

Running Head: Food Insecurity and mental health

Food insecurity and child health, maternal mental health, and coping mechanisms

Layal Al-Madhoun

Hiba Al-Dorzi

Nour Al-Khatib

Abstract

Background: Household food insecurity is among the leading causes of malnutrition due to the lack of availability, access, and utilization of food resources. Since the year 2020, with the rise of covid 19 and the economic crisis taking place, the prevalence of food insecurity and hunger widely increased affecting millions of families especially mothers and children worldwide.

Aim: limited research exists in Lebanon that tackles the effect of household food insecurity from several aspects. This study aims to find the association of household food insecurity with the children aged under 5 nutrition, the maternal mental health, and coping mechanisms used.

Methods : the study is a cross-sectional observational study. A survey was used to assess 67 mothers of children aged less than 5 years old, which consisted of 3 sections a background information section, the HFISA section for food insecurity screening, and the PHQ section to screen depression in mothers. All participants lived in Lebanon either in Beirut or in south Lebanon. Data was analyzed using Microsoft excel and SPSS.

Findings: No correlation was found between household's food insecurity and child's growth. A strong negative correlation was found between the HFISA score and the PHQ score where as Household food insecurity increased, maternal depression increased. The maternal education level was also significantly negatively correlated with household food insecurity. As for the coping mechanisms, 50.7% of the participants resorted to eating foods they dislike, and 62.7% reported eating smaller and fewer meals.

Conclusion: it's important to tackle food insecurity in Lebanon and worldwide, and to find solutions to minimize its effects on maternal mental health and child nutrition such as raising awareness on possible coping mechanisms among all mothers susceptible to food insecurity

Introduction

Food insecurity, defined as the limited or uncertain availability and ability to acquire nutritionally adequate and safe foods in socially acceptable ways, is a major risk factor of malnutrition worldwide. Malnutrition refers to insufficient energy intake, overconsumption of food, or nutrient imbalances in the human body. The WHO categorizes malnutrition into three types. The first type is Undernutrition, and it can be represented by stunting (low height-for-age), wasting (low weight-for-height), as well as underweight (low weight-for-age). Stunting is usually a consequence of chronic undernutrition, abundant in populations suffering from poor socioeconomic conditions, mothers with poor health and inadequate nutrition, individuals who are frequently ill, or infants and children that had poor feeding practices during their early lives. It can have a drastic effect, not only on the physical potential of children, but also on reaching their maximum cognitive potential. Wasting, on the other hand, is an indicator of severe and acute weight loss due to deficient food intake or infectious diseases such as diarrhea. Severe

wasting can lead to death in young children if left untreated. Underweight individuals include those who are stunted, wasted, or both. The second type of malnutrition includes imbalances in micronutrients; either inadequacy or excess in vitamin and mineral intake, and it is called Micronutrient-related Malnutrition. Micronutrient related malnutrition can be a major obstacle for proper growth and development because of the essential roles that vitamins and minerals play in the human body. These roles include enzyme and hormone production as well as production of many other substances that aid in growth. The final condition of malnutrition is related to overweight, obesity, and diet related non-communicable diseases (NCDs), and is usually represented by an excess in energy intake.

Despite the term food insecurity being frequently mistakenly used interchangeably with the term hunger, it is important to note that the two terms do not share one meaning. Hunger is a physiological condition felt on an individual level, which may be the result of food insecurity, a household level socioeconomic phenomenon. Because the two terms are highly related, statistics about one term can give important insights about the other. According to the Food and Agriculture Organization of the United Nations, undernourishment worldwide increased from 8.4% to 9.9% since 2020, with up to 811 million people facing hunger (FAO, 2021). Since 2014, global food insecurity was rising yet it was found that in 2020 alone, the number of people affected by food insecurity was equal to that affected in the past 5 years, making around 2,370,000,000 food insecure individuals, half of which live in Asia (FAO, 2021). Food security has 4 main pillars: Availability meaning that a source of safe nutritious food exists, accessibility meaning that people have sufficient resources to purchase or to produce the available food, utilization meaning that people have enough knowledge and safe sanitary conditions for food preparation and distribution and stability of all previous three pillars over time (Aborisade and

Bach, 2014). The USDA, in 2006, divided food security and insecurity into 4 ranges that can be used to measure them: High food security, marginal food security, low food security, and very low food security. High food security is characterized by no anxiety or difficulty accessing adequate foods constantly. Marginal food security indicates the presence of anxiety or problems accessing food, yet the family's intakes are kept mostly unreduced in quality, quantity, and variety. Low food security, on the other hand, occurs when the quality, variety, and desirability of the household members' diets are altered. Quantity of food here remains in the range of normal eating patterns. The fourth range, very low food security, is characterized by disrupted eating patterns and decreased intake of food more than once during the year due to lack of money or other food resources (USDA, 2021).

