as a predictor for obesity in adulthood.(Pell et al., 2016)

Obesity is a public health challenge and it is considered a serious problem that is global and has been affecting many low- and middle-income countries especially in urban areas. It is considered an epidemic which growing rapidly and its prevalence statistics quickly become outdated in both developed and developing countries. The etiology of childhood obesity is not fully clear but available scientific evidence suggests that it is the outcome of the interaction between biological, behavioral, and psychosocial factors (Al Junaibi et al, 2013).

According to the WHO, from 1975 to 2016 the obesity rates around the world were tripled. And more than 1.9 billion people above 18 years of age were overweight, 650 million of these being obese. Rate of overweight and obesity among children aged 5-19years increased worldwide from 4% in 1975 to 18% in 2016. (Miranda et al., 2019)

Adolescence is defined as the period that begins with the onset of physiologically normal puberty and ends when an adult identity and behavior are accepted. This period of development corresponds roughly to the period between the ages of 10-19 years, which is similar to the world health organization's definition of adolescence. (PMC, 2003)

During adolescence, major physiological and psychological changes take place, which affect their behavior and growth. So adolescence obesity is hypothesized to have a significant impact on both individual's physical and psychological health and it is a predictor of adult obesity and obesity-related metabolic upsets (Rathnayake et al, 2014).

According to the CDC, overweight and obesity among adolescents are defined by body mass index (BMI) which is often referred to as BMI- for-age. In which a child's or a teen's weight status is determined using an age- and sex-specific percentile for BMI rather than the BMI categories used for adults, in which obesity is defined as a BMI at above the 95th percentile for children and teens of the same age and sex. This difference comes from the rapid variation in body composition that occurs according to age and sex in this age group.(CDC, 2018)

In 2004, according to the international obesity task force (IOTF) criteria, it was estimated that approximately 10% of children around the world aged (5-17) years were overweight, and

about (2-3) % were obese, and according to the WHO report for the year 2011, more than 40 million children under five being overweight. Prevalence rates differ according to different regions and countries, which varies from <5% in Africa and parts of Asia to >20% in Europe and >30% in the Americas and some countries in the Middle East. (Sirbu et al., 2015)

Early-onset of obesity during childhood and adolescence causes certain health risks such as hypertension, impaired glucose tolerance, and type 2diabetes, liver disease, obstructive sleep apnea, and coronary heart disease. At the same time, it lowers the quality of life of the obese child and demonstrates more negative self-perceptions and lower perceived cognitive ability which results in increased behavioral problems (Sirbu et al., 2015). So many authorities investigate the problem of overweight and obesity in childhood and found that this problem is multifactorial rather than an imbalance between energy consumed and expended. These factors include genetic disposition, physical inactivity, poor dietary choices, and a toxic environment. (Mota et al., 2008)

So, studying various aspects of the nutritional status of adolescents worldwide is important. Also, it is critical to determine the relative importance of specific obesity related-risk factors to develop effective strategies for obesity prevention. (Mota et al., 2008)

Causes of obesity are very complex involves biological and behavioral risk factors. One of those risk factors investigated by researchers is the type of feeding adopted in the first years of life which is possibly associated with overweight in adolescence and adulthood. So, the time, quality, and quantity of the consumed food in the first years of life are very important and determine child development and have a lifelong effect. (Miranda et al., 2019)

The WHO defines Complementary feeding as the transition from breastfeeding to the family diet and should take place when a baby is both developmentally ready and when breast milk is no longer enough to fulfill the nutritional requirements of the child. (WHO, 2019a)

According to the WHO, adequate infant feeding includes breastfeeding, perfectly for 2 years, excursively for the first six months of life, and the timely introduction of appropriate complementary food which is between 4 and 6 months of age according to the recommendations of The American Academy of Pediatrics, The ESPGHAN Committee on Nutrition and the European Food Safety Authority. (Miranda et al., 2019)

When the baby can sit up and hold his head steady, being able to chew and control the movement of the bolus of food around the mouth and the diminishment of the tongue-thrust reflex, this means that the baby is developmentally ready to receive foods. In addition to other cues such as not sleeping well through the night and watching his parents eat. (Pearce, Taylor, and Langley-evans, 2013)

In developing countries, the early introduction of complementary feeding lowers the duration of breastfeeding and may cause malnutrition and poor growth, which leads to stunting and

wasting during childhood. On the other hand, among developed countries, respiratory tract infections, gestational problems, and increased risk of allergy have been linked to the early introduction of complementary feeding. A study suggests that there may be a hormonal link between the introduction of complementary feeding and subsequent overweight and obesity. This could occur due to the effect of the introduction of complementary foods in increasing the secretion of the ghrelin hormone, which stimulates appetite and increases food consumption and higher body mass index (BMI) in an animal model. (Pearce, Taylor, and Langley-evans, 2013)

Some research shows that there is a relationship between early introduction of complementary foods –before 4 months of age- and overweight in childhood, which may still be later in life. On the other hand, some researchers do not advocate the evidence linking the age of introduction of complementary foods and later obesity (Miranda et al., 2019). Due to these variations in addition to the importance of the appropriate feeding practices for child growth and development and its effects on later life this study will be done.

1.2 Study Justifications

A cross-sectional study conducted on 1013 children that examined the association between timing of complementary feeding introduction with adiposity throughout childhood found that complementary feeding initiated less than 4 months of age was associated with higher adiposity in childhood and persisted into adolescence. (Gingras et al, 2019)

A systematic review was conducted to investigate the relationship between the timing of the introduction of complementary feeding and overweight or obesity during childhood. It reviewed twenty-one studies from different countries around the world. Five studies found that early introduction of complementary foods (before 6 months) was associated with a higher body mass index in childhood.(Pearce, 2013)

1.3 Problem statement

Obesity during childhood and adolescence is a major public health challenge worldwide. So, it is critical to understand the risk factors that contribute to it especially the modifiable ones. (Crichton, 2017)

Overfeeding during infancy leads to obesity. And several studies suggest that early nutrition (infancy and childhood) may play an important role in adulthood obesity. (Tulldahl et al., 1999)

Many studies suggest that earlier introduction of solids (i.e. before 6 months) increased the risk of becoming overweight or obese during childhood or adolescence. (Crichton, 2017)

Several types of research show the role of breastfeeding in the prevention of childhood obesity. But, less attention is given to the optimal timing of introducing solid foods. (Crichton, 2017)

There is no study conducted in Palestine that investigated these associations. This study is a follow-up study for a previous study that was done at Al-Amari refugee camp which assesses the practices of breastfeeding and complementary feeding among children less than 2 years of age. (Qleibo, 2008)

1.4 Aim

To determine the relationship between the age of introduction of complementary foods and overweight/ obesity among school-children in the early adolescent in Al-Amari refugee camp.

1.5 Objectives

- 1.To determine the relationship between socio-demographic and economic factors and growth at adolescence.
- 2. To determine the relationship between breastfeeding practices and growth at adolescence.
- 3.To determine the relationship between birth weight and growth at adolescence.
- 4.To determine the relationship between lifestyle factors and adolescents' overweight and obesity.

1.6 Study expected outcomes

This is the first study of its kind in Palestine. The results of this study will clarify the effect of complementary feeding practices during infancy on adolescent growth. This data will help to set a health education program for parents to assist them in understanding the optimal feeding in infancy. Moreover, this data will help policymakers to set instructions about infants' proper feeding practices to enhance adolescent health.

1.6 Thesis structure

This thesis will be presented in six chapters as follows:

Chapter one: contains the background of the study, problem statement, study justification, study aim, and objectives.

Chapter two: includes related data (literature review) of conducted international, regional, and country studies and research.

Chapter three: includes the study's conceptual framework.

Chapter four: includes the study area, study methods, Population, sample size, ethical considerations, study tools, Field work and data collection, processing, and analyzing. **Chapter five:** presents the results

Chapter six: includes discussion, study limitations, conclusions, and recommendations.

Chapter two: A literature review

2.1. Introduction

In this chapter, the literature related to the study objectives will be presented.

2.2. Prevalence of overweight and obesity among adolescents

The prevalence of overweight and obesity were increasing rapidly around the world. In this section, literature related to the prevalence of obesity among adolescents worldwide and in Palestine will be presented.

2.2.1 Prevalence of overweight and obesity among adolescents: worldwide

Literature shows that the prevalence of overweight and obesity among adolescents is increasing at alarming rates worldwide. Musaiger et al conducted a cross-sectional study in 2012 in seven Arab countries to find out the prevalence of overweight and obesity among adolescents. Kuwaiti adolescents showed the highest prevalence of obesity for males (34.8%) followed by Jordanians (21.6%) and Syrian 19.7%. And the prevalence of overweight and obesity in Palestine was as follows (12.7-5.0) % for males and (12.5, 3.5) % for females, respectively. See (Table 2.1)

Authors, publication date	Type of the study	Sample	Objectives	Main findings
(Djoudi et al., 2012)	A school- based cross- sectional study	4698 adolescents (2240 boys, 2458 girls)	To find out the prevalence of overweight and obesity among adolescents in seven Arab countries (Algeria, Jordan, Kuwait, Libya, Palestine, Syria, and UAE)	Kuwaiti adolescents showed the highest prevalence of obesity for males (34.8%) followed by Jordanians (21.6%) Prevalence in Palestine Males(12.7, 5.0) % Females (12.5, 3.5)%
(Al Junaibi et al., 2013)	a cross- sectional study (Abu Dhabi)	Random selection of 1541 students (grades 1– 12; aged 6– 19 years) from 246 schools (50% male)	To estimate the prevalence and determinants of obesity in childhood and adolescence and their association with blood pressure	Prevalence of overweight 14.2% for males and females (16.7, 11.6) % P<0.001respectively. prevalence of obesity 19.8%(18.1,21.4)% for males and females respectively with a P=0.09

Table 2.1: Summary of published studies in the world about the prevalence of overweight/ obesity among adolescents.

(El- Bayoumy et al, 2009)	A cross- sectional study	5402 Kuwaiti children (2657 males and 2745 females)	To find out the prevalence of obesity and overweight among intermediate school adolescents 10-14 years	The prevalence of overweight and obesity was 30.7% and 14.6%, respectively. Among males, 29.3% and 14.9% For females, 32.1% and 14.2%. (P<0.001)
(Eker et al, 2017)	A cross- sectional study	1357 adolescents from Turkey	To investigate the frequency of obesity and to identify possible risk factors affecting obesity in adolescents.	Overweight and obesity among females were 12.6% and 2.6%, respectively. BMI values among males were higher than females (P<0.0001) and obesity ratios was higher in males (P<0.0001) 23.5% of the sample was physically active.

2.2.2 Epidemiology of overweight and obesity among adolescents in Palestine: prevalence and risk factors

In a cross-sectional study conducted among 1942 school adolescents aged 13-15 years old, the prevalence of overweight and obese Palestinian adolescents in Ramallah was higher for males and females than Hebron territory (9.6-8.2) % for boys and (15.6-6.0) % for girls, respectively (Mikki et al., 2009). (See table 2)

Badrasawi et al. conducted a study in 2019 to explore the prevalence of obesity and overweight among Palestinian adolescents and their relationship with socio-demographic factors, dietary habits, lifestyle, and healthy nutrition awareness on 392 students of secondary schools in Hebron and they found that the prevalence of obesity and overweight were 3.3% and 13.8%, respectively. There is no significant association with gender, age, and area of living. And a significant association for the high prevalence of obesity with lower self-satisfaction P <0.01 was found (Badrasawi et al., 2019). See (Table 2.2)

Authors,	Type of the	Sample	Objectives	Main findings
publication date	study			
Mikki et al., 2009)	Cross- sectional	1942 students in 65 schools attending the 8th and 9th grades	Prevalence of stunting, underweight, and overweight\ obesity among Palestinian school adolescents (13-15	Overweight and obesity were more prevalent in Ramallah than in Hebron (9.6- 8.2) % for boys and (15.6-6.0) % for girls, respectively.
			associated socio- demographic factors	
Al-Lahham et al., 2019	A cross- sectional study	1320 school- age children (6-12) years	To determine the current prevalence of underweight, overweight, and obesity among Palestinian school- aged children.	The prevalence of overweight and obesity were 14.5% and 15.7%, respectively
(Badrasawi et al., 2019)	A cross- sectional study	392 students of secondary schools from Hebron- Palestine Females 51.3%	To explore the prevalence of obesity and overweight among Palestinian adolescents and their relationship with socio- demographic factors, dietary habits, lifestyle.	The prevalence of obesity and overweight were 3.3% and 13.8%, respectively. Significant association with lower self-satisfaction P <0.01
(Ghrayeb&Farid, 2013).	A cross- sectional study	720 school students aged 13-17 years from southern rural Palestinian community.	To determine the prevalence of overweight and obesity among students and to compare the prevalence by gender, age group and family income.	The prevalence of overweight/obesity was 18.6% and 9.2 % respectively. Prevalence of obesity was significantly higher among males, students with moderate income families and those aged 13 years old and younger.

Table 2.2: Summary of published studies in Palestine about the epidemiology of overweight and obesity among adolescents.

2.3. Socio-demographic and economic status (SES)

Many research studies have reported the relationship between socio-economic status and overweight and obesity among adolescents. Some of these studies found a strong relationship between low SES and obesity among adolescents with OR of 3.76 and considered SES as a major determinant of obesity among this age period (Kleiser et al., 2009). And others talk about family income and risk of obesity and found that the risk of obesity significantly increase with high family income (Rathnayake et al., 2014). See (table 2.3)

Authors,	Type of the	Sample	Objectives	Main findings
(Kleiser et al	study Cross-sectional	13 450 non-	to identify	strong association
2009)	study	underweight children and adolescents aged 3 to 17 years	potential determinants of obesity and risk groups among 3- to 17-year old children and adolescents	between obesity among adolescents and low socio- economic status with OR=3.76
(Rathnayake et al., 2014)	Case-control study	age and ethnicity matched 100 cases and 100 controls adolescent girls between 14 to 18 years of age	To identify nutritional and behavioral risk factors associated with obesity among adolescent Sri Lankan school girls.	risk of obesity significantly increase with: High family income OR=2.99 and with being the first child for the family
Berry et al, 2016	Cross-sectional school-based study	11 years of age girls	To assess the Palestinian girls dietary habits and physical activity patterns	Predictors for overweight\obesity: being the first child in the family, watching TV>4 hrs a day, eating while watching TV and being physically active<5 days\week.
(Muthuri et al, 2016)	Cross-sectional study in several countries	4752 children (9-11) years of age	To investigate the relationship between maternal education level and BMI of the child	A positive relationship between maternal education and child overweight in Colombia
(Feng et al, 2019)	Cross-sectional survey	30,000 children	To explore the association between maternal education and weight status of school-aged children	A positive association between maternal education level and obesity among their children

Table 2.3: Summery of published studies in the world for socio-economic factors and adolescence obesity.

2.4. Complementary feeding (CF)

Many studies showed that there is an association between the age of introduction of CF and overweight/obesity among adolescents. In this section, literature about complementary feeding and its relation to adolescent obesity will be presented in a worldwide context and Palestine.

2.4.1 Complementary feeding and its relation to obesity among adolescents: worldwide

Most of the reviewed studies found that when the introduction of complementary foods occurred early <4 months then the risk of becoming overweight or obese during adolescence was increased see (table 2.4). In a systematic review, three of nine articles were included found an association between the age of introduction of complementary feeding and overweight in adolescents and adulthood. The first study (2011) found that when the age of introduction of complementary feeding was greater than 6 months, the BMI went down to (0.21 kg-2 (95% CI [-0.03, 0.45]). The second study (2010) found that early introduction of complementary feeding before 4 months increased the risk of overweight and obesity. And finally, a study conducted in 2010 found that the chance of overweight and obesity in adolescence was reduced with the late introduction of CF (OR=0.903 per week, P < 0.005).(Miranda et al., 2019) see (table 2.4)

Authors, publication date	Type of the study	Sample	Objectives	Main findings
(Pearce et al., 2013)	A systematic review	23 studies were included	To investigate the relationship between the timing of introduction of CF and abnormal weight among childhood	5 studies found that introduction of CF <3 months (2 studies) or 4 months (2 studies) or 20 weeks (1 study)associated with higher BMI in childhood
(Gingras et al,2019)	Cross-sectional study	1013 children from project Viva	To examine the association of the timing of CF introduction with adiposity throughout childhood	CF initiated at <4 months was associated with higher adiposity β 2.97 in childhood for breastfed children.
(Miranda et al., 2019)	A systematic review	Nine articles were included	To systemically review the evidence on the relation between the age of CF introduction and excess weight in adolescence	When the introduction occurs >6 months give a protective effect against overweight and obesity. <4 months increased the risk.
(Vehapoglu et al., 2014)	A cross- sectional study	4990 children aged 2-14 years	To assess the association of BF and timing of solid food introduction with childhood obesity	No significant differences in obesity or overweight rates between the early and late introduction of solid foods OR=0.993 (95%CI0.645-1.531)
(Moss &Yeaton, 2014)	A cross- sectional study		To assess the relationship between BF and postponing introduction to solid food on children's obesity.	Delaying introduction to solid food until 4 months were associated with lower obesity rates and higher healthy weight status rates (typically 5- 10%)

Table 2.4: Summary of published studies in the world for the introduction complementary feeding and adolescence obesity

(Papoutsou et	A cross-	n = 10,808;	To investigate	Children that were
al., 2018)	sectional study	50.5% boys	the association	introduced to solids after
		2-9 years	between timing	6 months of exclusive
			of solid food	breastfeeding and
			introduction	continued to receive
			and childhood	breast milk (≥ 12 months)
			obesity	were less likely to
				become overweight/obese
				(OR: 0.67)
(Barrera et al.,	A cross-	1181 infants	To assess the	Odds of obesity were
2016)	sectional study		association	higher among infants
			between timing	introduced to solids <4
			of the	months compared to those
			introduction of	introduced 4-<6 months
			solids and	OR=1.66.
			obesity at 6	Introduction of solids ≥ 6
			years	months was not
				associated with obesity.
(Papoutsou et	A cross-	10,808 children	To investigate	-Introduction CF>7
al., 2017)	sectional study	aged 2-9 years	the association	months associated with
		residing in 8	between timing	increased prevalence of
		European	of solid foods	late obesity (OR:1.38)
		countries	introduction	-Introduction <4 months
			and childhood	associated with lower
			obesity	prevalence of obesity
				OR:0.63
				-introduction of CF after
				6 months of exclusive BF
				less likely to become
				obese (OR:0.67)

2.4.2 Complementary feeding and its relation to obesity among adolescents: in Palestine

Authors,	Type of the	Sample	Objectives	Main findings
publication date	study			
(Qleibo, 2008)	A cross-	N=296 mother-	to assess	-The rate of giving
	sectional	child pair from	mothers'	foods <4 months
	household	Al-Amari	practices of	42.1%
	survey	refugee camp-	breastfeeding	-The rate of giving
		Ramallah	and	foods >4 months
			complementary	57.9%
			feeding for full-	
			term healthy	
			infants less than	
			24 months of	
			age	

Table 2.5: Summary of published studies in Palestine for the introduction complementary feeding and adolescence obesity

2.5. Breastfeeding

Breastfeeding is considered the best mode of infant feeding. When compared to formula feeding, it has several advantages one of them the protective effect against infectious diseases (Rousseaux et al., 2014). Moreover, many research studies talk about the association between the duration of breastfeeding and its relation to overweight\obesity risk during childhood and adolescence. In this section, literature about breastfeeding and its relation to adolescent obesity will be presented in a worldwide context and Palestine.

