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Parental knowledge and attitudes toward food allergies: a cross-sectional study on determinants and educational needs

Sari Taha^{1,2}, Raya Rabaiah³, Alaa Dweikat³, Lama Abu-Ali³, Hala Yaesh³, Razan Jbour³, Samah W. Al-Jabi^{3*} and Sa'ed H. Zyoud^{3,4,5*}

Abstract

Background Food allergy (FA) may often lead to fatal consequences if it is treated promptly. Parents of children with FA should have adequate knowledge to improve health outcomes and reduce the associated burden. This study aimed to examine the knowledge and attitudes regarding FA among parents of children with FA.

Methods This was a cross-sectional study conducted among parents attending a primary healthcare center using convenience sampling. The minimum sample size of 280 was calculated using an equation based on the local prevalence of FA among children, and was increased to account for missing data. The data were collected using a four-section questionnaire that collected data about the parents and their children and included questions about knowledge and attitudes regarding FA. The knowledge score was calculated by summing the number of correct answers, with a maximum of 15 points. The Mann–Whitney and Kruskal–Wallis tests were used to examine the associations between the knowledge score and other variables. Spearman's correlation was employed to test the correlations between the knowledge score and other variables.

Results A total of 381 parents completed the questionnaires, of whom 71.9% were mothers and 28.1% were fathers. The prevalence of food allergies was 14.22%. Almost one-third had children who had one or more types of FA (32.8%). Most of those patients had received a professional diagnosis of FA (75.3%). The median knowledge score was 7.0 (IQR = 6–8), with variable proportions of correct answers across and within topics. A higher knowledge score was significantly associated with parenting a child with FA ($p = 0.006$), comorbid asthma or eczema ($p = 0.012$), the preference to acquire information from professional health agencies ($p < 0.001$), and higher educational ($p = 0.002$) and income ($p = 0.001$) levels. Moreover, the number of discussions held with a healthcare professional regarding FA was significantly correlated with the knowledge score ($r = 0.210$, $p = 0.019$). Online resources were the most commonly reported source of information (65.4%). Parents believed that having a child with FA can cause stress in the family (76.1%) and impact siblings' daily lives (66.7%), while only a minority viewed FA as stigmatizing. Additionally, the majority encouraged governmental spending on FA research (92.9%).

*Correspondence:

Samah W. Al-Jabi
samahjabi@yahoo.com
Sa'ed H. Zyoud
saedzyoud@yahoo.com

Full list of author information is available at the end of the article



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Conclusions Parenting a child with FA, comorbid asthma or eczema, number of discussions held with healthcare professionals, and education and income levels were significantly associated with a higher knowledge score. Educational interventions targeting parents should blend emotional regulation, medical information, and management skills to increase knowledge about FA and alleviate associated stress.

Keywords Knowledge, Attitudes, Food allergy, Parents, Children, Questionnaire survey

Background

Food allergy (FA) is an immune-mediated response to a specific food [1]. Food allergies may lead to near-fatal symptomatology upon ingestion of a small amount of food, which shapes the nature of FA as a health condition with difficulties in management and a high rate of undertreatment [2, 3]. Although multiple mechanisms are implicated in the pathophysiology of FA, the immune response is mostly induced by allergen-IgE binding, leading to the release of histamine, tryptase, prostaglandin, and multiple cytokines [4, 5]. Cutaneous symptoms, including urticaria, flushing, and itching, are the most common clinical presentations of FA, followed by respiratory, cardiovascular, gastrointestinal, and central nervous system symptoms [6–8]. Exposure to allergenic food can lead to anaphylaxis, which is a generalized, rapidly progressive, and potentially life-threatening allergic reaction with a rapid onset of symptoms after ingestion [3]. For this purpose, epinephrine is the primary treatment method that mostly leads to the resolution of anaphylaxis with one injection [3, 9]. Therefore, carrying and properly using an epinephrine autoinjector is crucial for optimal management in patients with FA [9].

Food allergies influence the lifestyle of children through dietary restrictions, psychological effects, and the exacerbation of chronic conditions. First, food avoidance can limit participation in social activities, such as school lunches and dining out, and lead to feelings of isolation [10, 11]. Children living with FA are subject to bullying and harassment because of their FA [12, 13]. Second, FA is associated with distress, anxiety, school absence, and difficulties in the transition to adolescence [14, 15]. Similarly, children living with FA have demonstrated lower levels of quality of life [15–18]. Moreover, FA may exacerbate long-term conditions, including skin and gastrointestinal diseases. For instance, symptoms of atopic dermatitis can be triggered or exacerbated by exposure to certain foods, whereas diet elimination may decrease the severity of atopic dermatitis [19, 20]. Likewise, FA can worsen symptoms and complicate the management of gastrointestinal diseases, such as eosinophilic esophagitis [21, 22].