Literature Review

Women and children suffering from poverty and a low socioeconomic status (SES) are at a higher risk of being food insecure and hence malnourished. Research done in Ethiopia, one of the poorest countries, found a significant association between HFI and underweight and stunting in children aged 6-59 months, but not wasting. Children in food insecure households were 3.82 and 6.7 times more likely to be underweight and stunted, respectively, compared to children living in food secure households (Betebo et al., 2017). Another study assessing the correlation between household food insecurity and child and maternal malnutrition in rural Cambodia found a positive correlation between maternal thinness and HFI, yet no significant correlation was

found regarding child malnutrition and HFI (McDonald et al., 2014). In Malaysia, a study performed on 223 households, of which 83.9% had some kind of food insecurity, also had similar findings, with children living in food insecure households being 2.15 and 3 times more likely than food secure children to be underweight and stunted, respectively (Naser et al., 2014). Naser et al. also identified a few risk factors of food insecurity that were found to be significant, such as education of the mother, household size, number of children, number of children going to school, total monthly income, income per capital, number of household members contributing to the income and food expenditure. Slightly different findings were discovered in a study done in Haramoya where HFI was found to significantly predict underweight in children aged 24-59 months and marginally predict wasting (Abdurrahman et al., 2016). However, a study performed in India found opposing results, with HFI not being associated with neither stunting, wasting, nor underweight, but with diet diversity in children (Chandrasekhar et al., 2017). A study conducted in 2018 on the prevalence of food insecurity in Lebanese households with children aged 4 to 18 years old found that almost half of the sample studied was food insecure, and 7%, 23.3%, and 18.9% of the sample found to be respectively mildly, moderately, and severely insecure. Low parental education as well as unemployment and crowding were significant correlates of HFI, yet children nutrition was not found to have a significant association with HFI (Jomaa et al., 2018). Abhishek found that children in food insecure households in Nepal were 1.5 times more likely to be stunted and 1.4 times more likely to be underweight compared to children living in food secure households. There was no correlation found regarding wasting in children. Abhishek also found that married women were more likely (1.5 times) than married women in food secure households to have a BMI below 18.5 kg/m² indicating underweight (Abhishek, 2014).

Household food insecurity was not only found to have consequences on nutritional health but was also found to be associated with maternal mental health. A study done in Egypt on the impact of household food insecurity on maternal mental health found that mothers living in food insecure households, which were about 70% of studied women, significantly showed more symptoms of anxiety and depression, around 13 times worse than food secure mothers. A number of factors contributed to predicting mental distress in mothers, including household food insecurity, their husband working abroad, their socioeconomic status, and how many children they had (Mahfouz et al., 2021). Another review performed in 2020 on existing research regarding the relationships between food insecurity, the mental health of mothers and domestic violence concluded that the research reviewed demonstrated notable relationships between all three comorbidities, with food insecurity being associated with poor maternal mental health (Laurenzi et al., 2020). Maternal depression was found to influence household food insecurity for low-income families in a study performed on mothers in the United States. A significant association between maternal depression and household food insecurity at follow up was discovered (Garg et al., 2015), with similar findings discovered indicating that maternal depression increased household food insecurity by 11 to 69% and young children's food insecurity by up to 80% (Noonan et al., 2016). Wu, Hardwood, and Feng also studied the effect of family socioeconomic status (SES) and depression in mothers through food insecurity, to deduce that family SES was a predictor of household food insecurity which hence resulted in maternal depressive disorder (Wu et al., 2018). In addition, a different study performed in Ethiopia on food secure and insecure households revealed that all depressive disorders were significantly higher in food insecure households compared to secure ones (Ghebreyesus et al., 2017). Several adaptations were made by mothers to minimize the impact of food insecurity on

their families. A recent cross-sectional study done in Lebanon researching the prevalence and correlates of FI in Lebanon after COVID 19, the Beirut blast and the economic crisis found that more than 70% of participating households referred to skipping meals in order to spare food, with more than half eating less than 2 meals daily for each individual. Expanding debt to buy food was another coping mechanism (Hoteit et al., 2021). Similarly, a study on the prevalence of FI among Lebanese households and its correlates found that almost half of the sample studied resorted to skipping meals as a coping mechanism. Most households resorted to borrowing food from neighbors or family, and many adapted by spending savings or withdrawing their children from school (Jomaa et al., 2018). A research conducted in Ghana, however, had opposing results with the coping strategy used least being borrowing money to buy food, and the strategy most commonly used being decreasing portion sizes (Saaka et al., 2017).