2.5.1 Breastfeeding and its relation to obesity among adolescents: worldwide

Many studies discussed the duration of breastfeeding and its effect on childhood and adolescent growth. Most of their findings confirmed the protective effect of breastfeeding against being overweight\obese during childhood and adolescents. (See table 2.6)

A cross-sectional study aimed to investigate the relationship between high body mass index (BMI) in adolescence (15-16) years old and length of breastfeeding found that Short duration of exclusive breastfeeding for less than 3 months was associated with higher BMI (p<0.04) and higher adipose tissues. While exclusive breastfeeding for more than 3 months showed a trend toward lower skinfold values (Tulldahl et al., 1999). See (Table 2.6)

Authors,	Type of the	Sample	Objectives	Main findings
publication date	study			
(Tulldahl et al, 1999)	Cross- sectional	781 representatively chosen Adolescents (15-16) years from a cohort study of 1244 adolescents.	To study the relationship between high body mass index (BMI) (defined as 58 th percentile) in adolescence and Length of breastfeeding.	The short duration of exclusive BF< 3 months was associated with higher BMI (p<0.04) and higher adipose tissues. Exclusive BF for >3 months showed a trend toward lower skinfold values.
(Yin J et al, 2012)	Birth-cohort study	415 adolescents Mean age 16 years	To describe the association between early nutrition and body composition in adolescents.	Breastfeeding for > 25 days is negatively associated with fat mass among adolescents(a decrease of 14%, P- 0.01)
(Rousseaux et al, 2014)	Cross- sectional study	3528 adolescents (12.5-17.5) years old from 10 European cities.	To assess the relationship between BF and adolescents' body composition.	Breastfed adolescents have a BMI-Z score lower than not breastfed ones P value= 0.04.
(Oddy et al, 2014)	Cross- sectional study	Data from the Western Australian Pregnancy Cohort (Raine) Study. Between (1-20) years.	To examine the association between breastfeeding and measures of adiposity	Introduction of formula milk <6 months was a risk factor for overweight and obesity at 20 years (OR 1.47; 95% CI 1.12-1.93; p = 0.005).

Table 2.6: Summary of published studies in the world for breastfeeding and adolescent obesity

2.5.2 Breastfeeding as a risk factor for obesity among adolescents: in Palestine

To evaluate the relationship between mother's and infant's socio-demographic factors and breastfeeding patterns among 690 mothers from 3 refugee camps in Nablus/ Palestine, Musmar and Qanadeelu conducted a cross-sectional study in 2012 and they found that 69% of the included infants aged 0-6 months were exclusively breastfed. While only 14.3% were exclusively formula-fed. Also, a negative association with exclusive breastfeeding was found for older mothers at marriage (RR=0.13) and cesarean birth (RR=0.59) (Musmar& Qanadeelu, 2012). (See table 2.7)

Authors,	Type of the	Sample	Objectives	Main findings
publication date	study			
(Musmar	A cross-	N=690	To evaluate the	69% of included infants
&Qanadeelu,	sectional study	3 refugee	association	aged 0-6 months were
2012)		camps in	between	exclusively breastfed.
		Nablus-	mother's and	While only 14.3% were
		Palestine	infant's socio-	exclusively formula-fed.
			demographic	A negative association with
			factors and	exclusive BF was found for
			breastfeeding	older mothers at marriage
			patterns.	(RR=0.13)
(Qleibo, 2008)	A cross-	N=296	To assess	The rate of exclusive BF
	sectional	mother-child	mothers'	for 4 and 6 months was
	household	pair from Al-	practices of	10.1% and 3.4%,
	survey	Amari	breastfeeding	respectively. The main
		refugee camp-	and	reason for BF cessation
		Ramallah	complementary	was the occurrence of a
			feeding for full-	new pregnancy.
			term healthy	51.7% of children received
			infants less than	their first food between 4-
			24 months of	6 months of age and only
			age	19.7% received>6 months

Table 2.7: Summary of published studies for breastfeeding and adolescence obesity in Palestine

2.6. Birth weight

Many studies clarify the association between birth weight and abnormal-weight in adolescence see (table 8). Evensen et al. in a population-based cohort study about the relationship between birth weight, childhood body mass index for age (BMI-for-Age) and overweight and obesity in late adolescence in Norway found that higher birth weight was associated with a higher OR for overweight/obesity (OR= 1.25, 95% CI 1.06 to 1.48) see (table 2.8).

In 2018, Kang et al investigated the association between birth weight, obesity and fat mass in Korean adolescents in a cross-sectional study of 1304 participants aged 12-18 years old and they found that male adolescents within the highest 25^{th} percentile in birth weight were more likely to be overweight (OR=1.75 95% CI 1.11 to 2.76). While female adolescents within the highest 25^{th} percentile in birth weight were more likely to be obese (OR 2.13, 95% CI 1.03 to 4.41). (See table 2.8)

Authors,	Type of the	Sample	Objectives	Main findings
publication date	study			
(Kleiser et al., 2009)	Cross-sectional study	13,450 non- underweight children and adolescents aged 3 to 17 years.	To identify potential determinants of obesity and risk groups among 3- to 17-year old children and adolescents	The high birth weight is associated with overweight and obesity with OR of 1.73, 1.83 respectively.
(Evensen et al., 2017)	Population- based cohort study	961 adolescents	To explore the association between birth weight and childhood BMI and abnormal- weight among adolescents	Higher birth weight was associated with a higher OR for abnormal-weight at 15–20 years of age (OR 1.25, 95% CI 1.06 to 1.48)
(Kang et al., 2018)	Cross-sectional study	1304 participants aged between 12-18 years	To investigate the association between birth weight, obesity, and fat mass in Korean adolescents	Adolescents born with high birth weight (the highest 25th percentile) are at risk to be overweight OR=1.75. While females are at risk to become obese OR= 2.13.

Table 2.8: Summary of	of published studie	s in the world for birth	weight and adolescent	obesity
	- r			

2.7. Lifestyle factors

Healthy nutrition and physical activity have an important role in preventing and reducing obesity during childhood and adolescence. In this section, literature related to lifestyle factors as risk factors for obesity during adolescence will be presented.

2.7.1 Physical activity

Being physically active meant that you are healthy. Several studies highlighted the association between physical activity and the risk of obesity among adolescence see (table 2.9). Rathnayake et al conducted a case-control study in 2014 to identify nutritional and behavioral risk factors associated with obesity among 100 case-100 controls adolescents in Sri Lanka school girls aged 14-18 years and found that increased physical activity decreased the risk of obesity among adolescents OR=4.34 see (table 2.9). Another study found thatlow physical activity and prolonged screen time are the main predictors for overweight or obesity or both of them in rural adolescents(Jane Scott, 2015). (See table 2.9)

Authors,	Type of the	Sample	Objectives	Main findings
publication date	study			
(Rathnayake et al, 2014)	Case-control study	age and ethnicity matched 100 cases and 100 controls adolescent girls between 14 to 18 years of age	To identify nutritional and behavioral risk factors associated with obesity among adolescent Sri Lankan school girls.	Increased physical activity decreased the risk of adolescent obesity with OR =4.34
(Jane Scott,	Cross-sectional	370 school	To explore the	Low physical
2015)	study	children (196	relationship	activity and
		males and 174	between physical	prolonged screen
		females) aged	activity and	time are the main
		14 to 19 years	sedentary behavior	predictors for
			and obesity among	overweight\obesity
			adolescents in rural	or both of them in
			areas.	rural adolescents

Table 2.9: Summary of published studies in the world for lifestyle factors and adolescence obesity: physical activity

2.7.2 Diet

Dietary behaviors such as increasing meal frequency, having breakfast daily and consumption of fruits and vegetables in sufficient amount daily have a protective effect against obesity during childhood and adolescence. A cross-sectional study conducted in 2008 to assess the association and impact of increased meal frequency and skipping breakfast on

obesity levels and found that increased meal frequency may have beneficial effect in reducing BMI among boys (OR=2.75), girls (OR=1.97) and skipping breakfast associated significantly with obesity (Mota et al., 2008). The risk of obesity significantly increase with skipping breakfast OR= 3.99 and consumption of fruits <4 days per week OR=2.18 (Rathnayake et al., 2014). (See table 2.10)

Authors,	Type of the	Sample	Objectives	Main findings
publication date	study	0.0.4	-	
(Mota et al.,	Cross-sectional	886	To assess the	Increased meal frequency
2008)	study	adolescents	associations and	may have a beneficial effect
		(461 girls and	impact of	on a reduced BMI in boys
		425 boys)	increased meal	(OR: 2.75) and girls (OR:
		aged 13–17	frequency,	1.97).
		years old	physical activity,	Skipping breakfast is
			and skipping	associated significantly with
			breakfast on	obesity.
			obesity levels in	
			a sample of urban	
			adolescents	
(Rathnayake et	Case-control	age and	To identify	The risk of obesity
al., 2014)	study	ethnicity	nutritional and	significantly increases with
		matched 100	behavioral risk	skipping breakfast
		cases and 100	factors associated	OR= 3.99 and consumption
		controls	with obesity	of fruits <4 days per week
		adolescent	among	OR=2.18
		girls between	adolescent Sri	
		14 to 18 years	Lankan school	
		of age	girls.	
(Chowdhury	Cross-sectional	13-15	To find whether	The odds of being
&Chakraborty,	school-based	year-old	there is a	overweight and obese were
2017)	study	adolescents	prevalence of	high in those with poor
			adverse eating	dietary behavior OR=1.82
			behaviors among	[1.20–2.78].
			adolescents and	
			its relation to	
			obesity.	
(Berry et al,	Cross-sectional	11 years of	To assess the	Predictors for overweight
2016)	school-based	age girls	Palestinian girls'	and obesity: being the first
	study		dietary habits and	child in the family, watching
			physical activity	TV >4 hrs a day, eating
			patterns	while watching TV, and
				being physically active less
				than 5 days a week.

Table 2.10: Summary of published studies in the world for lifestyle factors and adolescence obesity: Diet

2.7.3 Health status:

Authors, publication date	Type of the study	Sample	Objectives	Main findings
(Pinhas-Hamiel et al, 2003)	Follow-up study	321 children and adolescents	To assess whether overweight children and adolescents are at increased risk of iron deficiency.	A significant negative correlation was found between high BMI and low iron levels
(Bagni et al, 2013)	School-based cross-sectional study	707 adolescents between 11- 19 years of age	To verify the prevalence of iron deficiency anemia and its association with overweight	Overweight girls presented lower hemoglobin levels than normal- weight girls.

Table 2.11: Summary of published studies in the world for Health status and adolescence obesity: Hemoglobin level

Chapter three: Conceptual framework

3.1. Introduction

In this chapter, the mechanism that describes the association between growth at adolescence and complementary feeding practices, breastfeeding during infancy, birth weight, lifestyle, and socio-demographic and economic factors will be presented. The study model will be shown and described.

3.2. Study context

Overweight and obesity were considered as an epidemic; due to the dramatic increase in the prevalence among people around the world. Despite the adverse health effects of obesity on all of the age groups, its effects during the age of adolescence still have special concerns (Badrasawi et al., 2019). Adolescence and school-age are the most critical periods in which lifelong habits are acquired. These habits include an unhealthy diet and low physical activity which are considered as known risk factors for overweight and obesity (Eker et al., 2017). On the other hand, many studies highlighted other possible risk factors for overweight and obesity among adolescents which take place early during infancy such as; birth weight, duration of breastfeeding, and complementary feeding practices.

3.3. Age of introduction of complementary feeding

World Health Organization recommended that the optimal age to start introducing complementary feeding is after 6 months of exclusive breastfeeding side by side with breast milk, the time when infant's energy and nutrients needs start to exceed that's provided by breast milk and the infant become developmentally ready to receive other foods, then complementary foods become important to meet infant's additional needs. If complementary foods did not introduce at this stage, then the infant's growth may be negatively affected. So, complementary foods should be timely, adequate, safe, and being fed properly. (WHO, 2019b)

3.4. Study conceptual framework (figure 1)

As shown in the literature, having a healthy diet; being physically active; born with a normal weight; breastfed for the recommended period, and being introduced to complementary foods in the recommended timing were considered as protective factors against overweight and obesity.

The core of this study is to determine the relationship between the age of introduction of complementary foods and BMI among adolescence. So, this thesis includes a model that has been derived from the literature review, consisting of socio-demographic and economic status, lifestyle factors, birth weight, breastfeeding, and complementary feeding practices.



Figure 3.1: Study conceptual framework

3.5. Definitions

Socio-demographic and economic status (e.g. gender, income, and educational status) Lifestyle factors (i.e. Diet, food habits, smoking, and physical activity) Breastfeeding: considered the best source of nutrition for most infants. Also, breastfeeding involves benefits for both mother and infant such as; reducing the risk for certain health conditions. (CDC, 2020) Complementary feeding: the process of transition from exclusive breastfeeding to family foods and its starts when breast milk alone is no longer sufficient to meet nutritional requirements of infants; so other foods and liquids are needed, along with breast milk. This process typically covers the period from 6-24 months of age. (WHO, 2019b)

Birth weight: measured in grams. Reported in the birth certificate
3.6 BMI at adolescence and socio-demographic and economic factors

3.6.1 Gender: Several studies in the literature found a significant association between gender and abnormal-weight among adolescents. Most of the studies in the literature showed that the risk of overweight and obesity is higher among males than females (Djoudi et al, 2012, Al Junaibi et al., 2013, Al Junaibi et al., 2013, Ghrayeb et al 2013).

3.6.2 Income: The literature showed a discrepancy in the results. Some of them found that the risk of abnormal-weight increases with high family income and high socio-economic status (Rathnayake et al., 2014). On the other hand, some studies found that abnormal-weight increases among adolescents with moderate-income families (Ghrayeb et al, 2013) and others with low socio-economic status (Kleiser et al., 2009).

3.6.3 Maternal education level: Maternal level of education was shown in several studies to be associated positively with rates of overweight and obesity among adolescents (Muthuri et al, 2016; Feng et al, 2019).

3.7 BMI at adolescence and lifestyle factors

The risk of obesity significantly increases with skipping breakfast (Mota et al, 2008;Rathnayake et al, 2014), poor dietary behaviors (Chowdhury& Chakraborty, 2017), low physical activity (Rathnayake et al., 2014; Jane Scott, 2015)

3.8 BMI at adolescence and breastfeeding

In general, breastfed adolescents have a lower BMI Z-score than not breastfed ones (Rousseaux et al, 2014). But, when the literature was reviewed about the association between abnormal-weight and the duration of breastfeeding the results showed that, Short duration of exclusive breastfeeding for less than 3 months was associated with a higher risk of overweight and obesity and higher adipose tissues during adolescence (Tulldahl et al, 1999). While, children that were exclusively breastfed for 6 months and then introduced to solid food and continued to receive breast milk (≥ 12 months) were less likely to have abnormal weight (Papoutsou et al, 2018).

3.9 BMI at adolescence and time of introduction of complementary feeding

Most of the studies in the literature showed that the introduction of complementary feeding at 6 months of age is considered a protective factor against obesity during adolescence (Miranda et al, 2019; Papoutsou et al, 2018; Papoutsouet al, 2017; Barrera et al, 2016). While, the risk increases if the complementary feeding started earlier < 4 months of age (Gingras et al,2019; Miranda et al., 2019) and others showed that the risk of obesity decreased when the introduction occurs between 4-6 months of age (Moss &Yeaton, 2014; Papoutsou et al., 2018; Papoutsou et al., 2017; Barrera et al, 2016)

3.10 BMI at adolescence and Birth weight

Several studies showed that high birth weight increases the risk of overweight and obesity during adolescence (Kleiser et al, 2009; Evensen et al, 2017; Evensen et al, 2017).

3.11 Summary

In summary, the literature showed that several factors were associated with BMI at adolescence, which is divided into socio-demographic and economic factors (e.g. gender and income), lifestyle factors (e.g. diet and physical activity), factors related to infancy such as Breastfeeding, time of introduction of complementary feeding and birth weight. These factors were used to build this study's conceptual framework. This chapter is the base for analysis in the coming chapters (study results, discussion, and conclusion).

Chapter four: study methodology

In this chapter, the research methodology is presented. The study area, study population, study design, sampling method, study tools, statistical analysis utilized during the project, ethical considerations, and variables operation definitions are presented.

4.1 Study population

A cohort of 199 children who were born between the years 2004 and 2006 at the Al-Amari refugee camp was included in the study. Those children were investigated about mother's practices of breastfeeding and complementary feeding during the first two years of life. Their anthropometric measures (Length, weight, and head circumferences) were measured too. In brief, it was a cross-sectional study that included all full-term healthy infants less than 24 months of age residing at the Al-Amari refugee camp. Data collection was divided into two parts: a questionnaire consists of four parts (socio-demographic information, method of delivery of the indexed child, information about breastfeeding, and finally, time and type of introduction of complementary feeding) which was filled by interviewing the mother (Study questionnaire, see appendix 5). The second part was anthropometric measurements: a digital weighting balance was used to measure weight and a strip meter was used to measure length and head circumference (Qleibo, 2008). After ten years, 97 children were traced in schools to get information related to these study objectives.

4.2 Study area

The study took place in the Al-Amari refugee camp which is located in the east of Ramallah governorate north of Palestine. As reported by UNRWA in 2015, the Al-Amari refugee camp is one of the smallest camps in the West Bank. According to the PCBs census of 2019, 4892 refugees live there (PCBS, 2019). Two UNRWA schools provide primary education to 1500 students. Primary health care services are provided by one UNRWA health center (UNRWA, 2015).

4.3 Study design:

This is a 10 years follow-up study. The first baseline study was a cross sectional study. This study was done 10 years after the first study.

