



Research article

Association of household food insecurity with dietary intakes and nutrition-related knowledge, attitudes, and practices among parents, aged \geq 18 years in Gaza Strip, Palestine: A descriptive studyAbdel Hamid El Bilbeisi^{a,*}, Ayoub Al-Jawaldeh^b, Ali Albelbeisi^c, Samer Abuzerr^d, Ibrahim Elmadfa^e, Lara Nasreddine^f^a Department of Nutrition, School of Medicine and Health Sciences, University of Palestine, Gaza Strip, Palestine^b Regional Office for the Eastern Mediterranean (EMRO), World Health Organization (WHO), Cairo, Egypt^c Health Research Unit, Palestinian Ministry of Health, Palestine^d Visiting Scholar with the School of Public Health, Department of Social and Preventive Medicine, University of Montreal, Montréal, QC, Canada^e Department of Nutrition, Faculty of Life Sciences, University of Vienna, Vienna, Austria^f Nutrition and Food Sciences Department, Faculty of Agriculture and Food Sciences, American University of Beirut, Beirut, Lebanon

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ABSTRACT

The purpose of this study was to examine the association between household food insecurity and dietary intake and nutrition-related knowledge, attitudes, and practices (KAP) among parents aged \geq 18 years in the Gaza Strip, Palestine. The current cross-sectional study was carried out in 2021 among adults (mothers and fathers) aged \geq 18 years. A total of 614 participants were selected from all Gaza Strip governorates using a cluster random sampling method. To assess the nutrition-related KAP, we employed the Food and Agriculture Organization (FAO) of the United Nations questionnaire (Modules 5, 6, 7, and 9). Data regarding household food security status, demographic and socioeconomic characteristics of the study participants, anthropometric measurements, and dietary intakes were obtained using standard questionnaires and methods. Statistical analysis was performed using SPSS version 25. About 71.5% and 28.5% of the study participants were household food-insecure and household food-secured, respectively. Significant associations were found between participants from household food-secured and household food-insecure concerning several socio-demographic variables, anthropometric measures, intakes of energy, protein, carbohydrate, and calcium; nutrition-related knowledge and attitudes toward undernutrition and vitamin A deficiency; nutrition-related KAP of iron deficiency anemia; and nutrition-related attitudes and practices of food safety (P-values $<$ 0.05 for all). In conclusion, the demographic and socioeconomic status, anthropometric measurements, and poor dietary intakes may be associated with high levels of household food insecurity, while having nutrition-related adequate KAP may be associated with low levels of household food insecurity among parents aged \geq 18 years.

1. Introduction

In 2022, the number of people afflicted by moderate or severe food insecurity will continue to rise over the world (WHO 2020). Nearly one-third of the world's population lacked access to appropriate food, an increase of nearly 320 million people in only one year (WHO 2020). Healthy diets are out of reach for nearly three billion people, especially the poor, in every region of the world, due to the high expense of healthy meals combined with continued high levels of wealth disparity (UN 2021). Despite international and national efforts to eradicate severe

poverty and enhance the global food supply, food insecurity continues to be a significant problem that affects people worldwide, especially those in low- and middle-income countries (Smith and Floro 2020). The Palestinian situation was one in which war remained the primary source of food insecurity, affecting the lives of two million of the population and exacerbated by high poverty and unemployment rates (OCHA 2018). Nearly seven out of ten people in Gaza are poor, half of the workforce is unemployed, and seven out of ten families are food insecure (WFP 2017). Moreover, based on the most recent data in 2018, over 68 percent of households in the Gaza Strip are food-insecure (FAO 2018).

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Undernutrition is defined as the outcome of poor nutritional intake in terms of quantity and/or quality and/or poor absorption and/or poor biological use of nutrients consumed as a result of repeated instances of disease (WHO 2019). In 2022, about a tenth of the world's population (up to 811 million people) will be malnourished. The figure suggests that meeting the world's commitment to end hunger by 2030 will necessitate a massive effort (FAO 2021). In addition, anemia is a serious global public health problem that affects young children and pregnant women (Lopez et al., 2016). Worldwide, 42 percent of children under the age of five, one-third of all women of reproductive age, and 40 percent of pregnant women are anemic, according to the World Health Organization (WHO) (WHO 2021). Nutritional deficiencies, particularly iron deficiency anemia (IDA), are the most common causes of anemia (WHO 2021). Vitamin A deficiency is also the greatest cause of preventable childhood blindness, as well as an increased risk of death from common childhood infections like diarrhea. In addition, the WHO has classified vitamin A deficiency as a public health problem affecting about one-third of children. Due to increased daily requirements, pregnant and lactating women are especially at risk of vitamin A insufficiency (WHO 2014). Periodic, high-dose vitamin A supplementation is a proven, low-cost intervention which has been shown to reduce all-cause mortality by 12–24 percent (UNICEF 2020). Despite the potential benefits of this key child survival intervention, only 41 percent of targeted children were reached in 2020 (Lailou et al., 2021). Moreover, ingestion and handling of contaminated food causes significant illness and death worldwide. Globally, food- and waterborne diarrheal diseases kill an estimated two million people annually, many of whom are children (Bintsis 2017). Food is responsible for the spread of over 200 diseases (Franz, den Besten et al., 2019). Even in the most industrialized countries, foodborne infections are frequent and pose a substantial public health threat (Newell et al., 2010). Foodborne illness affects the poorest individuals the most, but demographic and environmental changes are putting more people at risk (Aranceta-Bartrina et al., 2019).

Nutrition knowledge also includes the understanding of concepts and processes related to nutrition and health, such as diet and health, diet and disease, foods that represent significant nutrient sources, and dietary guidelines and recommendations (Turner et al., 2018). As one of the key factors influencing food choices, nutrition knowledge positively influences the adoption of healthy eating habits (Scaglioni et al., 2018).

In ideal circumstances, parents purchase and prepare foods, teach children skills of food selection and preparation, discuss healthy eating habits and act as role models for eating behaviour, thereby influencing the dietary practices and eating behaviour of their families (Haines et al., 2019). Parents' attitudes and level of knowledge are important determinants of the outcome of this process (Romanos-Nanclares et al., 2018). There is an obvious lack of studies investigating these associations in the Gaza Strip. Therefore, the present study concerns the association of household food insecurity with dietary intakes and nutrition-related KAP among parents, either mothers or fathers, aged ≥ 18 years in the Gaza Strip, Palestine.

2. Methods

2.1. Study design

A representative sample of adults (mothers and fathers) aged 18 years or older participated in this cross-sectional study that was conducted in 2021. A total of 614 participants were selected from all Gaza Strip governorates based on the population density, using a cluster random sampling method.