Given the possibility of a fatal presentation of FA and the need for specific management tools and skills, gaining sufficient knowledge about this condition can help improve health outcomes. Health literacy is the capacity to obtain, understand, and retain information about

health and healthcare and to use this information to maintain health and well-being, including the ability to interact with the healthcare system and acquire the skills required to manage health conditions [23]. Other concepts that address health literacy in relation to food have been developed, including the concept of ‘food literacy’, which refers to the acquisition of knowledge about nutritional needs and intake [24]. More specifically, the concept of ‘FA literacy’ includes aspects of physical health, mental health, and food literacy that are specific to managing and coping with FA [25].

Several barriers to competent management of FA have been identified among parents of pediatric patients. These include a lack of psychological support and social acceptance; knowledge gaps in identifying symptoms, triggers, and treatment; and hesitancy to carry an epinephrine autoinjector [26–29]. This hesitancy often results from a lack of preparedness to use an epinephrine autoinjector despite having adequate knowledge [29]. Moreover, research has shown that high health literacy among parents is associated with better health outcomes and more advantageous behaviors for children with FA [30]. Given the nature of FA as a health condition that is accompanied by a constant possibility of a fatal yet avoidable event, rectifying parental knowledge gaps is crucial for improving FA management and alleviating associated stress [30]. The knowledge gaps, perceptions, and attitudes among parents with FA should first be identified and quantified to inform policymaking and interventions to address these gaps, enhance health literacy, and improve health outcomes in patients with FA. Notably, local research exploring FA is scarce, with only one local study focusing on its prevalence and targeting a limited population [31]. This study aimed to explore the knowledge, perceptions, and attitudes regarding FA and its management among parents of children with FA. It also aimed to identify the characteristics of parents’ interactions with the healthcare system regarding FA.

Methods

Study design and settings

This was a cross-sectional, single-center study carried out in Nablus city from November 2023 to April 2024. All parents of children aged less than 18 years who visited the main community healthcare center in Nablus during the data collection period were eligible to participate.

Sampling

To calculate the minimum sample size (n), a desired margin of error (E) of 5% and a confidence level of 99% were selected. The corresponding z value was 2.576. The expected prevalence (P) of FA was 12.3%, according to a previous study conducted among Palestinian children [31]. The minimum sample size was 280 according to the following equation [32]:

$$n = z.P.(1 - P) / E$$

The sample size was increased as much as possible to account for missing data. A convenience sampling technique was employed to invite the participants. Parents who were attending the community healthcare center for pediatric consultation, as confirmed by the registry records, were approached, invited to participate, and provided with adequate explanations of the conduct and objectives of the study.

Goal definition

The primary goal of this study was to assess parental knowledge and attitudes toward FA in children. Specifically, the study aimed to identify key determinants of parental knowledge gaps, understand parental perceptions and attitudes regarding FA management and treatment, and explore their educational needs related to FA. This information is intended to inform the development of targeted interventions and healthcare policies aimed at improving the management of FA in pediatric populations.

Operational definitions

- **Severe Reaction to Food Allergy:** According to the Consensus on DEfinition of Food Allergy SEverity (DEFASE), a severe FA reaction is defined as respiratory and/or circulatory failure, requiring more than two doses of intramuscular (IM) epinephrine or intensive care treatment.
- **Moderate Reaction to Food Allergy:** A moderate FA reaction includes lower respiratory symptoms (e.g., wheezing), laryngeal symptoms (e.g., hoarseness), or gastrointestinal symptoms and may be managed with up to two doses of IM epinephrine.
- **Health belief model:** A psychological model used to explain and predict health-related behaviors, particularly in relation to the uptake of health services. In this study, it served as the basis for developing the questionnaire domains.
- **Knowledge score:** A numerical measure refers to the level of factual information and understanding that parents possess regarding FA in children.
- **Attitude score:** A numerical measure refers to the beliefs, feelings, and perceptions that parents hold about food allergies and their impact on quality of life, treatment options, and overall management of the condition.
- **Likert Scale:** A psychometric scale commonly used in questionnaires to measure participants' attitudes or perceptions. In this study, it ranged from 1 (strongly disagree) to 5 (strongly agree) for questions about parental perceptions of FA.

