AMERICAN UNIVERSITY OF BEIRUT

UNDERSTANDING THE CONTEXTUAL FACTORS THAT INFLUENCE CHILDREN'S FOOD CHOICES: A QUALITATIVE STUDY

by
RIM ASSAAD EL HELOU

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RIM ASSAAD EL HELOU

Approved by

Signature

Dr. Hala Ghattas, Associate Research Professor and Director of the Center for Research on Population and Health, American University of Beirut — Advisor

Signature

Co-Advisor

Dr.Chaza Akik, Assistant Research Professor, Faculty of Health Science
American University of Beirut

Signature

Dr. Lara Nasreddine, Assistant Professor of Human Nutrition, Faculty of Agriculture and Food Sciences, Nutrition and Food Sciences Department — Member of Committee

Date of thesis defense: August 31, 2022

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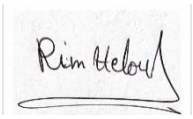
Signature 

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ABSTRACT

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Childhood obesity is a serious public health concern. Interventions to address this problem should not focus on biological and individual factors only, but they should target the factors in the child's environment that affect his eating choices. Recent studies have shown that choice experiments are an important tool to assess children's choices. The aim of this study is to explore why school aged children living in greater Beirut, make certain food choices, in the context of a real food modeling experiment. It also aims to understand to what degree the choices made in this choice experiment are similar to the real food choices they make in their life. Twenty-seven children in grades four, five and six played a game displaying a choice experiment. Then they were interviewed. Factors that were intended to be studies (food price, food placement, food preparation and mother's/ peer's influence), have been shown to affect children's food choices in addition to new factors that emerged (Expected taste, the degree to which the food is considered by the child and food safety). The findings also revealed that this choice experiment reflects children's real food choices. These findings can be used to inform policies aiming to address childhood obesity.

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BACKGROUND AND LITERATURE REVIEW

1.1. Childhood Obesity: A Serious Public Health Concern

Between 1975 and 2016, the world has been witnessing an "Obesity pandemic" among adults as well as children. Many countries especially low- and middle-income countries (LMICs), have noted a double or triple increase in the prevalence of obesity in the past decades [1-3]. In the United States of America, one in three adults and one in six children are affected by obesity (Figure 1, Figure 2) [3, 4]. In 2016, 340 million children and adolescents aged between 5 and 19 years old were diagnosed as overweight or obese [5].

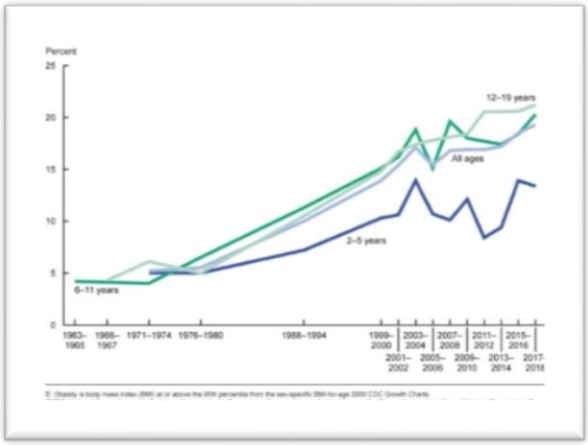

Figure 1: Trends in obesity among children. Contributed by the centers for Disease control (CDC)

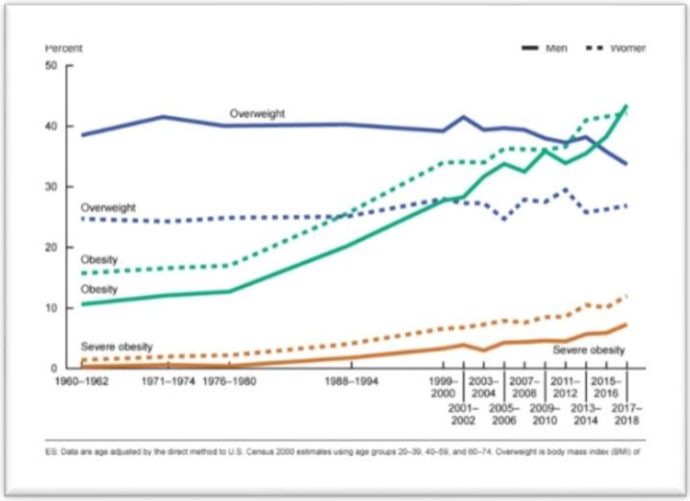

Figure 2: Trends in obesity among adults. Contributed by the centers for Disease control (CDC)

Thus, childhood obesity is alarmingly increasing, and it's recognized as a serious public health concern and one of the most important health challenges of this century. The current increase is mainly affecting children living in low- and middle-income countries (LMICs), especially those residing in urban areas [6].

Childhood obesity is associated with multiple short- and long-term complications that can be prevented by formulating proper policies and implementing adequate interventions. The short-term consequences are metabolic abnormalities, especially elevated levels of triglycerides, blood glucose and blood cholesterol as well as hypertension, insulin resistance and metabolic syndrome [7]. On the longer term, childhood obesity is associated with adult obesity [8], and it is considered a risk factor for non-communicable diseases (NCDs) such as cardiovascular diseases, diabetes, and some types of cancer [9]. A cohort study revealed that morbid obese patients lose around eight years of disease-free-years while obese patients lose around four disease-free-years[10].

Moreover, obesity is not only associated with serious diseases, but it also might decrease the average life expectancy of the population. Adult obesity is an important risk factor of early death [11]. One prospective cohort study, showed that adults who were obese at the age of 40 years old, lost six to seven years of their expected life [12] . In addition, obesity has been shown to decrease the quality of life by affecting the individual both physically and psychosocially. The self-perceived Health-related quality of life (HRQL) decreases with higher BMI scores. The Short Form Health Survey (SF-36) is usually the tool used to assess HRQL[13]. The possibility of having a chronic disease is doubled in morbid obese individuals compared to those who are overweight [14]. Obesity might also cause important psychological problems especially because the society considers thinness as a social norm. Obese women are more affected than obese men by the psychological burden of obesity [15]. Obesity also negatively affects employment, since obese individuals might suffer from more work limitations than normal-weight individuals [16], and because it's considered a main cause of discrimination during the hiring process, where obese women are more concerned than obese men [17].

Nonetheless, obesity has tremendous impacts on the economic levels, imposing significant healthcare costs resulting from the direct or indirect costs of obesity and its associated comorbidities during childhood or adulthood [18]. In 2018, the indirect cost of worldwide overweight and obesity was estimated around US$500 billion per year[19]. Compared to normal weight individuals, the annual health care expenditures are estimated to be around 30 to 40% higher among obese individuals [20]. The direct costs of obesity encompass the value allocated to diagnosis and treatment of obesity itself as well as the chronic diseases associated with it. The indirect costs cover the lost wages resulting from illness or premature death, the reduced work productivity and the money spent on disability [21].

1.2 . Obesity and Nutrition Transition

In the 1990s the nutrition transition model was presented for the first time. It mainly aims to explain the changes that have aroused in human diet and physical activity levels [22]. These shifts affect the nutritional outcomes of the population especially body composition[23]. Most countries of the EMR are shifting to consuming diets characterized by a low intake of fibers and a high consumption of fat, refined carbohydrates, added sugars, salty foods, processed meals and eating away from home [1, 24-26]. This type of diet is usually called the "Western Diet" because it's mostly consumed by populations of the United States or Europe [27]. Simultaneous shifts in demographics, epidemiological and socioeconomic outcomes are associated with the changes in the different stages of the nutrition transition. Figure 3 summarizes the different changes in health, demographics and nutritional factors and presents how they are related. Two main processes of change the demographic transition and the epidemiological transition are used to explain how populations move from a pattern to another[28] . They come before or happen at the same time with the nutrition transition. While, the first describes the changes from a pattern of high fertility and high mortality rates to a pattern of low fertility and low mortality [29], the second focuses on explaining the changes from a pattern of high prevalence of infectious diseases that results from famine and poor environmental sanitation to a pattern of high prevalence of chronic and degenerative diseases [28].

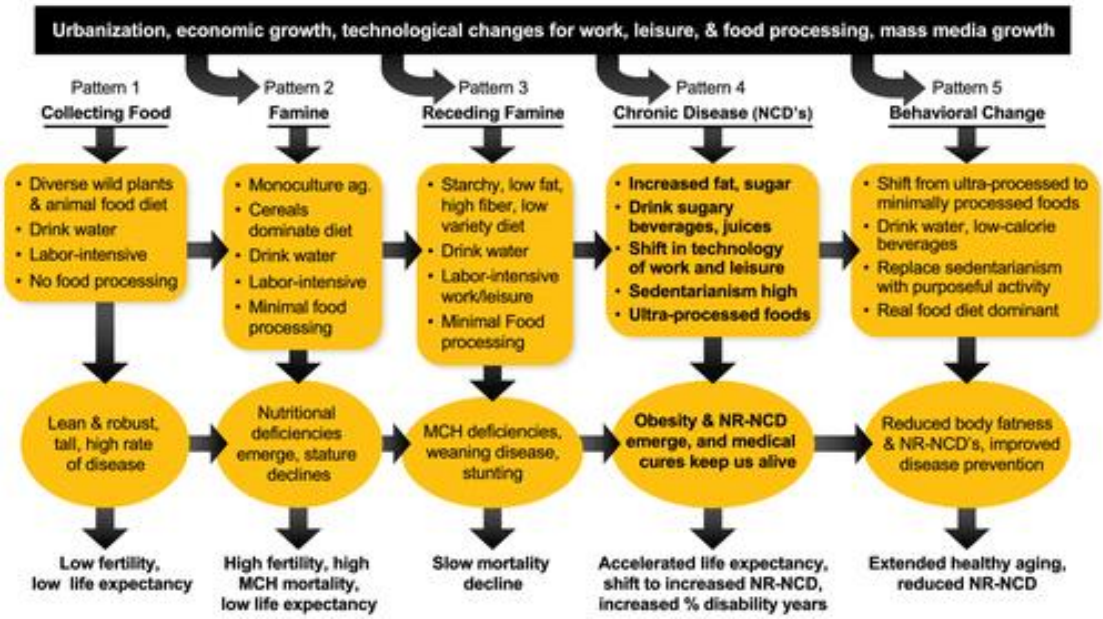

Figure 3: Stages of the nutrition transition [29]

The nutrition transition encompasses five main stages: collecting food, famine, receding famine, nutrition-related chronic diseases, and behavioral change. Most of the country seem to have passed through all the stages. The main characteristics of each stage are summarized below.

Stage 1: Collecting Food: It characterizes hunter gathered populations. It's mainly rich in carbohydrates and fiber and low in fat. Physical activity patterns are high and obesity rate is low.

Stage 2: Famine: The diet is simple without variety and subjected to periods of food shortages resulting from conflicts, natural disaster, or droughts. This stage is characterized with nutritional stress and a decrease in stature compared to hunter gathered population.

Stage 3: Receding Famine: Starchy staple consumption decreases, and it is replaced by consuming more fruits, vegetables, and animal proteins. Physical activity levels start to decrease and in this stage leisure time becomes an important side of the lives of more individuals.

Stage 4: Nutrition-Related Noncommunicable Disease (NR-NCD): The increased consumption of diets rich in cholesterol, added sugar, fat, and refined carbohydrates and poor in fiber and polyunsaturated fat PUFA, is usually associated with a sedentary lifestyle. This might lead to a rise in the prevalence of obesity resulting in degenerative diseases and representing the late stage of the epidemiological changes.

Stage 5: Behavioral Change: To delay chronic diseases and improve health, a new dietary pattern occurs. This new dietary pattern is established in some countries by the individuals themselves, while in other they are enforced by formulating governmental policies.

1.3 . Childhood Obesity and Nutrition Transition in the Eastern Mediterranean Region (EMR)

In the past decade, the Middle East and North African region has seen a tremendous rise in childhood obesity prevalence [30]. At the same time, the Eastern Mediterranean Region (EMR) has experienced important shifts on the social, political, and economic levels leading to significant effects on the health profile and lifestyle of populations [31]. As a result of rapid urbanization, economic growth, modernization, and technological development, most countries have undergone demographic and epidemiological changes, that have been accompanied with changes in dietary patterns and a sedentary lifestyle [24]. These changes occur in both rural and urban settings. However, they evolve faster in urban areas where food environments simplify access to unhealthy foods [32]. These changes are recognized as the “nutrition transition” [1, 24-26].