4.4 Study sample:

The sample included all children from the baseline survey (199 children). A list of students' names was prepared and was sent to the schools. Out of the original sample, we only could find only 97 students at schools (13-14) years old. We tried to reach the other children at the refugee camp, but all of them left the camp and could not be traced. So, the sample was only the 97 participants before 2 years of age and at adolescence

Characteristics of the missing data

Variable		Count	Column N %
Gender	Male	45	55.6%
	Female	36	44.4%
Child age (months)	4-6 months	3	3.7%
	6-12 months	21	25.9%
	12-18 months	26	32.1%
	18-24 months	31	38.3%
Order of child in the	$1^{\text{st}} \text{ or } 2^{\text{nd}}$	32	39.5%
family	3^{rd} - 6^{th}	35	43.2%
	More than6 th	14	17.3%
Mother level of	<= 6 years	2	2.5%
education	7-9 years	34	42.0%
	10-12 years	35	43.2%
	high diploma	10	12.3%
Gestation weeks	<37weeks	2	2.5%
	37-42 weeks	79	97.5%
Breastfeeding	full BF till 4 months	47	58.0%
	food or formula < 4	34	42.0%
	months		
Formula	no formula	30	37.0%
	takes formula	47	58.0%
	takes Nido, cow's milk	4	4.9%
Start complementary	0-3 months	24	29.6%
feeding	4-5.9 months	40	49.4%
	6 -11.9 months	17	21.0%

Table 4.1: Characteristics of the missing data

4.5 Inclusion and Exclusion criteria

Adolescents who have filled the questionnaire with the researcher and done anthropometric measurements and Hemoglobin test required for the study were included.

4.6 Study tools

4.6.1 Study questionnaire:

A structured questionnaire was developed by the researcher taking into consideration the aims and objectives of the study (see appendix 3). Previous studies validated questionnaires of similar objectives were used to develop the questionnaire (as shown below).

The questionnaire was an interview type of questionnaire that consisted of 97 questions divided into seven sections according to the study objectives. As follows:

Section one: Socio-Demographic information (6 questions) Section two: Economic information (9 questions) Section three: Smoking (8 questions) (GSHS questionnaire, 2007). Section four: Physical activity (13 questions) which is built on the WHO questionnaire of the Health Behavior in School-aged children (HBSC) study (WHO, 2019c). Section five: Health status assessment (13 questions) (WHO, 2019c) Section six: Adolescents food habits checklist (AFHC): This was developed by Johnson et al. in 2002 and consists of 23 questions with a (yes/no) response were aimed at measuring healthy eating behaviors among adolescents aged 13-16 years. (Kalkan I, 2019) Section seven: Nutrition (25 questions) which is built on the WHO questionnaire of HBSC survey (WHO, 2019c)

4.6.2 Anthropometric measurements:

In Body 120 machine was used in this research to analyze body composition (Total Body Water, Protein, Minerals, Body Fat Mass, and weight). The InBody Push uses ultrasound technology to measure child's accuracy with pinpoint accuracy. It also uses self-calibration in weight measurement (Inbody, 2021). In addition, height was measured for participants, which was used to calculate children's body mass index for age (BMI-for-Age).

Height measurement: The "wall-method" was used. The tape-measure was attached vertically to the wall with a zero mark on the tape exactly. The participant stood with their shoes off, heels together, touching the base of the wall with the back against the wall and looking forward. A ruler was placed horizontally on the highest part of the head and extended backwards till it touches the tape indicting child height.

The World Health Organization growth charts were used to indicate: Underweight, overweight, and obesity for both ages; before two years of age and adolescence (tables 4.1 and 4.2) (WHO, 2006).

Tuolo	1.2. 7 munopometre	malcutors		ciiiiu	naumon	status.	<u>under 5</u>	years	
Indica	tors		I	Defini	itions				

Table 4.2: Anthronometric indicators to assess child nutrition status: under 5 years

Indicators	Definitions
Stunting	Height-for-age < -2SD
Severe wasting	Weight- for- Height < -3 SD
Wasting	Weight -for- Height < -2 SD
Overweight	Weight-for- Height $> +2$ SD
Underweight	Weight-for-age < -2SD

Table 4.3: Anthropometric indicators to assess child nutrition status: 5-19 years of age

Indicators	Definitions (BMI-for-age)
Overweight	+1 SD
Obesity	+2 SD
Severely obese	+3 SD
Thinness and severe thinness	-2 and -3 SD

4.6.3 Hemoglobin level:

ſ

A blood test was done for each student to check Hemoglobin level. Blood samples were drawn at schools after completing the study questionnaire and measuring weight and height. Then, samples were delivered to the Al Quds University, Arabic Health Center in Ramallah city. This center has a certified laboratory that runs data quality program by Al Quds University. Where the tests are done using a German device "HumaCount" which calibrated regularly by the manufactured company "Human" and results of (Hb) levels were obtained.

According to the cut-off levels established by the WHO, anemia in children aged (12-14) years is defined as a Hemoglobin (Hb) concentration below 12 g/dl. (Soliman A et al, 2014).

4.7 Questionnaire validation

An epidemiologist, statistical arbitrator, and nutritionist validated the questionnaire. They evaluated the contents of the questionnaire according to the study objectives and modifications were done as requested.

4.8 Questionnaire piloting

A pre-test was conducted on20students in the same age group at Al-Amari refugee camp schools. The 20 students were interviewed by the fieldworker and were asked about the clarity, content, and alternatives of the specified questions. Following their answers and comments, some changes to the structure and terminology of some questions were performed to ensure better understanding by the interviewees. The data collected in the pilot testing were not included in the study sample.

The alpha chronbach results were as follows which reflects good questionnaire reliability

Section five: Physical activity = 0.50Section six: Health status assessment= 0.61Section seven: Adolescents food habits checklist (AFHC) = 0.68Section eight: Nutrition (25 questions)= 0.73

4.9 Field work and Data collection

The field work started in September 2019 in Al-Amari refugee camp schools. A list of 199 students' names was prepared and sent to schools after obtaining approval from UNRWA. Only 97 students of them could be traced and were asked to join the study after explaining the study aims and objectives for them. Then, the questionnaire was administered face to face by asking students questions that related to each objective of the study. After filling the questionnaire, students' weights and heights were measured. And finally, blood samples were taken to do the hemoglobin blood test. Each interview took about 30 minutes.

4.10 Data analysis:

Data were coded, entered, and cleaned then merged with the data needed from the previous study (Qleibo, 2008) to be ready for the analysis. The analysis was done by using the Statistical Package for the Social Sciences version 25 (SPSS).SPSS version 25 was used for data entry and analysis. Descriptive analyses were done for the collected data at adolescence and infancy. Frequencies means and standard deviations were calculated. For the univariate analysis, chi-square test and t-test were used to study the associations between adolescences' growth indicators and their determinants. Also, diet and infant growth indicators were examined for any association with adolescent growth at a significant p-value of 0.1(Due to the small sample size).

Body mass index calculations: The WHO equations were used to calculate anthropometric measures for infants and adolescents. The WHO Reference 2007 SPSS macro package was used to calculate the growth indicator for the participants (WHO, 2007).

Food habits of the questionnaire score (AFHC): Data analysis was done for the Section of food habits of the questionnaire (Section 7) to have a final score from 23 for each participant according to the scoring procedure recommended by (Johnson et al, 2002) in which one point was calculated for each healthy response, then the final score has adjusted for not applicable responses and missing ones by the following equation:

AFHC score = number of 'healthy' responses* (23/ number of items completed)

Physical activity: data analysis was done for the section of physical activity according to the HBSC recommendations which state that for the frequency questions, participants who reported being active two times a week or less were considered inadequately active and those who reported being active for more than that were considered to be active. While, for the duration questions, being physically active for less than one hour a day indicates that the participant is inadequately active and considered active if the duration was more than that.(Booth et al, 2001)

4.11 Ethical considerations

The study was ethically approved by Al-Quds University Ethical Research Committee (appendix 1). Also, permission to conduct the study was obtained from theUNRWA head quarter by email. Furthermore, participants' parents signed a consent form that confirmed their willingness to be included after they were informed about the aim of the study. See appendix 1&2 for the ethical approval letter and the consent form.

Chapter five: Results

In this chapter, study results will be presented. Part I shows the descriptive analysis of the study population characteristics.

Part II presents the univariate analysis.

Part I: Descriptive analysis

5.1 Socio-demographic and economic characteristics of the respondents

Of the study population we studied before age 2 years, we only could find 97 adolescents who were interviewed and are included in the study analysis.

Table 5.1 presents the socioeconomic and demographic characteristics of the respondents (n=97). Of the study population, 56.7% were males and 43.3% were females.26.8% of them were the child in the family. 72.3% of participants' fathers and 83.2% of their mothers had school education only; 93.7% of their fathers were working but only 29% of mothers were working mothers.

The reported monthly income for 44.7% of respondents' families was more than 3000 NIS. All of the adolescences take the daily expense and most of them (91.8%) think that it is always enough

5.2 Body mass index for age (BMI-for-Age) of participants:

Before 2 years of age, 53.6% of the study participants (n=97) were obese or severely obese, and 46.4% were of normal weight. While at adolescence (n=97), 55.7% were overweight\obese and 44.3% were of normal weight (figure 5.1).

However, in figure (5.2), only 5.2% who were of normal weight before 2 years of age stayed normal at adolescence and 40% stayed overweight or obese. However, 50% had a change in their BMI by the time either to become normal weight (38.1%) or overweight\obese (16.5%).

Variable		Count	N %
Gender	Male	55	56.7%
	Female	42	43.3%
Ranking among family membe	rs first-second	41	42.3%
	third-fourth	28	28.9%
	> fourth	28	28.9%
Number of people live in the	1-4 persons	8	8.2%
house	Male55Female42bers first-second41third-fourth28> fourth28> fourth28> fourth285-8 persons79>9 persons10<12 years of education	79	81.4%
	>9 persons	10	10.3%
Father's education level	≤12 years of education	68	72.3%
	> 12 years of education	12	12.8%
	Don't know	14	14.9%
Mother's education level	≤12 years of education	79	83.2%
	> 12 years of education	16	16.8%
Father work	No	6	6.3%
	Yes	89	93.7%
Father Job	Government employees	15	16.9%
	Non- governmental employees	9	10.1%
	Self-employed	65	73.0%
Mother work	No	69	71.1%
	Yes	28	28.9%

Table 5.1: description of study participant's Socio-economic and Demographic characteristics (n=97)

Mother JOB	Government employees	2	7.1%
	Employees of non- governmental	17	60.7%
	Self-employed	9	32.1%
Sufficiency of expenses	Always not enough	2	2.1%
	Often enough	6	6.2%
	Always enough	89	91.8%
Monthly household income	Less than 2000 NIS	19	22.4%
(NIS)	Between 2000-3000	28	32.9%
	More than 3000	38	44.7%



Figure 5.1: Body mass index before age 2 years (n=97) and at adolescence (n=97)



Figure 5.2: Change in BMI between 2 years of age and adolescence

5.3 Lifestyle factors:

5.3.1 Nutritional status before 2 years of age:

Table 5.2 shows a description of the nutritional status (Breastfeeding and complementary feeding) of the participants during the first 2 years of their life.

All of the participants have been breastfed for at least one day. 94.8% of the participated mothers had 37-42 weeks of gestation while only 5.2 % of them had less than 37 weeks. 13.7% of the participated mothers were stopped breastfeeding before 6 months of age. 53.6% of them introduce the first complimentary food to their child between 4-6 months of age.

Variable		Count	Column N %
BF cessation	Still BF (survey time)	53	55.8%
	stopped at < 6 months	13	13.7%
	Stopped 6-12 months	15	15.8%
	Stopped > 12 months	14	14.7%
Formula	No	42	43.3%
	Yes	55	56.7%
Age of first food (CF)	0-3 months	27	27.8%
	4-5.9 months	52	53.6%
	6 -11.9 months	18	18.6%
Formula (combined)	no formula	40	41.2%
	takes formula	55	56.7%
	Cow's milk	2	2.1%
Formula (month)	No	42	43.3%
	0-6 months	39	40.2%
	7-12 or more	16	16.5%

Table 5.2: Breastfeeding an	d complementary	feeding charac	teristics (n=97)
-----------------------------	-----------------	----------------	------------------

5.3.2 Nutritional status in adolescence:

Table 5.3 below shows information about food intake among participants during adolescence. Of them, 62.9% were eating breakfast daily before going to school; 52.6% consume milk and its products more than 7 times per week, and 78.4% eating bread 1-2 times daily.

Nearly, all of the participants do not take any supplements such as vitamins or iron pills at the time of the study (period of data collection) (figure 5.3)

Variable		Count	N %
Eat breakfast	Never eat breakfast	8	8.2%
	(1-4) days a week	28	28.9%
	Daily	61	62.9%
Breakfast preparation	Mother	81	88.0%
	I bring it myself	8	8.7%
	Others	3	3.3%
Eat or drink at school break	Never eat breakfast	6	6.2%
	(1-4) days a week	18	18.6%
	Daily	73	75.3%
Eat or drink after dinner	Never eat breakfast	60	61.9%
	(1-4) days a week	17	17.5%
	Daily	20	20.6%
Eat your main meal with	Never	1	1.0%
family members	Sometimes	6	6.2%
	yes daily	90	92.8%
Eating bread (daily)	1-2 times	76	78.4%
	>2 times	21	21.6%
Drink milk and its products	> 7 times weekly	51	52.6%
(weekly)	1-4 weekly	43	44.3%
	never, rarely	3	3.1%
Home-cooked food	No	2	2.1%
	Sometimes	1	1.0%
	Yes, always	94	96.9%

Table 5.3: Nutritional status among the study participants at adolescence



Figure 5.3 Iron and vitamin intake at adolescence

5.3.3 Factors affecting food habits:

52.6% of the study participants were having nutrition information from their family members, 65% of them were thinking that they have good health and 92.8% of them were satisfied with their appearance. See (Table 5.4)

Variable		Count	N%
Stay hungry because not	Never	95	97.9%
chough rood at nome	Sometimes	2	2.1%
Sources of nutrition	TV and Internet	11	11.3%
momation	School and friends	18	18.6%
	Doctor	17	17.5%
	family members	51	52.6%
Think of your health	Weak	5	5.2%
	Good	63	64.9%
	Excellent	29	29.9%
Satisfied with your	Not satisfied	7	7.2%
appearance	Satisfied	90	92.8%
Buy sandwich or cake from	do not	27	27.8%
school	1-3 weekly	38	39.2%
	Daily	32	33.0%
Eat or buy from the restaurant	do not	37	38.1%
	1-3 weekly	47	48.5%
	once monthly	13	13.4%
Eat or drink while watching	No	41	42.3%
I V	Yes	56	57.7%

5.3.4 Food habits checklist:

The food habits of the participants were evaluated by the adolescent's food habits checklist (AFHC) (Johnson et al, 2002). The checklist contains 23 questions; the maximum score to be attained by the instrument was determined to be (23) since each positive (yes) response scored a point. Collecting of a high score by the adolescents demonstrated healthy eating habits in the part of the individual.82.5% of the participants answered by "False" when were asked if they choose low-fat options when having lunch away from home. And the same answer was given from 89.6% of them when they asked about choosing to buy diet soft drinks.Seeappendix3, table A1 for the food habits checklist answers

The means and standard deviations of AFHC scores were shown in table 5.6 for males and female participants. In general, both males and females had low scores (9/23). The AFHC scores obtained by the male participants in this study were slightly higher as compared to female participants.

	(P-value	
	Male Female		
Variable	Mean (SD)	Mean (SD)	
AFHC	9.55 (3.79)	9.44 (3.88)	0.92

Table 5.5: adolescent food habits checklist scores of male and female participants

5.3.5 Physical activity:

33% of the participants were doing physical activity 1-2 times a week at school while 36.1 % do not participate in any physical activity or sports at school. 76.3 of them do not participate in any formal lessons of sport or physical activity while the others participated at least one time per week outside the school. See Appendix 4, Table A2

According to the physical activity part of the WHO questionnaire (HBSC), the participants were divided into two groups (active and inadequately active) according to their frequency of participation in physical activities and the duration of their participation (explained in methodology above)

Table 5.6 below describes the frequency and duration of physical activity among the participants. The table shows that the duration of physical activity among the participated adolescents was low (13%).

		Count	N %
PA Frequency	Active	45	46.4%
	Inadequately active	52	53.6%
PA Duration	Active	13	13.4%
	Inadequately active	84	86.6%

Table 5.6: frequency and duration of physical activity among participants at adolescence

5.3.6 Surrounding factors effects on physical activity and food choices at adolescence:

Table 5.7 shows that only 7.2% of the participants were influenced by their school curriculum when they choose what to eat and 5.2% of them were influenced by their teachers, while no one was influenced by his friends.

Table 5.7: Surrounding fa	ctors effect on phys	sical activity and foo	d choices at adolescence
0	1 2	2	

	Count	N%
No	90	92.8%
Yes	7	7.2%
No	92	94.8%
Yes	5	5.2%
No	96	99.0%
Yes	1	1.0%
No	94	96.9%
Yes	3	3.1%
No	94	96.9%
Yes	3	3.1%
No	97	100.0%
	No Yes No Yes No Yes No Yes No Yes No	No90Yes7No92Yes5No96Yes1No94Yes3No94Yes3No97

5.3.7 Smoking at adolescence:

Table 5.8 shows 78.4% of participants were non-smokers; 67.8% of the participants at least one of their parents is a smoker; 51.7% were smoking alone for the first time. See (table 5.8)

Variable	Count	N %	
Age of smoking initiation	never smoking	76	78.4%
	8- 11 years	9	9.3%
	>11 years	12	12.4%
Smoke cigarettes (past 30	No day	89	91.8%
uays)	More than one day	8	8.2%
Use other types of tobacco(Ex. pipe) (past 12 months)	No day	78	80.4%
Ex. pipe) (past 12 months)	More than one day	19	19.6%
Try stop smoking	never smoking	72	78.3%
(past 12 months)	never smoking through last 12 months	10	10.9%
	Yes	10	10.9%
Others smoked in your	No day	14	14.7%
(past 7 days)	1-4 days	9	9.5%
(past / days)	5 days or more	72	75.8%
Surroundings smokers	None	15	17.2%
	Parents	59	67.8%
	friends and siblings	13	14.9%
Smoke with you for the first	Friends and siblings	11	37.9%
	Alone	15	51.7%
	Others	3	10.3%

Table 5.8: Smoking status among the study participants

5.3.8 Health status at adolescence:

6.2% of the participants stayed in the hospital overnight during the last year, 27.8% of them had surgery, 7.2% took medicine at the time of the survey and 63% of them went to the dentist during the last year due to suffering from teeth problems. See appendix 4 table A3 and table A4 for more details

5.3.9 Hemoglobin levels:

Table 5.9 below shows the mean and standard deviation of the Hemoglobin test results for the participants. The results show that most of the participants have hemoglobin levels equal to or above 12 g/dl which means that the participant is non-anemic except <u>five</u> participants have hemoglobin levels between 11-11.9 g/dl which means mild anemia according to the WHO classification for adolescents 11-14 years of age mentioned in table (4.3) in methodology (Kaur et al, 2018).