2.2. Eligibility criteria

Either mother or father aged ≥ 18 years who have children (male or female) aged less than 18 years in their household were included in the current study. On the contrary, households without children less than 18

years old, pregnant mothers in the second and third trimesters, and fathers with disabilities or chronic diseases were excluded from the present study.

2.3. Study location

The current study was carried out on Gaza Strip families in Palestine. The Gaza Strip's population is projected to be over 2,106,745 million people. North Gaza, Gaza, Middle Area, Khanyounis, and Rafah governorates are separated into five governorates, with population densities of 19.3 percent, 34.9 percent, 14.4 percent, 19.1 percent, and 12.2 percent, respectively (PCBS 2016).

2.4. Sample size and sampling

The current study used the Charan and Biswas (2013) formula to obtain a representative sample size of 614 adults (mothers and fathers) aged 18 years. The FAO reported that the prevalence of household food insecurity in the Gaza Strip was 68% (FAO 2018). The sample was proportionally selected from the five governorates of the Gaza Strip, using a cluster random sampling method based on the population density in each of them as follows: 119 participants from North Gaza, 214 from Gaza, 88 from the Middle Area, 118 from Khanyounis, and 75 from Rafah governorate. Ten trained interviewers conducted the poll in all five governorates at the same time.

2.5. Data collection

2.5.1. A structured interview-based questionnaire

To achieve the purpose of the current study, a structured interview-based questionnaire was employed. The questionnaire is divided into five main parts as follows: 1) the 10-item Radimer/Cornell food security scale to assess the household food security status (Radimer et al., 1992); 2) demographic and socioeconomic characteristics of the study participants; 3) anthropometric measurements; 4) two non-consecutive days of 24-hour dietary recall for dietary intakes assessment; 5) and the FAO of the United Nations questionnaire (Module 5: Undernutrition; Module 6: IDA; Module 7: Vitamin A Deficiency; and Module 9: Food Safety) was used, to assess the nutrition-related KAP of the study participants (FAO 2014). Furthermore, ten qualified data collectors, who were given a full explanation and training by the researchers about the study, collected all data from the study participants. The data collectors went to the participants' homes, and the study participants did not go to any research center. Furthermore, prior to data collection, a pilot study was conducted on thirty eligible participants to allow the researcher to test the study's methods. Simple amendments were made to the questionnaire and data collection process based on the pilot study's findings.

2.5.2. Assessment of households' food security status

The 10-items Radimer/Cornell food security scale was used for determining the households' food security status. The scale is a valid and reliable tool for measuring household food insecurity in a culturally diverse setting (Terragni et al., 2020). The following categories were used to categorize the families based on their food security: 1) Household food secured: Negative responses to all hunger and food insecurity items; 2) Household food insecure: Positive responses to one or more hunger and food insecurity items ('sometimes true' or 'often true') (Kendall et al., 1996).

2.5.3. Demographic and socioeconomic characteristics

Individual face-to-face interviews with study participants, either adults' mothers or fathers, aged 18 years, were conducted to gather information about demographic and socioeconomic characteristics, such as age (years), gender, governorate, living area, educational level, number of family members, monthly household income (NIS), food aids, home-ownership, and work status. The educational level and monthly

household income (NIS) variables utilized in this study were similar to those used in previous studies in the Gaza Strip (El Bilbeisi, Albelbeisi et al., 2019; El Bilbeisi, Hosseini et al., 2017).

2.5.4. Assessment of anthropometric measurements

Participants' heights (cm) were measured (barefooted and head up-right) using a measuring rod attached to the balanced beam scale; the height was recorded to the nearest 0.5 cm (WHO 1995). Weight (kg) was measured using a standard digital weighing scale (SECA, Germany); the scale was set up on a hard floor surface, and participants were requested to take off their heavy outerwear before being weighed and recorded to the nearest 0.1 kg (WHO 1995). Furthermore, waist circumference (WC) was measured using a stretch-resistant tape at approximately halfway between the bottom border of the last perceptible rib and the top of the iliac crest (WHO 2011). All measurements were repeated twice, with the average of the two values recorded. The BMI was computed by multiplying the weight in kilograms by the square of the height in meters (El Bilbeisi, Hosseini et al., 2017). Then, the participants were subdivided into the various BMI categories according to the WHO classifications as follows: BMI: < 18.5 kg/m² (underweight); BMI: 18.5–24.9 kg/m² (normal weight); BMI: 25–29.9 kg/m² (overweight); and BMI: ≥ 30 kg/m² (obese) (WHO 2021).

2.5.5. Assessment of dietary intakes

Two non-consecutive days of 24-hour dietary recall were employed to determine the quantity of macro-and micronutrients consumed by the study participants. The mothers and fathers were requested to recall all beverages and food they consumed in the past 24 h. In the present study, the data were collected on the first day of the two non-consecutive days of 24-hour dietary recall by a face-to-face interview, and then the data collectors obtained each participant's phone number and called him/her later to obtain data about another different day. A set of household measures was used to approximate portion sizes (i.e. plates, cups, glasses, and spoons). The net grams of foods consumed by the study participants were calculated by hand (office work) using dietary data from the 24-hour dietary recall. Nutritionist Pro Software version 7.1.0 was used (Axxya Systems, USA) (Albelbeisi et al., 2020) to determine energy (kcal) and nutrient intakes, including protein (gram), carbohydrate (gram), fat (gram), iron (mg), vitamin A (microgram), vitamin D (microgram), calcium (mg), and zinc (mg).

2.5.6. Assessment of nutrition-related knowledge, attitudes, and practices (KAP)

To assess the nutrition-related KAP of the study participants (mothers and fathers), the FAO of the United Nations questionnaire (Module 5: Undernutrition; Module 6: IDA; Module 7: Vitamin A Deficiency; and Module 9: Food Safety) was used (FAO 2014). Predefined questions on key KAP relating to undernutrition, IDA, vitamin A deficiency, and food safety are included in the questionnaire:

2.5.6.1. Module 5: undernutrition. In the present study, the nutrition-related KAP (Module 5: Undernutrition) consists of five questions related to knowledge (question 1: signs of undernutrition; question 2: causes of undernutrition; question 3: seeking growth monitoring for infants and young children; question 4: meaning of lack of weight gain among infants and young children; and question 5: prevention of undernutrition); and two-questions related to attitudes towards undernutrition (question 1: perceived susceptibility; and question 2: perceived severity) (FAO 2014).