A study done by Sibai and colleagues among different countries of the EMR shows the huge rise in energy consumption from 2200 kcal/d in 1970s to 3220 kcal/d in 2011. The highest rise

take place in Algeria, Kingdom of Saudi Arabia and Iran while Djbouti, Yemen and Sudan have seen the lowest rise (Figure 4)[30].

	1969–1971	1979–1981	1995–1997	2001–2003	2002–2004	2005
Energy, kcal						
Algeria	1,820	2,640	2,910	3,040	3,070	3,094
Djibouti	1,686	1,635	1,899	2,100	2,113	2,210
Egypt	2,350	2,900	3,320	3,350	3,330	3,331
Iran	2,096	2,724	3,079	3,091	3,098	3,102
Jordan	2,240	2,610	2,660	2,680	2,730	2,909
KSA	1,900	2,910	2,800	2,820	2,800	3,061
Kuwait	2,590	2,980	3,030	3,060	3,110	3,099
Lebanon	2,330	2,710	3,170	3,170	3,190	3,180
Libya	2,361	3,275	3,287	3,180	3,017	3,018
Morocco	2,470	2,750	3,040	3,070	3,110	3,167
Palestine	–	–	2,350	2,240	2,240	2,168
Sudan	2,083	2,150	2,206	2,271	2,277	2,300
Syria	2,380	2,950	2,980	3,060	3,070	3,042
Tunisia	2,340	2,820	3,210	3,250	3,280	3,264
UAE	2,980	3,300	3,170	3,220	3,250	2,922
Yemen	1,755	1,908	1,968	2,012	2,005	2,001

Figure 4: Changes in dietary energy supply/person/day from 1969 to 2004 in different countries of the MENA region [30].

In addition, this study shows how fat intake doubled in some countries of the EMR mainly in Lebanon, Syria, Algeria and KSA (Figure 5) [30].

Fat, g						
Algeria	36	62	69	68	65	69
Djibouti	34	36	54	65	57	66
Egypt	47	65	57	58	56	56
Iran	39	60	66	62	63	63
Jordan	52	62	76	80	74	90
KSA	33	76	73	82	78	84
Kuwait	69	88	98	113	102	116
Lebanon	63	82	103	113	103	117
Libya	62	91	102	94	93	97
Morocco	43	52	60	59	54	57
Palestine	–	–	67	63	69	62
Sudan	65	74	65	74	68	66
Syria	60	83	99	101	91	104
Tunisia	63	70	86	94	83	90
UAE	97	130	107	92	92	74
Yemen	29	38	34	41	44	47

FAOSTAT = Food balance sheets [12]; KSA = Kingdom of Saudi Arabia; UAE = United Arab Emirate

Figure 5: Changes in total fat supply/person/day from 1969 to 2004 in different countries of the MENA region [30]

According to the World Health Organization (WHO), the countries of the EMR are divided to different categories [33]:

1. Countries in an early nutrition transition: These countries have moderate levels of overweight and obesity, low levels of undernutrition and high levels of micronutrient deficiencies. It includes Lebanon, Egypt, Libya, Syria and Morocco.

2. Countries in advanced nutritional transition stage: The countries have high levels of obesity prevalence and low undernutrition prevalence or micronutrient deficiencies. It includes Tunisia, Iran and the Gulf Cooperation Council.

3. Countries in emergency and humanitarian crisis: These countries have high prevalence of severe child and maternal undernutrition and high prevalence of micronutrient deficiencies. It includes Afghanistan, Somalia, and Sudan.

4. Countries with significant undernutrition: These countries suffer from high levels of acute and chronic child malnutrition as well as a high level of micronutrient deficiencies and emerging overweight and obesity in certain socioeconomic subgroups. It includes Djibouti, Iraq, Pakistan, occupied Palestinian territory and Yemen [33].

In the Eastern Mediterranean Region (EMR), the nutrition transition has been associated with the increase in obesity/overweight prevalence, as well as the rise in the levels of non-communicable diseases [24, 26]. NCDs are responsible of 68% of deaths in the EMR [34]. The prevalence of obesity in this region exceeds the global average with around 50% of women and 43.8% of men suffering from overweight or obesity [35]. Moreover, the prevalence of overweight and obesity among children under five years is 6.9% exceeding the global average of 6.2%. In many countries the prevalence of school aged children who are overweight or obese

was higher than 15% and adolescence overweight and obesity is higher than 50% [35]. Additionally, 43 million individuals suffer from diabetes in this region, and compared to the other WHO regions, the EMR has the highest death rates from diabetes [35]. 31.9% of total deaths in the EMR is attributed to CVDs [34]. The prevalence of hypocholesterolemia is 38.5%, being the third highest in the world compared to the other WHO regions[34]. Thus, the prevalence of obesity, blood glucose, and CVD risk factors are increasing in the different countries of the EMR especially low- and middle-income countries (Figure 6), reflecting the link of these factors with nutrition transition [34].

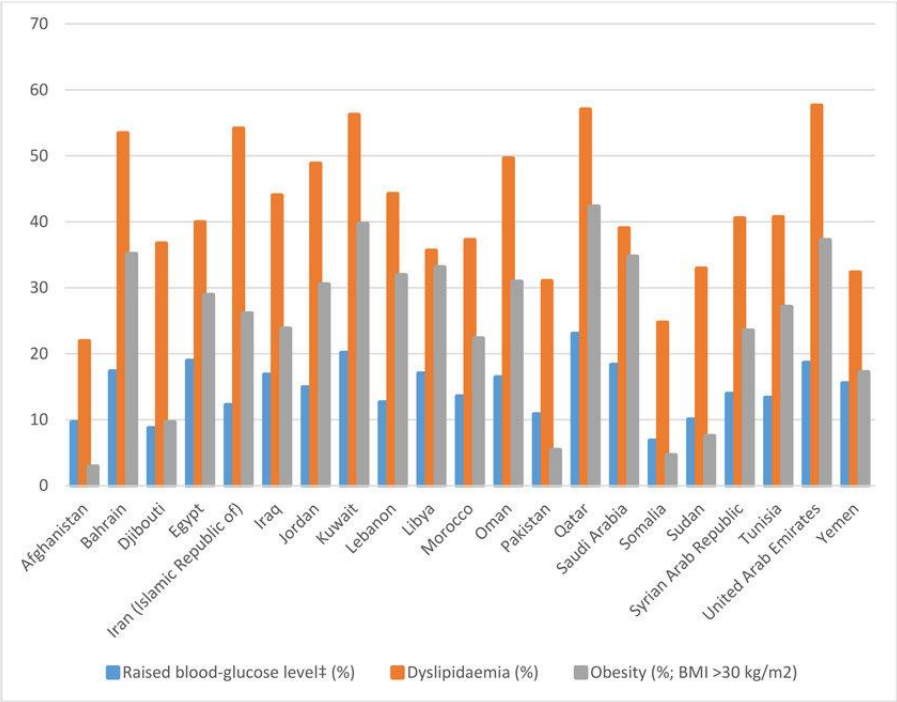

Figure 6: Prevalence of obesity, impaired glucose metabolism and dyslipidemia in the EMR (2018).

1.4 . Childhood Obesity and Nutrition Transition in Lebanon

Going more specifically to Lebanon, starting 1961, an increase in the total caloric intake, total fat intake and total carbohydrate intake have been noted among the Lebanese population and this was confirmed by individual food consumption surveys (Figure 7) [36]. In addition, a cross sectional study done in 2009 among Lebanese individuals shows that younger individuals are more prone to consume the western dietary pattern, while the older individuals tend to adhere more to the Traditional Lebanese diet [37]. Thus, through these changes in food intake, the nutrition transition is associated with the increased prevalence of overweight and obesity as well as their associated diseases.

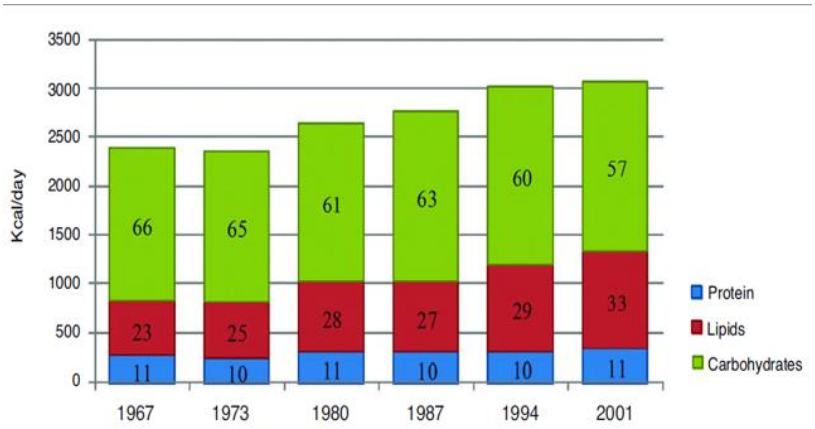

Figure 7: Secular trends in dietary energy supply and macronutrient distribution in Lebanon.

Children living in this country are one of the most vulnerable age groups that might be affected by these changes in intake and lifestyle. In Lebanon, the prevalence of children overweight and obesity is estimated to be around 32.1%. More importantly, recent data show an increasing trend in childhood obesity (Figure 8) [38]. Additionally, metabolic complications have been shown to be prevalent in Lebanese obese and overweight schoolchildren [39, 40]. In a study conducted among Lebanese obese children, Mourad et al. states that the prevalence of

metabolic syndrome to be around 26.4% [41]. Other studies show that 37% of overweight Lebanese children had elevated levels of blood glucose [42]. Among obese and overweight children, the most common metabolic syndrome risk factors are high waist circumference, high triglycerides and hypertension, no differences between genders are noted [43]. NCDs in Lebanon account for 85% of deaths and are recognized as the leading causes of death [31].

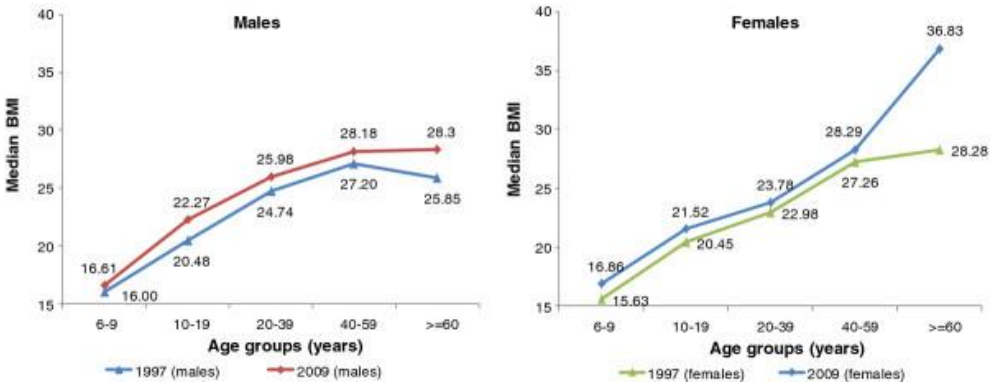

Figure 8: Median body mass index of study subjects by age, sex, and survey year in the study population, Lebanon 1997-2009

1.5 . Childhood Obesity on the Global and National Agendas

The World Health Organization (WHO) recognizes childhood obesity as one of the most urgent public health challenges of this century and a priority goal to be addressed by 2025. For this reason, the WHO is always working on advancing the global obesity agenda and different efforts are being made. The World Health Assembly adopted the "WHO Global Strategy on Diet, Physical Activity and Health" in 2004 and recognized it again in 2011.This strategy aims to protect health by improving eating habits and promoting regular physical activity [44]. Additionally, NCDs are recognized

as an important problem that hinders sustainable development by the 2030 Agenda for Sustainable Development. As part of the agenda, the Global Nutrition Targets aim to end the rise in childhood obesity (SDG 4) [45]. The WHO also published the " Global action plan on physical activity 2018–2030: more active people for a healthier world ", providing policy actions aiming to increase the level of physical activity internationally [46]. In 2017, the World Health Assembly adopted the report of the Commission on Ending Childhood Obesity (2016) and its plan to implement the six recommendations that tackle the obesogenic environment as well as the life course' critical periods to address childhood obesity [47].

On a national level, the Lebanese Ministry of Public Health included a specific element targeting childhood obesity prevention in its strategic goals for NCD prevention and control for 2016-2020. To formulate proper policies and implement adequate interventions to prevent this public health concern, it is crucial to comprehend the factors that influence children's food choices.

1.6 . Causes of Childhood Obesity

Overweight and obesity result from a chronic excess of energy intake compared to energy expenditure due to excessive calorie consumption and low physical activity [48]. Childhood obesity is a result of multiple and interconnected underlying factors [49]. Some of these factors can be changed while others are unchangeable. To understand childhood food choices, it is important to consider the five levels of the Socio-Ecological Model (SEM) because to understand a certain behavior, the environmental context in which the child is evolving and making decisions regarding his food choices influence his behavior to a greater extent [50].