Table 5.9: Hemoglobin levels of the participants

Variable	Mean (SD)	Min	Max
Hemoglobin	13.38 (.86)	11.10	15.50

Part II: Univariate analysis

5.4 Socio-demographic and economic data of study participants:

Table 5.10 shows that a significant relationship was found with the gender of the participant, 66.7% of male participants were of abnormal- weight compared to 33.3% of females. 35.2% of the overweight participants were the first or second child in their families compared to 16.3% of normal-weight participants (P-value=0.003). Of the participated adolescents whose have a high maternal education levels (> 12 years of studying) 23% were overweight\obese while only 9% had a normal weight (P-value=0.074). Moreover, the table shows that there is no difference in father work between the normal-weight group and the overweight\obese group. 32.6% of the normal-weight participants have working mothers compared to 26% of overweight\obese. Monthly household income was more than 3000 NIS for 49% of the overweight\obese participants compared to 38.9% of the normal-weight participants.

		BN	BMI-for-age(Adolescence)				
		Norma	l weight	Overwe	Chi-square		
Variable		N	%	N	%	-	
Gender	Male	19	44.2%	36	66.7%	0.026	
	Female	24	55.8%	18	33.3%	-	
number of people living	1-4 persons	3	7.0%	5	9.3%	0.869	
in the house	5-8 persons	35	81.4%	44	81.5%	-	
	>9 persons	5	11.6%	5	9.3%	-	
Ranking among family	first-second	14	32.6%	27	50.0%	0.003	
members	third-fourth	20	46.5%	8	14.8%	-	
	> fourth	9	20.9%	19	35.2%	-	
Father's education level	\leq 12 years	33	80.5%	35	66.0%	0.291	
	>12 years	4	9.8%	8	15.1%	-	
	Don't know	4	9.8%	10	18.9%		
Mother's education level	≤ 12 years	39	90.7%	40	76.9%	0.074	
	>12 years	4	9.3%	12	23.1%	-	
Father work	No	2	4.9%	4	7.4%	0.616	
	Yes	39	95.1%	50	92.6%	-	
Father employment	Governmental	5	12.8%	10	20.0%	0.274	
	Non- governmental	6	15.4%	3	6.0%	-	
	self employed	28	71.8%	37	74.0%	-	
Mother work	No	29	67.4%	40	74.1%	0.474	
	Yes	14	32.6%	14	25.9%	-	

Table 5.10: Association between socio-demographic/ economic characteristics and BMI-for-age at adolescence.

Mother job	government employees	1	7.1%	1	7.1%	0.919
	employees of non- governmental	8	57.1%	9	64.3%	
	self employed	5	35.7%	4	28.6%	
Sufficiency of daily expenses	always not enough	0	0.0%	2	3.7%	
	often enough	2	4.7%	4	7.4%	
	always enough	41	95.3%	48	88.9%	
Monthly household income (NIS)	less than 2000	10	27.8%	9	18.4%	0.523
	between 2000-3000	12	33.3%	16	32.7%	
	more than 3000	14	38.9%	24	49.0%	

5.5 Lifestyle factors:

This section shows the association between lifestyle factors (smoking, physical activity, nutrition, food habits) and BMI of the participants in adolescence.

5.5.1 Nutritional status before 2 years of age: (Breastfeeding and complementary feeding)

Table 5.11 below shows the association between breastfeeding, time of complementary feeding introduction, birth weight and other factors related to the infancy period with current BMI of the participants. A difference was found between the two groups in birth weight (although not significant), the mean (SD) of birth weight among the normal-weight group was higher than that of the overweight\obese group, 3316 ± 396 compared to 3298 ± 440 , respectively. 57.4% of the overweight or obese participants were formula-fed in addition to breastfeeding compared to 55.8% of normal participants. 97.7% of the normal-weight participants were born after 37-42 weeks of gestation compared to 92.6% of the abnormal weight group (not significant). 57.4% of the overweight or obese group was given complementary food for the first time between 4-6 months of age compared to 18.5% for those who were given CF after 6 months of age.

		BMI	-for-Age	P-value of		
		Norm	Normal weight		rweight\o bese	Chi-square
Variable		N	%	N	%	
Give colostrum to baby	Yes	40	95.2%	52	98.1%	0.426
	No	2	4.8%	1	1.9%	
Breastfeed your child (at least one day)	Yes	43	100.0%	54	100.0%	
Frequency of breastfeeding	i don't BF (at the time of survey)	1	2.3%	6	11.1%	0.419
	when he cries	28	65.1%	31	57.4%	
	when he wakes up	7	16.3%	8	14.8%	
	different time intervals	7	16.3%	9	16.7%	
BF cessation	Still BF	22	51.2%	31	59.6%	0.472
	< 6 months	7	16.3%	6	11.5%	
	6-12 months	9	20.9%	6	11.5%	
	> 12 months	5	11.6%	9	17.3%	
Formula	No	19	44.2%	23	42.6%	0.875
	Yes	24	55.8%	31	57.4%	
Age of first food	0-3 months	14	32.6%	13	24.1%	0.623
	4-5.9 months	21	48.8%	31	57.4%	
	6 -11.9	8	18.6%	10	18.5%	

Table 5.11: The association between nutritional factors related to infancy and BMI-for-age at adolescence.

Formula combined	no formula	19	44.2%	21	38.9%	
	takes formula	24	55.8%	31	57.4%	-
	Takes cow's milk	0	0.0%	2	3.7%	_
Baby first put to your	first 3 hr	38	88.4%	46	85.2%	0.849
breast (postpartum) nours	> 3 hr	3	7.0%	4	7.4%	_
	don't remember	2	4.7%	4	7.4%	_
Formula (month)	No	19	44.2%	23	42.6%	0.490
	0-6 months	19	44.2%	20	37.0%	_
	7-12 months or more	5	11.6%	11	20.4%	_
CF information	didn't get(past experience)	22	51.2%	32	59.3%	0.425
	get info	21	48.8%	22	40.7%	

5.5.2 Nutritional status at adolescence:

The participants were asked about their snacking habits, skipping of main meals during the day, consumption of specific types of food, and about the effect of their curriculum, teacher, and friends on their food habits. And the table below shows the relation of these factors with the Body Mass Index (BMI-for-age) of the participants in adolescence.

Table 5.12 shows that about 64.8% of the overweight\obesity participants were eating breakfast daily compared to 60.5% of the normal participants; 24% of the overweight\obese participants were eating or drinking after dinner daily compared to 16% of the normal-weight participants; 53.7% of overweight or obese participants consume milk or its products more than 7 times per week compared to 51% of normal participants.

		BN	BMI-for-Age (adolescence)					
		Norma	Normal weight		Overweight\obese			
Variable		N	%	N	%	Cm-square		
Eat breakfast	Never	4	9.3%	4	7.4%	0.893		
	(1-4) days a week	13	30.2%	15	27.8%			
	Daily	26	60.5%	35	64.8%			
Breakfast preparation	Mother	34	82.9%	47	92.2%			
	I bring it myself	7	17.1%	1	2.0%			
	Others	0	0.0%	3	5.9%			
Eat or drink at school break	Never	3	7.0%	3	5.6%	0.574		
	(1-4) days a week	6	14.0%	12	22.2%			
	Daily	34	79.1%	39	72.2%			
Eat or drink after	Never	29	67.4%	31	57.4%	0.559		
diinei	(1-4) days a week	7	16.3%	10	18.5%			
	Daily	7	16.3%	13	24.1%			
Eat main meal with	Never	1	2.3%	0	0.0%			
rainity memoers	Sometimes	3	7.0%	3	5.6%			
	yes daily	39	90.7%	51	94.4%			
Eating bread (daily)	1-2 times a day	33	76.7%	43	79.6%	0.732		
	>2 times a day	10	23.3%	11	20.4%			
Drink milk and its	>7 times weekly	22	51.2%	29	53.7%			
	1-4 weekly	21	48.8%	25	46.3%			

Table 5.12: Association between nutrition factors at adolescence and BMI-for-age of participants

5.5.3 Supplements intake and BMI-for-age at adolescence:

No significant difference was found between the two groups in the section of supplements intake. Only 3.7% of the overweight or obese participants had iron supplements compared to none of the normal-weight participants and the same percentage for vitamins supplementation compared to 2.3% of the normal-weight participants. See table 5.13

	BN	P-value of				
		Norma	l weight	Overwe	Cm-square	
Variable		N	%	N	%	
Taking Iron pills or syrup (now)	No	43	100.0%	52	96.3%	
	Yes	0	0.0%	2	3.7%	
Taking vitamins or syrup (now)	no, never	42	97.7%	52	96.3%	0.697
	Sometimes	1	2.3%	2	3.7%	

Table 5.13: Association between supplements intake and BMI-for-age at adolescence

5.5.4 Factors affecting food habits at adolescence and BMI-for-age:

Table 5.14 below shows the association between several factors that may affect participants' food habits and BMI in adolescence. Most of the obese participants (79.6%) received nutrition information from their family members While, 32% of normal-weight adolescents received information from their schools and friends. The number of overweight or obese participants who bought cake or sandwiches from school daily or (1-3) times weekly was higher than normal-weight participants. 97.7% of normal-weight participants were satisfied with their appearance compared to 88.9% of overweight or obese participants.

		BMI	P-value of			
		Normal weight		Overwe	Ciii-square	
Variable		Ν	%	N	%	
Sources of nutrition	TV and Internet	11	25.6%	0	0.0%	
information	School and friends	14	32.6%	4	7.4%	
	Doctor	10	23.3%	7	13.0%	
	family members	8	18.6%	43	79.6%	
Think of your health	Bad	4	9.3%	1	1.9%	0.085
	Good	30	69.8%	33	61.1%	
	Excellent	9	20.9%	20	37.0%	
Satisfied with your	Not satisfied	1	2.3%	6	11.1%	0.097
appearance	Satisfied	42	97.7%	48	88.9%	
Buy sandwich or cake from school	do not buy from the school	16	37.2%	11	20.4%	0.182
	1-3 weekly	15	34.9%	23	42.6%	
	Daily	12	27.9%	20	37.0%	
Eat or buy from restaurant	do not buy from restaurant	18	41.9%	19	35.2%	0.535
	1-3 weekly	21	48.8%	26	48.1%	
	once monthly	4	9.3%	9	16.7%	
Eat or drink while	No	10	23.3%	31	57.4%	0.001
	Yes	33	76.7%	23	42.6%	

Table 5.14: association between factors affecting food habits at adolescence and BMI

5.5.5 Adolescents food habits checklist:

The mean of AFHC scores for the normal group was 9.18 compared to 9.76 for the overweight or obese group, although the difference is not significant (P-value= 0.2) see table 5.15. But, these results mean that overweight or obese participants have slightly healthier food habits than normal-weight participants. See appendix 4 table A5 for more details

	BMI-for-Ag		
	Normal weight	Overweight\obese	P-value of
Variable	Mean±SD	Mean±SD	T-test
AFHC score	9.18±4.15	9.76±3.53	0.20

Table 5.15: Adolescent food habits checklist scores of participants

5.5.6 Physical activity:

The frequency of physical activity was higher among normal-weight participants. While the duration was higher among overweight-obese participants compared to normal weight ones (although not significant) (Table 5.16). See appendix 4 (table A2) for the physical activity details

Table 5.16: Association between frequency and duration of physical activity among adolescence and their BMI-for-age

		BN	P-value of			
		Normal weight		Overweight\obese		. Chi-square
Variable	ariable		%	Ν	%	
PA Frequency	Active	22	51.2%	23	42.6%	0.400
	Inadequately active	21	48.8%	31	57.4%	
PA Duration	Active	4	9.3%	9	16.7%	0.290
	Inadequately active	39	90.7%	45	83.3%	

5.5.7 Surrounding factors effect on food and physical activity:

About the effects of adolescence surrounding such as school curriculum; teachers and friends on food choices and physical activity, table 5.17 below shows that a significant difference was found in the curriculum effect on food consumption; 16.3% of the normal weight group were affected while no one was affected from the overweight or obese group. There is no clear difference between the two groups in the effects of either their teachers and friends on their physical activity or food choices. 7% of the normal weight adolescence was influenced by their teacher when choosing what to eat, compared to only 3.7% of the overweight or obese group. And 4.7% and 1.9% of normal and overweight or obese groups respectively were influenced by their teachers on physical activity.

		BMI-For-Age (adolescence)					
Variable		Norma	Normal weight		Overweight\obese		
		Count	N %	Count	N %		
Curriculum effect on food	No	36	83.7%	54	100.0%		
consumption	Yes	7	16.3%	0	0.0%		
Teacher effect on food consumption	No	40	93.0%	52	96.3%	0.469	
	Yes	3	7.0%	2	3.7%		
Friends effect on food consumption	No	43	100.0%	53	98.1%		
	Yes	0	0.0%	1	1.9%		
Curriculum effect on physical activity	No	41	95.3%	53	98.1%	0.429	
	Yes	2	4.7%	1	1.9%		
Teachers effect on physical activity	No	41	95.3%	53	98.1%	0.429	
	Yes	2	4.7%	1	1.9%		
Friends effect on physical activity	No	43	100.0%	54	100.0%		

Table 5.17: Association between surrounding effects on food and physical activity during adolescence and their BMI-for-age

5.5.8 Smoking at adolescence:

Table 5.18 below shows the relation between smoking and BMI of adolescents. 26% of the overweight or obese participants were smokers compared to 16% of the normal participants. 18.5% of overweight or obese participants started smoking >11 years compared to 4.7% of the normal-weight participants.

Table 5.18: Association	between smoking	and BMI-for-age	of participants
	U	U	1 1

		BM	P-value of			
			al weight	Overwe	eight\obese	-Chi-square
Variable		N	%	N	%	
Age of smoking initiation	Never smoking	36	83.7%	40	74.1%	0.107
	8- 11 years	5	11.6%	4	7.4%	-
	>11 years	2	4.7%	10	18.5%	
Smoke cigarettes (past 30	No day	40	93.0%	49	90.7%	0.685
days)	More than one day	3	7.0%	5	9.3%	
Use other types of	No day	36	83.7%	42	77.8%	0.464
tobacco(Ex. pipe) (past 12 months)	More than one day	7	16.3%	12	22.2%	
Try stop smoking (past	never smoking	4	57.1%	6	46.2%	0.719
12 months)	Yes	3	42.9%	6	46.2%	-
	No	0	0.0%	1	7.7%	
Others smoked in your	No day	7	17.1%	7	13.0%	0.844
presence	1-4 days	4	9.8%	5	9.3%	_
(past 7 days)	5 days or more	30	73.2%	42	77.8%	-
Surroundings smokers	None	5	12.8%	10	20.8%	0.095
	Parents	31	79.5%	28	58.3%	
	friends and siblings	3	7.7%	10	20.8%	-

Smoke with you for the	brother or sister or	5	50.0%	6	31.6%	0.187
first time	friends					
	Alone	3	30.0%	12	63.2%	
	Others	2	20.0%	1	5.3%	
Drives you to smoke	My friends all smoke	10	23.3%	18	33.3%	0.277
	I don't smoke	33	76.7%	36	66.7%	

5.4 Health status at adolescence:

No significant difference was found among the studied health status variables between normal weight and overweight or obese group. See table (5.19)

Of the normal-weight group, 23% had at least one health problem while the proportion for the other group was less than that. While31.5% of the overweight/obese group had surgery for different reasons compared to 23.3% of the normal weight group and they went to the dentist more than them, also.

Table 5.19: Association between health status var	riables and BMI-for-age of adolescence
---	--

		BN	BMI-for-Age (Adolescence)				
	Normal	weight	Overwei	Chi-square			
Variable		N	%	N	%		
Allergic to any medicines	No	42	97.7%	52	96.3%	0.697	
	Yes	1	2.3%	2	3.7%		
Any health problems	No	33	76.7%	44	81.5%	0.567	
	Yes	10	23.3%	10	18.5%		
Taking any medicine (now)	No	41	95.3%	49	90.7%	0.384	
	Yes	2	4.7%	5	9.3%		

Went to the dentist(last	No	31	72.1%	31	57.4%	0.135
<i>J J</i>	Yes	1	27.9%	23	42.6%	
		2				
Stayed overnight in a hospital(last year)	No	41	95.3%	50	92.6%	0.576
	Yes	2	4.7%	4	7.4%	
Have a surgery	No	33	76.7%	37	68.5%	0.369
	Yes	10	23.3%	17	31.5%	
Doctor prevented you from sports (for any reason)	No	39	90.7%	50	92.6%	0.736
	Yes	4	9.3%	4	7.4%	

5.4.1 Health status <u>for girls</u>:

Some questions were asked to girls about the menstrual period to investigate if there is an association with BMI-for-age. No significant difference was found but the percentage of having a regular period was higher among normal-weight girls.

Table 5.20: Association between health variables related to <u>girls only</u> and BMI-for-age of female adolescence

		BM	BMI-For- Age (Adolescence)				
	Normal	weight	Overwei	Overweight\obese			
Variable		N	%	N	%		
Started your period	No	3	12.5%	3	16.7%	0.703	
	Yes	21	87.5%	15	83.3%		
Regular period (once a month)	No	6	28.6%	6	37.5%	0.565	
	Yes	15	71.4%	10	62.5%		
Severe contractions in your period	No	6	30.0%	5	35.7%	0.726	
	Yes	14	70.0%	9	64.3%		

5.4.2 Hemoglobin levels and BMI-for-age at adolescence:

When the means of the hemoglobin levels for the normal weight and overweight\obese groups were compared, no significant difference was found. The mean for the normal group was 13.58 compared to 13.22 for the overweight or obese group see table 5.21. This result means that participants with higher BMI-for-age have lower Hb levels although not significant.

ce
С

Variable		BMI-For-Age	P-value of	
		Normal	Overweight\obese	T-test
Hemoglobin	Mean (SD)	13.58 (.81)	13.22 (.87)	0.85
level				

6.1 Introduction

In this chapter, study results are summarized and compared to other studies' results worldwide. Also, the results are interpreted and discussed. In the final part of the chapter study's conclusions and recommendations are presented.