2.5.6.2. Module 6: iron-deficiency anemia (IDA). The nutrition-related KAP (Module 6: IDA) consists of eight questions related to knowledge (question 1: general signs of IDA; question 2: consequences of IDA for infants and young children; question 3: consequences of IDA for pregnant women; question 4: causes of IDA; question 5: prevention of anemia;

question 6: iron-rich foods - easily absorbed; question 7: foods that increase iron absorption; and question 8: foods that decrease iron absorption); six-questions related to attitudes [attitudes towards IDA (question 1: perceived susceptibility, and question 2: perceived severity); attitudes towards preparing meals with iron-rich foods (question 3: perceived benefits, question 4: perceived barriers, and question 5: self-confidence); and question 6: attitudes towards food preferences]; and three-questions related to practices (question 1: food-intake practices; question 2: consumption of vitamin-C-rich fruits; and question 3: consumption of coffee/tea) (FAO 2014).

2.5.6.3. Module 7: vitamin A deficiency. The nutrition-related KAP (Module 7: Vitamin A deficiency) consists of four questions related to knowledge (question 1: signs of vitamin A deficiency; question 2: causes of vitamin A deficiency; question 3: prevention of vitamin A deficiency; and question 4: food sources of vitamin A); six-questions related to attitudes [attitudes towards vitamin A deficiency (question 1: perceived susceptibility, and question 2: perceived severity); attitudes towards preparing meals with vitamin-A-rich foods (question 3: perceived benefits; question 4: perceived barriers; and question 5: self-confidence); and question 6: attitudes towards food preferences]; and one-question related to practices (question 1: food-intake practices) (FAO 2014).

2.5.6.4. Module 9: food safety. The nutrition-related KAP (Module 9: Food Safety) consists of five-questions related to knowledge (question 1: separation of raw and cooked foods; question 2: cooking thoroughly; question 3: storage of perishable foods; question 4: storage of leftovers in a cool/cold place; and question 5: washing raw fruits and vegetables); eight-questions related to attitudes [attitudes towards food poisoning/sickness from eating spoiled food (question 1: perceived susceptibility; and question 2: perceived severity); attitudes towards keeping perishable food in a cool place (question 3: perceived benefits; and question 4: perceived barriers); attitudes towards reheating leftovers before eating them (question 5: perceived benefits; and question 6: perceived barriers); and attitudes towards washing fruits and vegetables with clean water (question 7: perceived benefits; and question 8: perceived barriers)]; and two-questions related to practices (question 1: cleaning of dirty surfaces, plates and utensils; and question 2: storage of perishable foods) (FAO 2014).

2.6. Data analysis

For data analysis, the Statistical Package for Social Science (SPSS) for Windows (version 25) was utilized. Continuous and categorical variables were described using descriptive statistics. The significance of differences between category variables was determined using the chi-square test. The differences in mean were investigated using the independent samples t-test. A P-value of less than 0.05 was considered statistically significant.

2.7. Ethical consideration

The Palestinian Health Research Council (PHRC/HC/961/21), the University of Palestine Ethical Committee of Research, the Palestinian Ministry of Health, and the Palestinian Ministry of Interior all authorized the study protocol. In addition, each participant gave their informed consent.

3. Results

A total of 614 adults aged ≥18 years (48.5% males and 51.5% females), with a mean age of 35.86 ± 10 years, have participated in the current study. More than two-thirds (71.5%) of the study participants belonged to food-insecure households. About 262 (42.6%) of the food-insecure households were situated in Gaza strip refugee camps.

Approximately 116 (66.3%) participants who belong to food-secured households had a high education level. In addition, 466 (75.9%) of the study participants had a monthly household income of less than 2000 New Israeli Shekel (NIS) \approx USD 650. Nearby, 194 (44.2%) of those who belonged to food-insecured households were receiving food aid; 82.0 (18.7%) were living in rented homes, and 253 (57.6%) were unemployed. Furthermore, obesity was higher in food-insecured households than in food-secured households (33.9% vs 6.9%), respectively. However, being overweight was higher in food-secured households than in food-insecured households (39.4% vs 27.8%), respectively. There were statistically significant associations between food-secured households

and food-insecured households concerning gender, the governorate of residence, nature of the living area, educational level, employment status, height (meter), weight (kg), BMI (kg/m^2), and waist circumference (cm) (P -values < 0.05 for all) (Table 1).

In addition, Table 2 shows the energy, macro-and micronutrient intakes among the study participants by household food security status. The results indicated that adults ≥ 18 years from food-insecured households had a lower mean of energy (kcal) (2786 ± 858), protein (gram) (53.18 ± 25.22), carbohydrate (gram) (538.24 ± 215.65), fat (gram) (114.92 ± 41.61), iron (mg) (17.07 ± 6.64), vitamin A (microgram) (567.71 ± 243.31), vitamin D (microgram) (23.79 ± 9.63), calcium (mg)

Table 1. Characteristics of the study participants (adults' ≥ 18 years) by food security status.