Research Questions

Research on the prevalence and effect of HFI on child nutrition and maternal mental health and the coping mechanisms is wide, yet it remains controversial and limited in Lebanon specifically. This study aims to confirm the previous research regarding the prevalence of household food insecurity in Lebanon as well as the relation between household food insecurity on the mental health of mothers. Regarding the effect of FI on child nutrition and health, children are expected to be undernourished upon reviewing previous research. Also, few studies targeted children under the age of 5, so this research further elaborates the literature on ages 6-24 months

as well as children aged 24-59 months and aims to confirm the hypothesis of FI being positively correlated with Undernutrition in children aged less than 5 years. Most studies reviewed focused on the relation between FI and maternal mental health or children nutrition, yet further research is needed to study the coping mechanisms used by mothers in food insecure households, which is another purpose for the conduction of this study. This study was centered on 3 main research questions:

RQ1: Is household food insecurity associated with nutrition of children aged 6-59 months in Lebanon?

RQ2: Is household food insecurity associated with deteriorated maternal mental health in Lebanon?

RQ3: What are the maternal coping mechanisms used to minimize the effect of food insecurity in households in Lebanon?

Methodology

The study conducted was a cross-sectional observational study. Data was collected using one tool, a survey. The survey was filled face to face by 67 mothers who were randomly chosen from susceptible households in Lebanon categorized into two main regions: Beirut and the South. Areas and streets visited included Nweiri, Basta, Ras el nabeh, and Furn el Chebbak and from the south data was collected from Saida and Nabatiyeh.

Five inclusion criteria were set for participants in the study: the household includes a mother and a child, the mother is aged above 18 years old, the child's age is less than 5 years old

and more than 6 months old, the child does not suffer from any disease that might affect his growth and development, and the mother has not been medically diagnosed for any specified mental illness. The survey, reviewed and approved by the IRB committee, was sectioned into three main parts.

The first part, which was self-created based on target outcomes, was centered around general background information, possible risk factors and nutrition of the child. The second part was centered around measuring food insecurity, whereas the last part measured the maternal mental health. For survey preparation, the HFIAS (household food insecurity access survey) was used as a screening tool to measure household food insecurity, and The Patient Health Questionnaire (PHQ) was used to estimate maternal mental health, both being validated questionnaires by AUB research center (to assess FI in Lebanon) and the DSM, respectively.

The HFIAS included 9 questions with scores of 0 (never) to 3 (often) and categorized the sample as either food secure (a score of 0-1), mildly food insecure (score 2-8), moderately food insecure (score 9-16) and severely food insecure (score 17-27). The PHQ included 9 questions, with 4 scores for each, ranging from 0 (not at all) to 3 (nearly every day). Scores of 5, 10, 15, and 20 represent cutpoints for mild, moderate, moderately severe and severe depression, respectively. After attaining informed consent from participants, phone numbers of all participants were taken prior to survey filling for possible future interviewing with their identity kept anonymous. To maintain confidentiality, surveys were coded (by region, area, and survey number) and the codes were assigned to each phone number. Participants had the choice to skip answering any question and to dismiss the rest of the survey when they want to.

As for the analysis of data, Microsoft Excel was used for data entry and descriptive statistics. Then, data collected was analyzed using the SPSS tool using bivariate correlations.

Results

Descriptive Analysis:

The average age of mothers/caregivers who participated in the study was 32.1, with a standard deviation of 7.478. The oldest caregiver interviewed was 60 years old, and the youngest was aged 19 years old (Figure 1).

<i>Figure 1</i>	N	Minimum	Maximum	Mean	Std. Deviation
mother's age	67	19	60	32.10	7.478

Participants were from three different nationalities: 28 Lebanese (41.8%), 29 Syrian (43.3%), and 10 Palestinian (14.9%) (Figure 2).