Data collection and study variables

Data collection was conducted using an interviewer-administered, four-section questionnaire adapted from the Chicago FA Research Survey for Parents of Children with FA, which is a validated tool developed by Gupta et al. to assess FA-related knowledge and attitudes and whose domains were developed on the basis of the Health Belief Model [33]. The developed questionnaire was reviewed, cross-checked, and edited by academic and professional experts in the field. It was then piloted with 30 participants. After the pilot study, the questionnaire was edited for clarity, accuracy, cultural relevance, and language improvement on the basis of the comments of the participants and the results of the pilot study. The questionnaire needed 15 min on average to be completed. The final questionnaire included the following sections (Additional file 1):

- The first section included questions about the demographic, socioeconomic and personal characteristics of the parents and children who participated in the study.
- The second section gathered data from parents of children with current FA, including the presence of related comorbidities and types of allergens; the number of times an FA-related topic was discussed with a healthcare provider by phone or in person in the last 12 months; the number of emergency room (ER) visits due to FA during the last 12 months; and, if the child had a moderate or severe reaction to food, the child received a diagnosis of FA by a doctor and/or was told by a healthcare professional to strictly avoid the allergen. The severity of symptoms was adopted from the Consensus on DEfinition of Food Allergy SEverity (DEFASE) [34].
- The third section included questions that tested the participants' level of knowledge about FA. This section comprises 12 questions about the definition and diagnosis, clinical presentation, triggers, susceptibility, and treatment and utilization of healthcare services. The questions were divided into two groups: eight true-or-false questions and

four multiple-choice questions. The knowledge score was calculated by summing the number of correct answers, with a maximum of 15 points. Two questions out of 12 had more than one true answer, with one point calculated for every true answer.

- The fourth section included 19 questions about parental perceptions and attitudes regarding FA that can be answered via a five-point Likert scale (strongly disagree, disagree, uncertain, agree, or strongly agree). This section addresses perceptions about treatment, quality of life (QoL), stigma, policy issues, and effective steps to improve the lives of children with FA.

Data analysis

The Statistical Package for the Social Sciences (SPSS) software version 25.0 (IBM Corporation, USA) was used to analyze the data via both descriptive and inferential statistics. The Kolmogorov–Smirnov test was used to test the normality of the distribution of the data. Frequencies and percentages were used to describe the demographic, socioeconomic, and personal data and the knowledge and attitude responses and scores. The median, interquartile range (IQR), and mean rank were reported for nonnormally distributed data. The responses to the knowledge and attitude questions were reported as frequencies and percentages according to the Likert scale used. For inferential statistics, the Mann–Whitney U and Kruskal–Wallis tests were used to analyze nonnormally distributed data. Spearman’s rank correlation was used to analyze the correlation between the nonnormally distributed variables and the knowledge score. A p value < 0.05 indicated statistical significance.

Ethical considerations

Approval for conducting the study was obtained from the *Institutional Review Board (IRB) at An-Najah National University* (Ref: Pharm.Sept 2023/15). Permission to conduct the study at the community healthcare center of Nablus was obtained from the Palestinian Ministry of Health. The objectives and conduct of the study were communicated to the participating parents, who provided informed consent before participation. The data were kept safe and used only for research purposes.

Results

Of the 397 questionnaires distributed, 16 refused to participate (response rate=95.97%). All participants who agreed and started to fill the questionnaire completed all of its items. A total of 381 questionnaires were returned by the parents and included in the final data analysis. Among those, 274 were mothers (71.9%), and 107 were fathers (28.1%), the majority of whom were

married (97.1%). The median number of children was 2 (IQR=1–3, range=1–7). Fewer than half of the respondents had received undergraduate-level education (41.5%). Table 1 includes more details on the characteristics of the participants.

The prevalence of food allergies was 14.22%. Approximately one-third of the participants had children who had one or more types of FA at the time of data collection (32.8%), and a small minority had children who had outgrown a type of FA (4.2%). Most of those children with current FA had received a professional diagnosis of FA (75.3%) and had only minor reactions to their reported FA (65.9%). Among the parents of children with FA, 42.4% visited an ER due to FA, and 89.6% had a discussion with a healthcare professional regarding FA in the preceding 12 months. The majority had children without a diagnosis of comorbid eczema (78.4%) or asthma (84.8%). Milk was the most commonly reported type of allergenic food among those with a current FA (32.9%), followed by banana (6.5%), strawberry (6.5%), egg (6.5%), and wheat (5.3%). Figure 1 depicts the types of allergenic food reported by the participants.

The Kolmogorov–Smirnov test revealed that the knowledge score was nonnormally distributed ($p < 0.001$). The median knowledge score was 7.0 (IQR=6–8). The proportions of correct answers were variable among different topics. For instance, most participants knew that rash (64.6%) is a symptom of FA, identified milk (77.4%) and eggs (52.7%) as common allergens, and correctly selected “*children aged less than five*” as the group that is most likely to have FA (62.7%). However, the majority did not identify peanuts as common allergens (57.4%) and were not familiar with the use of antihistamines (81.4%) or epinephrine (75.1%) in the management of anaphylaxis (Table 2). Online resources were the most commonly reported source of information about FA (65.4%), followed by professional health agencies (37.8%) and local support groups (7.1%). Table 2 provides more details on the responses to the questions concerning testing knowledge.