Variables	Total n = 614 (100%)	Household food-secure n = 175 (28.5%)	Household food-insecure n = 439 (71.5%)	P-value
Age (year)				
Mean \pm SD	35.86 \pm 10	35.36 \pm 9.5	36.06 \pm 10	0.437 ^a
Gender				
Male	298 (48.5)	107 (61.1)	191 (43.5)	<0.001 ^b *
Female	316 (51.5)	68.0 (38.9)	248 (56.5)	
Governorate				
North Gaza	119 (19.4)	39.0 (22.3)	80.0 (18.2)	0.002 ^b *
Gaza	214 (34.9)	77.0 (44.0)	137 (31.2)	
Middle Area	88.0 (14.3)	19.0 (10.9)	69.0 (15.8)	
Khanyounis	118 (19.2)	20.0 (11.4)	98.0 (22.3)	
Rafah	75.0 (12.2)	20.0 (11.4)	55.0 (12.5)	
Living area				
City	230 (37.5)	80.0 (45.7)	150 (34.2)	0.003 ^b *
Village	122 (19.9)	21.0 (12.0)	101 (23.0)	
Camp	262 (42.6)	74.0 (42.3)	188 (42.8)	
Educational level				
Low education	270 (44.0)	59.0 (33.7)	211 (48.1)	0.001 ^b *
High education	344 (56.0)	116 (66.3)	228 (51.9)	
Number of family members				
Mean \pm SD	5.46 \pm 2.1	5.43 \pm 2.1	5.54 \pm 2.2	0.553 ^a
Family income (NIS)				
<2000	466 (75.9)	126 (72.0)	340 (77.4)	0.094 ^b
≥ 2000	148 (24.1)	49.0 (28.0)	99.0 (22.6)	
Receive food aid				
Yes	259 (42.2)	65.0 (37.1)	194 (44.2)	0.066 ^b
No	355 (57.8)	110 (62.9)	245 (55.8)	
Homeownership				
Owned	500 (81.4)	143 (81.7)	357 (81.3)	0.505 ^b
Rented	114 (18.6)	32.0 (18.3)	82.0 (18.7)	
Work status				
Has work	318 (51.8)	132 (75.4)	186 (42.4)	<0.001 ^b *
Do not have work	296 (48.2)	43.0 (24.6)	253 (57.6)	
Height (meter)				
Mean \pm SD	1.67 \pm 0.09	1.68 \pm 0.08	1.66 \pm 0.09	0.004 ^a *
Weight (kg)				
Mean \pm SD	75.9 \pm 13.9	73.4 \pm 8.41	77.0 \pm 15.4	0.032 ^a *
BMI (kg/m^2)				
Mean \pm SD	27.2 \pm 4.80	25.7 \pm 0.95	27.8 \pm 5.53	<0.001 ^a *
Underweight (BMI <18.5)	2.0 (0.3)	0.0 (0.0)	2.0 (0.5)	<0.001 ^b *
Normal weight (BMI: 18.5 to 24.9)	260 (42.4)	94.0 (53.7)	166 (37.8)	
Overweight (BMI: 25 to 29.9)	191 (31.1)	69.0 (39.4)	122 (27.8)	
Obesity (BMI ≥ 30)	161 (26.2)	12.0 (6.9)	149 (33.9)	
Waist circumference (cm)				
Mean \pm SD	93.1 \pm 14.1	90.3 \pm 11.9	94.3 \pm 15.1	0.002 ^a *

NIS: New Israeli Shekel; BMI: Body Mass Index; low education mean (illiterate, primary, or preparatory), and high education mean (secondary, or university).

^a Independent Samples t-test.

^b Chi-Square Test.

* Difference is significant at the 0.05 level (two-tailed).

Table 2. Energy, macro, and micronutrients intakes among the study participants (adults' ≥ 18 years) by food security status.

Variables	Total (n = 614)	Household food-secure (n = 175)	Household food-insecure (n = 439)	P-value ^a
Energy (kcal)				
Mean \pm SD	3009 \pm 1084	3098 \pm 1150	2786 \pm 858	<0.001*
Protein (gram)				
Mean \pm SD	58.61 \pm 31.25	60.78 \pm 33.13	53.18 \pm 25.22	0.002*
Carbohydrate (gram)				
Mean \pm SD	598.83 \pm 276.74	622.98 \pm 294.38	538.24 \pm 215.65	<0.001*
Fat (gram)				
Mean \pm SD	118.32 \pm 46.38	119.68 \pm 48.12	114.92 \pm 41.61	0.222
Iron (mg)				
Mean \pm SD	17.13 \pm 6.44	17.15 \pm 6.37	17.07 \pm 6.64	0.893
Vitamin A RAE (microgram)				
Mean \pm SD	574.73 \pm 244.85	592.33 \pm 248.50	567.71 \pm 243.31	0.261
Vitamin D (microgram)				
Mean \pm SD	24.34 \pm 9.75	24.57 \pm 9.79	23.79 \pm 9.63	0.371
Calcium (mg)				
Mean \pm SD	1377.13 \pm 465.31	1402.64 \pm 470.37	1313.15 \pm 447.31	0.031*
Zinc (mg)				
Mean \pm SD	22.31 \pm 8.78	22.36 \pm 8.84	22.19 \pm 8.64	0.822

Vitamin A RAE: Vitamin A Retinol Activity Equivalents.

^a Statistical testing using Independent samples t-test.

* Difference is significant at the 0.05 level (two-tailed).

Table 3. Nutrition-related knowledge and attitudes (Module 5: Undernutrition) by food security status.

Variables	Total n = 614 (100%)	Household food-secure n = 175 (28.5%)	Household food-insecure n = 439 (71.5%)	P-value ^a
Nutrition-related knowledge				
Question 1: Signs of undernutrition				
Know	560 (91.2)	165 (94.3)	395 (90.0)	0.057*
Do not know	54.0 (8.8)	10.0 (5.7)	44.0 (10.0)	
Question 2: Causes of undernutrition				
Know	409 (66.6)	125 (71.4)	284 (64.7)	0.066*
Do not know	205 (33.4)	50.0 (28.6)	155 (35.3)	
Question 3: Seeking growth monitoring for infants and young children				
Know	503 (81.9)	144 (82.3)	359 (81.8)	0.492
Do not know	111 (18.1)	31.0 (17.7)	80.0 (18.2)	
Question 4: Meaning of lack of weight gain among infants and young children				
Know	535 (87.1)	161 (92.0)	374 (85.2)	0.014*
Do not know	79.0 (12.9)	14.0 (8.0)	65.0 (14.8)	
Question 5: Prevention of undernutrition				
Know	437 (71.2)	146 (83.4)	291 (66.3)	0.001*
Do not know	177 (28.8)	29.0 (16.6)	148 (33.7)	
The overall knowledge				
Adequate knowledge	464 (75.6)	151 (86.3)	313 (71.3)	0.003*
Inadequate knowledge	150 (24.4)	24.0 (13.7)	126 (28.7)	
Nutrition-related attitudes (question 1: perceived susceptibility; and question 2: perceived severity)				
Question 1: How likely do you think your child is to be undernourished, that is, they stop growing or lose weight?				
Likely	204 (33.2)	50.0 (28.6)	154 (35.1)	0.025*
Not sure	164 (26.7)	40.0 (22.8)	124 (28.2)	
Not likely	246 (40.1)	85.0 (48.6)	161 (36.7)	
Question 2: How seriously do you think undernutrition is for a baby's health?				
Serious	534 (87.0)	154 (88.0)	380 (86.6)	0.501
Not sure	57.0 (9.3)	13.0 (7.4)	44.0 (10.0)	
Not serious	23.0 (3.7)	8.0 (4.6)	15.0 (3.4)	
The overall attitudes				
Positive attitudes	390 (63.5)	120 (68.6)	270 (61.5)	0.002*
Negative attitudes	224 (36.5)	55.0 (31.4)	169 (38.5)	

^a Chi Square Test.

* Difference is significant at the 0.05 level (two-tailed).

Table 4. Nutrition-related KAP (Module 6: Iron-deficiency anemia) by food security status.