Individual behaviors, family practices, society or community characteristics and policy environments are all identified as key factors that influence children's food choices (Figure 9) [51].

At the biological level, the genetic component has been shown to predispose children to weight gain in the first months of life and to increase the risk of obesity later in life [52]. Predispositions to obesity develop throughout the life cycle [53]. Fetal growth in utero is considered a critical period that increases susceptibility to obesity. Maternal pregnancy weight gain, development of gestational diabetes, and low /high birth weight have been proven to increase the risk of childhood and adulthood obesity [54]. Proper breastfeeding and complementary feeding practices have been associated with a reduced risk of pediatric obesity [54]. Moreover, biologically, hunger and satiety are regulated by hormones that might be affected by the percentage of fat [55].

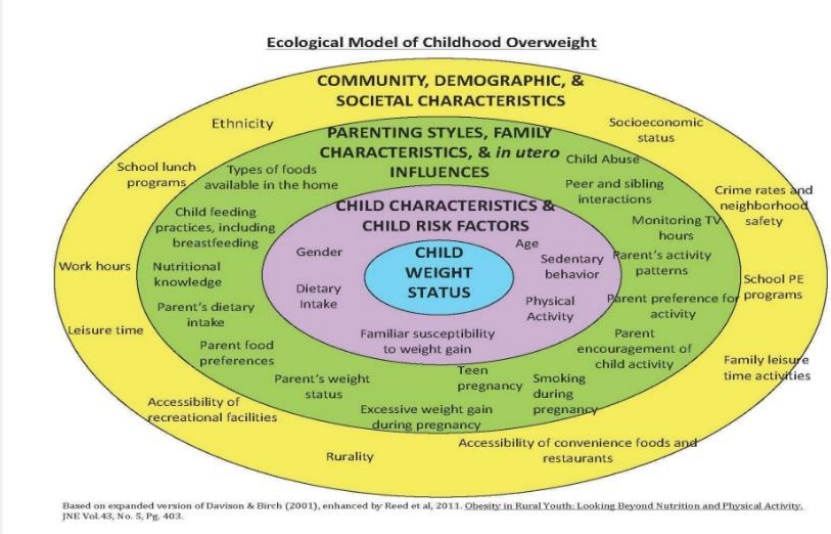

Figure 9: Ecological Model of Childhood Obesity

However, the genetic component can be affected by both behavioral (Eating habits and physical activity) and environmental factors (Marketing of food, society norms, economic

situation, food prices and infrastructure). Thus, these factors might influence people with genetic predisposition causing either weight gain or not (Social Environmental and Genetic Influences on Obesity and Obesity-Promoting Behaviors: Fostering Research Integration)[55].

At the individual behavioral level, eating behaviors related to overeating and lack of physical activity might cause energy imbalance leading therefore to obesity. In the past few years, the nutrition transition occurred in Lebanon leading to a more westernized dietary pattern. Thus, the consumption of fast food and red meat increased while the consumption of fruits and vegetables decreased. This dietary pattern has been linked to obesity and development of non-communicable diseases [56]. A study conducted in 2015 proves that Lebanese children consuming a westernized dietary pattern are more obese than those consuming the traditional Lebanese dietary pattern [57]. Western diet characteristics such as sedentary lifestyle and the high consumption of fast foods and sugar sweetened beverages are identified as strong predictors of obesity among Lebanese children [58]. A study done in Lebanon in 2015, shows that children who consume a western diet pattern are more likely to have a sedentary lifestyle [57].

Earlier studies emphasized the role of biological factors such as genetics on obesity as well as the role of individual factors such as motivation and knowledge. However, more recently research has focused on studying obesity in the larger context where the environment has been found to have a major role in influencing the individual food choices [59-61]. “Obesogenic environment” refers to the impact that the environment surrounding or the opportunities available have on enhancing obesity in populations and it was associated with childhood obesity [62]. Environmental factors could impair the self-regulation capacity that children have, to take responsible decisions about healthy eating and physical activity performance [63]. Some factors in the environment that have been found to affect children’s food choices are presented below:

Excess energy intake and weight gain are associated with the obesogenic environment characteristics such as the increased availability, affordability, and accessibility to processed and high sugar-high fat foods as well as the marketing of these types of foods, and factors that prevent proper physical activity [64]. In Lebanon, children spend most of their days in schools where they consume around a quarter of their daily caloric intake. Thus, their eating habits might be influenced by the nutrient poor foods available in the school which might lead to increased energy intake and weight gain [47]. Physical activity sessions are reduced in schools because of the lack of infrastructure and the prioritization of academic performance over physical activity [47, 65].

Food choices might be also affected by the food marketing and food outlets available in the surroundings of their schools or their houses. A study done in the UK (2010), showed that density of close supermarkets was associated with an increase in unhealthy food consumption among school aged children and living closer to convenience stores was linked to increased consumption of chocolates, chips, and white bread [66].

Furthermore, the family that surrounds the child also has a key role in shaping eating behaviors that will last throughout his life [29]. Children and mainly girls, consider their parents as role models especially in relation to their nutritional behaviors, physical activity, and body image [65]. Family meals are found to play a crucial role of interaction with the child. They mainly represent a time when parents can promote and foster in their children healthy eating habits [67]. The presence of the parents especially the mother lead to higher consumption of dairy products and fruits as well as lower frequency of skipping meals [68]. Furthermore, involving the child in grocery shopping and meal planning have been found to be critical periods to promote healthy behaviors such as teaching the child how to read nutritional label or discussing self-regulation [69-71]. On another side, studies have shown that parents especially

those from low-income countries tend to choose food that are high in calories, fat and sugar because they are less expensive than healthy food [72, 73].

In late childhood, the children become more independent, thus family influence decreases, and peer's influence becomes more important [74]. At this stage, peer pressure plays an important role in shaping children's eating habits and food preferences especially because friends ae considered the most important source of acceptable norms and lifestyles [75].

Moreover, price of food and socioeconomic factors also influence eating behaviors: It's also well known in the literature that healthy dietary patterns are more expensive than unhealthy ones [76, 77]. Studies have shown that reducing price in community-based settings such as school canteens might be an effective way to increase the consumption of healthy options, since it is associated with an increase in the sales of fresh fruits and baby carrots[78]. In addition, each 10% price reduction of low fat snack is associated to a 39% increase in low-fat snacks purchase [79]. A study conducted in Lebanon showed that parental education and socioeconomic status are important predictors of childhood obesity [80].

Thus, children live in a combination of multiple systems that affect in diverse ways their food choices and the realities of children's lives make it hard for them to eat well. Moreover, assessing the factors influencing food choices among school aged children is difficult and might be subjected to measurement bias since it is based on self-reported data and because children might have irregular eating patterns as well as unwillingness to record food intake [81].

1.7 Research on Food environments

Although, understanding food environments has advanced significantly due to important research on their quantitative characteristics, such as the number of advertisements, the price of food, and the amount of food service outlets, fully understanding the impact of food environment on people's food choices also necessitates qualitative research into how people take decisions regarding food choices in the context of their lived economic, social, and psychological realities [82].

Different methods to study lived experiences of food environments are available. They are categorized into three main groups: The first group explores perceptions, feelings, attitudes, and experiences directly from the participants through interviews, focus group discussions and geospatial methods. It aims to gain a deep and accurate understanding of the ways people interact and experience the food environment that influences them from an insider perspective. The second group encompasses observation methods to capture people's lived experience; the researcher spends time with the target audience in their daily life either by observing or by becoming part of this daily life. The third group engages the participants in the research through photovoice, film essays / digital stories, consensus panels, systems mapping. Group model building, Co-design Co-create. These methods encourage participants to reflect on their own experiences, expertise and knowledge of their food environments and propose policies and interventions for change, thus the resulting policies and interventions are context-specific which makes them more sustainable [83].

1.8 Research on Food Choices

Choice experiments have been used to study food choices. This approach aims to bring out the preferences of consumers based on hypothetical scenarios [84]. It has been used widely

to explore the effect of the food price or the marketing strategies on food choices among adults as well as children. A choice experiment conducted in Bangladesh to understand adults consumers' fish preferences based on their price used a survey among fish consumers in Bangladesh and this survey consisted of two parts: The first collected data about socioeconomic characteristics, consumer's attitudes and preferences as well as household consumption pattern while the second one consisted of a choice experiment [85]. This approach was also used to investigate the effects of different price information and marketing claims on fruits and fruits product consumers' choices. Four marketing claims were tested through an online survey consisting of a choice experiment [86]. The responsiveness of consumers to the nutritional food label Traffic Light System in the UK was also assessed by an online household survey that includes a choice experiment. The results proved that the Traffic Light System was effective in changing participants' behaviors [87].

Discrete choice experiments were used among American children as well to examine the effect of food price and branding on making healthy food options for the snacks. In this study 116 children answered a survey about the amount of money they receive to buy food, food preferences and consumption patterns, then they played a purchase experiment consisting of choosing two products or "No Purchase". The products mainly differed by three factors: healthfulness, brand, and price (Figure 10). The results proves that children's food choices are mainly affected by the type of the product, followed by branding and price respectively [88].

	Option A	Option B	Option C
Product	Chocolate Chip Cookie 	Apple Slices 	None
Price	$0.30	$0.70	
I would choose →	☐	☐	☐

Figure 10: Recording card used in the food choice experiment of Hartmann et al., 2017

On another side discrete choice experiment was also used as innovative tool to study the factors that influence food choices among different populations such as Dutch older adults or young adults living in Australia. These experiments were done by conducting face to face interviews and sending the interview online respectively [89, 90].

Even though the choice experiment literature focuses on adult populations, a scarce number of choice experiments have been conducted among children. A pilot study was conducted in Sweden in 2016 to assess children's food choices through designing an online grocery store simulation having three scenarios (promotions on healthy products; promotions on unhealthy products; and no promotions (control)). Participants were allocated randomly to one of the three groups to play the game and then answered a survey. The results showed that perceived taste was the main predictor of food selection and promotions put on the packages of foods did not affect food choices [91]. Another study was conducted in Sweden (2021), among children aged between 10 and 11 years old to study their lived experiences of school lunch. Students were asked to imagine a school lunch experience and to write or draw a story about it [92]. Food choice experiment was also used to explore the effect of healthy snack placement on strengthening healthy eating habits among children. In this study, participants were exposed to

a cartoon movie either displaying placement of snacks in nutritional values, or snacks low in nutritional values or no placement options [93].

However, studies of choice experiments aimed to collect quantitative data and mainly focused on the price or the marketing influence on food choices. Social and economic factors were not taken into consideration in the design of studies. Thus, choice experiments that also collect complementary qualitative data could be used as innovative strategies to test the impact of children's exposure to certain factors in their food environment on their food choices. As children are increasingly using technology [81, 94] and digital technology has been shown to be beneficial in collecting more representative and accurate data about food experiences, quantitative research based on a food choice modelling game is ongoing in Lebanon starting January 2021. It is being conducted through a food choice modeling game on a tablet. This game creates scenarios similar to the child's lived experience and is expected to elicit important information on why certain food choices are made.

CHAPTER 2

STUDY OBJECTIVES

This study has two main objectives: The first one is explanatory aiming to explore why school aged children living in greater Beirut, make certain food choices, in the context of a food choice experiment, whereas the second one is a objective aiming to understand to what degree the choices made in this game are similar to the real food choices they make in their real life.

This study is important because it ensures data triangulation providing a comprehensive understanding of the relation between children's lived experiences and food choices. By conducting this research, information will be collected from various sources, thus increasing the credibility and validity of research findings that will be generated from the main quantitative study. Moreover, this study will generate contextual knowledge on the effects of children's lived experiences on child dietary behaviors. Thus, the findings can be used to inform multi-level interventions and policies that address childhood obesity.

CHAPTER 3

METHODS

2.1 Study Description

This study is a component of a larger cross-sectional study "School and Community Drivers of Children's unhealthy Diets", aiming at collecting data on factors influencing food choices among school aged children. This main study, addresses several socio ecological factors found to influence children's food choices, by collecting quantitative information from children, their parents, teachers, and school directors.

This study will collect qualitative data on the social and economic determinants that influence children's food choices, by interviewing school aged children about the reasons behind making certain food choices, while participating in a choice experiment. This study will complement the quantitative choice modelling component to understand the contextual factors that influence food choices among school aged children residing in greater Beirut.