A higher knowledge score was significantly associated with a higher education level ($p = 0.002$), higher household income level ($p = 0.001$), having a child with FA ($p = 0.006$) or having comorbid asthma or eczema ($p = 0.012$), and a preference to acquire information from professional health agencies ($p < 0.001$). Among parents of children with FA, none of the variables indicating the level of engagement with healthcare services reached statistical significance, including visiting an ER for FA, the number of visits, having on-the-phone or in-person discussions with a healthcare professional, the number of these discussions, and the preference to acquire information from online sources or local support groups. Table 3 contains further details on the associations between the

Table 1 Demographic, socioeconomic, and personal characteristics of the participants

Variable	Frequency N (%)
Gender	
Male	107 (28.1)
Female	274 (71.9)
Marital status	
Married	370 (97.1)
Single or divorced or widowed	11 (2.9)
Education level	
Primary	11 (2.9)
High-school	91 (23.9)
Received an associate degree	98 (25.7)
Received a bachelor's degree	158 (41.5)
Received a master's degree or PhD	23 (6.0)
Monthly household income level (NIS)	
< 1000	48 (12.6)
1000–2000	111 (29.1)
2000–3000	135 (35.4)
> 3000	87 (22.8)
Parenting a child with a current food allergy	
Yes	125 (32.8)
No	256 (67.2)
Parenting a child with an outgrown food allergy	
Yes	16 (4.2)
No	365 (95.8)
Parenting a child with comorbid asthma or eczema	
Yes	46 (36.8)
No	79 (63.2)
Visiting the ER for a FA-related complaint in the last 12 months	
Yes	53 (42.4)
No	72 (57.6)
Number of ER visits or a FA-related complaint in the last 12 months	
None	73 (58.4)
1	28 (22.4)
2	11 (8.8)
3 or more	13 (10.4)
Discussing a FA-related topic with a healthcare professional in the last 12 months (on-phone or in-person)	
Yes	112 (89.6)
No	13 (10.4)
Number of times discussing a FA-related topic with a healthcare professional in the last 12 months (on-phone or in-person)	
None	13 (10.4)
1	31 (24.8)
2	34 (27.2)
3 or more	47 (37.6)

- Abbreviation: ER: emergency room; FA: food allergy

- The four variables that measure healthcare engagement (regarding ER visits and holding discussions with healthcare professionals) are restricted to parents of children with FA for meaningful results

knowledge scores and other variables. The knowledge score was significantly correlated with the number of discussions held with an on-phone or in-person healthcare professional ($r=0.210$, $p=0.019$), whereas the number of ER visits ($r=0.363$, $p=0.082$) and the number of children ($r=0.013$, $p=0.887$) did not reach statistical significance (see Table 4).

Parents believed that FA can have a negative impact on QoL, as the majority agreed or strongly agreed that having a child with FA can cause stress in the family (76.1%), impact siblings' daily lives (66.7%), affect parents' careers (61.5%), and lead to financial difficulties (55.1%). Only a minority agreed or strongly agreed that FA can be stigmatized among relatives (15.0%) and friends (33.6%). When asked about suggested policies regarding FA, most parents believed that an EpiPen should be made available at a nursing office at schools (89.3%), that a person with training in FA should be present at lunchtimes, parties, and trips (95.8%), and that governmental spending on FA research should be increased (92.9%). Moreover, parents viewed developing a cure (39.3%), determining the cause (33.1%), and promoting school education programs (33.1%) as the most important steps in improving the lives of people with FA. Table 5 includes more details on the responses to the attitude questions.

Discussion

Because FA is associated with a constant threat of anaphylaxis as a near-fatal to fatal event, understanding effective management can improve health outcomes and reduce the stress associated with this condition. Given that local research on FA is lacking, this study was the first to address FA from a public health perspective. This study aimed to assess the knowledge, perceptions, and attitudes among parents of children with FA. The findings revealed that higher educational and income levels, parenting a child with FA, a diagnosis of asthma or eczema comorbid with FA, the number of discussions held with a healthcare professional regarding FA, and the preference to acquire information from professional health agencies were significantly associated with a higher knowledge score. Online resources were the most commonly reported source of information. While most parents believed that FA may have a negative impact on QoL, only a minority viewed FA as stigmatizing.