Variables	Total n = 614 (100%)	Household food-secure n = 175 (28.5%)	Household food-insecure n = 439 (71.5%)	P-value ^a
Nutrition-related knowledge				
Question 1: General signs of IDA				
Know	491 (80.0)	145 (82.9)	346 (78.8)	0.154
Do not know	123 (20.0)	30.0 (17.1)	93.0 (21.2)	
Question 2: Consequences of IDA for infants and young children				
Know	506 (82.4)	152 (86.9)	354 (80.6)	0.038*
Do not know	108 (17.6)	23.0 (13.1)	85.0 (19.4)	
Question 3: Consequences of IDA for pregnant women				
Know	398 (64.8)	123 (70.3)	275 (62.6)	0.044*
Do not know	216 (35.2)	52.0 (29.7)	164 (37.4)	
Question 4: Causes of IDA				
Know	544 (88.6)	154 (88.0)	390 (88.8)	0.433
Do not know	70.0 (11.4)	21.0 (12.0)	49.0 (11.2)	
Question 5: Prevention of anemia				
Know	433 (72.1)	136 (77.7)	307 (69.9)	0.031*
Do not know	171 (27.9)	39.0 (22.3)	132 (30.1)	
Question 6: Iron-rich foods - easily absorbed				
Know	336 (54.7)	107 (61.1)	229 (52.2)	0.027*
Do not know	278 (45.3)	68.0 (38.9)	210 (47.8)	
Question 7: Foods that increase iron absorption				
Know	543 (88.4)	158 (90.3)	385 (87.7)	0.224
Do not know	71.0 (11.6)	17.0 (9.7)	54.0 (12.3)	
Question 8: Foods that decrease iron absorption				
Know	527 (85.8)	163 (93.1)	364 (82.9)	<0.001*
Do not know	87.0 (14.2)	12.0 (6.9)	75.0 (17.1)	
The overall knowledge				
Adequate knowledge	473 (77.0)	142 (81.1)	331 (75.4)	0.047*
Inadequate knowledge	141 (23.0)	33.0 (18.9)	108 (24.6)	
Nutrition-related attitudes				
Question 1: Attitudes towards IDA - Perceived susceptibility				
Likely	233 (37.9)	62.0 (35.4)	171 (39.0)	0.001*
Not sure	179 (29.2)	37.0 (21.2)	142 (32.3)	
Not likely	202 (32.9)	76.0 (43.4)	126 (28.7)	
Question 2: Attitudes towards IDA - Perceived severity				
Serious	554 (90.3)	163 (92.7)	391 (89.1)	0.018*
Not sure	42.0 (6.8)	5.0 (2.9)	37.0 (8.5)	
Not serious	18.0 (2.9)	8.0 (4.6)	10.0 (2.4)	
Question 3: Attitudes towards preparing meals with iron-rich foods - perceived benefits				
Good	557 (90.7)	165 (94.3)	392 (89.3)	0.007*
Not sure	33.0 (5.4)	10.0 (5.7)	23.0 (5.2)	
Not good	24.0 (3.9)	0.0 (0.0)	24.0 (5.5)	
Question 4: Attitudes towards preparing meals with iron-rich foods - perceived barriers				
Not difficult	410 (66.8)	126 (72.0)	284 (64.7)	0.041*
So-so	174 (28.3)	46.0 (26.3)	128 (29.1)	
Difficult	30.0 (4.9)	3.0 (1.7)	27.0 (6.2)	
Question 5: Self-confidence; how confident do you feel in preparing meals with iron-rich foods?				
Confident	388 (63.2)	119 (68.0)	269 (61.3)	0.095
Ok/so-so	186 (30.3)	50.0 (28.6)	136 (31.0)	
Not confident	40.0 (6.5)	6.0 (3.4)	34.0 (7.7)	
Question 6: Attitudes towards food preferences - the taste of iron-rich food item or meal				
Like	559 (91.1)	162 (92.6)	397 (90.5)	0.032*
Not sure	21.0 (3.4)	9.0 (5.1)	12.0 (2.7)	
Dislike	34.0 (5.5)	4.0 (2.3)	30.0 (6.8)	
The overall attitudes				
Positive attitudes	445 (72.5)	135 (77.1)	310 (70.6)	0.045*
Negative attitudes	169 (27.5)	40.0 (22.9)	129 (29.4)	
Nutrition-related practices				

(continued on next page)

Table 4 (continued)

Variables	Total n = 614 (100%)	Household food-secure n = 175 (28.5%)	Household food-insecure n = 439 (71.5%)	P-value ^a
Question 1: Food-intake practices-iron-rich foods				
Yes	469 (76.4)	152 (86.9)	317 (72.2)	0.021 *
No	145 (23.6)	23.0 (13.1)	122 (27.8)	
Question 2: Consumption of vitamin-C-rich fruits				
Yes	529 (86.2)	158 (90.3)	371 (84.5)	0.038 *
No	85.0 (13.8)	17.0 (9.7)	68.0 (15.5)	
Question 3: Consumption of coffee/tea				
Yes	540 (87.9)	159 (90.9)	381 (86.8)	0.102
No	74.0 (12.1)	16.0 (9.1)	58.0 (13.2)	
The overall practices				
Good practices	512 (83.4)	156 (89.1)	356 (81.1)	0.029 *
Bad practices	102 (16.6)	19.0 (10.9)	83.0 (18.9)	

IDA: Iron Deficiency Anemia.

^a Chi-Square Test.

* Difference is significant at the 0.05 level (two-tailed).

(1313.15 ± 447.31), and zinc (mg) (22.19 ± 8.64) than their food-secured counterparts. Moreover, there were significant differences in intakes of energy (kcal), protein (gram), carbohydrate (gram), and calcium (mg) between the food-insecured and food-secured groups (P -values < 0.05 for all).

Table 3 shows the nutrition-related knowledge and attitudes (Module 5: Undernutrition) by food security status. The overall nutrition-related adequate knowledge between food secured and food insecure adults aged ≥18 years was 86.3% and 71.3%, respectively, whereas the overall nutrition-related positive attitudes between food secured and insecure food participants were 68.6% and 61.5%, respectively. The highest nutrition-related knowledge percentage among food secured and food insecure participants was about "Signs of undernutrition" (94.3% and 90.0%, respectively). The highest nutrition-related attitudes percentage among food secured and food insecure participants was about "How serious do you think undernutrition is for a baby's health?" (88.0% and 86.6%, respectively). Moreover, a statistically significant difference was found between food secured participants and food-insecured participants in nutrition-related knowledge questions of "Meaning of lack of weight gain among infants and young children" and "Prevention of undernutrition", and nutrition-related attitudes question of "How likely do you think your child is to be undernourished, that is they stop growing or lose weight?". In general, a statistical difference was found in the overall nutrition-related knowledge and attitudes (Module 5: Undernutrition) between food secured participants and food insecure participants (P -values < 0.05 for all).