2.2 The Choice Experiment

This choice experiment is deployed as a digital game on a tablet. It is designed based on the fact that different interconnected factors such as individual characteristics, social, economic and neighborhood surroundings affect children's food choices. The choice experiment aims to collect data on each child's hypothetical food choices given different scenarios. It mimics a typical day of the child's life, including breakfast at home, food store on his way to school, morning snack from the lunch box or from the cafeteria, lunch at home, afternoon snack and

dinner. Each section will include different types of food choices (eg: fruits, pasta, sandwiches) as well as different contextual factors that are known in the literature to affect children's food choices (eg: color, parent's presence, peer influence, food availability and convenience). The game is repeated over three days: Tuesday, Wednesday, and Thursday. In each choice scenarios, children get to choose their preferred meal by specifying the number of food choices they would make in each one of them.

This choice experiment is based on data revealed from the mapping of trajectories component and focus group discussions with a sample of children and their parents to search for the most common food choices made by the school aged children and to ascertain that some factors affect children's food choices. Pictures captured during the trajectory mapping process have been used to create realistic scenarios that are usually encountered by the children.

2.3 Study Population and Inclusion Criteria

The study population includes children aged between 9 and 12 years old, attending private, public, and private free schools located in Greater Beirut and enrolled in grades 4, 5 and 6.

2.4 Sampling and Recruitment

The main study – was launched in January 2021 after the approval of the Institutional Review Board (IRB) at The American University of Beirut (IRB ID: SBS-2019-0306). A two-stage sampling approach was used to select study participants: First, 37 schools were selected from the list of schools in Greater Beirut available on the 'Center for Educational Research and

Development (CERD)'s website through stratified systematic random sampling. Then Schools were stratified by the type of school (public, private, and private free) and by geographic location (Central Beirut, Northern suburbs, and Southern suburbs). After securing the approval of the Institutional Review Board and the Ministry of Education and Higher Education (MEHE), school directors were contacted by the research team to explain the study objectives, protocol, and timeline. Secondly, a sample of 20 children was chosen randomly from each grade per school.

For the qualitative study, a sub-sample of 1-3 participating children, from from different schools and grades were selected by convenience but we aimed to obtain a diverse sample in terms of gender, age, and socio-economic status. The selected child should have played the game on the tablet and his parents should have consented for their children to take part in a short interview.

One week before data collection, informed consent was sent from the school to the parents and assent was sent to the children. This consent explains in detail the aim of the study and the game component developed as well as the recorded interview that will be done. It also emphasizes the benefits and risks of participating in this study and focus on the right to refuse participating or withdrawing from the study. Recruitment continued until theoretical saturation was reached.

2.5 Interview

While playing the game, the child was observed by the interviewer who was taking notes about the child's choices. After completing the choice experiment, a semi-structured interview was conducted to elicit the reasons behind certain food choices made by the child

when playing the game and investigate in-depth how the game compares to the real choices they make in their daily lives. This semi-structured interview was conducted based on a topic guide (Table 1) that has been developed by the research team based on an initial literature review. The interview was recorded if the consent of the parents and the assent from the child were granted and signed. If it is not the case, detailed notes were taken by the interviewer.

Table 1: Semi-Structured Topic Guide

A. What are the factors that usually influence your food choice?

B. Can you explain why you made this particular food choice?

Probing based on the child's food choices and the context around the food choice

- How often do you consume this food? Why do you consume it this often/sometimes/rarely?
- Where do you usually eat it (home, school, on the way to school)?
- To what extent did you base your choice on whether it is a healthy/unhealthy food? Why do you consider it healthy/unhealthy?

C. Prices

- To what extent did you consider price when making your choice?

- How does price usually influence your choice in your life?

The research assistant can pick one of the vignettes where prices of food items were displayed and ask about the child's food choice in this vignette.

D. Placement of foods

- How did the location at which the foods were placed influenced your choice?

- How does the location at which foods are placed usually influence your food choice in your life?

E. Preparation of foods

- How did the availability of foods that require various levels of preparation (ready-made vs. you putting it together) influence your choices?

- How does the way the food is available (ready to be eaten vs. requires that you make some preparation) influence your food choice in your life?

F. Mother/caregiver/peer influence

- How did the presence of the mother/caregiver/peer influence your choice in this game?

- How does his/her presence usually influence your food choices in your life?

G. To what extent are the food choices you made as part of this game similar to the food choices you make in your daily life? (Probe: How are they different? How are they similar)

This is a general question on the game, but the research assistant can possibly ask about specific choices that he/she thinks are contradictory

H. How did you find the game, in general? (Probe: was it fun?)

I. To what extent do you think this game is similar to your reality? In what way?
J. If you would want to make this game more realistic, what would you change?

2.7 Data Management

At the end of each day of data collection, the recordings of interviews were transcribed verbatim in colloquial Arabic by a trained member of the research team. The recordings of interviews as well as the transcripts were stored in the interviewer's laptop and in a protected laptop at the Center for Research on Population and Health, and they will only be used and accessible by the research team working directly on this research study. All recordings will be deleted after a period of two years.

2.8 Data Analysis

Thematic analysis will be done with the help of Dedoose, a qualitative software package. As data collection is on-going, the researcher will familiarize herself with the data by reading each transcript several times. During the reading process, the researcher will search for themes already included in the topic guide as well as new emerging themes. In addition, she will be looking for patterns occurring in the data collected to identify possible relationships between certain themes. After becoming familiar with the content, the researcher will start by identifying the coding framework: a set of structural codes that match with the questions of the topic guide will be developed. Then, this coding framework will be applied to the transcripts and themes will be identified, this will help the researcher organize the data on each topic for more interpretation. Finally, the data will be interpreted by explaining how the different themes

relate or contradict each other's and by identifying their importance in providing answers to the objectives of this study.

CHAPTER 4

ETHICAL CONSIDERATIONS

This study protocol was reviewed and approved by the American University of Beirut Institutional Review Board and MEHE (The Ministry of Education and Higher Education).

The data collector obtained her CITI certificate and was trained by qualified data collectors having previous experience with research among children on data collection tools, research ethics and implementation of the Infection Prevention Protocol (IPC). In addition, the data collector was closely supervised by CITI certified research team who were visiting the schools on different days to monitor the data collection process.

The data collector showed respect for the participants and interviewed the participant in a neutral and objective way that did not influence the participant's food choice. Confidentiality, autonomy, and safety were protected by specific measures.

4.1 Privacy and confidentiality

As mentioned before, informed consent were collected from the parents of the participants and informed assent from the children participating in the study. Additionally, students whose parents provided informed consent sat in a private space with a trained data collector that explained again the components of the study and obtained their assent. All signed consent and assent forms were stored in a locked filing cabinet.

The interview following the game component were conducted in a private place at the school and individually. To protect participants' confidentiality, child names were retained during data collection and a unique ID was assigned to each participant. Additionally, any name mentioned during the interview was changed and personal identifying information were not recorded. Moreover, the privacy of all information collected will be preserved in any publication that follows this study.

4.2 Autonomy

As mentioned before, assent was sought from the participants to affirm their participation in the study. Additionally, the assent emphasized the right of the participant to withdraw from the research at any stage. Before starting the choice experiment, the participant were asked if he would like to participate in the study and the data collector repeated this question before starting the interview.

4.3 Covid-19 Infection Prevention Measures

Given the current Covid 19 pandemic, strict infection prevention control measures were implemented. Data collectors were trained on specific safety measures that should be followed during data collection to protect himself as well as the participants interviewed. When the data collector arrived at the school, her temperature was measured to make sure that it is within the normal range. If this is not the case, she was asked to leave the school and follow up with her family physician.

Moreover, the data collector was wearing a facial mask and sanitizing her hands before and after each interview. The tablet was also disinfected between interviews.

Additionally, all participants were asked before playing the game to confirm the absence of respiratory problems or fever, the absence of travel history and exposure to covid19 patients in the past two weeks. Sanitizers and facial masks were provided for participants and the data collector asked them to sanitize their hands before starting the choice experiment. During the game, verbal instructions from a specific distance were given to the participants on how to proceed with the game. During the interview, social distance of one meter was respected between the data collector and the participant and both were wearing masks throughout the interview.

4.4 Risks

We expected no more than minimal risk to participants in the choice experiment component of the study. However, the interview component may cause embarrassment to the participants, especially the questions related to food price. To alleviate the risk, the data collector reminded the participants that they have the right to accept or refuse participation in the study and they are allowed to skip any question they do not feel comfortable answering. Moreover, the names of the participants will not be kept or shared with anyone from outside the research team.

CHAPTER 5

FINDINGS

This section summarizes the findings of the interviews that followed the choice experiment. First, it presents the factors found to affect children's food choices in this game such as food price, food placement, food preparation, mother's, and peer's influence, expected taste, the degree of healthiness and food safety. Then it explains the ways in which the food choices made in this game are similar and different from the ones in real life respectively. Finally, it presents the children's impression on the game and their suggestions for improving this game.

5.1 Study Population Characteristics

The final sample for analysis included twenty-eight children, consisting of fifteen girls and thirteen boys. Eight children from the sample were from grade 4, twelve children from grade 5 and eight children from grade 6. Ten interviews were conducted in private schools, six in private free schools and the remaining twelve were conducted in public schools. Seven schools were in the Northern suburbs of Beirut, twelve in the central area and the remaining nine schools were in the Southern suburbs of the capital.

Table 2: Study Population Characteristics

Gender	Grade Distribution	Type of school	School Location
15 Girls 13 Boys	Grade 4: 8 children Grade 5: 12 Children	10 Private Schools 6 Private Free Schools	Northern Suburbs: 7 Schools

	Grade 6: 8 children	12 Public schools	Central area: 12 schools Southern Suburbs: 9 schools

5.2 Factors Affecting Children's Food Choices in the Game

The game was designed to explore the effect of some factors found in the literature such as food price, food placement, food preparation, and mother's and peer influence on children's food choices. This section explains how each one of these factors affects children's food choice. Then, it also discusses some factors that emerged from the interviews and identified by the study population as significant determinants of food choices.

5.2.1 Food Price

Findings revealed that food prices influenced children's food choices in this game in different ways:

Some children from both private and public schools were not affected either because they didn't see the prices on each food item at the shop or in the cafeteria or because they saw it but didn't give it any importance. Some of these children considered the taste of the food as the most important factor that affects their choices while others emphasized that they prefer to buy healthy food despite being more expensive as they are good for their health.

"I didn't even see the prices, where were they displayed?"

(Interview 8, girl, G5, Private School)

"{I have chosen the food}, that I like its taste and I am used to eat regardless of its price." (Interview 2, girl, G5, Public School)

"I don't care about the price, if it's healthy I will buy it even if it is expensive." (Interview 1, girl, G4, Public School)

On the other hand, many children affirmed that food price was an important element in making food choices and that the prices displayed with each item influenced in different ways their choices. First, the children were comparing the prices in the game to the real prices in the Lebanese market and this influenced their choices in two different ways. Some of them found the food in the game cheaper than the real prices and for this reason they bought more food items in the game compared to the real life. Others found the prices in the game very expensive, so they decided to not choose anything from the shop or the supermarket.

"Yes, I considered the price to a great extent. {In the game}, I was buying more than the real life because the food is less expensive in this game" (Interview 24, boy, G4, Public school)

"Because of the price, I didn't buy anything from the shop. I checked the prices and found them expensive. For this reason, I didn't buy anything" (Interview 23, boy, G6, Public School)

Secondly, some participants explained that they chose what they want to buy in the shop based on how much money they receive from their parents. They were comparing the amount they have in their pockets with the choices' prices available and they were planning how to spend the money. Most of them preferred to use all the amount on the same day, some decided to divide the amount over the week and others didn't buy anything and chose to save the money.

"I was thinking how much money my parents gave me to know what food I can choose from the shop" (Interview 6, girl, G5, Private Free School)

"When I was buying from the shop, I checked the amount of money I have to see if it's equal to the price of food I like so I can buy it." (Interview 18, girl, G4, Public School)

"I had 20 000 LBP and I wanted to save it, I didn't want to spend it all in one day, so I decided to buy just one item each day." (Interview 21, boy, G5, Public School)

Additionally, some children who did have money on them, decided not to buy anything because they brought their own food in their lunchboxes from their houses and considered them enough. Thus, they preferred to save the money instead of spending it.

"On my way to school, I didn't buy any food. In the cafeteria also I didn't choose anything because I have enough food in my lunchbox. So why do I need to buy additional food and spend my money on them?!" (Interview 13, boy, G5, Private School)

Moreover, some children clarified how they were choosing less healthy options because they were cheaper.