The proportions of participants with correct answers varied across and within every knowledge domain of FA. For example, most participants labeled milk and eggs as common triggers of FAs but not peanuts. Moreover, a higher knowledge score was associated with having a child with FA, consistent with other studies comparing parents of children with FA to those without FA. Two studies found that people who parented children or who had a relative or acquaintance with FA had significantly

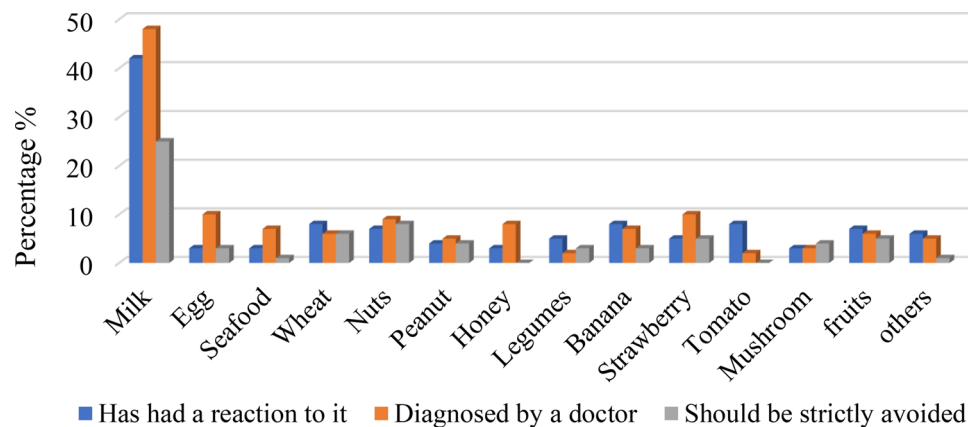


Fig. 1 Types of allergenic food reported by the participants

Table 2 Descriptive statistics of the participants' correct responses to the questions about their testing knowledge

Knowledge variables	Frequency (%)
N = 381	
Definition and diagnosis	
Food allergy is related to the immune system (true)	(24)64.3
The only way to know that your child is allergic to a food is with a medical test (false)	(168)44.1
Symptoms and severity	
Eczema may be the first sign of having a food allergy (true)	(179)47.0
Which of the following could be a sign of a food allergy reaction?	246 (64.6)
Answer 1: rash may appear on the face and chest an hour after ingestion	150 (39.4)
Answer 2: an immediate reaction may include tongue swelling and breathing difficulties	
Triggers	
Asthma is a risk factor for anaphylaxis (true)	(183)48.0
Foods eaten by a mother can be passed to her child through her breast milk (true)	317 (83.2)
Food additives, such as citric acid, colorants, and starch are common food allergens (false)	(52)13.6
Which of the following are the three most common allergies in children?	198 (52.7)
Answer 1: egg	291 (77.4)
Answer 2: milk	160 (42.6)
Answer 3: peanut	
Perceptions of susceptibility	
Teenagers are at higher risk for fatal FA than younger children (true)	(81)21.3
Which age group is the most likely to have FA? (0–5 years)	(239)62.7
Treatment and utilization of healthcare	
Taking daily antihistamine (e.g., <i>Lorias</i> and <i>Claristine</i>) can prevent food allergic reactions (false)	(71)18.6
Which of the following body areas is best for injecting epinephrine after an allergic reaction? (outer thigh)	(95)24.9

Abbreviation FA: food allergy

Correct answers are written in brackets after each item

Some statements have proportions that sum to more than 100% owing to the potential for response multiplicity

higher knowledge scores than those who did not [35, 36]. Additionally, the findings of other studies conducted specifically among parents of children with FA showed a trend toward higher knowledge scores compared to other populations, such as school teachers, school nurses, restaurant staff, and the public [37–44]. However, the findings of the present study indicated that even parents of children with FA had multiple knowledge gaps, although the questionnaire used was probably easier than that used in other studies. The inadequate knowledge among all parents who participated in this study highlights the

need for implementing educational interventions targeting these knowledge gaps.

Moreover, parents with higher education and household income levels had higher knowledge scores. Other studies conducted among parents of children with FA demonstrated contrasting findings regarding the associations between socioeconomic variables and knowledge about FA [40, 45–47]. Education level and household income, among other factors, are commonly used indicators of socioeconomic status [48]. People with a higher socioeconomic status have better access to educational