Furthermore, Table 4 shows the nutrition-related KAP (Module 6: Iron-deficiency anemia) by food security status. The results revealed that the overall nutrition-related adequate knowledge between food-secured and food-insecured participants was 81.1% and 75.4%, respectively. The overall nutrition-related positive attitudes between secured and insecure food participants were 77.1% and 70.6%, respectively. The overall nutrition-related good practices between food-secured and food-insecured participants were 89.1% and 81.1%, respectively. The highest nutrition-related knowledge percentage among food-secured participants was about "Foods that decrease iron absorption" (93.1%). The highest percentage among food-insecured participants was "Causes of IDA" (88.8%). The highest nutrition-related attitudes percentage among food-secured participants was about "Attitudes towards preparing meals with iron-rich foods - perceived benefits" (94.3%), and the highest percentage among food-insecured participants was about "Attitudes towards food preferences - the taste of iron-rich food items or meals" (90.5%). The highest percentage of nutrition-related practices between food secured and food insecure participants was about "Consumption of coffee/tea" (90.9% and 86.8%, respectively). Additionally, statistically, significant differences were found between food-secured participants and food-

insecured participants in nutrition-related KAP (Module 6: Iron-deficiency anemia) questions (P -values < 0.05 for all).

Moreover, Table 5 shows the nutrition-related KAP (Module 7: Vitamin A Deficiency) by food security status. The overall nutrition-related adequate knowledge between secured and insecure food participants was 84.0% and 78.1%, respectively. The overall nutrition-related positive attitudes between food secured and insecure food participants were 69.7% and 64.9%, respectively. The overall nutrition-related good practices between food secured and insecure food participants were 38.3% and 31.4%, respectively. The highest nutrition-related knowledge percentage among food secured and insecure food participants were about "Prevention of vitamin A deficiency" (90.9% and 83.8%, respectively). The highest nutrition-related attitudes percentage was "Attitudes towards food preferences - vitamin-A-rich food item or meal" (88.0%, and 79.2%, respectively). Statistically significant differences were found between food-secured participants and food-insecured participants in nutrition-related knowledge and attitudes (Module 7: Vitamin A Deficiency) questions (P -values < 0.05 for all).

Finally, Table 6 shows the nutrition-related KAP (Module 9: Food Safety) by food security status. The overall nutrition-related adequate knowledge between secured and insecure food participants was 90.8% and 89.3%, respectively. The overall nutrition-related positive attitudes between secured and insecure food participants were 73.7% and 68.3%, respectively. The overall nutrition-related good practices among secured and insecure food participants were 92.6% and 86.3%, respectively. The highest nutrition-related knowledge percentage was about "Cooking thoroughly" (94.9% and 95.7%, respectively) among food secured and food insecure participants. The highest percentage was about "Attitudes towards washing fruits and vegetables with clean water-perceived benefits" (92.6% and 90.0%, respectively). The highest percentage of nutrition-related practices among secured and insecure food participants was about "Storage of perishable foods" (98.3% and 92.9%, respectively). Statistically significant differences were found between secured and insecure food participants in nutrition-related attitudes and practices (Module 9: Food Safety) questions (P -values < 0.05 for all).

4. Discussion

The results indicate that household food insecurity is widespread among Gaza's households. More than two-thirds (71.5%) of the study participants belonged to food-insecured households, whereas only 28.5% belonged to food-secured households. According to the recent assessment by the FAO of the United Nations, around two-thirds of Gaza's families are food insecure (FAO 2018). The findings of our research back up these assertions. Furthermore, the findings of our study are consistent with prior research in other underdeveloped nations, such as Nepal

Table 5. Nutrition-related KAP (Module 7: Vitamin A deficiency) by food security status.

Variables	Total n = 614 (100%)	Household food-secure n = 175 (28.5%)	Household food-insecure n = 439 (71.5%)	P-value ^a
Nutrition-related knowledge				
Question 1: Signs of vitamin A deficiency				
Know	487 (79.3)	147 (84.0)	340 (77.4)	0.043*
Do not know	127 (20.7)	28.0 (16.0)	99.0 (22.6)	
Question 2: Causes of vitamin A deficiency				
Know	473 (77.0)	144 (82.3)	329 (74.9)	0.031*
Do not know	141 (23.0)	31.0 (17.7)	110 (25.1)	
Question 3: Prevention of vitamin A deficiency				
Know	527 (85.8)	159 (90.9)	368 (83.8)	0.024*
Does not know	87.0 (14.2)	16.0 (9.1)	71.0 (16.2)	
Question 4: Food sources of vitamin A				
Know	478 (77.9)	141 (80.6)	337 (76.8)	0.305
Do not know	136 (22.1)	34.0 (19.4)	102 (23.2)	
The overall knowledge				
Adequate knowledge	491 (79.9)	147 (84.0)	343 (78.1)	0.040*
Inadequate knowledge	123 (20.1)	28.0 (16.0)	96.0 (21.9)	
Nutrition-related related attitudes				
Question 1: Attitudes towards vitamin A deficiency - perceived susceptibility				
Likely	241 (39.2)	56.0 (32.0)	180 (41.0)	0.001*
Not sure	151 (24.6)	66.0 (37.7)	90.0 (20.5)	
Not likely	222 (36.2)	53.0 (30.3)	169 (38.5)	
Question 2: Attitudes towards vitamin A deficiency - perceived severity				
Serious	483 (78.6)	141 (80.6)	342 (77.9)	0.743
Not sure	106 (17.3)	27.0 (15.4)	79.0 (18.0)	
Not serious	25.0 (4.1)	7.0 (4.0)	18.0 (4.1)	
Question 3: Preparing meals with vitamin-A-rich foods - perceived benefits				
Good	478 (77.9)	148 (84.5)	330 (75.2)	0.018*
Not sure	59.0 (9.6)	15.0 (8.6)	44.0 (10.0)	
Not good	77.0 (12.5)	12.0 (6.9)	65.0 (14.8)	
Question 4: Preparing meals with vitamin-A-rich foods - perceived barriers				
Not difficult	386 (62.9)	118 (67.5)	268 (61.0)	0.327
So-so	202 (32.9)	51.0 (29.1)	151 (34.4)	
Difficult	26.0 (4.2)	6.0 (3.4)	20.0 (4.6)	
Question 5: Self-confidence; how confident do you feel in preparing meals with vitamin- A- rich foods?				
Confident	368 (59.9)	115 (65.7)	253 (57.6)	0.029*
Ok/so-so	210 (34.2)	56.0 (32.0)	154 (35.1)	
Not confident	36.0 (5.9)	4.0 (2.3)	32.0 (7.3)	
Question 6: Attitudes towards food preferences - vitamin-A-rich food item or meal				
Like	502 (81.7)	154 (88.0)	348 (79.2)	0.034*
Not sure	84.0 (13.7)	17.0 (9.7)	67.0 (15.3)	
Dislike	28.0 (4.6)	4.0 (2.3)	24.0 (5.5)	
The overall attitudes				
Positive attitudes	406 (66.1)	122 (69.7)	285 (64.9)	0.031*
Negative attitudes	208 (33.9)	53.0 (30.3)	154 (35.1)	
Nutrition-related related practices				
Question 1: Food-intake practices				
Yes (good practices)	205 (33.4)	67.0 (38.3)	138 (31.4)	0.064
No (bad practices)	409 (66.6)	108 (61.7)	301 (68.6)	