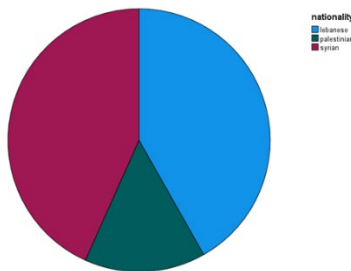


Figure 2

		Frequency	Percent
Valid	Lebanese	28	41.8
	Palestini an	10	14.9
	Syrian	29	43.3
	Total	67	100.0

The HFIAS score used to measure household food insecurity had a mean of 11.13, indicating moderate food insecurity. The standard deviation was 5.393, and the minimum score reported was 0 (food secure) and the maximum was 24 (severely food insecure) (figure 3).

	N	Minimum	Maximum	Mean	Std. Deviation
HFIAS score	67	0	24	11.13	5.393
Valid N (listwise)	67				

Figure 3) HFIAS

Monthly Family Income:

As for the monthly family income, income was categorized into two currencies, family income in Lbp and family income in \$. For families with income in Lbp. , it was found that 7.5% of participants did not have an income, 11.9% had an income of less than 675,000, and 17.9% having and income of 675,000 to 1,000,000. 13.4% had an income between 1,000,000. to 1,500,000 and similar results were found for those who got an income of 1,500,001 to 2,000,000. Some families had higher incomes, with 11.9% getting between 2,000,001 and 2,500,000 monthly, 10.4% getting 2,500,001 to 3,000,000, 9% getting 3,000,001 to 5,000,000, and the least percentage (1.5%) making or receiving more than 5,000,000 per month. 2% refused to answer (Figure 4).

		Frequency	Percent
Valid	<675,000	8	11.9
id	>5,000,000	1	1.5

	0	5	7.5
	1,000,001- 1,500,000	9	13.4
	1,500,001- 2,000,000	9	13.4
	2,000,001- 2,500,000	8	11.9
	2,500,001- 3,000,000	7	10.4
	3,000,001- 5,000,000	6	9.0
	675,000- 1,000,000	12	17.9
	n/a	2	3.0
	Total	67	100.0

Figure 4 Family income in LBP

In dollars, only 19.4% of participants had an income source in \$, with 10.4% of total participants getting less than \$450, 1.5% getting between \$450 and \$650, and 4.5% getting between \$651 and \$1000 (figure 5)

		Frequency	Percent
Valid		2	3.0
	<450	7	10.4
	0	54	80.6
	450-650	1	1.5
	651-1000	3	4.5
	Total	67	100.0

Figure 5 Family income in \$

29 out of 42 children had a BMI for age that indicated that they have abnormal weight 19 of them were underweight (figure 6)

		Frequency
Valid	NA	25
	Normal	13
	Obese	3
	Overweight	7
	Underweight	19
	Total	67

Figure 6 BMI for age

Regarding Child nutrition, the mean and Std. Deviation of the height for age, length for age, weight for age, weight for length and weight for height are displayed in (figure 7).

	Mean	Std. Deviation
height for age	35.606	40.6100
length for age	12.459	26.6951
WHO_weight_for_age	60.353	28.8111
weight for length	23.669	39.5381
WHO_weight_height	65.375	31.2616

Figure 7 descriptive statistics

Household Food Insecurity and coping mechanism:

Regarding food insecurity in households in Lebanon, it was found that 67.2% of participants worried during the past month that they did not have enough food in their homes (figure 8 (a)).

		Frequency	Percent
Valid	0	22	32.8
	1	6	9.0
	2	20	29.9
	3	19	28.4
	Total	67	100.0

Figure 8 a) Not enough food

91% had to eat less of their favorite foods due to lack of resources with 56.7% choosing a score of 3 (more than 10 times in the past month) (figure 8 b) with a similar percentage of 55.2% for a score of 3 when asked if they had to eat limited types of food due to lack of resources (figure 8

		Frequency	Percent
Valid	0	6	9.0
	1	1	1.5
	2	22	32.8
	3	38	56.7
	Total	67	100.0

c).

Figure 8 b) eat less food

		Frequency	Percent
Valid	0	9	13.4
	1	5	7.5
	2	16	23.9
	3	37	55.2
	Total	67	100.0

Figure 8 c) limited types of food

50.7% of participants had a member in their household eat foods they disliked at least once in the past month because of lack of resources (figure 8 d)

		Frequency	Percent
Valid	0	33	49.3
	1	5	7.5
	2	13	19.4
	3	16	23.9
	Total	67	100.0

Some adaptations were made by mothers such as cutting down the size of meals or the number of meals. In the past month,

Figure 8 d) eat dislike food

62.7% of participants had a family member eat a meal smaller in size, not enough to meet their needs due to unavailability of enough food in the household, (figure 8 e).