Table 3 Association between the knowledge score and other variables

Variable		Frequency (%) N = 381	Mean Rank	Median (Q1-Q3)	p value
Gender	Male	107 (28.1)	199.61	7 (6–9)	0.335
	Female	274 (71.9)	187.64	7 (5–8)	
Marital status	Single, divorced, widowed	11 (2.9)	208.73	8 (5–9)	0.584
	Married	370 (97.1)	190.47	7 (6–8)	
Education level	Primary	11 (2.9)	131.36	6 (3–7)	0.002*
	High-school	91 (23.9)	164.71	7 (5–8)	
	Received an associate degree	98 (25.7)	182.04	7 (6–8)	
	Received a bachelor's degree	158 (41.5)	210.49	7 (6–9)	
Monthly household income level (NIS)	Received a master's degree or PhD	23 (6.0)	227.83	8 (6–9)	0.001*
	< 1000	48 (12.6)	150.97	7 (5–7)	
	1000–2000	111 (29.1)	168.09	6 (5–8)	
	2000–3000	135 (35.4)	201.33	7 (6–9)	
Parenting a child with a current food allergy	> 3000	87 (22.8)	226.29	8 (6–9)	0.006*
	Yes	125 (32.8)	212.95	7 (6–9)	
Parenting a child with an outgrown food allergy	No	256 (67.2)	180.28	7 (5–8)	0.082
	Yes	16 (4.2)	188.97	7.0 (6.0–8.0)	
Parenting a child with comorbid asthma or eczema	No	365 (95.8)	237.31	8.0 (7.0–9.0)	0.012*
	Yes	46 (36.8)	73.57	7.0 (6.0–9.0)	
Visiting the ER for a FA-related complaint in the last 12 months	No	79 (63.2)	56.85	8.0 (7.0–10.0)	0.715
	Yes	53 (42.4)	64.37	8.0 (6.0–9.0)	
Number of ER visits or a FA-related complaint in the last 12 months	None	72 (57.6)	61.99	7.0 (6.0–9.0)	0.263
	1	73 (58.4)	61.88	7.0 (6.0–9.0)	
	2	28 (22.4)	55.73	7.0 (6.0–8.8)	
	3 or more	11 (8.8)	72.00	8.0 (7.0–9.0)	
Discussing a FA-related topic with a healthcare professional in the last 12 months (on-phone or in-person)	13 (10.4)	77.35	8.0 (6.5–10.0)	0.153	
	Yes	112 (89.6)	64.56		8.0 (6.0–9.0)
Number of times discussing a FA-related topic with a healthcare professional in the last 12 months (on-phone or in-person)	No	13 (10.4)	49.54	6.0 (5.0–8.5)	0.098
	1	31 (24.8)	58.84	7.0 (6.0–9.0)	
	2	34 (27.2)	58.41	7.0 (6.0–8.3)	
	3 or more	47 (37.6)	72.79	8.0 (6.0–10.0)	

- Abbreviations ER: emergency room; FA: food allergy

- Mann–Whitney U and Kruskal–Wallis tests were used to analyze the associations between the variables

--The four variables that measure healthcare engagement (regarding ER visits and holding discussions with healthcare professionals) are restricted to parents of children with FA for meaningful results

*p value is below the threshold value for significance (0.05)

Table 4 Correlations between knowledge scores and other variables

Variable	Spearman's correlation coefficient	p value
Number of ER visits or a FA-related complaint in the last 12 months	0.363	0.082
Number of times discussing a FA-related topic with a healthcare professional in the last 12 months (on-phone or in-person)	0.210	0.019*
Number of children	0.013	0.887

- Abbreviations ER: emergency room; FA: food allergy

- Spearman's rank correlation was used to test the correlation between the variables

*p value is below the threshold value for significance (0.05)

resources about health and healthcare, which improves their health outcomes and probably explains the high score in the present study. While a higher socioeconomic status is associated with better health outcomes, health literacy, a modifiable risk factor, mediates the relationships between socioeconomic status and health outcomes and QoL [49]. In addition, the association between comorbid asthma or eczema and a higher knowledge score might be explained by increased involvement in healthcare and the subsequent need for knowledge about the management of multiple conditions. Related studies conducted among parents of children with FA did not assess similar associations with knowledge [40, 45–47]. However, other studies have shown that parenting a child