"I was choosing a mankouche and a juice from the shop because they are not very expensive. I mean these options are the cheapest ones available." (Interview 5, boy, G4, Private Free School)

Others decided to replace healthy food options like fruits with less healthy options like juices and chocolate just because the price of the healthier options was higher.

"I decided to choose the canned juice because it is cheaper {than the fresh juice}."

(Interview 26, boy, G5, Private School)

"I wanted also to choose an apple but nowadays {fruits} are becoming expensive, so I decided to delete the apple and keep the money with me, maybe I will decide to buy something else {a chocolate bar from the cafeteria}." (Interview 5, boy, G4, Private Free School)

5.2.2 Food Placement

Most children affirmed that their food choices weren't affected by the places where the food is found this game. While some of them argued that they didn't even think about this factor when making their choices, others emphasized that they were choosing either the food they are used to eat or the food choices they like its taste regardless of where it was displayed in the game.

"I didn't feel that {food placement} affected {my food choices}. To tell you the truth, I was just choosing the food I eat usually {in my life}, regardless of its place." (Interview 13, boy, G5, Private School)

"I didn't care about the placement of food. I chose the food I like {its taste} whenever it was appearing." (Interview 19, girl, G5, Public School)

On the other hand, few children admitted that in the game, especially at lunch and dinner, they chose food placed on the table inside the kitchen because in their real life, this is what they do: They enter the kitchen and take the food prepared by their mothers or caregivers that is placed on the kitchen's table.

"Generally, I chose the food placed on the table, because usually my mom prepares {the lunch or dinner} and put them here." (Interview 13, boy, G5, Private School)

Among these children, older ones noted that they took into consideration to a great extent, the placement of food when they were choosing food from the game. The main reason behind this thinking was their concerns about food safety. Some of them explained that they were choosing the food displayed inside the shop because they considered it safer, without bacterial and microbial growth since it is protected from sunlight and humidity. Others pointed out that they preferred to not choose salads if they were placed outside the fridge because they were worrying about their safety. *"I chose the food placed inside the shop, because it contains less bacteria {especially that} inside there is neither sunlight, nor humidity." (Interview 11, Boy, G6, Private School)*

"I didn't choose the salad, if it was placed outside the fridge because it might contain molds" (Interview 14, Girl, G6, Private School)

5.2.3 Food Preparation

The findings revealed various opinions regarding the availability of food that require different levels of preparation on children' choices in this game. While some children chose food that is prepared and ready to eat, others chose food that need preparation.

The children that chose ready to eat food had different reasons. Many of them indicated that they prefer to select food that is prepared because they considered it easy and need less efforts and time. They explained that usually they rely on their parents to prepare the food

because they don't know how to cook or because they are not interested in mixing the ingredients together or because they are not allowed by their parents since they don't have the required skills and they might make a mess in the kitchen. Other children claimed that they didn't know how to mix the ingredients together in the game.

"All the time, I chose in the game ready to eat food {because}, it is easier and don't need a lot of efforts." (Interview 6, girl, G5, Private Free School).

"I selected food that is prepared simply because I don't like to prepare it. I prefer that all my food is prepared by others, it's better, thus I will not make the kitchen dirty, and my mom will not be obliged to clean it. Anyways, I don't know how to make my food." (Interview 4, girl, G4, Private Free school)

"I was choosing the ready to eat food, because I didn't know that I can prepare my own food." (Interview 17, girl, G5, Public School)

However, the children that decided to prepare their own food had different reasons. All of them clarified that they don't know how to prepare meals for lunch or dinner, but they affirmed that they could prepare food that are easy like sandwiches or cornflakes and milk or pancakes. They emphasized that the preparation of these types of food does not require a lot of efforts and time and it does not cause any dangers for them since they don't need put on the fire. Moreover, some children explained that they prefer to prepare their own food since they know its ingredients and considered it safe from bacterial growth. In addition, they admitted that while preparing the food, they can replace some ingredients to make the recipe healthier.

"When the sandwich is ready to eat, we don't know when it was prepared. Maybe it's prepared a longtime ago {And if we eat it, we might be poisoned}." (Interview 26, boy, G5, Private School)

"I prefer to prepare my own food because it will be healthier, and I will know from what it is made." (Interview 16, boy, G6, Public School)

Some of the children that were choosing to prepare their food were trying to apply what they do in their real life in the game. For example, one child explained that he chose to prepare his own food in the game even though in real life he chooses ready to eat food just because his parents do not accept that he goes to school before eating. Once in the game, he did not find ready to eat food, so he decided to prepare.

"Thursday morning, I didn't find a labneh sandwich that is prepared. I was obliged to prepare it because my mom does not accept that I skip my breakfast." (Interview 11, boy, G6, Private School)

5.2.4 Mother's Influence

The findings proved that the mother appearance from time to time in the game affected the children's food choices in various ways.

First, many children explained that in the game they were selecting food choices similar to the ones consumed by the mother since in their real life, their mothers prepare the meals for lunch or for dinner and all the family eat it. Several children justified the reason behind making similar choices to their parents by highlighting the importance of family meals and sharing food for them.

"{In my family}, we eat the same thing all together every day." (Interview 15, boy, G4, Private School)

"I have selected a pancake like my mom, because I want to eat with her and because whatever food available at home, we eat it all together." (Interview 4, girl, G4, Private Free School)

Secondly, children were admitting the fact that the mother appearance with specific food in the game helped them to remember that they like its taste and then decided to select it.

"First I wanted to choose a pancake, but when I saw the mom coming with chips, I decided to choose chips because when I saw her, I remembered that I like the taste of chips." (Interview 2, boy, G5, Private Free School)

Moreover, few children claimed that they selected food choices like the ones consumed by the mother in the game, because they related these scenarios to their real lives. For example, one child explained that he selected the chips in the game when the mother was eating chips because in his life, his mom does not eat the whole bag of chips alone and usually he continues it in her place.

"I have selected chips like my mom, because in real life my mom doesn't consume chips regularly. Sometimes, when she eats it, she cannot continue it, so I eat the rest." (Interview 13, boy, G5, Private School)

Furthermore, many children argued that they chose food like the food consumed by the mom in the game only when she was eating healthy choices like apples, peaches, or salad. These children consider their mothers as their role models and believe that their moms know what they should eat to be in a good health.

"When the mom was appearing in the game, I selected the same food she consumes since she knows what is healthy and what I should eat." (Interview 14, girl, G6, Private School)

5.2.5 Peer's Influence

Generally, oldest children also argued that their food choices are not affected by their friends. They got nervous and anxious trying to prove that they are independent. One child even started shouting and saying:

"I even don't accept that I get affected by my friends. Everyone has their own personality." (Interview 23, boy, G6, Public School)

Additionally, many children explained how their friends influence their choices. These children were mainly from schools who have cafeterias or schools that distribute snacks. They associated this to the fact that a limited number of food choices is available, so they plan to bring different choices and share them all together. Sharing food is considered very important for the children.

"In my school, they give us a meal for the break, so we all eat the same things. Now outside the school, we eat like each other's because everyone of us buys something, and we share it." (Interview 24, boy, G4, Public School)

"I have a deal with my friend, we eat the same food at school." (Interview 6, girl, G5, Private Free School)

"I love sharing my food with my friends." (Interview 27, girl, G5, Public School)

Eating with friends was also associated with ordering deliveries or eating fast food in restaurants.

"When I am with my friend, I order deliveries, or I eat at Macdonald's." (Interview 15, boy, G4, Private School)

5.2.6 Other factors that have been found to affect children's food choices

Even if the game was designed to test the effects of the factors discussed previously on children's food choices, other factors emerged from the interviews with children. These factors were mainly the expected taste of food, the degree to which the food is considered healthy/unhealthy by the child, and the food safety.

5.2.6.1 The expected taste of food

Most children explained that the main reason for choosing specific choices in the game was their expected taste. Since they are used to eat it in their real life and they know how it tastes, they chose it while playing expecting that it will have a taste like what they eat. For example, one child declared:

"I chose food {such as cheese sandwiches} because I eat it in my life daily and this is the food, I like its taste too" (Interview 24, boy, G4, Public school)

Some children confirmed that the display of different choices that have *"good taste"* at the same meal made the choices harder for them thus they decided to choose two meals. Others, certified that they were choosing the same meal over different days because they didn't find other options that taste better.

"I love the taste of chips, for this reason I chose it." (Interview 2, boy, G5, Private Free School)

"For lunch, I chose Mujaddara and pasta because I like the taste of both, and it was hard for me to choose between them." (Interview 23, boy, G6, Public School)

"In the game, I was choosing pizza each day because I didn't find something tastier." (Interview 22, girl, G4, Public School)

In real life, children also give a lot of importance to the taste of the food. They even argued that they prioritize it over food placement and food price.

"I search for the food I like its taste whenever it is possible." (Interview 18, girl, G4, Public School)

"Even if it costs 30, 40 or 50 000 lbp, I choose it because it's Yummy." (Interview 21, boy, G5, Public School)

5.2.6.2 The degree to which the food is considered healthy/unhealthy by the child

Some children claimed that they made these food choices since they are healthy. Most of them attended schools that have health education in their curriculum or schools in which teachers told them that we are coming to test if they eat healthy.

Generally, children were able to differentiate healthy food options from less healthy options. They explained that consuming healthy food regularly is important for their growth and for this reason mainly they were taken into account how healthy the food is in their choice. In general, food low in fat and salt was considered healthy by the child as well as the consumption of fruits and vegetables. They recognized that milk and cheeses are rich sources of proteins that contain calcium. Additionally, they explained the importance of eating salad before any meal as

well as replacing canned juices with fresh ones. These children also acknowledged the fat and preservatives content of chips and junk food such as burgers and chicken nuggets admitting that they eat these less healthy options occasionally and this was reflected in their choices in the game. For example, one child wanted to choose a burger but then changed his mind and chose zucchini, explaining that he remembered that he ate pizza yesterday and that he needs to choose something healthier today.

"{When I think about the factors that affect my food choices}, first I think about healthy food." (Interview 6, girl, G5, Private Free School)

"Most of the time, I choose healthy food, rich in vitamins like milk and fruits. {I can't eat chips every day}, it contains preservatives." (Interview 13, boy, G5, Private School)

"{I always make sure to} eat salad before starting my meal." (Interview 14, girl, G6, Private School)

"Thursday, I wanted to choose a burger, but I changed my mind and took koussa, because I remembered that the day before I consumed junk food." (Interview 19, girl, G5, Public School)

Oldest children also acknowledged the monetary value of healthy food and noticed that they are more expensive.

"I prefer healthy food, but it's a little bit more expensive." (Interview 14, girl, G6, private school)

5.2.6.3 Food Safety

Children also emphasized that food safety is a very important factor that might influence their food choices. They always think about the place from where they buy their food to check if it's a reputable source that has all the safety and cleanliness measures. Additionally, they considered homemade food safer and less subjected to bacterial growth.

"I care about the place from where I am buying my food to make sure that this food is safe, clean and without microbes." (Interview 16, boy, G6, Public School)

"I prefer homemade cake, […]. I know what you are putting inside it." (Interview 26, boy, G5, Private School)

5.3 Similarity Between the Food Choices Made in the Game and those Made in Real Life

5.3.1 The ways in which the food choices made in this game are similar to the ones made in real life

All the children confirmed that the game is similar to their real life to a great extent. They explained that they made these specific food choices in the game because they are like the choices, they make daily.

"{I made these choices}, because normally I eat like this! […] I have chosen cheese sandwich and I usually eat it 4 to 5 times per week." (Interview 17, girl, G5, Public School)

Even more, some of them claimed that this game resembles their life hundred per cent, one child was joking and noted:

"I got confused is this a game or my life?!" (Interview 16, boy, G6, Public school)

When talking about the similarity, the children described multiple and different ways. First, several children affirmed that this game resembles their life by presenting the timing of all the meals and the snacks they consume as well as by displaying the shops on their way to school. They also asserted that repeating the game over three days helped them feel it more authentic. In addition, the children noticed that the type of food displayed in the game, is like the food consumed in their culture mainly Mujaddara, sandwiches, pizza and mankouche.

"This game is like my life, when it comes to the {type of food for the} lunch and dinner. The number of meals is also identical to my real life." (Interview 9, girl, G6, Private School)

"This game looks like my life to a great extent. I found different types of food like the food I eat in my life. In addition, on my way to school there are shops, and the game is repeated over different days." (Interview 23, boy, G6, Public School)

"I have chosen Mujaddara and salad, and in my life, I eat them." (Interview 18, girl, G4, Public school)

More interestingly, the interviews revealed that while playing the game, the children were able to associate the scenarios presented with their life and this influenced their food choices enormously. This section presents how each one of the factors that affected the children's food choices in this game and discussed in the previous section resemble the choices made in real life.