		Frequency	Percent
Valid	0	25	37.3
	1	8	11.9
	2	20	29.9
	3	14	20.9
	Total	67	100.0

Figure 8 e) smaller meals

and the same percentage ate fewer meals in the past month for the same reason with most skipping dinner and depending on breakfast

and lunch solely (figure 8 f). A higher percentage (28.4%) chose a score of 3 for fewer meals relative to the percentage of score 3 for smaller meals (20.9%).

		Frequency	Percent
Valid	0	25	37.3
	1	7	10.4
	2	16	23.9
	3	19	28.4
	Total	67	100.0

Figure 8 f) fewer meals

Figure 8 g) no food

		Frequency	Percent
Valid	0	48	71.6
	1	8	11.9
	2	9	13.4
	3	2	3.0
	Total	67	100.0

The percentage of participants who reported having no food in their homes at least once (figure 8 g), or a family member sleeping hungry due to unavailability of food at least once in the past month was

28.4% of participants (figure 8 h).

		Frequency	Percent
Valid	0	48	71.6
	1	7	10.4
	2	9	13.4
	3	3	4.5
	Total	67	100.0

Figure 8 h) slept hungry

		Frequency	Percent
Valid	0	63	94.0
	1	3	4.5
	2	1	1.5
	Total	67	100.0

Most participants reported a score of 0 (never in the past month) when asked if any family member ever went 24 hours without food due to a lack of food at home, with only 4 out of 67 reporting it is happening once or twice in the past month (figure 8

Figure 8 i) 24 hours no food i).

Some families resorted to seeking financial help donations (44.8%) to minimize food insecurity. When asked about the type of help 28.36% of total participants got food boxes, 14.93% specified that they got financial aid from the United Nations and 1.49% got help from their parents or financial support as money with the source kept unspecified.

Patients Health Questionnaire

According to the patient health questionnaire, 88.1% of the participants had a lack of interest and enjoyment in daily activities (figure 9 a)

Figure 9 a) had a lack of interest/enjoyment

		Frequency	Percent
Valid	0	8	11.9
	1	16	23.9
	2	25	37.3
	3	18	26.9
	Total	67	100.0

95.6% of the participants answered that they experience sadness, chest tightness or despair, where

46.3% out the participants answered that they face these issues daily. (Figure 9 b)

		Frequency	Percent
Valid	0	3	4.5
	1	16	23.9
	2	17	25.4
	3	31	46.3
	Total	67	100.0

70.2% of the mothers faced difficulty in falling asleep, interrupted sleep, or sleeping more than usual, 18% faced these issues daily (figure 9c).

Figure 9 b) experienced sadness, chest lightness, or despair

		Frequency	Percent
Valid	0	20	29.9
	1	18	26.9
	2	17	25.4
	3	12	17.9
	Total	67	100.0

92.5% of the mothers claim that they feel tired. (Figure 9 d)

Figure 9 c) unusual sleeping

		Frequency	Percent
Valid	0	5	7.5
	1	10	14.9
	2	21	31.3
	3	31	46.3
	Total	67	100.0

Figure 9 d) felt tired

Regarding the mother’s appetite, 55% of the mothers reported that they face decrease or increase in appetite in food intake (figure 9 e).

		Frequency	Percent
Valid	0	30	44.8
	1	9	13.4
	2	16	23.9
	3	12	17.9
	Total	67	100.0

Figure 9 e) unusual appetite

60% of the mothers stated that they experience feeling unhappy or feeling like they let themselves or their family down (figure 9 f).

		Frequency	Percent
Valid	0	27	40.3
	1	12	17.9
	2	13	19.4
	3	15	22.4
	Total	67	100.0

45% of the mothers declare that they feel that have less concentration compared to their past day (figure 9 g).

Figure 9 f) feeling unhappy

		Frequency	Percent
Valid	0	21	31.3
	1	13	19.4
	2	16	23.9
	3	17	25.4
	Total	67	100.0

Figure 9 g) difficulty concentrating

46.3% of the mothers claim that they have slow movement, or they face slow talking or conversely talk fast and move more than usual (figure 9 h).