Table 5 Descriptive statistics of the responses to the attitude questions

Items	Strongly agree	Agree	Undecided	Disagree	Strongly disagree
Treatment and utilization of health care					
1. Doctors often provide different information about food allergies	29 (7.6)	125 (32.8)	121 (31.8)	92 (24.1)	14 (3.7)
Perceptions of quality of life					
2. FA causes stress in the family	77 (20.2)	213 (55.9)	53 (13.9)	35 (9.2)	3 (0.8)
3. Parents usually agree on how to take care of their child's FA	12 (3.1)	127 (33.3)	120 (31.5)	105 (27.6)	17 (4.5)
4. Mothers pay more attention than fathers to keep their children away from allergic foods	85 (22.3)	183 (48.0)	52 (13.6)	58 (15.2)	3 (0.8)
5. Parents' careers can be affected because of their child's FA	41 (10.8)	193 (50.7)	59 (15.5)	84 (22)	4 (1.0)
6. FA may cause financial difficulties in the family	40 (10.5)	170 (44.6)	77 (20.2)	84 (22.0)	10 (2.6)
7. Other siblings' daily life is affected by having a sister or brother with a FA	35 (9.2)	219 (57.5)	60 (15.7)	65 (17.1)	2 (0.5)
Stigma and acceptability					
8. Having a child with FA can be embarrassing among relatives	6 (1.6)	51 (13.4)	126 (33.1)	155 (40.7)	43 (11.3)
9. Children with FA will be treated differently by their friends	15 (3.9)	113 (29.7)	152 (39.9)	87 (22.8)	14 (3.7)
10. Most people take FA seriously	75 (19.7)	262 (68.8)	27 (7.1)	17 (4.5)	0 (0.0)
Policy issues					
11. Workers at a child's school or daycare can manage FA emergencies.	37 (9.7)	167 (43.8)	71 (18.6)	91 (23.9)	15 (3.9)
12. It should be acceptable for children with FA to bring an EpiPen to school	67 (17)	224 (58.8)	54 (14.2)	34 (8.9)	2 (0.5)
13. An EpiPen should be kept at nurse's offices at schools.	107 (28.1)	233 (61.2)	30 (7.9)	11 (2.9)	0 (0.0)
14. All nuts' products should be prohibited in schools	35 (9.2)	134 (35.2)	121 (31.8)	77 (20.2)	14 (3.7)
15. An adult who has knowledge of or training in FA should be present throughout lunchtimes, parties, and field trips organized by schools	130 (34.1)	235 (61.7)	13 (3.4)	3 (0.8)	0 (0.0)
16. Food labeling rules help reduce incidents of FA reaction among children	84 (22.0)	245 (64.3)	29 (7.6)	22 (5.8)	1 (0.3)
17. Government funding for research on FA should increase	127 (33.3)	227 (59.6)	2.4 (6.3)	2 (0.5)	1 (0.3)
18. Most important step to improve the lives of those with FA. N= 181 (%)	1. Develop a cure 152 (39.3) 2. Determine the cause 126 (33.1) 3. Promote school education programs 36 (33.1) 4. Promote public awareness 67 (17.6)				

- Abbreviation FA: food allergy

- Some statements have proportions that sum up to more than 100% due to the potential for response multiplicity

with comorbid conditions with FA is associated with poorer quality of life among parents [50–52].

This study also revealed that the knowledge score was significantly correlated with the number of discussions held with a healthcare professional regarding FA but not with the number of visits to the ER. Additionally, only the preference to acquire information from professional health agencies demonstrated statistical significance, with higher knowledge scores. Research has shown that

high health literacy levels are generally associated with less utilization of healthcare services, which may reduce healthcare costs and improve health outcomes [53–55]. Two studies have explored the association between health literacy and healthcare utilization among parents of children with FA. In contrast to the present study, the first study showed that knowledge scores were significantly higher among parents who made multiple ER visits for FA than among those who did not [40]. However, another

study revealed that greater health literacy was associated with less healthcare utilization [56]. These contrasting findings might be attributed to the cross-sectional nature of these studies, which precludes the examination of temporality between service utilization and gaining adequate levels of knowledge. Inadequate knowledge about FA can lead to poor management, unnecessary utilization of emergency services for mild allergic reactions, and poor health outcomes [56]. Therefore, improving knowledge by implementing educational interventions could encourage parents to follow medically indicated approaches to FA management, reduce unnecessary healthcare utilization and costs, and improve health outcomes in patients with FA.

Moreover, nearly two-thirds of the participants selected the internet as the most preferred source of information, which is consistent with the findings of another regional study conducted among a similar population [41]. The recent increase in the popularity of the digital world has made breaking from the traditional model of health education into a blended model in which online sources are integrated into patient education inevitable. The methods and complexity with which people obtain health information are key considerations in designing communication strategies for health education. For instance, mothers in one study valued the anonymity and ability to obtain unlimited information online compared with other traditional methods when they were concerned about their children's health [57]. Therefore, communication strategies addressing knowledge gaps in FA should use channels that are culturally appropriate and consider the audience's preferences to achieve better coverage of the target population and improve the outcomes of educational interventions.

Most parents believe that FA may negatively impact QoL, causing stress and financial difficulties and affecting siblings' daily lives. Research has shown that parents of children with FA have greater stress levels and poorer mental health outcomes than other parents do [58]. Studies have also revealed several factors that may influence QoL among parents of children with FA, including age, certain types of allergies, comorbid allergic conditions, and maternal demographic characteristics [50–52]. This poor QoL might be attributed to the constant uncertainty and hypervigilance associated with food avoidance, especially since food consumption is integral to many social activities. A study revealed that nearly half of the fatal reactions to food take place outdoors, creating a source of stress and maintaining a constant threat of anaphylaxis for families of children with FA [59]. However, educational interventions providing training on emotional self-regulation and management skills were found to improve parental QoL [60, 61]. This further emphasizes the need for local educational interventions to address the double