5.3.1.1 Usual Influence of Food Price in Real Life

The findings proved that also in real life, the food price is an important factor that affects children's food choices. All participants from public, private and private free schools affirmed that they take into consideration to a great extent the price when making their food

choices. Most interviewees affirmed that in real life as it was in the game, they receive a specific amount of money from their parents. They explained that before buying any item they check its price, and they compare it to the money they have, to see if they can buy it. One child noted:

"I search for the food I like. Then I see how much money my parents gave me to know if I can buy this food or not." (Interview 6, girl, G5, Private Free School)

In cases where the food they have chosen cost more than the monetary sum they have, many of them clarified that they ask their parents for extra money to buy the food they liked. One child stated:

"If I need more money […] I go to my dad and ask him if I can get more money to buy the food I liked in the shop." (Interview 22, girl, G4, Public School)

However, other children explained how they alter their food choices in these cases. Some of them claimed that they search for cheaper food options in other shops or supermarkets:

"I search for places where I can find the same item at a lower price." (Interview 26, boy, G5, Private School)

Many of them discussed how they try to replace this food item with another cheaper option:

"If there are three types of chocolate, I choose the cheapest." (Interview 21, boy, G5, Public School)

The remaining children especially those in private schools explained that if they can't buy what they like because it costs more than the money they have, they prefer to not buy other cheaper food choices because the quality will be different. Instead, they choose to decrease the quantity or to save the money day after day until they have the required amount and will be able to buy the food they liked.

"The food choices that I like are becoming expensive, for this reason I try to buy them once per week instead of every day." (Interview 24, boy, G4, Public School)

Moreover, the children pointed out the fact that healthy food is expensive and many of them confirmed that they are not buying healthy food due to their prices.

"I like healthy food, but it's a little bit expensive. I can't always choose it." (Interview 14, girl, G6, Private School)

The effect of food prices on food choices has been amplified due to the economic crisis in the country. Most children understood the situation very well and acknowledged the increase in food prices. Additionally, they described the effect of the rise of food prices on their food choices. They reported changes in their food choices and eating habits resulting from this situation. As some types of food like cheeses and meat are not as available in children's houses all the time as it was before, some children replaced these choices by more affordable ones like zaatar.

"Now we are in the middle of an immense crisis. So, for sure my food choices will be affected by the price." (Interview 16, boy, G6, Public School)

"I didn't eat pancake for more than one year {Because}, we used to eat it as a desert in a restaurant, but now we are not going to restaurants due to the corona situation as well as the crisis." (Interview 11, boy, G6, Private School)

Living through such situation was difficult for students particularly for those studying in public schools. Most of them became anxious and nervous when talking about the effect of food prices on their food choices. Some of them got tears to their eyes and preferred not to talk

about this point. This situation made children sympathize with their parents. They admitted the efforts of their parents to alleviate the effects of this crisis on their children.

"I don't want to buy {expensive food} every day, {because} my parents are working a lot, they are tired and don't have enough money." (Interview 27, girl, G5, Public School).

Older children defended their parents, describing how despite all their struggles, they still endure to provide them with all what they need.

"{If I like something and I can't afford its price}, I tell my mom who will find a way for sure to buy it for me." (Interview 20, Girl, G5, Public School)

Additionally, older children showed sympathy towards their parents. They explained how they tried to support their parents in these struggles. While some of them decided to stop buying food, others claimed that they need to be thankful and appreciate the food available in their houses.

"I always think that even if some types of food are expensive, my dad is still working hard to be able to buy them like meat that costs 200,000 LBP. As a result, I tell myself that I should consume them {to value my dad's efforts}." (Interview 3, Boy, G6, Private Free School)

To compensate for the increase in food prices, children adopted different coping strategies. For some of them, the rise of food prices obliged them to decrease the quantity of food they consume. This is because with a specific amount of money children before the crisis were able to buy two or three items. However, nowadays, due to the inflation rate and the increase in food price that accompanied it, children are still receiving the same sum and forced to buy less food items.

"Price is a very important factor {that influences my food choices} because you know the situation: Everything became expensive specially the food. Before {The crisis}, with 5 000 lbp I used to buy water, croissant, juice, and chocolate. Now with 5 000 lbp, I can't buy a lot of things, I just can buy one item." (Interview 24, boy, G4, Public School)

"{Before the crisis, I used to take two chocolate bars with me to the school}. Nowadays, if my mum put 1 chocolate bar in my lunchbox, I don't buy a second one." (Interview 13, boy, Grade 5, Private School)

On the other hand, for other children the economic crisis affected the quality of food they consume. Different children mainly from public schools affirmed that they tried to compensate for the increase in the price of the food by choosing other unknown brands that cost less than the food they used to choose before the crisis.

"For sure, I can't buy the type of chocolate I used to buy before because its price increased a lot. […] So, I buy a chocolate from a Turkish brand that is less expensive." (Interview 20, girl, G5, Public School)

5.3.1.2 Usual Influence of food Placement in Real Life

The findings proved that food placement in real life also influences children's food choices in different ways as it was in the game.

First, many children admitted that they prefer to choose the food placed on the kitchen's table for two main reasons. Some of them explained that in their real life, their parents prepare the food for them and place it on the table. This makes it accessible for them, thus they just take the prepared food and eat it. Others affirmed that they choose the food available on

the table because it is easier to reach, thus, they can grab it fast instead of looking inside the fridge or the shelves to choose food items. Additionally, some children emphasized that when visiting the supermarket, they tend to buy the food displayed next to the cashier because it is the easiest and fastest to reach.

"At home, I choose the food placed on the table because it is easy for me to take it and it doesn't need a lot of time." (Interview 11, boy, G6, Private School)

"In our house, my mom prepares the food and places it on the table, we came and eat it. […]. If I am at the supermarket or the shop, I feel it is easier to take the food {available} next to the cashier, because it is close to me and {I can take it} rapidly." (Interview 13, boy, G5, Private School)

Secondly, the children associated the placement of food with its organoleptic characteristics. Many children indicated that they prefer to choose some types of food like juices and chocolate from the fridge because when they are cold, they might taste better. Others highlighted their preferences to choose foods from the oven due to their pleasant smells.

"I prefer food placed in the fridge, especially chocolate because it has a greater taste." (Interview 15, boy, G4, Private School)

"When I go to the supermarket, or I enter the kitchen, I like to choose hot food, coming from the oven, it smells really good." (Interview 5, boy, G4, Private Free School)

The association between food placement and food safety was a recurrent theme among grade 6 students. Several children declared that they choose the food available inside the fridge or inside the shop because it is less subjected to microbial growth.

"Some food like eggs, I don't eat them if they are not in the fridge. I am afraid that they might contain bacteria." (Interview 14, girl, G6, Private School)

However, other children argued that they don't consider food placement as an important factor while making their food choices in real life. These children emphasized that the expected taste of the food is their most important priority and that they choose the food they like its taste whenever it is placed.

"I choose the food I like in whatever place it is put." (Interview 18, girl, G4, Public School).

Moreover, the children noticed that the food is displayed in the game in different places as it is available in their real lives, some on the table, others in the fridge or the shelves. They also were surprised that places other than the kitchen where they can eat like a cafeteria and supermarkets were appearing in the game.

"On the kitchen table we have food and, in the game, also food was put on the table, same thing for the fridge." (Interview 10, girl, G4, Private School)

"In the game, I was eating from the cafeteria and in my real life, I also eat there." (Interview 15, boy, G4, Private School)

5.3.1.3 Usual Influence of food Preparation in Real Life

While playing the game, the children were linking the preparation of food to their real life. One girl explained that she wanted to prepare a mortadella sandwich but decided to not do it, since she remembered that in real life, her mom will start shouting and accusing her that she has made the kitchen dirty *(Interview 18, girl, G4, Public School).*

Most children affirmed that they do not prepare their own food in real life, and they prefer to rely on their parents. These children in particularly asserted that they do not know how to cook or mix the ingredients to create their food and considered the food prepared by their parents tastier.

Certain children were a little bit nervous and wanted to show their independence. This was a recurrent theme among the oldest ones and especially among girls who affirmed that if they are obliged, because their parents are not at home, or their mothers are tired, they are able to prepare their own food.

"Usually, I don't prepare my food. I only do it when I am obliged […]. For example, when my mum is tired {I prepare my food}." (Interview 9, girl, G6, Private School)

Additionally, a recurrent theme appeared among the girls who expressed their interest in preparing food. These girls considered food preparation as a hobby as well as a way of helping and supporting their mothers in the household duties.

"I love preparing my food. I always help my mom in food preparation." (Interview 4, girl, G4, Private Free School)

Furthermore, several children discussed how the availability of food that require different levels of preparation influences their food choices over the day. Most of them explained that in the morning, they prefer ready to eat food because it's already prepared by their parents and don't need efforts and don't consume their time, especially that in the morning the children will be in a rush to put on their clothes and go to schools. On the contrary, these children confirmed that in the afternoons, they have more free time and enjoy preparing their snacks especially corn flakes and milk, pancake, or sandwiches.

Nonetheless, certain children claimed that they prepare their own food, and they fill their lunchboxes in the morning before going to school since their mothers are busy or still sleeping.

"I don't have enough time in the morning to prepare my own food […], I should hurry up to go to school. Sometimes, I prepare it in the afternoons." (Interview 11, boy, G6, Private School)

"I prepare my food in the morning because my mom doesn't wake up early." (Interview 19, Girl, G5, Public School)

Moreover, many children insisted that they don't take this factor into consideration while making their food choices. Some of them affirmed that if ready to eat food is available, they will consume it. If it's not the case, they will mix the ingredients together to make something to eat. Others clarified that they first choose food that is already prepared, but if they are still hungry, they do prepare something else.

"Generally, my parents prepare my food. I come and eat it. However, if it's not prepared, I go to the supermarket to buy some items and cook them." (Interview 24, boy, G4, Public School)

5.3.1.4 Usual Influence of Mother's Influence in Real Life

The interviews with children demonstrated that parents and especially mothers affect the food choices of their children in numerous ways. Like it was in the game, parents' role modeling of eating well was found to be a foundation for the children's behavior of healthy food choices. These children considered their parents as *"Good Influence"* and described how they encourage them to choose healthy food because they contain macro-and micro-nutrients that are essential for their proper growth.

"If my parents are eating a meal that I don't like, my mom encourages me to eat it by telling me that this food is essential for me to grow properly." (Interview 10, girl, G4, Private School)

"What my parents eat affects me a lot. […]. My mom and dad all what they eat is healthy and they try to be good influencers to us." (Interview 11, boy, G6, private School)

Moreover, children from private schools emphasized how their parents teach them about food labeling and counting calories to make sure that they are meeting their required dietary intake.

"My mom teaches us how to read the food label, {to know if we are eating well}." (Interview 11, boy, G6, Private School)

Additionally, the findings revealed how the mother affects her children food choices by putting rules and creating a positive eating environment. Some children explained how their mothers establish regular meals and snacks and expressed how their mothers don't accept that they skip their breakfast. Others explained how their mother oblige them to eat food that contains vitamins and minerals like Mujaddara (a dish made of lentils and rice) even if they don't like its taste. The remaining described how their mothers put rules on consuming chips and chocolate. These rules focus on the timing and quantity of this type of food per day.

"{In the morning, I need to eat a sandwich}, because my mom doesn't accept that I go to school without having my breakfast." (Interview 11, boy, G6, Private School)

"I don't like to eat Mujaddara a lot, but my parents don't accept this because they want me to have a good health. So, they make me eat a little bit of it and then allow me to eat something else." (Interview 16, boy, G6, Public School)

"I can't eat chocolate every day, my mom does not allow me." (Interview 22, girl, G4, Public School)

"My mom doesn't accept that I eat chips alone. I need to eat something good for my health first, then she allows me to eat chips." (Interview 13, Boy, G5, Private School)

Children also described how their food choices and eating habits are altered in the presence of the parents especially the mother. Many children claimed that their parents restrain them from eating specific food that are high in sugar, salt, and fat. Some of these children respond by eating these forbidden foods in secret when they are outside home or when their parents aren't present, while others accept this situation and replace their food choices with other choices that are accepted by the parents.