		Frequency	Percent
Valid	0	36	53.7
	1	18	26.9
	2	9	13.4
	3	4	6.0
	Total	67	100.0

Figure 9 h) unusual movement

Only 27% of the mothers stated that they had thoughts that it would be better if they were dead or thoughts that they would self-harm (figure 9 i).

		Frequency	Percent
Valid	0	49	73.1
	1	7	10.4
	2	4	6.0
	3	7	10.4
	Total	67	100.0

Figure 9 i) harmful thoughts

A significant positive correlation was found between the HFIAS score measuring food insecurity and the PHQ score measuring depression in mothers. Families with a higher HFIAS score meaning more food insecurity tended to have more depressed mothers (figure 10).

		phq score	HFIAS score
phq score	Pearson Correlation	1	.474**
	Sig. (2-tailed)		<.001
	N	67	67
	HFIAS score	.474**	1

	Sig. (2-tailed)	<.001	
	N	67	67
**. Correlation is significant at the 0.01 level (2-tailed).			

figure 10 correlation between PHQ and HFIAS

Based on the results, there was no significant correlation between household food insecurity access score and the growth indicators (height for age, length for age, weight for age...) (figure 11).

		height for age	length for age	WHO_w eight_for _age	weight for length	WHO_w eight_hei ght	HFIAS_ score
height for age	Pearson Correlation	1	-.422*	.101	-.542**	-.340	.113
	Sig. (2-tailed)		.016	.582	.001	.057	.539
	N	32	32	32	32	32	32
length for age	Pearson Correlation	-.422*	1	.243	.433*	-.111	-.179
	Sig. (2-tailed)	.016		.180	.013	.546	.327
	N	32	32	32	32	32	32
WHO_weight_ for_age	Pearson Correlation	.101	.243	1	.335	.618**	.111
	Sig. (2-tailed)	.582	.180		.061	.000	.545

	N	32	32	32	32	32	32
weight for length	Pearson Correlation	-.542**	.433*	.335	1	.424*	-.274
	Sig. (2-tailed)	.001	.013	.061		.015	.129
	N	32	32	32	32	32	32
WHO_weight_height	Pearson Correlation	-.340	-.111	.618**	.424*	1	.114
	Sig. (2-tailed)	.057	.546	.000	.015		.534
	N	32	32	32	32	32	32
HFIAS_score	Pearson Correlation	.113	-.179	.111	-.274	.114	1
	Sig. (2-tailed)	.539	.327	.545	.129	.534	
	N	32	32	32	32	32	32
*. Correlation is significant at the 0.05 level (2-tailed).							
**. Correlation is significant at the 0.01 level (2-tailed).							

figure 11

A strong negative correlation was found between mother’s education level and HFIAS score (-0.376) at the 0.01 level indicating that as the latest level of education increases for the mothers, HFIAS score decreases (figure 12).

		husband job	mothers' education	HFIAS_sc ore
husband job	Pearson Correlation	1	.287*	-.085
	Sig. (2-tailed)		.019	.492
	N	67	67	67
mothers' education	Pearson Correlation	.287*	1	-.376**
	Sig. (2-tailed)	.019		.002
	N	67	67	67
HFIAS_score	Pearson Correlation	-.085	-.376**	1
	Sig. (2-tailed)	.492	.002	
	N	67	67	67
*. Correlation is significant at the 0.05 level (2-tailed).				
**. Correlation is significant at the 0.01 level (2-tailed).				

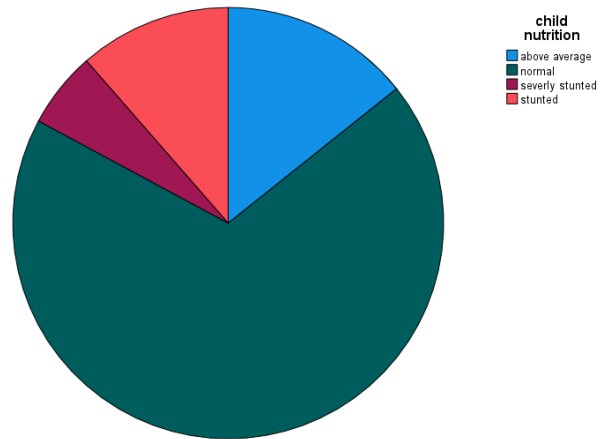
figure 12

Child health:

4 out of 35 children were stunted, 2 were severely stunted, 5 were above the normal average, this analysis is related the length/height for age (figure 13)