6.2 Summary of the results

The results of this study showed that the percentage of overweight /obesity was approximately equal for the participants before two years of age (n=97) and at adolescence (n=97), 54% and 56%, respectively which are considered high percentages. But, when the change in BMI between the two ages was calculated for each participant, the results showed that only 5% with normal weight in infancy continues to be normal at adolescence, also 40% of participants who were overweight\obese in infancy continue to be the same in adolescence. However, 55% of participants had a change in their BMI by age, of which 16% who were of normal weight in infancy became overweight or obese. Several variables have been studied in order to find the determinants such as factors related to infancy (e.x Breastfeeding and complementary feeding and life style factors through adolescence (ex. Smoking, physical activity, nutrition and food habits)

The univariate analysis of the study data showed positive associations for overweight/obesity with gender (male) p-value <0.1, ranking in the family (first or second child) p-value <0.1, mother education level (> 12 years of studying) p-value <0.1, and monthly household income (higher than 3000 NIS) p-value >0.1. However, a negative association between overweight\obesity and the birth weight of the participants (p-value >0.1). Also, higher frequency of breastfeeding (p-value >0.1) was found to be a protective factor against overweight\obesity. In the adolescence lifestyle section, positive associations were found for overweight\obese group with eating or drinking after dinner (p-value >0.1); being family members the source of nutrition information; buying sandwich or cake from school canteen (p-value >0.1). On the other hand, a negative association was found between overweight\obesity and eating or drinking while watching TV (p-value <0.1); satisfying with appearance (p-value <0.1). And finally, a lower frequency of physical activity is associated with a higher percentage of overweight\obesity (p-value >0.1).

6.3 Socio-demographic and economic factors

At adolescence, 66.7% of male participants were overweight\obese compared to 33.3% of females. This result is consistent with results revealed by other studies which found that the prevalence of overweight among male adolescents was significantly higher than females. (Al Junaibi et al, 2013; Djoudi et al, 2012; Eker et al, 2017; Ghrayeb&Farid, 2013). This result is

justified by being Arab boys usually spend more time out of their houses which exposes them to buy fast food and soft drinks which are high in sugar and fat content and may cause more weight. Also, girls are caring more at this age (puberty) for their shape especially weight compared to males.

Study results showed that 50% of the overweight/obese participants were ranked as the first or second child in their families. So, being the first or second child in the family increases the risk of being obese during adolescence. This result is consistent with the results of two studies which found that being the first child for the family increases the risk of obesity in adolescence (Rathnayake et al, 2014;Berry et al, 2016). This is could be justified with the increased feeding care of the first child in the family and un-controlled behavior they might have which exposes them to eat more especially calorie-dense food and also doing less exercise. Rathnayake et al explained their finding by the increased adipogenesis during late gestation which is continuing after birth; due to resetting of leptin and glucocorticoid axis within the adipocyte, they highlighted that this may lead to increase the prevalence of obesity in communities who have restrictions in family size (Rathnayake et al, 2014).

Study results showed a positive association between maternal education level and rates of adolescence abnormal weight. This finding is consistent with the findings of several studies which found a positive association between maternal education level and children's BMI (Muthuri et al, 2016; Feng et al, 2019). This study finding could be attributed to being adolescents of higher maternal education levels spent more time sedentary (Sherar LB et al, 2016).

Study results showed that 49% of overweight\obese adolescents belong to families with a monthly income of more than 3000 NIS compared to 18.4% for families with lower monthly income. And this is consistent with the results of a study that occurred in Sri Lanka (Rathnayake et al., 2014)showed that the risk of obesity among adolescents significantly increases with high family income and This could be explained by being adolescents who belong to families with higher income have a wider range of food choices. Moreover, a higher daily pocket income of the adolescent leads to higher purchasing power to buy calorie-dense food ex. Fast food and soft drinks increase the risk of obesity.

6.4 Associations of infancy breastfeeding practices, complementary feeding practices and growth in infancy on adolescence growth:

Study results showed that overweight\obese adolescents had a lower mean birth weight compared to normal-weight adolescents. This result is inconsistent with all of the studies in the literature (Kleiser et al., 2009; Evensen et al., 2017; Kang et al., 2018) which shows that being born with a high birth weight increases the risk of overweight and obesity during adolescence. This result could be explained by being people keeping with the notion that babies born with low birth weight need to catch up with growth and this might lead to obesity

due to wrong feeding habits such as giving them high-calorie food (rice, potato), more meals, etc.

In this study, differences were found in the frequency of breastfeeding and time of BF cessation (although not significant). All of the indexed adolescents were breastfed for at least one day. 13.4% had a short duration of breastfeeding (stopped before the time of the survey) of them 11.1% were overweight\obese and those who have been breastfed for 6-12 months of age have an increased probability of being at normal weight during adolescence. Moreover, babies who did not breastfeed all day and night were at higher risk of becoming overweight or obese during adolescence. These results are consistent with several studies in the literature (Tulldahl et al., 1999, Yin J et al., 2012, Rousseaux et al., 2014) and could be explained by the higher risk of overfeeding for babies who stopped breastfeeding early and starting formula and CF. But the association in our study is not clear as other studies may be due to the small sample size.

The results of this study did not show any association between the age of introduction of complementary feeding >6 months of age and the risk of being obese in adolescence; which may be due the small sample size. Most of the studies in the literature found a protective effect against overweight/obesity either if the CF introduction occurs between 4-6 months of age or after 6 months of age (Miranda et al., 2019;Papoutsou et al., 2018; Papoutsou et al., 2017, Pearce et al., 2013; Moss &Yeaton, 2014; Barrera et al., 2016). The studies presented high heterogeneity in their findings and this could be explained firstly, due to the differences in the classification of overweight\ obesity and secondly, due to the differences in the cut-off points for the age of introduction of CF.

6.5Adolescence lifestyle factors

There are no clear differences found in this section and this may be due to reporting bias, obese adolescents usually try to hide their wrong eating habits. This is the reason why this study found that overweight or obese participants have slightly healthier food habits than normal-weight participants. The univariate analysis showed a positive association for adolescent BMI; firstly, with eating or drinking after dinner which could be attributed to lower energy expenditure at night due to early sleeping; secondly, with receiving nutrition information from family members; thirdly, with buying a sandwich or drink from school canteen either several times a week or daily which could be due to higher calorie content. On the other hand, a negative association was found between BMI; firstly, with eating or drinking while watching TV which is inconsistent with results of a study in the literature (Berry et al, 2016) found a positive relationship between them and explained it's finding by eating while watching TV may lead to increase the consumption of food and snakes which may lead to increase BMI; secondly, with school curriculum effect on food consumption and thirdly with satisfaction from appearance which is inconsistent with the finding of

(Badrasawi et al, 2019) which found a significant association between overweight\obesity with lower self-satisfaction.

The results of this study showed that participation in physical activity at least 3 times a week (frequently active) decreases the risk of being overweight or obese even if the duration was low (not significant). These findings are consistent with studies in the literature (Rathnayake et al, 2014, Jane Scott, 2015) which concluded that being physically active significantly reduces the risk of overweight and obesity. The in-significance of our results in physical activity can be attributed to the small sample size and reporting bias from the adolescents themselves.

No significant differences were found between the normal weight group and the overweight\obese one in the health status variables; this could be attributed to the small sample size. On the other hand, the mean of Hemoglobin levels was higher among normal-weight participants and this is consistent with (Pinhas-Hamiel et al, 2003;Bagni et al, 2013) which conclude a negative correlation between BMI-for-age and hemoglobin levels among adolescents and anemia and this could be attributed to poor eating habits of overweight and obese adolescents.

6.6 Limitations and obstacles

The first obstacle was getting the permission to do the study at the UNRWA schools due to internal managerial problems within the organization. It took us more than one year to have the permission and it was the end of the year. We were supposed to do a ten year follow up study; with this delay it was already a year and we have to wait till the start of the new academic year to do the study. Therefore, the children became more than 10-12 years of age.

This study was conducted in Al Amari refugee camp. We had an assumption when we started the field work that students residing at the refugee camp continue their studies at the schools in the camp or a school that is under the supervision of the UNRWA. The researcher prepared a list of the children and it was sent to the schools to check for their registration at the camp school. However, only 97 could be found at these schools. We tried to trace the other students at other UNRWA schools out the camp but could not find any of them. We approached the governmental schools in the same governorate, but could not find them too. We also tried to look in the refugee camp itself, however, at the time the outbreak of COVID 19 started and we could not reach the camp due to the lockdown and the whole study was stopped.

Another limitation of the study could be related to recall bias maybe affect the results. Children have to remember what they have eaten, how much physical activity. So information bias might bias out study findings.
6.7 Conclusion

Obesity in adolescence is a predictor for obesity during adulthood. Therefore, adolescents should be directed to maintain normal weight by increasing their awareness of the determinants of obesity. Several factors have been investigated in this study either related to infancy or adolescence. Unfortunately, the small sample size prevented us from obtaining significant results as expected. But, the results showed a trend toward protective effect against overweight\obesity for higher frequency of breastfeeding and physical activity.

6.8 Recommendations

Recommendations for people at risk

Living a healthy lifestyle decreases the risk of being overweight or obese

Encourage smoker adolescents to stop smoking

Importance of family in the promotion of healthy eating behaviors among adolescence

Recommendations for policymakers and future researchers to provide

Providing more attention to the health status of adolescence

Enhance schools role in the promotion of healthy habits either in diet or in physical activity

Conduct more detailed researches with a larger sample size.

Focusing not only on the time of introduction of CF also on the type of food introduced

Reference list:

- Abdulrahman.Musaiger; Mariam Al-Mannai; ReemaTayyem; Osama Al Lalla,4
- Al Junaibi, A., Abdulle, A., Sabri, S., Hag-Ali, M., & Nagelkerke, N. (2013). The prevalence and potential determinants of obesity among school children and adolescents in Abu Dhabi, United Arab Emirates. International Journal of Obesity, 37(1), 68–74.
- Al-Lahham, S., Jaradat, N., Altamimi, M., Anabtawi, O., Irshid, A., AlQub, M., Dwikat, M., Nafaa, F., Badran, L., Mohareb, R., Haji, R., Aqqad, T., Jayyab, S., Ghosh, B. A., Taher, R., & Al Zabadi, H (2019). Prevalence of underweight, overweight and obesity among Palestinian school-age children and the associated risk factors: a cross-sectional study. BMC pediatrics, 19(1), 483.
- Badrasawi MM, Abu. Snouber LM, Al-Tamimi MA, Badrasawi KJ (2019).
 Prevalence, Risk factors and Psychosocial Status of obese and overweight
 Adolescents in Hebron City, Palestine. Int J Nutr Pharmacol Neurol Dis 2019; 72-9.
- Bagni U; Gloria R; Veiga V (2013).Being overweight is associated with low hemoglobin levels in adolescent girls. Obesity Research & Clinical Practice, Volume 7, Issue 3, Pages e218-e229
- Barrera, C. M., Perrine, C. G., Li, R., & Scanlon, K. S. (2016). Age at Introduction to Solid Foods and Child Obesity at 6 Years. Childhood obesity (Print), 12(3), 188–192.
- Centers for Disease Control and Prevention (2020).Breastfeeding; Retrieved October 29, 2020 from the website: https://www.cdc.gov/breastfeeding/index.htm.
- Centers For Disease Control And Prevention (CDC). (2018). Defining Childhood Obesity. Retrieved May 5, 2019, from Website: https://www.cdc.gov/obesity/childhood/defining.html
- Crichton, G. E. (2017). Does the early introduction of solids promote obesity ?, 58(11), 626–631.
- Eker, H. H., Taşdemir, M., Mercan, S., Mucaz, M., Bektemur, G., Şahinoz, S.,
 &Özkaya, E. (2017).Obesity in adolescents and the risk factors. Turkish journal of physical medicine and rehabilitation, 64(1), 37–45.
- El-Bayoumy, I., Shady, I., &Lotfy, H. (2009). Prevalence of Obesity Among Adolescents (10 to 14 Years) in Kuwait. Asia Pacific Journal of Public Health, 21(2), 153–159.
- ElinEvensen, Nina Emaus, AneKokkvoll, Tom Wilsgaard, Anne-SofieFurberg, GuriSkeie (2017). The relation between birth weight, childhood body mass index, and overweight and obesity in late adolescence: a longitudinal cohort study from Norway, The Tromsø Study, Fit Futures; 7:e015576.

- Essa Y. H. Ali; FaizaKalam; MofidaM. Benhamed; SabriSaghir; Ismail Halahleh;
 Zahra DjoudiandManelChirane (2012). Prevalence of Overweight and Obesity among
 Adolescents in Seven Arab Countries: A Cross-Cultural Study, Journal of obesity.
- Feng, Y., Ding, L., Tang, X., Wang, Y., & Zhou, C. (2019). Association between aternal Education and School-Age Children Weight Status: A Study from the China Health Nutrition Survey, 2011. International journal of environmental research and public health, 16(14), 2543.
- Ghrayeb, Farid. (2013). Prevalence of Overweight and Obesity among Adolescents in Tarqumia, Palestine. CANADIAN JOURNAL OF BASIC AND APPLIED SCIENCES. 1. 49-57.
- Gingras, V., Aris, I. M., Rifas-Shiman, S. L., Switkowski, K. M., Oken, E., &Hivert, M. F. (2019). Timing of complementary feeding introduction and adiposity throughout Childhood. Pediatrics, 144(6), e20191320.
- Inbody (2021). Inbody machine technology. Website <u>https://inbodyusa.com/#</u>
- Jenny Tulldahl, KjellPettersson, Susan W. Andersson, and Lena Hulth&n (1999).
 Mode of Infant Feeding and Achieved Growth in Adolescence: Early Feeding Patterns in Relation to Growth and Body Composition in Adolescence.
- Johnson F, Wardle J, Griffith J, (2002). The adolescent food habits checklist: reliability and validity of a measure of healthy eating behavior in adolescents.
- JulienRousseaux; Alain Duhamel; Dominique Turck; Denes Molnar; Julia Sallero; Enrique Garcia Artero; Stefaan De Henauw; Sabine Dietrich; YannisManios; RaffaelaPiccinelli; Michael Sjöström; Luis Aznar Moreno; FrédéricGottrand (2014). Breastfeeding Shows a Protective Trend toward Adolescents with Higher Abdominal Adiposity, Obesity facts.
- Kalkan I. The impact of nutrition literacy on the food habits among young adults in Turkey. (2019) .Nutr Res Pract.(4):352 357.
- Kang, M., Yoo, J. E., Kim, K., Choi, S., & Park, S. M. (2018). Associations between birth weight, obesity, fat mass and lean mass in Korean adolescents: the Fifth Korea National Health and Nutrition Examination Survey. BMJ open, 8(2), e018039.
- Kaur, Sukhdeep&Bains, Kiran&Kaur, Harpreet.(2018). Anemia among School-Going Children in the Perspective of Socio-Economic Disparity in Punjab, India (Journal of Applied and Natural Science). Journal of Applied and Natural Science.
- Kleiser, C., Schaffrath Rosario, A., Mensink, G. B. M., Prinz-Langenohl, R., & Kurth, B. M. (2009). Potential determinants of obesity among children and adolescents in Germany: Results from the cross-sectional KiGGS study. BMC Public Health, 9, 1–15. https://doi.org/10.1186/1471-2458-9-46
- M L Booth, A D Okely, T Chey, A Bauman (2001). The reliability and validity of the physical activity questions in the WHO health behaviour in schoolchildren (HBSC) survey: a population study. Br J Sports Med 2001;35:263–267

- Miranda, E. P., Leila, M., Santana, P. De, Costa, J., Pitangueira, D., & Assis, A. M. De. (2019). Age of introduction of complementary feeding and overweight in adolescence and adulthood : A systematic review, (July 2018), 1–9.
- Moss, B. G., &Yeaton, W. H. (2014). Early childhood healthy and obese weight status: potentially protective benefits of breastfeeding and delaying solid foods. Maternal and child health journal, 18(5), 1224–1232.
- Mota, J., Fidalgo, F., Silva, R., Ribeiro, J. C., Santos, R., Carvalho, J., & Santos, M.
 P. (2008). Relationships between physical activity, obesity and meal frequency in adolescents. Annals of Human Biology, 35(1), 1–10.
- Musmar, Samar &Qanadeelu, Shaden. (2012). Breastfeeding Patterns among Palestinian Infants in the First 6 Months in Nablus Refugee Camps: A Cross-Sectional Study. Journal of human lactation: official journal of International Lactation Consultant Association. 28. 196-202.
- Muthuri SK, Onywera VO, Tremblay MS,Broyles ST, Chaput J-P, Fogelholm M, et al. (2016)Relationships between Parental Education andOverweight with Childhood Overweight and PhysicalActivity in 9–11 Year Old Children: Results from a 12-Country Study. PLoS ONE 11(8): e0147746
- Nubani-Husseini M, Berry E, Abdeen Z, Donchin M (2016) .Dietary patterns and physical activity among Palestinian female schoolchildren in East Jerusalem (Original research). SEEJPH 2016
- Oddy, W. H., Mori, T. A., Huang, R. C., Marsh, J. A., Pennell, C. E., Chivers, P. T., Hands, B. P., Jacoby, P., Rzehak, P., Koletzko, B. V., &Beilin, L. J. (2014). Early infant feeding and adiposity risk: from infancy to adulthood. Annals of nutrition & metabolism, 64(3-4), 262–270.
- Palestinian Central Bureau of statistics. (2019). Retrieved April 2, 2021 from http://pcbs.gov.ps/Portals/_Rainbow/Documents/RamallahA.html
- Papoutsou, S., Savva, S. C., Hunsberger, M., Jilani, H., Michels, N., Ahrens, W., Tornaritis, M., Veidebaum, T., Molnár, D., Siani, A., Moreno, L. A., Hadjigeorgiou, C., & IDEFICS consortium (2018). Timing of solid food introduction and association with later childhood overweight and obesity: The IDEFICS study. Maternal & child nutrition, 14(1), e12471.
- Papoutsou.S; Savva.S; Hunsberger .M; Jilani.H; Michels. N; Ahrens.W; Tornaritis. M; Veidebaum.T; Molnár. D; Siani.A; Moreno. L; Hadjigeorgiou. C (2017). Timing of solid food introduction and association with later childhood overweight and obesity: The IDEFICS study. Maternal and Child Nutrition journal.
- Pearce, J., Taylor, M. A., & Langley-Evans, S. C. (2013). Timing of the introduction of complementary feeding and risk of childhood obesity: a systematic review. International journal of obesity (2005), 37(10), 1295–1306.