"If I want to eat chips and chocolate, my parents get angry. […] I don't eat this type of food in their presence. {I eat them at school}." (Interview 13, Boy, G5, Private School)

"My mom doesn't accept that I eat chips. When I am with her, I choose milk or fruits but when I go to school, I buy whatever I want." (Interview 5, boy, G4, Private Free School)

"{If my mom is eating cucumber and I want chips}, I choose cucumber because I don't want my mum to start shouting at me." (Interview 19, girl, G5, public School)

More interestingly, the findings also proved that parents influence their children's eating habits indirectly by affecting other factors such as food availability, food preparation and the amount of money they give to their children.

First, parents influence children's' developing preferences by making some food available in the house rather than others and this may also affect the diet quality of the child. Secondly, as explained in a previous section, a lot of children affirmed that they mostly rely on their parents

when it comes to food preparation thus the form in which the food is available at home affects the child's eating choices. In case, food was not prepared by the parents, the child will be forced to consume ready to eat food or to go to the supermarket and buy something to consume. Third, children receive money from their parents to buy food. Thus, the monetary value set by the parents determines what and how much food the child can buy.

"I eat labneh […] Only labneh is available in the fridge because my parents didn't buy anything else." (Interview 21, boy, G5, Public School)

"Usually, my mom prepares the food but in case, she didn't do it, I pass by the supermarket and buy a chocolate or chips." (Interview 19, Girl, G5, Public School)

"If my mom is not able to prepare food, we are obliged to order deliveries." (Interview 17, girl, G5, Public School)

"I was in the supermarket with my mom and decided to buy Milka chocolate, but it became expensive. It costs 30 000 lbp now. I asked my mom if I can buy it and she said yes but just 2 bars no more." (Interview 11, boy, G6, Private School)

Even though many children affirmed that their eating choices are altered by their parents' behaviors, some children get offended when addressing this factor; they insisted to show their autonomy. This was a recurrent theme among grade 6 students who affirmed that they don't care about their parents' choices, insisting that everyone has its own personality and preferences in life.

"{My parents' food habits} don't affect my eating choices because, everyone is independent and has its own personality." (Interview 20, Girl, G5, public School)

In many cases, the food choices of the children made in the game got affected by the fact that children were relating the game to their real life. For example, one child wanted to eat a peach like his mom but, he then chose a muffin explaining that his mom is always dieting and needs to eat fruits because they are low in calories, but he is not restricted to a certain number of calories, so he decided to take the muffin *(Interview 24, boy, G4, Public School)*. Another girl explained that she wanted to prepare a mortadella sandwich but decided to not do it, since she remembered that in real life, her mom will start shouting and accusing her that she has made the kitchen dirty *(Interview 18, girl, G4, Public School).*

5.3.2 The ways in which the food choices made in this game are different from the ones made in real life

Even though this game is similar to the children's lives to a great extent and the fact that the children made a lot of choices that resemble the choices they make in their lives, different children affirmed that some choices that have been made are different from the real choices they usually make in their lives. Many children explained that they have chosen certain food in the game even if they don't eat them in their lives. Each one of them had his own reasons. First many children claimed that some types of food are missing mainly Kibbeh, fries, and more types of fruits.

"Every Monday, I eat Kibbeh, but in the game, I was not able to choose this food, it was not available." (Interview 15, boy, G4, Private School)

Trying to compensate for this, children used different strategies that made their choices differ from their choices in real life. While some of them decided to go for other choices, others decided to prepare other type of food by mixing the ingredients all together in the game.

"While playing the game, in many cases, I chose to prepare my food because I am used to eat them in my life, but they were not available in the game." (Interview 13, boy, G5, Private School)

Secondly, the findings showed that the game doesn't reflect the real frequency of choosing specific food choices. In other words, the children were making the same food choices every day even if in their real life, they don't eat it daily.

"Normally, I eat pizza once per week. […]. In the game, I was choosing it daily, because I didn't find other food that I like." (Interview 22, girl, G4, Public School)

Additionally, several children chose in the game food they don't eat in their lives as a rebellion: Some children benefitted from the game to choose food that are not consuming anymore due to their increased price that followed the economic crisis in the country, or to choose food that like to eat but they are not allowed by their parents because they are not healthy.

"I chose Muffin because it's longtime ago that I didn't eat it. {I used to consume it before the crisis when we used to go out}." (Interview 11, boy, grade 6, Private School)

"In the game, I have chosen chips that I am not allowed to eat it often in my life." (Interview 15, boy, G4, Private School)

Furthermore, the children pointed out that they were buying from the shop in the game more than what they buy in their lives just because the game differs from the real life by the price of food.

"In the game, I was buying more food because it's cheaper than real life." (Interview 24, boy, G4, Public School)

Finally, in many cases, the children were making some choices that doesn't reflect their real choices, just to play the game and enjoy it. For example, one child confirmed that he was choosing to prepare his own food in the game, even if in his real life he chooses ready to eat food just to try this option in the game. A second child who studies in a school that doesn't have a cafeteria, chose food in the game from the cafeteria to try it. Another child confirmed that in the game, he was choosing food for breakfast, however in his real life he skips this meal just because he was afraid to make something wrong.

5.4 The child's Impression on the Game

Most children liked the game. They found it interesting and enjoyed playing it. Moreover, some of them considered this game as a reexamination of their eating habits as well as a reflection of their food choices. One of the students claimed that the game helped him think to which degree the food he eats usually in his life is healthy or not. He noted:

"{The game} is cool! It helps… and it let us think about what we eat, are they healthy or not?" (Interview 27, girl, G5, Public School)

Another student explained how this game made him reflect about the money he receives from his parents to spend it on food. He stated:

"{The game} is funny, I enjoyed it. It can be used to test each other's (the students), to know if we are helping or if we are annoying our parents. When our parents give us a certain amount of money to buy food, for example 10 000 lbp we can buy one item only or we can use it to buy 3 items, one for each day. In addition, this game helped me to think about the food price and how I spend my money." (Interview 26, boy, G5, Private School)

Even though most children appreciated the game, some children found it normal because the same thing is replicated over three different days and because it didn't include any challenge or competition.

"{The game} is nice, but you have put in it a lot of recurring actions. I mean that the game repeats itself for three days" (Interview 3, boy, G6, Private Free School)

"{The game} is nice, but it didn't amuse me a lot because it doesn't consist of any challenge or competition" (Interview 5, boy, G4, Private Free School)

5.5 Suggestions to Improve this Game and Make it more Realistic

In general, children were very excited and responsive in proposing suggestions for improving the game and make it realistic. Most of them suggested including more food choices options especially for the lunch and dinner like Kibbeh, different types of fruits and vegetables and zaatar. They also indicated the importance of including water on each meal. For example, one child affirmed:

"Add to the lunchbox zaatar's option and off course you need to add water!" (Interview 10, boy, G6, Private School)

Many children insisted on reducing the number of unhealthy options especially the food that are high in sugar and fat and replacing them with other healthier options. One child stated:

"{To improve this game}, try to remove the food that is not healthy. For example, {in this game}, there is a lot of cake. Cake is present in different types, and it is available in different places

inside the fridge, inside the kitchen cabinet, on the table of the kitchen. {Instead of this,} you can put one type of cake in one place at each meal." (Interview 27, girl, G5, Public School)

Another one noted:

"{To make the game more realistic}, remove the fried food and replace it by more healthy options like tomatoes, Laban, milk, cornflakes. Also, you need to remove the pancake". (Interview 3, boy, G6, Private Free School)

Moreover, the children from private schools also came up with some suggestions related to exercising. Some of them advised to include physical activity in the game explaining that when they exercise, their eating choices especially for the snacks might change.

"To improve the game, I would advise to include in it some activities for the boys or for the girls such as swimming or running. And then you can ask what he or she will eat after finishing exercising as a snack or as a dinner." (Interview 14, G6, Private School).

Additionally, some participants from private school too pointed out the importance of including on the food choices their nutritional fact labels, because their parents taught them that reading the nutrition label is very important to know the sugar salt and fat content of the food and this may alter their food choices. For example, one child stated:

"On the chips package, write its nutritional content information, to be able to read them before choosing. Also try to include healthier options of chips with a reduced amount of oil" (Interview 26, boy, G5, Private School)

Other participants claimed that this game focuses on the type of food without taking into consideration the quantity consumed. Thus, one of them suggested to ask the players about how much he consumes from each food chosen.

"{This game} tests me on the type of food I choose, but it didn't test how I eat it: Maybe I will eat it fully and maybe I will eat a part of it and keep the remaining" (Interview 20, girl, G5, Public School).

One student suggested to add a day of the weekend to the game to make it more realistic. He explained that during the weekend, his parents usually accepts that he eats some junk food like pizzas or burgers. He noted:

"Think about adding a Saturday or a Sunday to the game. In this way, I will be able to choose some fast food" (Interview 13, boy, G5, Private School).

Additionally, one child proposed to include in the game, the possibility to make a food choice during a certain period of the day other than breakfast, lunch, dinner, and snacks. She explained that usually in her real life, she revises her lessons before going to bed, and to be able to focus she needs to eat.

"Add to the game, a time in the evening when we are revising our lessons. Because when I am studying, I eat a small snack to be able to focus." (Interview 19, girl, G6, Public School).

Regarding the food price, some students recommended to edit the price attached on the food available at the store, claiming that there is a difference between the prices indicated in the game and the real prices in the supermarket or at any shops and this may affect the food choices. For example, one of them said:

"{If you want to make the game more realistic, first of all you need to correct the food prices and to make them similar to the prices of food available in the Lebanese market" (Interview 24, boy, G4, Public School)

CHAPTER 6

DISCUSSION

This study had two objectives: One was explanatory aiming to explore the factors affecting the food choices of school aged children living in Beirut, while the second was a validation objective to understand to what extent the children's choices are similar to those made in real life. Our study found that children's food choices are influenced by different factors. Some of these factors such as food price, food placement, food preparation, mother's, and peer's influence were displayed in the food choice experiment because they were found in the literature to affect children food choices. Other factors such as expected taste, the degree to which the food is considered healthy/unhealthy by the child and food safety emerged from the interviews with the children. The findings also revealed that the choices made in this game were similar to a great extent to those made in real life.

Lebanese school aged children from different socioeconomic status affirmed that the price of food is an important factor they take into consideration while selecting what to eat. All children explained that their main source of money is their parents and based on the amount of money received, they compare the price displayed on food choices to the amount of money they have, to see if they can buy it or not. These results are in line with the results of a survey conducted in four Chinese cities, in which children have been found to be included in purchasing food through receiving a specific allowance to spend it from their parents [95]. In addition, our findings showed that if the allowance received by the parents is less than the price of the food desired, many children tend to purchase other food choices that are lower in cost and in quality from the same shop or from another one. French and his colleagues confirmed that the price of

the food influences individual's behavior of adults as well as children, making them search for cheaper options in other places [96].

However, our study showed that students from high socioeconomic status prefer to decrease the quantity consumed instead of replacing the food items with other cheaper options that are lower in quality. These results highlight the socioeconomic inequalities in nutrition [97, 72, 98,99] that help to understand some of the observed social disparities in health [72, 100]. Studies have shown that children from higher socioeconomic status consume healthier food choices, whereas children from lower socioeconomic status have less healthy food choices that do not meet the dietary guidelines and nutritional recommendations, thus leading to malnutrition and non-communicable diseases [100, 101].

Additionally, Lebanese school aged children from different socioeconomic status were able to describe the economic crisis in the country and to recognize its effect on their food choices mainly availability and price. They were willing to express their own experiences of food insecurity. In line with the findings of a study done on food insecurity experiences among families in South Carolina where children in this research were willing to express their fears and worries as well as their own experiences of food insecurity, in a context of increased food insecurity at the national level [102]. In 2021, following the Lebanese economic collapse, the COVID-19 pandemic, and the Beirut port blast, 50% of the Lebanese respondents expressed their worries about not having enough food to eat in the previous month in addition to one in five Lebanese noting consuming one mal only in the preceding day [151]. UNICEF indicated that in March 2021, 77% of 1244 households surveyed did not have enough money to buy food items and 30% of families had at least one child who was obliged to skip a meal or to go to bed hungry due to food scarcity [152].

In our study, children acknowledged their parents' efforts to face food insecurity and sympathized with them. These findings are similar to the results of an earlier study conducted among Lebanese children aiming to assess food insecurity. Children expressed sympathy towards their parents' struggles in ensuring food and they tried to defend their parents noting that despite not being able to secure food for their kids, parents did not stop taking care of them [103]. Moreover, Fram and colleagues explained that children's experiences of food insecurity are not due to the economic context of their family life but from the relational and resource environment they encounter daily. Children are afraid when they see lower amount of food in their houses, or when they are given less allowance to buy foods or when they observe their parents changing their behaviors towards food choices and mealtimes [102].