^a Chi-Square Test.

* Difference is significant at the 0.05 level (two-tailed).

(69%) (El Bilbeisi, Hosseini et al., 2017) and Colombia (76%) (Isanaka et al., 2007). In the current study, food-insecured families with adults aged ≥ 18 years had considerably lower monthly earnings than secured food households. In addition, food insecurity was strongly linked to living in refugee camps and having a poor level of education. The previous study has repeatedly established a link between poor family socio-economic status and food insecurity (Souza et al., 2016; Jamaluddine et al., 2017; Orr et al., 2019; Mumena and Kutbi 2020).

Obesity was higher in food-insecured households belonging to participants than in food-secured households belonging to participants. However, being overweight was higher in food-secured households belonging participants than in food-insecured households belonged participants. Additionally, weight, BMI, and waist circumference were related to food security status in this study; and the participants from food-insecured households' had a lower mean weight, BMI, and waist circumference. Previous research has looked at these connections, but

Table 6. Nutrition-related KAP (Module 9: Food safety) by food security status.

Variables	Total n = 614 (100%)	Household food-secure n = 175 (28.5%)	Household food-insecure n = 439 (71.5%)	P-value ^a
Nutrition-related knowledge				
Question 1: Separation of raw and cooked foods				
Know	565 (92.0)	162 (92.6)	403 (91.8)	0.447
Do not know	49.0 (8.0)	13.0 (7.4)	36.0 (8.2)	
Question 2: Cooking thoroughly				
Know	586 (95.4)	166 (94.9)	420 (95.7)	0.671
Do not know	28.0 (4.6)	9.0 (5.1)	19.0 (4.3)	
Question 3: Storage of perishable foods				
Know	542 (88.3)	157 (89.7)	385 (87.7)	0.291
Do not know	72.0 (11.7)	18.0 (10.3)	54.0 (12.3)	
Question 4: Storage of leftovers in a cool/cold place				
Know	498 (81.1)	148 (84.6)	350 (79.7)	0.173
Do not know	116 (18.9)	27.0 (15.4)	89.0 (20.3)	
Question 5: Washing raw fruits and vegetables				
Know	568 (92.5)	166 (94.9)	402 (91.6)	0.178
Do not know	46.0 (7.5)	9.0 (5.1)	37.0 (8.4)	
The overall knowledge				
Adequate knowledge	551 (89.7)	159 (90.8)	392 (89.3)	0.065
Inadequate knowledge	63.0 (10.3)	16.0 (9.2)	47.0 (10.7)	
Nutrition-related related attitudes				
Question 1: Attitudes towards food poisoning/sickness from eating spoiled food - perceived susceptibility				
Likely	332 (54.1)	64.0 (36.6)	268 (61.0)	0.001 [*]
Not sure	63.0 (10.2)	13.0 (7.4)	50.0 (11.4)	
Not likely	219 (35.7)	98.0 (56.0)	121 (27.6)	
Question 2: Attitudes towards food poisoning/sickness from eating spoiled food - perceived severity				
Serious	482 (78.5)	146 (83.4)	336 (76.5)	0.038 [*]
Not sure	51.0 (8.3)	11.0 (6.3)	40.0 (9.1)	
Not serious	81.0 (13.2)	18.0 (10.3)	63.0 (14.4)	
Question 3: Attitudes towards keeping perishable food in a cool place - perceived benefits				
Good	542 (88.3)	148 (84.6)	394 (89.7)	0.182
Not sure	46.0 (7.5)	18.0 (10.3)	28.0 (6.4)	
Not good	26.0 (4.2)	9.0 (5.1)	17.0 (3.9)	
Question 4: Attitudes towards keeping perishable food in a cool place - perceived barriers				
Not difficult	496 (80.7)	141 (80.6)	355 (80.9)	0.630
So-so	98.0 (16.0)	30.0 (17.1)	68.0 (15.5)	
Difficult	20.0 (3.3)	4.0 (2.3)	16.0 (3.6)	
Question 5: Attitudes towards reheating leftovers before eating them - perceived benefits				
Good	406 (66.1)	107 (61.1)	299 (68.1)	0.020 [*]
Not sure	123 (20.1)	33.0 (18.9)	90.0 (20.5)	
Not good	85.0 (13.8)	35.0 (20.0)	50.0 (11.4)	
Question 6: Attitudes towards reheating leftovers before eating them - perceived barriers				
Not difficult	514 (83.7)	149 (85.2)	365 (83.1)	0.235
So-so	77.0 (12.6)	17.0 (9.7)	60.0 (13.7)	
Difficult	23.0 (3.7)	9.0 (5.1)	14.0 (3.2)	
Question 7: Attitudes towards washing fruits and vegetables with clean water - perceived benefits				
Good	557 (90.7)	162.0 (92.6)	395 (90.0)	0.497
Not sure	26.0 (4.2)	7.0 (4.0)	19.0 (4.3)	
Not good	31.0 (5.1)	6.0 (3.4)	25.0 (5.7)	
Question 8: Attitudes towards washing fruits and vegetables with clean water - perceived barriers				
Not difficult	548 (89.3)	158 (90.3)	390 (88.8)	0.038 [*]
So-so	22.0 (3.5)	10.0 (5.7)	12.0 (2.7)	
Difficult	44.0 (7.2)	7.0 (4.0)	37.0 (8.5)	
The overall attitudes				
Positive attitudes	431 (70.2)	129 (73.7)	300 (68.3)	0.045 [*]
Negative attitudes	183 (29.8)	46.0 (26.3)	139 (31.7)	
Nutrition-related related practices				