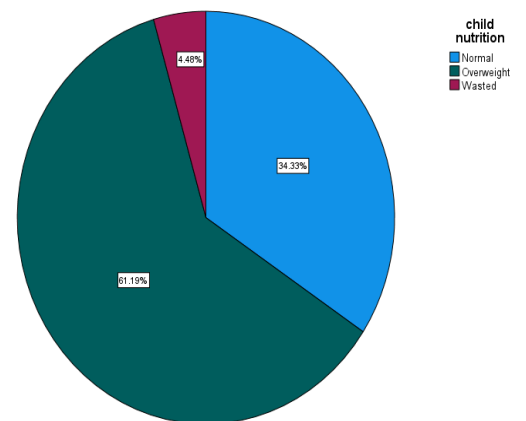
		Frequency
Valid	above average	5
	excluded	32
	normal	24
	severly stunted	2
	stunted	4
	Total	67

figure 13 length/ height for age



Upon analyzing weight for length/height 66% have abnormal weight, whereby 61% children were overweight, and 5% children were wasted (figure 14)

		Frequency	Percent
Valid	Normal	23	34.3
	Overweigh t	41	61.2
	Wasted	3	4.5



	Total	67	100.0
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figure 14 weight for length/ height 1

Discussion:

This study is one of the first studies in Lebanon to tackle the association between household food insecurity on children under 5 years malnutrition and the mothers' mental health as well as the coping mechanisms used. Many factors that might have an effect on the prevalence of food insecurity were taken into consideration, such as the currency of income (dollars or Lebanese pound), parents' education and employment, and also their method of coping. Given the recent situation in Lebanon regarding the Lebanese currency and the dollar rate fluctuations, the results of this study revealed that most of the participants (80.6%) with food insecurity had their income in Lebanese pounds, whereas the remaining 19.4% got an income in dollars. Thus, revealing that food insecurity was present in most households that had an income in Lbp. Another aspect to take into consideration was the parent's level of education and employment. Among the studies reviewed, one study conducted in Lebanon in 2018 claimed that Food insecurity prevalence was found to be 49.3%, and that low maternal and paternal education, and unemployment had a strong correlation with food insecurity, and one of the coping mechanisms that this research came across was also reducing the number of meals further noting how widely used this method is. Although it was found in our study that most of the participants had someone who was employed and was providing some type of an income, (only a few had no job at all) they still had food insecurity despite having a job, and this is mainly due to the economical state that the country is in at the moment, where what used to be a \$400/month minimum wage paying job is now barely \$50. With Lebanon's industrial sector being weak, most food products are imported and are hence priced in dollars, increasing the risk of household food insecurity

even if family members are employed yet getting paid in LBP. Newly conducted studies claimed that after the covid 19 pandemic many developing countries faced a rise in food insecurity. Another reviewed recent study conducted in 2021 in Lebanon “Food Insecurity Pre- and Post the COVID-19 Pandemic and Economic Crisis in Lebanon: Prevalence and Projections” revealed that although Lebanon was facing major economic issue before the pandemic, the economy deteriorated even further after covid hit, and this left more than half of the Lebanese population below poverty line. Thus, increasing the risk of food insecurity deeming it greater than before. In addition, the Beirut port explosion was one of the factors that further exacerbated the economy’s downfall and the food insecurity since a huge chunk of the wheat stored was destroyed along with other resources and homes which further explains the prevalence of food insecurity found in our study. However, we found a correlation between the mother’s education level and HFI, in which the higher the education the lower the household food insecurity. This could be due to increased nutritional knowledge and ability to create new coping mechanisms and organize income based on their family’s needs.

Furthermore, most of the mothers who filled the questionnaire , had low level of education, and lacked advanced degrees decreasing the chance of getting any job to help provide the household with an income which could be considered one of the reasons for their food insecurity. Using the HFIAS and the PHQ score we were able to find a strong negative correlation between household food insecurity and the mother’s mental health. Household food insecurity is expected to raise anxiety in mothers to try and provide enough food for their families, and inability to do so might lead to increased depression in mothers. Deteriorated maternal mental health, in return, might also lead to worsened household food insecurity due to increased exhaustion in inability to prepare food regularly as found in several studies that were reviewed. HFIAS included questions