Previous studies have found that food placement is a strong determinant of children's food choices [104,105]. Different authors showed that food products placed at children's eye levels and in places easy to reach are more likely to capture the consumers attention and their purchasing behaviors [106,107]. In this study food placement affected children' food choices in the choice experiment as well as in real life. However, the ways in which food placement affected the choices and were reported by the children differed from the literature: First a lot of children linked the organoleptic characteristics of food to its placement; many of them affirmed that the perceived smell of the cooked food placed on the kitchen table encourages them to eat it and others confirmed that the coolness of the food placed in the fridge motivate them to select it. Secondly, older children linked the placement of food inside or outside the shop to food safety, considering the food placed inside safer because it is less exposed to humidity and sun. These differences between the published literature and our results might be caused by the way in which the data collectors were reminding the children to open the oven, the fridge or the kitchen's closet to see all the food choices, thus the children were linking these scenarios to

their real lives and imagining where the food they choose in reality is placed to make similar choices in the game. Another explanation might be the fact that displaying food at the children's eye level was impossible in this choice experiment.

Regarding food preparation, most children claimed that they prefer to consume ready to eat food because they are easy to reach and require less efforts and time. These results are in line with previous studies conducted in India which showed that due to lifestyle changes and more working parents, consumers prefer to buy food that does not require preparation for convenience and because it needs less time to cook [109]. More interestingly, Ares and colleagues claimed that children might prefer ready to eat food over preparing it because of their food packaging that might encourage the child indirectly to consume them [110]. The food and beverages companies tend to display cartoon characters on the packaging as a marketing strategy to attract children [111], especially because children are exposed to these characters in their daily life and as a result, when they see the packaging, they tend to establish emotional bonds and mimic them [112]. Another reason that led the children in our study to prefer ready to eat food is the fact that some of them pretended that they are not allowed by their parents to prepare their food and that they even do not know how to do it. This can be explained by the fact that in some studies parents expressed their lack of confidence in their children's cooking skills or meal planning [113], or because in the Lebanese culture, the mother is considered the main family member responsible for preparing meals. Furthermore, our study found out that some children preferred to prepare their own food because they consider it healthier and safer as found in a previous study conducted among Palestinian and Lebanese children [114]. Secondly, De Jesus and colleagues affirmed that children' preparation of their own food is considered a reflection of their own decisions, giving them the power to decide what ingredients and what quantity to use [115].

Moreover, the findings of the current study showed that older children and girls, expressed their preference to prepare their food because they wanted to help their mothers and considered food preparation as a home duty. These findings can be explained by the fact that usually in the Lebanese culture, daughters help their mothers in food preparation and become responsible of maintaining the house if the mother isn't present [116].

Some children claimed that they do not prepare main meals but instead they prepare snacks or help their mothers in preparing desserts. Including children in meal preparation is a strategy highly recommended by the American Academy of Pediatrics as it might motivate children to eat new food items [115]. Anliker and colleagues explained that children who were more included in food preparation, had better knowledge on food origin, food role, energy balance, and nutrition awareness [153] . Also, involvement of Canadian children in food preparation correlated with higher consumption of fruits and vegetables [117]. The Eating Among Teens and Young Adults American project also proved that engaging children in food preparation was linked to healthier intake [118]. De Jesus and colleagues, found out that children tend to consume more food when they are involved in its preparation[115]. These findings are important to take into consideration, as while that the American Academy of Pediatrics recommends involving children in food preparation, our findings showed that children prepare desserts with their mothers that might be high in fat and added sugars. Thus, Lebanese children might be consuming unhealthy foods such as desserts. Studies investigating the consequences of including children in food preparation are needed.

Lebanese school aged children from different socioeconomic status were able to explain their parents' influence on their food choices especially when more family meals are shared. They perceived their parents as their role models and considered all what they eat as healthy. These results are in line with other cross-sectional studies that have showed the close analogy

between parents' consumption of healthy or unhealthy food and children's food choices, especially when the frequency of family meals increased [119-121]. Thus, parents' food choices have been shown to play an important role in creating healthy or unhealthy eating habits among school aged children [121] Moreover, the emphasis of family meals among Lebanese children can be explained by the cultural norms of this country [122]. A study conducted among families living in the Mediterranean area showed that family meals are considered by the parents as an opportunity to socialize and communicate with their children as well as a chance to promote healthy eating habits among them [154]. Other studies highlighted that regular family meals are an important space for the parents to act as role models of healthy food choices [123, 124].

The findings of our study revealed that children from private schools are taught by their parents about food labeling and counting calories as well as the importance of eating a varied and diverse diet. This can reflect how parents from higher socioeconomic status and educational levels have higher health consciousness and try to transmit this to their children [125].

Additionally, the findings showed that household food rules are an important factor established by the parents of Lebanese children to shape the eating behaviors of their offspring. While most Lebanese children counted parents' rules and norms as a reference to what is good to eat, some of them did not accept these rules and found other ways to consume "forbidden food". These results are noted by other authors: Birch et al. affirmed that parenting style and parent-child interaction in terms of feeding have a major influence on children's food choices, diet quality and growth parameters [126]. Food rules created by parents were found to be a powerful tool to regulate children's behaviors. A rule imposing limiting the consumption of junk food was significantly associated with improvements in the quality of food consumed and weight. [127]. Whereas a rule of "not eating while watching TV", have been shown to be effective because the amount of food consumed increased while the children were distracted by

the television and because the eating period might be prolonged in front of the television [127]. Additionally, parents' imposing breakfast routines on their children understood that consuming breakfast was significantly associated with improved nutritional status and cognitive development among children [128]. A cross sectional study conducted in Indonesia highlighted that breakfast routines of children were associated with their parents' routines [129]. Another study done in Queensland proved that breakfast skipping among school aged children correlated with poor parental emphasis on the importance of regular consumption of breakfast [130]. However, it's worth noting that limiting access to "forbidden food" might also have an adverse effect on food choices and food intake. Studies have shown that restricting some food among children might decrease the child's ability to control oneself when the "forbidden food" is available, resulting possibly in overeating this food in the absence of parents [131, 132] and this can explain the behavior of some children in our study who affirmed consuming chips and chocolate outside home because they cannot be seen by their mothers.

Moreover, children in many situations explained how their parents influenced their food choices indirectly by making certain food choices available or accessible especially because they were the main providers of food. These results are in line with three systematic reviews suggesting that fruits and vegetables availability inside the children's houses was associated with an increase in their intake [133-135].

Research has proved the strong influence of family on dietary behaviors and food choices [105,136] however as children grow up, the family influence decreases and the peer influence becomes a stronger determinant of food choices since at this age spend less time with their family [137]. The results of our study were comparable to the literature since many children and mainly the oldest ones got nervous and ascertained that their food choices in the game or in real life are not affected by their friend's food choices. Their attitude when

answering questions related to peer influence on food choices might be reflecting the fact that preadolescents start to create their own identity, searching for autonomy and trying to show that they are able to think independently and are able to make their own choices [138, 139]. Another point found in our study is the correlation between peer influence and the consumption of fast food and deliveries. These results support previous research showing that preadolescents independency around food was associated with less healthy eating choices [140], and that autonomy is a determinant for poor nutrition [141].

Even if the food choice experiment aimed to test the effects of specific factors found in the literature to affect children's food choices such as food price, food placement, food preparation and mother's/peer's influence on food choices, three more factors have been identified by the interviewed children as important influencers of their food choices.

First, many children identified the perceived taste of the food as a powerful factor affecting their food choices. Studies have proved that children give a lot of importance for the sensory characteristics of food and tended to choose those identified to have a "good taste" [142, 143]. However, this factor was not included in the choice experiment because in the actual display of this experiment, it was difficult to test the organoleptic characteristics of food on children's choices. Moreover, children tended to indicate that the reason behind certain food choices was their expected taste in the first general questions of the topic guide where no cues about the factors intended to be studied were presented. This can reflect the results of a study conducted among American children, that found that taste was often recognized by the children as a default option in cases where there was no other reason to use specific criterion in selecting food [144].

Secondly, some students also emphasized food safety as an important factor they consider while selecting their food choices. However, food safety was not found in the literature to affect children's choices. One potential explanation of the appearance of this specific factor might be that the answers of these children were influenced by the crisis they are living in. Children might be affected by their parents' discussions and worries about electricity cuts and food contamination. One child even explained that the main reason to give attention to this factor is that she caught a foodborne illness some months ago and entered the hospital for three days. This may clarify why she focused on food safety.

The third factor noted by the children to affect their food choices is the degree to which the food is considered healthy by the child. To our knowledge, this factor was not identified in previous studies. Many explanations might clarify the emergence of this factor. One explanation might be the fact that in many schools, the directors or the teachers have told the students that we are coming to check if they eat healthy or not. In these schools the answers of the children might be influenced by the presence of the data collectors, they might have over reported healthy behavior and under reported less healthier ones. A second explanation is that the covid 19 pandemic might have led the children being more health conscious, thus more willing to engage in healthy eating behaviors [145].

When comparing the food choices made in this choice experiment to the food choices made in real life, we found that they are similar to a great extent that it was difficult for us to separate the findings while presenting the reasons behind making these particular food choices in this game and the reasons behind making them in real life. This similarity can be explained by the fact that before starting playing the game, the child was instructed by the data collector to choose the food choices that reflect his real food choices and while playing the game, the child was reminded constantly by the data collector about this main instruction and the objective

from the game. Additionally, most participants affirmed that the game helped them to be more realistic by creating an environment very similar to the one they live in especially by displaying their peers, mothers, way to school, cafeteria, kitchen and culturally adapted food choices. There is evidence that choice experiment is an effective and reliable tool in predicting real choices[146-149].

To our knowledge this is the first study to explore the factors affecting children's food choices using a choice experiment. A strength of this study is that it emphasized different factors of the ecological model proven to affect children's food choices. It also highlighted new factors that might affect children's food choices such as expected taste, food safety and degree of healthiness. More research is needed to investigate the relationship between these determinants and children's eating choices. Additionally, the current study proved that the choice experiment collected information about children's real food choices to a great extent, thus, based on the suggestions of the interviewees, the game can be developed to become a more realistic assessment tool and then it can be used on a larger sample that includes children from other Lebanese regions.

However, this study has some limitations. First, the presence of the data collector while the child was playing the game and the fact some schools told their students that this study aims to assess if they consume a healthy diet or not, might have influenced children's choices making them choose healthier food options that might not reflect reality. To decrease the effect of social desirability bias, all data collectors were trained on how to be neutral. Secondly, choice experiments are associated with hypothetical biases which according to Beck et al., are defined as differences between choices displayed in the experiment and those available in real life. They usually appear when respondents have other preferences than those displayed or when the choices do not mimic reality in the characteristics of the choices presented [150]. Efforts have

concentrated in reducing hypothetical bias by repeating the experiment over three days. The choice experiment was also based on the results of focus group discussions with a sample of children and their parents aiming to search for the most common food choices made by the school aged children and to ascertain that some factors affect children's food choices. Moreover, the findings showed that the economic crisis in which the country is passing through affected children deeply, so regarding the questions related to the food price, the children might have not answered in a truthfully way due to feelings of shame and this might have affected the results. To compensate for this, we tried to include in our study children from different socioeconomic status. In addition, the price change resulting from the inflation rate between the time the game was developed and the time the child played it might have affected the accuracy of the children's choices. Furthermore, the findings generated from this study were intended to be compared to the results of the quantitative components to increase the credibility and validity of the main quantitative research, however, this was not done because by the time this report was written, the quantitative data analyses were not yet completed

CHAPTER 7

CONCLUSION AND FUTURE RECOMMENDATIONS

In sum, this study combined with the results of the quantitative study ensure a comprehensive understanding of the relation between children's lived experiences and food choices. Thus, they can be used to inform multi-level interventions and policies that address childhood obesity.

The findings generated from this study specifically highlight again that actions for preventing childhood obesity, require the collaboration of different stakeholders to address the multiple factors influencing children's food choices. This study could provide support for additional qualitative research and in depth understanding of the different factors in the socioecological model that might influence children's food choices. Research investigating the relationship between food safety and children's choices are needed to be done in the Lebanese context to acquire a better understanding of what factors children take into consideration when making their food choices. Also, as mentioned before, this choice experiment can be used as an assessment tool to collect data on the factors affecting children food choices. The results of our study should be taken into consideration while developing the choice experiment to make it more realistic: First to decrease hypothetical bias, the children could be given the option of adding other choices if the ones displayed do not show reality. Secondly, food placement should be assessed by showing the same choice in different places. Additionally, the price of the food choices presented in the game should be updated to be similar to the change in price that resulted from the inflation rate.

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