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Table 6 (continued)

Variables	Total n = 614 (100%)	Household food-secure n = 175 (28.5%)	Household food-insecure n = 439 (71.5%)	P-value ^a
Question 1: Cleaning of dirty surfaces, plates and utensils				
Yes	505 (82.2)	153 (87.4)	352 (80.2)	0.020*
No	109 (17.8)	22.0 (12.6)	87.0 (19.8)	
Question 2: Storage of perishable foods				
Yes	580 (94.5)	172 (98.3)	408 (92.9)	0.010*
No	34.0 (5.5)	3.0 (1.7)	31.0 (7.1)	
The overall practices				
Good practices	542 (88.3)	162 (92.6)	379 (86.3)	0.004*
Bad practices	72.0 (11.7)	13.0 (7.4)	60.0 (13.7)	

^a Chi-Square Test.

* Difference is significant at the 0.05 level (two-tailed).

the results have been mixed. For example, research has been done in the United States and Saudi Arabia found no link between food security and weight status (Nguyen et al., 2017; Mumena and Kutbi 2020). Similarly, people from food-insecured homes were three times more likely to be underweight, according to research have been done in Bogota, Colombia (Isanaka et al., 2007). Other research has discovered a link between food insecurity and obesity (Papas et al., 2016). The diverse methodologies for assessing food security, age group disparities, and the reference for nutritional status evaluation might all explain these contradictory findings.

In this research, adults aged ≥ 18 years old from food-insecured households have substantially lower energy, macro, and micronutrient intakes than their food-secured counterparts. In addition, energy, protein, carbohydrate, and calcium intakes were related to food security status in this study. The purchasing power of a household's income determines its access to food. When income levels are low, households utilize a variety of coping mechanisms to acquire access to food and safeguard food security levels, including lowering meal size, reducing the frequency of meals consumed, and consuming low quality or inexpensive foods (Norhasmah et al., 2010). Thus, the lower nutritional status indices and lower nutrient intakes seen in people living in food-insecured homes might be explained by limits on food consumption.

Further, in the present study, the FAO of the United Nations questionnaire (Module 5: Undernutrition; Module 6: IDA; Module 7: Vitamin A Deficiency; and Module 9: Food Safety) was used to assess the nutrition-related KAP of the study participants (adults mothers and fathers; aged ≥ 18 years) (FAO 2014). As one of the key factors influencing food choices, nutrition knowledge positively influences the adoption of healthy eating habits (Scaglioni et al., 2018). In ideal circumstances, parents purchase and prepare foods, teach children skills of food selection and preparation, discuss healthy eating habits and act as role models for eating behaviour, thereby influencing the dietary practices and eating behaviours of their families (Haines et al., 2019). Parents' attitudes and level of knowledge are important determinants of the outcome of this process (Romanos-Nanclares et al., 2018). In reality, just a few research have looked at the association between nutrition-related KAP and adult participants in households that are food secured or food insecure, making comparisons with earlier studies problematic. A key result the current study indicates that the nutrition-related knowledge and attitudes toward undernutrition were statistically significant between household food secured and household food insecure participants. The participants from food-insecured households also have lower intakes of energy, macro, and micronutrients than their secured food counterparts. Improving the participants' knowledge and attitudes could improve the nutritional intake of food in terms of quantity, quality, absorption, or biological use of nutrients consumed and might reduce the risk of undernutrition, especially in household food insecure participants.

The present study also shows that the nutrition-related KAP of IDA were statistically significant differences among household food secured and household food insecure participants. In addition, the participants

from food-insecured households also have lower intakes of iron than their secured food counterparts. No statistically significant association was found in iron intake among household food secured and household food insecure participants. Nutritional deficiencies, particularly IDA, are the most common causes of anemia (WHO 2021). Unfortunately, we do not have any laboratory tests regarding the hemoglobin level of the study participants, making interpretation of the results challenging. Furthermore, the nutrition-related knowledge and attitudes toward vitamin A deficiency were statistically significant among household food secured and household food insecure participants. In the present study, the participants from food-insecured households had lower intakes of vitamin A than their food-secured counterparts, but no statistically significant association was found among the participants. Vitamin A deficiency significantly raises the risk of death from common pediatric diseases such as diarrhea. In addition, the WHO has classified vitamin A deficiency as a public health problem affecting about one-third of children (WHO 2014). Future studies using biochemical tests are required. Moreover, the nutrition-related attitudes and food safety practices were statistically significant among household food secured and household food insecure participants. Ingestion and handling of contaminated food causes significant illness and death worldwide. In fact, people living in poverty and food insecurity are the most exposed to foodborne health risks, but demographic and environmental developments are putting more people at risk (Aranceta-Bartrina et al., 2019). Finally, it seems that the overall nutrition-related KAP percentage was high among all participants, and about 56.0% of them had a high educational level. It is worth mentioning that the majority (75.9%) of the study participants had a low monthly household income, which supports the fact that poverty could be one of the main factors contributing to the high food insecurity level in the Gaza Strip. Actually, the relationship between nutrition-related KAP and food insecurity needs more studies in the future.

There were several flaws in this research. The first limitation was the cross-sectional research design, which made it impossible to identify the causative link and limited the generalizability of our findings. Unfortunately, we do not have any measures or biochemical tests for the study participants. Lastly, employing 24-hour dietary recall to measure nutritional intakes has the potential for recall bias and misreporting. Our study's main strength was its large sample size and the fact that it was the first to reveal a link between family food insecurity and dietary intake and nutrition-related KAP among individuals aged 18 in Gaza, Palestine.

5. Conclusions

In conclusion, our study demonstrates that food insecurity is highly prevalent in the Gaza Strip, Palestine. In addition, the demographic and socioeconomic status, anthropometric measurements, and poor dietary intake may be associated with high levels of household food insecurity, while having nutrition-related adequate KAP may be associated with low levels of household food insecurity among parents aged ≥ 18 years in the

Gaza Strip, Palestine. Policymakers should continue to concentrate their efforts and resources on the most effective combinations of initiatives for reducing food insecurity in Gaza.

Declarations

Author contribution statement

Abdel Hamid El Bilbeisi, Ayoub Al-Jawaldeh, Ali Albelbeisi, Samer Abuzerr, Ibrahim Elmadfa, Lara Nasreddine: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

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Data availability statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declaration of interest's statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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