- Pell, C., Imelda, J. D., Allotey, P., Hardon, A., Evans, N., Reidpath, D. D., & Soyiri, I. (2016). Coming of age, becoming obese: a cross-sectional analysis of obesity among adolescents and young adults in Malaysia. BMC Public Health, 16(1), 1–11.
- Pinhas-Hamiel O, Newfield RS, Koren I, Agmon A, Lilos P, Phillip M.(2003) Greater prevalence of iron deficiency in overweight and obese children and adolescents. Int J ObesRelatMetabDisord.
- PMC. (2003). Age limits and adolescents. Retrieved May 9, 2019, from Website: <u>https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2794325/</u>
- Prell C &Koletzko B (2016).Breastfeeding and Complementary Feeding. DeutschesArzteblatt international, 113(25), 435–444. https://doi.org/10.3238/arztebl.2016.0435
- Rathnayake, K. M., Roopasingam, T., & Wickramasighe, V. P. (2014). Nutritional and behavioral determinants of adolescent obesity: A case-control study in Sri Lanka. BMC Public Health, 14(1). <u>https://doi.org/10.1186/1471-2458-14-1291</u>
- Sherar LB, Griffin TP, Ekelund U, et al (2016). Association between maternal education and objectively measured physical activity and sedentary time in adolescents J; Epidemiology Community Health;70:541-548.
- Sirbu, A. E., Albu, A. I., Teleman, M. D., Bancescu, A., Fica, S. V., Barbu, C. G., & Martin, S. C. (2015). Obesity and eating behaviors in school children and adolescents –data from a cross sectional study from Bucharest, Romania. BMC Public Health, 15(1), 1–10.
- Soliman, A. T., De Sanctis, V., &Kalra, S. (2014). Anemia and growth. Indian journal of endocrinology and metabolism, 18(Suppl 1), S1–S5.
- Tulldahl, J., Pettersson, K., Andersson, S. W., Hulth, L., Pettersson, K., & Susan, W. (1999). Mode of Infant Feeding and Achieved Growth in Adolescence : Early Feeding Patterns in Relation to Growth and Body Composition in Adolescence, 7(5), 431–437.
- UNRWA. (2015).Ama'ri camp. Retrieved April3, 2021 from Website: https://www.unrwa.org/where-we-work/west-bank/amari-camp#block-menu-block-10
- Vehapoglu, A., Yazıcı, M., Demir, A. D., Turkmen, S., Nursoy, M., &Ozkaya, E. (2014). Early infant feeding practice and childhood obesity: the relation of breast-feeding and timing of solid food introduction with childhood obesity. Journal of pediatric endocrinology &metabolism: JPEM, 27(11-12), 1181–1187.
- VéroniqueGingras, Izzuddin M. Aris, Sheryl L. Rifas-Shiman, Karen M.
 Switkowski, Emily Oken and Marie-France Hivert (2019). The association between the timing of CF introduction and adiposity throughout childhood.Pediatrics 144 (6) e20191320.
- World Health Organization (WHO) (2006) .WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body

mass index-for-age: methods and development. Retrieved October 29. Website: https://www.who.int/publications/i/item/924154693X

- World Health Organization (WHO) (2007).Growth reference data for 5-19 years.Application tools.Website: <u>https://www.who.int/tools/growth-reference-data-for-5to19-years/application-tools</u>
- World Health Organization (WHO) (2019b). Appropriate complementary feeding, Retrieved September10, 2020 from Website: <u>https://www.who.int/elena/titles/complementary_feeding/en/</u>
- World Health Organization (WHO) (2019c). About the Health Behavior in Schoolaged children. (HBSC) study. Website: https://www.euro.who.int/en/healthtopics/Life-stages/child-and-adolescent-health/health-behaviour-in-school-agedchildren-hbsc/about-hbsc
- World Health Organization (WHO), (2019a).Complementary feeding.Retrieved October 29, 2020 from Website<u>https://www.who.int/health topics/complementary-feeding #tab=tab_1</u>.
- YinJ; QuinnS; DwyerT; Ponsonby A-L and Jones G (2012). Maternal diet, breastfeeding and adolescent body composition: a 16-year prospective study. Eur J ClinNutr 66, 1329–1334.

Appendices

- Appendix 1: Ethical approval letter
- Appendix 2: Study consent form
- Appendix 3: Adolescence study questionnaire
- Appendix 4: Study additional tables
- Appendix 5: Baseline study questionnaire

Appendix 1: Ethical approval letter

Al-Quds University Jerusalem

Deanship of Scientific Research



جامعة القدس القدس عمادة البحث العلم

Research Ethics Committee Committee's Decision Letter

Date: November 3, 2018 Ref No: 48/REC/2018

Dear Dr. Nuha El Sharif,

Thank you for submitting your application for research ethics approval. After reviewing your application entitled "Infants weaning practices and early adolescence health: Ten years follow up of a cohort of children residing in Al Amari Refugee Camp."

The Research Ethics Committee confirms that it is in accordance with the research ethics guidelines at Al-Quds University.

Please inform us if there will be any changes in your research methodology, subjects, plan and

we would appreciate receiving a copy of your final research report.

Thank you again and wish you productive research that serves the best interest of your subjects.

Lapine Blar Dina M. Bitar PhD

Research Ethics Committee Chair

Cc. Prof. Imad Abu Kishek - President Cc. Members of the committee Cc. file

Abu-Dies, Jerusalem P.O.Box 20002		أبوديس، القدس ص.ب. 20002
Tel-Fax: #970-02-2791293	research@admin.alquds.edu	تلفاكس: 2791293-970-02-2791293

Appendix 2: Study consent form



نموذج طلب موافقة على المشاركة في بحث علمي عنوان الدر اسة:

Age of Complementary feeding introduction in infancy and growth among adolescence residing in Al-Amari refugee camp: A follow up study.

تعتبر التغذية خلال السنتين الأولى من العمر عامل مهم من العوامل التي تؤثر على جودة مراحل الحياة اللاحقة وخصوصا مرحلة المراهقة حيث اثبتت الدراسات أن التغذية الصحيحة خلال هذه المرحلة العمرية من حيث الرضاعة الطبيعية و وقت وطريقة ادخال الأغذية المكملة تؤثر على أوزانهم و احتمالية اصابتهم ببعض الامراض مثل امراض الجهاز التنفسي بالاضافة الى تحصيلهم العلمي.

وقد جاء هذا البحث استكمالا لبحث سابق تم اجراؤه عام 2008 على جميع الاطفال الذين لم تتجاوز اعمار هم السنتين-في ذلك الوقت- في مخيم الأمعري/رام الله والذين كان عددهم 250 طفل. كان يهدف البحث لدراسة ممارسات الامهات مع اطفالهم من حيث الرضاعة الطبيعية وادخال المكملات الغذائية في هذه الفترة العمرية, حيث سنقوم بالبحث عن هؤلاء الاطفال في المدر اس بهدف دراسة مدى تأثير هذه الممارسات على صحة هؤلاء الاطفال في مرحلة المراهقة من حيث زيادة الوزن , اصابتهم ببعض الامراض مثل امراض الجهاز التنفسي , ضغط الدم والسكري والنمو بالاضافة الى مستوى تحصيلهم العلمي.

و لاتمام هذه الأهداف قمنا بتجهيز استبيان يحتوي على اسئلة خاصة بأهداف الدراسة لذا نرجو منكم الموافقة على مشاركة أبنائكم في هذا البحث علما ان المعلومات الواردة في الاستبيان ستستعمل لأغراض البحث العلمي فقط ونضمن لكم السرية التامة في المعلومات التي سيدلي بها أبناؤكم. كما وسيتم عمل فحص لقوة الدم بواسطة باحث مرخص بالاضافة لاستخدام جهاز حديث لقياس نسبة الدهون والعضلات في الجسم. لذلك نرجو منكم التوقيع بالموافقة على مشاركة أبنائكم لاتمام أهداف هذه الدراسة.

شاكرين لكم حسن تعاونكم

لقد قمت بقراءة جميع التعليمات الواردة في هذا الاستبيان وعليه قررت الموافقة على مشاركة ابني/ابنتي في هذه الدراسة وان وجود اسمي وتوقيعي هو دليل على قبولي لمشاركته في هذه الدراسة_. التاريخ: -----

الساعة: -----

التوقيع:

اسم ولي أمر المشارك/ة:

التوقيع:

اسم الباحث:

Appendix 3: Study questionnaire

بيانات هذه الاستبانة سرية وتستخدم في أغراض البحث العلمي فقط.

Field worker
التوقيع
التاريخ

		(D	ىية (Q	الأول : البيانات الشخص	الجزء	
	_م	سنة	رر	الميلاد: يوم شمير	تاريخ	DQ1
					الجنس	DQ2
[-أنثى				0-ذکر		
شخص	:	^ي في نفس المنزل	ون معا	د الأشخاص الذين يسكن	کم عد	DQ3
			ى	ترتيبك بين أفراد أسرتا	ما هو	DQ4
3-□الرابع 4-□غير ذلك	الثالث	□-2]الثاني	لأول 1-[₩□-0	
				، التعليم للأب	مستوى	DQ5
2-اعدادي 🗆 3-ثانوي 🗆 4-مهني		1 -ابتدائي		0-بدون تعليم		
7-در اسات عليا		6-بكالوريوس		5-دبلوم		
				، التعليم للأم	مستوى	DQ6
2-اعدادية 🔲 3-ثانوية 🔲 4-مهني		1 - ابتدائية		0-بدون تعليم		
7-در اسات عليا		6-بكالوريوس		5-دبلوم		

الجزء الثاني : البيانات الاقتصادية (ECQ)	
هل يعمل الأب؟	ECQ1

				[-نعم			ט-ע					
				للأب؟	ة العملية	ا هي الحال	نت الإجابة نعم م	إذا كا	ECQ2			
2-موظف في القطاع الخاص		ت غير حکومية	مۇسسا	1-موظف		ي	()۔موظف حکوم					
			<u>مر</u> ة	4-أعمال		ۇسسات	3-موظف في الم الدولية					
هل تعمل الأم؟												
					2	?-0 □	1-نعم					
				للأم؟	ة العملية	ا هي الحال	نت الإجابة نعم م	إذا كا	ECQ4			
2-موظفة في القطاع الخاص		ت غير حکومية	مۇسساد	1-موظفة		ڀ	()-موظفة حكوم					
			حرة	4-أعمال		ۇسسات	3-موظفة في الم الدولية					
							أخذ مصروف؟	هل ت	ECQ5			
					2	2-0	1-نعم					
	?.	فٍ لتلبية احتياجاتك	رمي کاه	ىروفك اليو	ن أن مص	هل تعتقد/ير	لانت الإجابة نعم ه	إذا ك	ECQ6			
0-غالباً لا يكفي		1-دائماً لا يكفي		Ļ	غالباً يكف	2	3-دائماً يكفي					
		اشخاص		و اخوات)	ة (اخوة ا	في الأسر	عدد العاملين في		ECQ7			
					ب حاليا؟	رة الشهري	مجمل دخل الاس		ECQ8			
2	2000	1-ما بين 1000-				ز شیکل	0-أقل من 000]					
	3	3-اكثر من 000				3000-	2-ما بين 2000					
							طبيعة المنزل		ECQ9			
		نأجر	1_مسز				0-ملك					
	ċ	مشترك مع اخرير	3-شقة				2-مىيىتقل					
						(4-مع عائلة الأب					

		ء الثالث:التدخين(SMQ)	الجز	
) مرة؟	ان عمرك عندما جربت تدخين السجائر لأول	کم ک	SMQ1
1-(7 سنين أو أقل)		0-لم أدخن سيجارة أبدا		
11-10)-3 (سنة		2-(8-9 سنوات)		
15-14)-5 سنة)		13-12)-4سنة)		
َ سخائر ؟	خنت فيها	، الثلاثين يوما الماضية _. كم عدد الأيام التي د	خلال	SMQ2
2-1)-1 يوم)		0 -ولا يوم		
3-(6-6 أيام)		2-(3-3 ايام)		
5-(29-20 يوم)		4-(10-10 يوم)		
		6-الثلاثين يوما كاملة		
دمت فيها أي نوع أخر من التبغ, مثل النارجيلة (الشيشة) أو	لتي استخ) الاثني عشر شهرا الماضية _. كم عدد الأيام ا ِن (البايب)؟	خلال الغليو	SMQ3
(2-1) يوم		0-ولا يوم		
9-6)-3 ايام)		2-(3-3 ايام)		
5-(29-20 يوم)		4-(10-10 يوم)		
		6-الثلاثين يوما كلها		
ن تدخين السجائر ؟	تتوقف ع	، الاثني عشر شهرا الماضية _. هل حاولت أن	خلال	SMQ4
1-أنا لم أدخن السجائر خلال الاثني عشر شهرا الماضية		0-أنا لم أدخن السجائر أبدا		
צ-3		2-نعم		
لمخاص يدخنون أثناء وجودك؟	نان فيها أنْ) الأيام السبعة الماضية, كم عدد الأيام التي ك	خلال	SMQ5
2-1)-1 يوم)		0-ولا يوم		
3-(5 أو 6 أيام)		2-(3 أو 4 أيام)		
		4-السبعة أيام كلها		

			دخن من عائلتك ومحيطك؟	من پ	SMQ6
ولي أمري	[-أبي أو	1	0-لا يوجد		
ي أبي وأمي ر)۔کل من	3	2-أمي أو ولية أمري		
و اختي	إ-أخي أو	5 🗆	4-أصدقائي /صديقاتي		
		-1	ة من قمت بالتدخين لأول مرة؟	برفقا	SMQ7
	[-أمي	1	0-أبي		
ئي	أصدقا	3 🗆	2-أخي أو أختي		
			4-غير ذلك4		
		خانة)	ذي يدفعك للتدخين؟ (يمكن اختيار أكثر من	ما الذ	SMQ8
ن أفضل من الاحساس بالملل	[- التدخير	1	0-التدخين مريح للاعصاب		
الك (حدد)	ز-غير ذا	3	2-أصدقائي كلهم يدخنون		
			ط الجسدي(PAQ)	والنشاد	الجزء الرابع
			مدد حصص لرياضة التي تأخذها في الأسبوع 	کم ع	PAQ1
		?	رة تشارك في حصص الرياضة في الأسبوع	کم مر	PAQ2
مدرسة (مثلا قبل الدوام أو بعده أو في الفرصة)	غ في الم	، وقت الفر ا	رة تشارك في لعب الرياضة أو النشاط البدني	کم مر	PAQ3
1-مرة_مرتين أسبوعيا			0-لا أشارك		
3-(5-6)مرات اسبو عيا(تقريبا يوميا)		(2-(3-4)مرات اسبو عيا(تقريبا يوم بعد يوم)		
•			غير _و حدد/ي		
، فرق رسمية أو دروس رسمية (مثلا فريق كرة	رسة في	، خارج المد ؟	رة تشارك في لعب الرياضة أو النشاط البدني تدريب كاراتيه يركة سياحة كثيافة الخ	کم مر سالة	PAQ4
. f	<u> </u>	•(لىرىب كارانيە, دېپ، شېكە, كساف, الى	,-uu	
1-مرة_مرتين اسبوعيا			0-لا اشارك		
3-(5-6)مرات اسبو عيا(تقريبا يوميا)		(2-(3-4)مرات اسبو عيا(تقريبا يوم بعد يوم)		
			غير هر حدد/ي		
ن نشاطات غير رسمية (مثلا اللعب مع الأصدقاء	رسة في	، خارج المد	رة تشارك في لعب الرياضة أو النشاط البدني	کم مر	PAQ5

	في ا	شارع أو في ساحات أخرى)؟		
		0-لا أشارك		1-مرة_مرتين أسبوعيا
		2-(4-3)مرات اسبو عيا(تقريبا يوم بعد يوم)		3-(5-6)مرات اسبو عيا(تقريبا يوميا)
		غير _{هر} حدد/ي	<u> </u>	
PAQ6	مانو	ع الرياضة أو الأنشطة الجسمية التي تلعبها:		
PAQ7	کم س	اعة تقضي في اليوم في أيام المدرسة وأنت تشاهد التلفز	يون, الفي	يو, DVD
		0-لا أشاهد التلفزيون, الفيديو, DVD		1-أقل من ساعة
		2-1)-2)ساعة		3-3)-3)ساعات
		4-أكثر من 5 ساعات	1	
PAQ8	کم س	اعة تقضي في اليوم في أيام العطل والجمع وأنت تشاهد	التلفزيوز	, الفيديو, DVD
		0-لا أشاهد التلفزيون, الفيديو, DVD		1 -أقل من ساعة
		2-1)-2)ساعة		3-3)ساعات
		4-أكثر من 5 ساعات	1	
PAQ9	هل ا	ديكم انترنت في البيت؟		
		ע-ע		[-نعم
PAQ10	کم س	اعة تقضي في اليوم في أيام المدرسة أمام الكمبيوتر "أل	باب الكم	يوتر والانترنت"؟
		0-لا استعمل الكمبيوتر أو الانترنت		1-أقل من ساعة
		2-1)-2)ساعة		5-3)-3) ساعات
		4-أكثر من 5 ساعات	<u> </u>	
PAQ11	کم س	اعة تقضي في اليوم في أيام العطل أمام الكمبيوتر "ألعاب	الكمبيوت	ر والانترنت"؟
		0-لا استعمل الكمبيوتر أو الانترنت		1-أقل من ساعة
		2-1)-2)ساعة		5-3)-3) ساعات
		4-أكثر من 5 ساعات		

					اعة تدرس في اليوم في أيام المدرسة؟	کم س	PAQ12		
ية	2-1)-1)ساء				0-أقل من ساعة				
ساعات	3-أكثر من 5				2-(3-3)ساعات				
		<u> </u>		مع؟	العة تدرس في اليوم في أيام العطل والجا	کم س	PAQ13		
ية	(2-1)-1 ساء				0-أقل من ساعة				
ساعات	3-أكثر من 5				2-(3-3)ساعات				
		<u>. </u>	<u></u>		و الخامس: الحالة الصحية (HQ)	الجزء			
				وية؟	ماني من حساسية لأي نوع من أنواع الأد	هل ت	HQ1		
			1-نعم		ט-ע				
				دوية؟	نت الاجابة نعم فما هو اسم الدواء أو الأ	اذا کا			
					ماني من أية مشاكل صحية؟	هل ت	HQ2		
	-لا								
					نت الاجابة نعم, أذكر ها	اذا کا			
					تاول أي نوع من أنواع الأدوية الان؟	هل تت	HQ3		
			1-نعم		א-0				
				.	نت الاجابة نعم أذكر أسماء هذه الأدوية	اذا کا			
				خىيە؟	هبت الى طبيب الأسنان خلال السنة الماه	هل ذ	HQ4		
2-لست متأكدا			1-نعم		א-0				
			الماضيه؟	، السنة	مت بقضاء ليلة كاملة في المستشفى خلال	هل قم	HQ5		
2-لست متأكدا			1-نعم		ט-ע				
	!				نت الاجابة نعم _، اذكر /ي السبب	اذا کا			
					، اجراء أي عملية جراحية لك سابقا؟ 	هل تد	HQ6		
		ع العملية.	1- نوع نعم		0-צ				