that revealed the severity of food insecurity, and in turn gave us an idea about the mother's coping mechanism to the given food crisis. It was revealed in our study that 67.2% of the participants worried about not having enough food in their households and this could be due to either the insufficient resources in Lebanon itself or the low income that is a prevalent issue in Lebanese households. Some of the coping methods used by these households under the given circumstances was eating food that they don't prefer (91% of the participants used this method), and 50.7% of the participants ate foods they disliked. One way the mothers found effective was cutting down on the size of the meal where 62.7% of mothers adopted this method in their households and this could also be because of their inability to buy sufficient food/ food products. A study also conducted in Lebanon 2021 "Exploring the Impact of Crises on Food Security in Lebanon: Results from a National Cross-Sectional Study" found similar results of the households coping mechanisms where they found that 9 in every 16 households ate less than 2 meals per day, and more than 70% of them skipped their meals to spare food. When it came to the mother's mental health, we found that around 88% and 95.6% & of the participants stopped enjoying things that they used to enjoy and felt sad respectively. A reason for this could be all the stress and worrying that they face on a daily basis making it difficult for them to enjoy what they used to enjoy previously. In addition, 70.2% of mothers found a difficulty in falling asleep due to overthinking about how they will provide the necessities to their children, and 92.5% claimed to be tired most of the time. The situation also affected the mother's appetite and their state of self-content where 55% said that their appetite increases/ decreased, and 60% were unhappy with themselves. This is mainly due to the fact that they feel like they should be in a better place and providing their children with better lives, and it could be a form of guilt towards their children or anxiety towards their husbands. Our results revealed that this did not only affect

the mothers mentally but also physically where 45% of them complained about having a hard time concentrating and 46.3% voiced their inability to work like they used to since they felt that they were moving a lot slower due to lack of energy. Finally ,we found that 27% of mothers had suicidal thoughts and depression similar to the results in a study conducted in Egypt in 2021 “Impact of household food insecurity on maternal mental health in Egypt” where results of this study showed that mothers in food insecure houses regularly experienced signs of anxiety, and depression.

No significant correlation was found between household food insecurity and children growth indicators, indicating that children’s growth was not found to be significantly affected by food insecurity. This could be due to the exclusion of several participants that had illogical results, since most of them were estimations of the child’s weight and height due to the mother’s lack of knowledge. Another explanation could be that mothers are cutting down from their diets in order to provide their families with food. In addition, the small size of the sample played a huge role in the results that we found, since a larger sample size could have had different results regarding the child anthropometrics. Nevertheless, a study conducted in Nepal 2014 “Household food insecurity and nutritional status of children and women in Nepal” found different results, where there was a correlation between food insecurity and the child’s anthropometrics where 51% of children were stunted and 40% were underweight.

Limitations

The study has several limitations that must be highlighted for future references. The first limitation was the sample size, which was 67 participants, making in relatively small in comparison to the size of the Lebanese population and not representative of the entire population. The second limitation is sample profile. Due to limited access to extremely poor areas for political, security, and health safety issues, it was difficult to screen samples from very poor profiles which could've led to inaccurate results. The third was the tool used to assess household food insecurity, which lead to generalized results and inability to identify members of the family more affected by food insecurity than others. The fourth limitation was time constraints. The study had to be conducted in 1 month, resulting in decreasing sample size and hence getting fewer representative results and less cases of malnutrition reported. Another major weakness of the research was report bias. All data collected was reported by participants and no anthropometric measurements were taken during data collection. Due to the fact that children studied were aged 6 months to 5 years, any slight estimation led to big differences in the growth charts percentiles any many answers had to be considered as error and eliminated. The final limitation is the presence of cofactors other than food insecurity affecting mental health of mothers and health of children in Lebanon such as the lack of safety, inconsistency of the dollar rate due to the financial crisis, and separation from loved ones due to immigration.

Conclusion:

In conclusion, food insecurity is a food system issue that hit different households in Lebanon greatly affecting maternal mental health. Despite finding that it does not directly affect the nutritional health of the children in Lebanon in this study, further research is recommended with

tackling the limitations that may have altered the results. The study found many cases of malnutrition among the sample, with stunted, wasted, and even overweight children which could be due to several factors. Deteriorated maternal mental health is a serious issue, and even if not found to affect child health in the meantime, it could have a future impact on the food security of the family and the nutrition of children. It remains essential to try and find solutions to minimize household food insecurity and make use of the coping mechanisms to decrease the effect of FI, and to raise awareness among mothers susceptible of being food insecure on the strategies that could diminish its outcomes.

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