			Ş	بق وأن عانيت أو تعاني حاليا من التالية	هل س	HQ7
2-لست متأكدا	[-نعم	א-0		حساسية الجيوب الانفية أو حمى القش	1	
حدد/ي	[-نعم	¥-0		الربو أو الحساسية أو مشاكل في التنفس	2	
2-لست متأكدا	1-نعم	0-צ		مرض في القلب	3	
2-لست متأكدا	[-نعم	0-צ		تشنجات	4	
2-لست متأكدا	[-نعم	0-צ		سرطان	5	
2-لست متأكدا	[-نعم	ט-צ		مرض السكري	6	
2-لست متأكدا	1-نعم	ט-צ		الصرع	7	
2-لست متأكدا	1-نعم	0-צ		اكتئاب أو قلق دائم	8	
2-لست متأكدا	[-نعم	0-צ		ارتفاع في ضىغط الدم	9	
2-لست متأكدا	[-نعم	0-צ		الم في المفاصل او عظامك	10	
2-لست متأكدا	[-نعم	0-צ		فقر الدم أو الانيميا	11	
2-لست متأكدا	[-نعم	0-צ		دهنيات في الدم	12	
2-لست متأكدا	[-نعم	0-צ		اصابة جسدية حادة	13	
2-لست متأكدا	[-نعم	¥-0		تعاني من الم في الرأس عند الركض او ممارسة الرياضة	14	
حدد/ <u>ي:</u>	[-نعم	0-צ		حساسية في الجلد	15	
حدد/ي:	[-نعم	0-צ		اسهال دائم	16	
حدد/ي:	[-نعم	0-צ		امساك دائم	17	
حدد/ <u>ي :</u>	[-نعم	ע-ע		مشاكل في الهضم او الم في البطن دائما	18	
حدد/ي:	[-نعم	0-צ		مشاكل في السمع	19	
حدد/ي:	[-نعم	0-צ		مشاكل في النظر	20	

حدد/ <u>ي:</u>		1-نعم		ט-צ		مشاكل في العيون	21					
ح <i>دد/<u>ي :</u></i>		[-نعم		ט-צ		ألام في الرأس	22					
حدد/ <u>ي:</u>		[-نعم		ט-צ		الفم والاسنان او اللثة	23					
						أخرى حدد/ي:	24					
ا هل لديك أي تساؤ لات أو قلق حيال أي من الأتية:												
						ی, أذكر ها	اخرى					
		الأسباب؟	بب من	ـة لأي س	رياض	ىبق وأن منعك طبيبك من المشاركة في ال	هل س	HQ9				
	سبب	1-نعم ال				¥-0						
								1 \$1.NIT				
								للإيات فقط				
						دأت لديك الدورة الشهرية؟	هل بد	للايات فقط HQ10				
				1-نعم		دأت لديك الدورة الشهرية؟ 0-لا	هل بد	للريات فقط HQ10				
		بر)؟	في الشع	1-نعم ظام(مرة	۵	دأت لديك الدورة الشهرية؟ 0-لا انت الاجابة نعم, هل تأتيك الدورة الشهري	هل بد ادا ک	HQ10 HQ11				
		بر)؟	في الشو	1-نعم ظام(مرة 1-نعم	ة بانتذ	دأت لديك الدورة الشهرية؟ 0-لا انت الاجابة نعم, هل تأتيك الدورة الشهري 0-لا	هل بد اذا ک	HQ10 HQ11				
اليوم		بر)؟ شهر	في الشو ة اك؟ ال	1-نعم ظام(مرة 1-نعم رة شهريا	ے به بانتم ر دور	دأت لديك الدورة الشهرية؟ 0-لا انت الاجابة نعم, هل تأتيك الدورة الشهري 0-لا انت الاجابة نعم, متى كان أول يوم من اخ	هل بد اذا ک اذا ک	HQ10 HQ11 HQ12				
ليوم ذهاب للمدرسة.؟	مي او ال	بر)؟ شهر	في الشو ة لك؟ ال	1-نعم ظام(مرة 1-نعم رة شهريا	له بانتخ بانتخ در دور	دأت لديك الدورة الشهرية؟ 0-لا انت الاجابة نعم, هل تأتيك الدورة الشهري 0-لا انت الاجابة نعم, متى كان أول يوم من اذ عادة تعانين خلال الدورة من انقباضات ح	هل بد اذا ک اذا ک هل ء	HQ10 HQ11 HQ12 HQ13				

						الجزء السادس:العادات الغذائية (FHQ)	
	1				r		
لا اتناول وجبة			لا		نعم	اذا كنت اتناول وجبة الغداء خارج المنزل, عادة ما اقوم	FHQ1
الغداء خارج						باختيار وجبة قليلة الدهون	
المنز ل							
			لا		نعم	في العادة اتجنب تناول الاطعمة المقلبة	FHO2
			لا		نعم	عادة أقوم بتناول الحلوي عند توفر ها	FHO3
			لا		نعم	أحرص على تناول حصبة واحدة من الفواكه على الأقل في	FHO4
				_	`	 اليو د	
		X			نعد	يرم. أحاول التقليل من استعلاك الدهون قدر الإمكان	FHO5
اد أقد بشد ازما		-	V			اذاكانتاقه مدشد اعد قائقال طاطير يفغالا أم الختارين عدققارا قالدهن	FHO6
ے 'ے بے بے رہے أبدا			4		~		1 IIQ0
لم أقم بتناولها أبدا			لا		نعم	أنا أتجنب الاكثار من تناول النقانق والبر غر	FHQ7
			لا		نعم	غالبًاماأشتر يالمعجناتأو الكعك	FHQ8
			لا		نعم	أحاول التقليل من استهلاك السكر قدر الامكان	FHQ9
			لا		نعم	أحرص على تناول حصبة واحدة من الخضبار أو السلطة	FHQ10
					,	على الأقل في اليوم	
لا أتناول			لا		نعم	اذا توفرت حلوى في المنزل, أحاول الحصول على نوع قليل	FHQ11
الحلويات						المحتوى من الدهون	_
			لا		نعم	نادرا ما اتناول الوجبات الجاهزة	FHQ12
			لا		نعم	أحرص على التأكد من تناول الكثير من الخضار والفواكه	FHQ13
			لا		نعم	عادة ما اتناول الحلويات كوجبة خفيفة بين الوجيات	FHO14
			لا		نعم	عادةماأتناو لحصةو احدة علىالأقامنالخضار	FHO15
					``	(باستثناءالبطاطس) أو سلطةمعو جبتيالمسائية.	
			لا		نعم	عندما أقوم بشراء مشروب غازي عادة ما اختار مشروب	FHO16
					``	الحمية	
لا أقوم بوضعها			لا		نعم	عندما أضع الزبدة أو المارجارين على الخبز عادة ما أقوم	FHQ17
على الخبز أبدا						بنشر ها بشکل رقیق	
لم أقوم بأخذ علبة			لا		نعم	اذا اخذت علبة غذاء معك للمدر سة،عادةً ما أقوم بوضع	FHO18
غذاء أل المدرسة					,	بعض الشيكولاتة و / أو البسكويت.	
أبدا							
لا اتناو ل			لا		نعم	عندما اتناول وحيات خفيفة بين الوحيات عادة ما اختار ها	FHO19
الوجبات الخفيفة				_	``	من الفو اكه	
أبدا							
لا أتناو ل			لا		نعم	اذا كنت سأتناول حلوي أو يو دنغ في مطعم أقوم باختيار	FHO20
الحلوبات في					`	النوع الصحي منها	- <-~
المطعم أبدا							
لا انتاول			لا		نعم	عادة ما أتناول الكريما على الحلويات	FHO21
الحلويات ابدا					`		
			لا		نعم	أتناول ثلاث حصص من الفواكه على الاقل في معظم الأيام	FHQ22
			لا		نعم	عادة أحاول الحصول على غذاء صحي	FHQ23

الجزء السا	ء السابع: التغذية(NQ)								
NQ1	حدد الو	حِبات الرئيسية التي تأكلها عادة؟							
		0-الفطور		[-الغداء					
		2-العشاء (يمكن وضع دائرة على اكثر من خيار)							
NQ2	هل تأكا	ل الفطور (قبل الحصنة الأولى)؟							
		3-يوميا		2-(3-4)مرات في الاسبوع (تقريبا يوم بعد يوم)					
		1-(1-2) مرة في الأسبو ع		0-لا المفطور ابدا					
NQ3	من يحد	نىر لك فطورك عادة؟	<u>!</u>						
		0-الأم		1-الأب					
		2-أنا أحضره بنفسي		3-غيره, حدد/ي					
NQ4	اذا كنت	لا تتناول الفطور عادة, فلماذا؟	I						
NQ5	هل تأكا	ل أو تشرب شئ في المدرسة خلال فترة الاستراحة؟							
		3-يوميا		2-(3-4) مرات في الاسبوع (يوم بعد يوم تقريبا)					
		1-(1-2) مرة في الأسبوع		0-ابدا					
NQ6	هل تأك	ل أو تشرب شئ بعد وجبة العشاء؟	<u>I</u>						
		3-يوميا		2-(3-4) مرات في الاسبوع (يوم بعد يوم تقريبا)					
		1-(1-2) مرة في الأسبوع		0-ابدا					
NQ7	ماذا تأد	كل أو تشرب عادة بين الوجبات الرئيسية؟	(تستطي	ع أن تضع دائرة على اكثر من اختيار)					
		0-لا شىئ		1-ساندويتشات					
		2-خضار		3-فواكه					
		4-حلويات, بسكوت, شوكولاطة.		5-تشيبس, بيجلة,بسلي,بسكوت مالح.					
		8							

		6-کولا, عصير		7-غيره _, حدد/يز
NQ8	هل تأك	ل وجبتك الرئيسية مع أفراد العائلة؟		
		0-لار أبدا		1-نعم, أحيانا
		2-نعم,يوميا	<u>I</u>	
NQ9	کم مرۃ	، تأكل الخبز يوميا؟		
		0-مرة يوميا		1-مرتين يوميا
		2-ثلاث مرات يوميا		3-أربع مرات يوميا
		4-خمس مرات يوميا		5-ستة مرات يوميا
		6- اکثر من 6 مرات یومیا		7-غيره _، حدد/ي
NQ10	هل تحد	ب تناول الطعام المطبوخ في البيت؟	<u> </u>	
		ע-ע		1-نعم, أحيانا
		2-نعم, دائما	L	
NQ11	کم مرۃ	ة في الأسبوع تشتري ساندويتش أو كعك أو وجبة جا	هزة من	المدرسة؟
		0-لا أشتري ساندويتش أو وجبة جاهزة من المدرسة		1-مرة أسبوعيا
		2-(2-3) مرات اسبو عيا(يوم بعد يوم)		3-يوميا
		4- غيره _، حدد/ي		
NQ12	کم مرۃ	ة في الأسبوع تأكل الطعام في مطعم أو تشتري ساندو	يتش مر	ن المطاعم؟
		0-لا أشتري ساندويتش أو وجبة جاهزة من المدرسة		1-مرة أسبوعيا
		2-(2-3) مرات اسبو عيا(يوم بعد يوم)		3-يوميا
		4- غير ه _ر حدد <i>اي</i>	<u>.</u>	
NQ13	هل تأك	ل أو تشرب عادة وأنت تشاهد التلفاز؟		
		[-نعم		א-0

		نذ حبوب أو شراب حديد لتقوية الدم الان ؟	هل تأذ	NQ14
1 -أحيانا		0-لا, أبدا		
3-أخذ مقويات ولكن لا أعرف ما هي		2-يوميا		
	I	ند حبوب أو شراب فيتامينات الان؟	هل تأذ	NQ15
1-احیانا		0-لا, أبدا		
3-أخذ مقويات ولكن لا أعرف ما هي		2-يوميا		
م جياع لأنهم لا يمتلكون الطعام الكافي في البيت, كم مرة	للنوم و ه	الشباب والشابات يتوجهون الى المدرسة أو يذهبون أ هذا بالنسبة لك؟	بعض يتكرر	NQ16
1-احيانا		0-ابدا		
3-دائما		2-غالبا		
طيع أن تضع دائرة على أكثر من اختيار)	بة؟(تستم	المصادر التي تحصل منها على معلومات عن التغذي	ما هي	NQ17
الجرائد والمجلات		التلفزيون		
المدرسة		الر اديو		
الأصدقاء		الطبيب		
الانترنت		أفراد العائلة		
غير _{ه.} حدد/ي		لا أحصل على أية معلومة عن التغذية		
		ك بصحتك؟	مارأيك	NQ18
1-متوسطة		()-ضعيفة		
3-ممتازة		2-جيدة		
		ن راض عن مظهر ك (شكلك)؟	هل أنن	NQ19
1-غیر راض		0-غیر راض أبدا		
3-کثیر ا		2-قايلا		
્રિં	لذي تأكا	عليك المنهاج الدراسي في اختيارك لنوعية الغذاء ا	هل أثر	NQ20
2 -أحيانا	-نعم	-1 D Y-0		

	تأكله؟	ذاء الذي	ثر عليك مدرسوك في اختيارك لنوعية الغ	هل أث	NQ21
2-أحيانا	[-نعم		א-0		
	تأكله؟	ذاء الذي	ثر عليك أصدقائك في اختيارك لنوعية الغُر	هل أث	NQ22
2-أحيانا	1-نعم		۲-0		
	للنشاط البدني الذي تمارسه؟	ختيارك أ	ثرُ عليك المنهاج الدراسي فيممار ستك أو أ	هل أث	NQ23
2-أحيانا	1-نعم		א-0		
	لبدني الذي تمارسه؟	للنشاط ال	تر علیك مدرسیك فیممارستك أو اختیارك	هل أث	NQ24
2-أحيانا	1-نعم		א-0		
	لبدني الذي تمارسه؟	للنشاط ا	ثر عليك أصدقائك فيممارستك أو اختيارك 	هل أث	NQ25
2-أحيانا	1-نعم		א-0		

كم مرة تأكل من أنواع المأكو لات التالية (الرجاء وضع / في المربع الذي ينطبق عليك)								NQ26	
	شهريا			اسبو عيا			يوميا		
^{خادر ا} , أبدا	1-3 مرات	مرہ	2-3 مرات (یوم بعد یوم)	4-6 مرات (تقريبا يوميا)	1-2 مرات	4-4 مرات	اکٹر من 4 مرات		
								الالبان والاجبان(لبنة جبنة جبنة لبن	.1
								الفواكه الطازجة	.2
								الخضار الطازجة(بندورة, خيار, خس,فلفل حلو)	.3
كم مرة تأكل من أنواع البقوليات التالية: (الرجاء وضع / في المربع الذي ينطبق عليك)							NQ27		
	لي	شهر		وعيا	با اسبر	يومب			

نادرا, أبدا	3-1 هرات	مره	2-3 مرات (یوم بعد یوم)	4-6 مرات (تقريبا يوميا)	1-2 مرات		
						العدس	1
						الحمص	ب
						الفول	ج ج
						بازيلاء	د
	(لمبق عليك	ع الذي ينم	/ في المر ب	باء وضع	كم مرة تأكل من أنواع الخضار المطبوخة التالية: (الرج	NQ28
	شهريا			اسبوعيا	يوميا		
نادرا, أبدا	1-3 مرات	مره	2-3 مرات (یوم بعد یوم)	4-6 مر ات (تقريبا يوميا)	1-2 مرات		
						خضار مطبوخة(مثل يخني, محاشي مع لحمة أو بدون لحمة, مقلوبة , أوزي, خصار في صينية, خضار مسلوقة, خضار مقلية غير البطاطا,)	ĥ
						الملوخية, السبانخ	ب
						الخبيزة, الهندبة, الجرجير, الحويرنه	ى
			يك)	ينطبق عا	مربع الذي	كم مرة تأكل من الأطعمة التالية: (الرجاء وضع / في ال	NQ29
	شهريا			اسبوعيا	يوميا		
نادرا, أبدا	1-3 مرات	مره	2-3 مرات (یوم بعد یوم)	4-6 مرات (تقريبا يوميا)	1-2 مرات		
						المعكرونة/الباستا/السباجيتي	ţ
						البيتزا	ب
						البطاطا المقلية	ج
						الكورن فليكس	د

			ن عليك)	الذي ينطبؤ	لي المربع	ء وضع / ف	بة: (الرجا:	كم مرة تأكل من أنواع اللحوم التالب	NQ30
	شهريا			اسبوعيا	يوميا				
نادرار أبدا	I-3 مراث	مرہ	3-2 مرات	4-6 مرات	1-2 مرات				
								الدجاج	Í
								الحبش	ب
								الشاورما	ج
								الهامبر جر	د
								السمك الطازج	ر
								السمك المعلب (تونا, سردين)	س
								لحم العجل أو الغنم	ص
	كم مرة تأكل من أنواع الحلويات والموالح التالية (الرجاء وضع / في المربع الذي ينطبق عليك)						NQ31		
	شهريا			اسبوعيا			يوميا		
نادرا, أبدا	1-3 مرات	مرہ	2-3 مرات (يوم بعد	4-6 مرات (تقريبا	1-2 مرات	4-4 مرات	اکٹر من 4 مرات		
								حلويات(شوكولاتة جاتوه كنافة راس العبد بسكوت ملبس الخ)	.1
								رقائق البطاطا والبسكوت المالح(الشيبس, بسلي,البمبة, البيجلة)	.2
			ق عليك)	, الذي ينطب	في المربع	اء وضع /	تالية (الرجا	كم مرة تشرب من المشروبات ال	NQ32
	شهريا			اسبوعيا			يوميا		
نادرا, أبدا	1-3 مرات	مرہ	2-3 مرات (یوم بعد یوم)	4-6 مرات (تقريبا يوميا)	1-2 مرات	2-4 مرات	اکثر من 4 مرات		
								حليب	.1

				عصير جاهز (مصنع)	.2
				عصير طبيعي (بيتي)	.3
				مشروبات مع صودا (کولا _ر فانتا _ر سفن أب)	.4
				شاي	.5
				ماء	.6

Appendix 4: Study tables

Table A1: Results of AFHC provided	by the	participants
------------------------------------	--------	--------------

Variable		Count	N %
If I am having lunch away from	False	80	82.5%
option.	True	15	15.5%
	I never have lunch away from home	2	2.1%
I usually avoid eating fried foods.	False	76	78.4%
	True	21	21.6%
I usually eat a dessert or pudding if	False	23	24.0%
	True	73	76.0%
I make sure I eat at least one	False	29	29.9%
Serving of fruit a day.	True	68	70.1%
I try to keep my overall fat intake	False	61	62.9%
uown.	True	36	37.1%
If I am buying crisps, I often	False	93	95.9%
chouse a low-rat brand.	True	4	4.1%
	I never buy crisps	0	0.0%
I avoid eating lots of sausages and	False	49	50.5%
ourgers.	True	44	45.4%
	I never eat sausages or burgers	4	4.1%
I often buy pastries or cakes	False	46	47.4%
	True	51	52.6%
I try to keep my overall sugar	False	59	60.8%

intake down.	True	38	39.2%
I make sure I eat at least one serving of vegetables or salad a	False	38	39.2%
day.	True	59	60.8%
If I am having a dessert at home, I try to have something low in fat	False	87	89.7%
	True	9	9.3%
	I don't eat desserts	1	1.0%
I rarely eat takeaway meals	False	18	18.6%
	True	79	81.4%
I try to ensure I eat plenty of fruit and vegetables.	False	41	42.3%
	True	56	57.7%
I often eat sweet snacks between meals.	False	47	48.5%
	True	50	51.5%
I usually eat at least one serving of vegetables (excluding potatoes) or	False	59	60.8%
salad with my evening meal.	True	38	39.2%
When I am buying a soft drink, I	False	86	89.6%
	True	3	3.1%
	I never buy soft drinks	7	7.3%
When I put butter or margarine on bread. Lusually spread it thinly.	False	9	9.3%
orono, i usoni j sprono is ninij.	True	4	4.1%
	I never have butter or margarine on bread	84	86.6%
If I have a packed lunch, I usually include some chocolate and/or	False	68	70.8%
	True	20	20.8%

biscuits.	I never have a packed lunch	8	8.3%
When I have a snack between meals. I often choose fruit.	False	39	40.2%
	True	57	58.8%
	I never eat snacks between meals	1	1.0%
If I am having a dessert or pudding in a restaurant. I usually choose the	False	86	88.7%
healthiest one.	True	7	7.2%
	never have desserts in restaurants	4	4.1%
I often have cream on desserts.	False	60	61.9%
	True	36	37.1%
	I don't eat desserts	1	1.0%
I eat at least three servings of fruit most days.	False	66	68.0%
	True	31	32.0%
I generally try to have a healthy diet.	False	33	34.4%
	True	63	65.6%

Table A2: Physical activity content

Variable		Count	Column N %
Number of sport classes	One class	96	99.0%
(weekiy)	Two classes	1	1.0%
Participation in sports classes	None	2	2.1%
(weekiy)	Once	95	97.9%
Play sports or physical activity	Do not participate	35	36.1%
	1-2 per week	32	33.0%
	(3-4) times a week (day after day)	11	11.3%
	(5-6) times a week (almost daily)	19	19.6%
Participate in sports or activity	Do not participate	74	76.3%
lessons)	1-2 times per week	16	16.5%
	(3-4) times a week (day after day)	2	2.1%
	(5-6) times a week (almost daily)	5	5.2%
Play sports or activity outside	Do not participate	22	22.7%
OI SCHOOL (INFORMAL ACTIVITIES)	1-2 per week	33	34.0%
	(3-4) times a week (day after day	8	8.2%
	(5-6) times a week (almost daily	34	35.1%
Time spent watching TV,	do not watch TV, video, DVD	41	42.3%

video, DVD <u>on school days</u> less than an hour		18	18.6%
(nour/day)	(1-2) hours	31	32.0%
	(3-5) hours	5	5.2%
	more than 5 hours	2	2.1%
Time spent watching TV,	do not watch TV, video, DVD	45	46.4%
holidays(hour/day)	less than an hour	13	13.4%
	(1-2) hours	23	23.7%
	(3-5) hours	12	12.4%
	more than 5 hours	4	4.1%
have internet at home	No	13	13.4%
	Yes	84	86.6%
Time spent on <u>school days</u> in front of computer (hour/day)	Do not use computer or Internet	14	14.6%
	less than an hour	15	15.6%
	(1-2) hours	42	43.8%
	(3-5) hours	16	16.7%
	More than5 hours	9	9.4%
Time spent on <u>holidays</u> in front of computer (hour/day)	Do not use computer or Internet	16	16.5%
	less than an hour	11	11.3%
	(1-2) hours	22	22.7%
	(3-5) hours	30	30.9%
	More than5 hours	18	18.6%
Studying time <u>on school</u>	less than an hour	11	11.3%

<u>days(</u> hour/day)	(1-2) hours	62	63.9%
	(3-5) hours	21	21.6%
	More than 5 hours	3	3.1%
Studying time <u>on holidays</u> (hour/day)	less than an hour	37	38.1%
	(1-2) hours	51	52.6%
	(3-5) hours	8	8.2%
	More than 5 hours	1	1.0%

Table A3: Health status content

Variable		Count	Column N %
Allergic to any medicines	No	94	96.9%
	Yes	3	3.1%
Any health problems	No	77	79.4%
	Yes	20	20.6%
Taking any medicine (now)	No	90	92.8%
	Yes	7	7.2%
Wentto the dentist in the last year	No	62	63.9%
	Yes	35	36.1%
Stayed overnight in a hospital (last year)	r) No	91	93.8%
	Yes	6	6.2%
Had a surgery	No	70	72.2%
	yes	27	27.8%
Have you ever had any of the problems	s below		
Allergies or hay fever	No	90	92.8%
	Yes	7	7.2%
Asthma	No	95	97.9%
	Yes	2	2.1%
Convulsions	No	96	99.0%
	Yes	1	1.0%
Pain in your joints or bones	No	94	96.9%

	Yes	3	3.1%
Anemia or anemia	No	94	96.9%
	Yes	3	3.1%
Severe bodily injury	No	96	99.0%
	Yes	1	1.0%
suffer from headaches when running or	No	85	87.6%
exercising	Yes	12	12.4%
Sensitive skin	No	91	93.8%
	Yes	6	6.2%
Permanent constipation	No	96	99.0%
	Yes	1	1.0%
Always digestion or abdominal pain	No	95	97.9%
	Yes	2	2.1%
Hearing problems	No	96	99.0%
	Yes	1	1.0%
Vision problems	No	74	76.3%
	Yes	23	23.7%
Eye problems	No	95	97.9%
	Yes	2	2.1%
Headache	No	87	89.7%
	Yes	10	10.3%
Mouth, teeth or gums	No	94	96.9%
	Yes	3	3.1%

Do you have any questions or concerns	No	96	99.0%
about any	Yes	1	1.0%
Doctor prevented you from participating in sports (for any reason)	No	89	91.8%
	Yes	8	8.2%

Table A4: Health status (period) for girls only

Variable		Count	Column N %
Have you started your period?	No	6	14.3%
	yes	36	85.7%
Does your period come regularly (once a month)?	No	12	32.4%
	yes	25	67.6%
Do you usually have severe contractions during the course of your daily life or go to school?	No	11	32.4%
	yes	23	67.6%

		BMI-for-Age (adolescence)				P-value
		Normal	weight	Overweig	ht\obese	vobese of chi-
Variable						
		Count	N %	Count	N %	
If I am having lunch	False	35	81.4%	45	83.3%	.966
choose a low-fat option.	True	7	16.3%	8	14.8%	
	No i never have lunch away from home	1	2.3%	1	1.9%	
I usually avoid eating fried foods.	False	32	74.4%	44	81.5%	.401
	True	11	25.6%	10	18.5%	
I usually eat a dessert or pudding if there is one available.	False	11	25.6%	12	22.6%	.737
	True	32	74.4%	41	77.4%	
I make sure I eat at least	False	15	34.9%	14	25.9%	.338
day.	True	28	65.1%	40	74.1%	•
I try to keep my overall fat intake down.	False	29	67.4%	32	59.3%	.407
	True	14	32.6%	22	40.7%	
If I am buying crisps, I often choose a low-fat brand.	False	42	97.7%	51	94.4%	.427
	true	1	2.3%	3	5.6%	
	No I never buy crisps	0	0.0%	0	0.0%	

Table A5: Association between adolescent's food habits and their BMI-for-age at adolescence
I avoid eating lots of	false	22	51.2%	27	50.0%	.419	
sausages and burgers.	true	18	41.9%	26	48.1%		
	No I never eat sausages or burgers	3	7.0%	1	1.9%		
I often buy pastries or	false	23	53.5%	23	42.6%	.286	
cares	true	20	46.5%	31	57.4%		
I try to keep my overall	false	27	62.8%	32	59.3%	.723	
sugar intake down.	true	16	37.2%	22	40.7%		
I make sure I eat at least	false	19	44.2%	19	35.2%	.367	
or salad a day.	true	24	55.8%	35	64.8%	-	
If I am having a dessert	false	35	81.4%	52	96.3%	.052	
something low in fat.	true	7	16.3%	2	3.7%		
	No I don't eat desserts	1	2.3%	0	0.0%		
I rarely eat takeaway	false	11	25.6%	7	13.0%	.112	
meals	true	32	74.4%	47	87.0%		
I try to ensure I eat	false	19	44.2%	22	40.7%	.733	
plenty of fruit and vegetables.	true	24	55.8%	32	59.3%		
I often eat sweet snacks	false	23	53.5%	24	44.4%	.376	
between meals.	true	20	46.5%	30	55.6%		
I usually eat at least one serving of vegetables	false	27	62.8%	32	59.3%	.723	
(excluding potatoes) or salad with my evening meal.	true	16	37.2%	22	40.7%		

When I am buying a soft	false	37	86.0%	49	92.5%	.148	
drink, I usually choose a							
diet drink.	true	3	7.0%	0	0.0%		
	No I never buy	3	7.0%	4	7.5%		
	soft drinks						
When I put butter or margarine on bread I	false	4	9.3%	5	9.3%	.450	
usually spread it thinly.	true	3	7.0%	1	1.9%		
	No I never have	36	83.7%	48	88.9%		
	butter or						
	margarine on						
	bread						
If I have a packed lunch, I usually include some	false	34	79.1%	34	64.2%	.248	
chocolate and/or biscuits.	true	7	16.3%	13	24.5%		
	No I never have	2	4.7%	6	11.3%		
	a packed lunch						
When I have a snack	false	16	37.2%	23	42.6%	.554	
between meals, I often							
choose fruit.	true	27	62.8%	30	55.6%		
	I never eat	0	0.0%	1	1.9%		
	snacks between						
	meals						
If I am having a dessert	false	36	83.7%	50	92.6%	.073	
restaurant, I usually	true	3	7.0%	4	7.4%		
choose the healthiest one.	No never have	4	9.3%	0	0.0%		
	desserts in restaurants						
I often have cream on	false	28	65.1%	32	59.3%	.402	
uc55c115.	true	14	32.6%	22	40.7%		
	No I don't eat desserts	1	2.3%	0	0.0%		

I eat at least three	false	27	62.8%	39	72.2%	.322
servings of fruit most days.	true	16	37.2%	15	27.8%	
I generally try to have a healthy diet	false	12	27.9%	21	39.6%	.229
	true	31	72.1%	32	60.4%	

Appendix 5: Baseline study questionnaire

تقييم ممارسات الرضاعة الطبيعية والفطام بين الأطفال من الولادة إلى عمر 24 شهر في مخيّم الامعري القسم الاول: التفاصيل السكّانية والإجتماعية: : ____ اسم العائلة: ____تليفون:_____ جوال:_____ تاريخ الميلاد: 1- اسم الام الاول: _____ 2- العنوان: 3- العمر: _______ 4- الحالة الاجتماعية: ج مطلقة ب أرملة أ متزوجة 5- عدد مرات الحملِ: _ 6-عدد الو لادات الحبّة: خصائص الطفل المبحوث: اسم طفلك الرضيع: الاسم الأول: ب أنثى ا ذکر 2- الجنس: 3- ترتيبه بين بقية الاطفال: 4- العمر: ____ سنة ______شهر 5- وزن الطفل عند الولادة: 1. ____ غم تاريخ الميلاد: __/ __/ 200 2. غير متوفر 2. غیر متوفر 2. غیر متوفر 6- طول الطفل عند الولادة: 1. 7 - محيط الر أس: 8- أين ولد الطفل؟ أ. في المستشفى ب. في البيت معلومات اجتماعية: ما هو المستوى التعليمي لوالد الطفل: أ. اقل او يساوي 6 سنوات ب. 7-9 سنوات ج. 10-12 سنة د. دبلوم عالي، بكالوريوس، ماجستير ه ِأُمّى 2- ما هو المستوى التعليمي لوالدة الطفل: أ. اقل او يساوى 6 سنوات ب. 7-9 سنوات ج. 10-12 سنة د دبلوم عالى، بكالوريوس، ماجستير ه أُمّية 3- هل تعملين؟ ا. نعم، حدّدى: ب ربّة ببت 4- هل و الد الطفل يعمل؟ أ نعم، حدّدي: ت لا 5- ما هو عدد الاشخاص الذين يسكنون معك في البيت:

القسم الثاني: الولادات

?

ولكن **ليس** حليب صناعي او اطعمه مهرووسه. - اطعمة تكميلية تعني اعطاء الطفل اطعمة صلبة أو مهرووسة او حليب صناعي ا**ضافة** الى حليب الام.

حليب اطفال	استمرار الرضاعة الطبيعية	اطعمة تكميلية	سيادة الرضاعة الطبيعية	اقتصار على	ترتيب
صناعي	لغاية عمر شهر	(عدد الاشهر)	(عدد الأشهر)	رضاعة طبيعية	الطفل
	(حددي الشهر)			(عدد الأشهر)	
					1
					2
					3
					4
					5
					6
					7
					8
					9
					10
					11
					12

ب. لا

و. غير ذلك، حدّدي: _____

القسم الرابع: الفطام: 1-كيف بدأت بتقديم الحليب الصناعي / الطعام المهروس أو السائل / الطعام الكامل إلى طفلك **غير حليب الام؟**

للباحثة: حددي الشهر الذي تقوله الام

لا اتذكر	لا يأخذ	محاولة / تذوق	الشهر	العمر (اشهر)
				الحليب الصناعي للرضع / للاطفال
				سكر فضيي مع ماء أو ينسون
				ماء
				ماء محلى
				شاي بدون سكر
				شاي مع سکر
				شاي مع بسكويت أو قرشلة
				حليب مع بسكويت أو قرشلة
				مهابية / كاسترد / سحلب
				بابونج/ينسون/ مير مية/اعشاب
				عصير فاكهه طبيعي
لا اتذكر	لا يأخذ	محاولة / تذوق	الشهر	العمر (اشهر)
				عصير خضار (جزر/ بندورة
				حليب بقر كامل الدسم (بودرة / سائل)
				لبنة/ جبنة/ جبنة مثلثات
				لبن ر ایب / شمینت
				لبن محلى (برللي، جماديم، لبن مع فاكهه
				خضار مهروسة في البيت
				فاكهه مهروسة في البيت
				بطاطا مهروسة
				بقوليات (حمص، فول، عدس)
				عسل/ديس
				حبوب للاطفال (سيريلاك، كورن فلور)
				بسكويت الأطفال
				خبز، بسكويت بانواعه
				ارز مهروس بدون اضافات
				ارز مهروس مع اضافة مرقة الطعام
				طعام اطفال جاهز (جيربر)
				شوربات
				طعام العائلة (طبيخ)
				بیاض بیض
				صفار بيض
				بيضة كاملة
				لحوم/ دجاج/ سمك
				بمبا/ شیبس
				غير ه، حددي

2- ماذا كان الغذاء الأول الذي اعطي للطفل غير حليب الصدر أو الحليب الصناعي؟ لماذا؟

3- لماذا بدأت بإعطاء الأطعمة الصلبة أو السوائل في هذا الشهر _____ (للباحثة: حدّدي الشهر)؟ للباحثة: ضعي اشارة بجانب جميع الأجوبة المحتملة

ر غبة شخصية من قبل الأم	1
نصيحة الدكتور	2
نصيحة الممرضة	3
تجربة سابقة	4
الطفل وصل عمر الفطام	5
حليبي غير كافي	6
الطفل دائم البكاء	7
ر فض الطفل لصدر ي	8
مشاكل مستمرة في الصدر	9
عودتي للعمل	10
سفر / عطلة	11
مرض/ علاج بالمستشفى	12
الطفل لا يشبع	13
تشجيع العائلة / الأصدقاء	14
ضغط الجدات	15
تعبت من الرضاعة	16
اشعر بالعزلة بسبب الرضاعة	17
ملابسي اصبحت دائما مبللة وحمالة الصدر غيرمرتبة بسبب الحليب	18
تعاطي ادوية	19
حمل جديد	20
الطفل يمسك الطعام بيده	21
الطقس الحار	22
غيره، حددي	23

4- من أين حصلت على معلوماتك حول كيفية إطعام الطفل؟

أ. لم احصل على أي معلومات
ب. طبيب العائلة
ج.طبيب الأطفال
د.ممرضة / عاملة إجتماعية
ه. تجربة سابقة
و. أفر اد العائلة
ز. مواد تثقيفية
ح.التلفزيون
ط. غيره، حددي

6-هل هناك شيء معين تقومين به لجعل غذاء طفلك مقبول أكثرِ؟ أ. نعم ب. لا 7- ماذا تفعلين؟ أ. أضافة سكر

8- من يطعم طفلك عندما تكونين بعيدة عنه؟
أ. إذا فقط الذي تطعمه
ب. الجدة
ج. الأخت أو الاخ الأكبر سنا
د. الأقرباء (العمّات، الخالات الخ)
ه. في الحضانة

9- كم مرة تعطى طفلك المواد الغذائية التالية:

1 1 1	/**	4.0	7.5		1: 0	1 *	/:11	: · 1 N
الطعام	مرہ/	4-2	/-5	يوم بعد	ے مرہ /	مرہ /	محاوله/	لا ياحد
	اليوم	مرات /	مرات /	يوم	الاسبوع	الاسبوع	تذوق	
		اليوم	اليوم					
الحليب الصناعي								
ماء								
شاي بدون سکر								
شاي مع سکر								
اعشاب مع سکر								
شاي مع بسكويت أو قرشلة								
حبوب								
خبز، ارز، بطاطا، کورن فلور								
فاكهه								
خضار								
مهابية								
حليب بقر								
لبنة / جبنة								
لبن								
بيض								
لحوم / دجاج								
طعام العائلة								

10- الوزن الحالي: _____ غم 11- الطول الحالي: _____ سم 12- محيط الرأس الحالي: سم

. _____ .

شكرا لتعاونكم