burden of inadequate knowledge and poor QoL reported by parents of children with FA in this study. These interventions should go beyond the traditional provision of medical information and management–skill training to equip parents with coping mechanisms and address the emotional and psychological aspects of raising children with FA. In addition to targeting parents, broader public awareness campaigns can improve the quality of life of parents and children alike. Such campaigns can contribute to reducing stigmatization around food allergies in the region. A considerable minority of the participants were undecided about whether having a child with FA could be embarrassing among relatives (33.1%) or if their children would be treated differently (39.9%). Another study conducted among adults in Saudi Arabia reported that only one-third of the participants disagreed that individuals with FA are treated differently [36]. By raising public awareness and correcting misconceptions, these campaigns can mitigate the stigma experienced by families of children with FA and foster a more supportive environment. This can reduce social isolation and encourage greater acceptance within the community, creating a safer social space for children to participate in social activities and enhancing the quality of life of both parents and children.

This was one of the first studies on FA in Palestine. Indeed, a review of the literature revealed a notable lack of published studies concerning FA in general. This was reflected by parents participating in this study, with 92.9% agreeing that governmental spending on research regarding FA should increase. This study can be the first step toward encouraging research on FA and guiding the implementation of educational interventions, as indicated by the emerging evidence. However, this study had several limitations. The generalizability of the findings is limited by multiple sampling constraints. First, the study included parents from one city attending one primary healthcare center. The characteristics of this population, such as health literacy and health-seeking behavior, might differ from those of people residing in other cities, attending other centers, or not utilizing healthcare services at all. Higher healthcare utilization rates are associated with higher education levels among various populations and for different health services [62–65]. Second, the majority of the participants were females (71.9%) and married (97.1%), which affects the comparisons between the categorized groups and limits the generalizability of the findings to certain populations. Compared with male caregivers, female caregivers are more likely to accompany children in seeking healthcare services. Moreover, a larger sample size would have improved the power and generalizability of the study, especially given its quantitative nature. Furthermore, the cross-sectional design used in this study precludes

determining causality between variables. For example, greater engagement with healthcare might initially improve knowledge, as revealed by this study, but is often found to be associated with less health service utilization in the long run.

Conclusions

Food allergy is an immune response to the ingestion of a particular food, which may lead to various clinical presentations ranging from mild cutaneous symptoms to death. Adequate knowledge about the prompt management and nature of FA can help parents of children with FA improve their children's well-being and reduce the ensuing stress. This study aimed to assess the knowledge, perceptions, and attitudes among parents of children with FA. This study revealed several knowledge gaps in FA among parents. A higher knowledge score was associated with parenting a child with FA, comorbid asthma or eczema; higher education and household income levels; a greater number of discussions held with healthcare professionals regarding FA; and a preference to acquire information from professional health agencies. The most commonly reported source of information about FA was online resources. Moreover, parents said that FA may negatively affect QoL and encouraged governmental spending on research about FA. Educational interventions targeting parents should include emotional regulation techniques, medical information, and management skills to increase knowledge about FA and improve the QoL of families with children diagnosed with FA. Moreover, given the severe lack of published studies locally, more research on FA is recommended.

Abbreviations

FA	Food allergy
ER	Emergency room
QoL	Quality of life
SPSS	Statistical Package for the Social Sciences
IRB	Institutional review board

Supplementary Information

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Supplementary Material 1

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Author contributions

All the authors contributed to the study design. RR, AD, LAA, HY, and RJ collected the data, reviewed the literature, and participated in manuscript writing. SWA participated in manuscript writing and ensured the integrity of the data and coordination between research team members. SHZ and ST

conceptualized the study, analyzed the data, wrote the manuscript, managed the research team, and enhanced the intellectual content of the study.

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Data availability

The data collected and analyzed for this study are available from the corresponding authors upon reasonable request.

Declarations

Ethics approval and consent to participate

Our research was approved by the *Institutional Review Board (IRB)* of An-Najah National University (Ref: Pharm.Sept 2023/15). Furthermore, the parents verbally provided informed consent before they participated in the survey. We described the study goals to the parents and asked them to participate in the study. The *IRB of An-Najah National University* approved only informed verbal consent. The reason for the informed verbal consent is that participants were only needed for the interview and were not subjected to any harm as long as their privacy was kept confidential. The authors confirmed that all the methods followed the relevant guidelines and regulations.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹An-Najah Global Health Institute (GHI), An-Najah National University, P.O. Box 7, Nablus, Palestine

²Department of Public Health, Faculty of Medicine and Health Sciences, An-Najah National University, P.O. Box 7, Nablus, Palestine

³Department of Clinical and Community Pharmacy, College of Medicine and Health Sciences, An-Najah National University, Nablus 44839, Palestine

⁴Poison Control and Drug Information Center (PCDIC), College of Medicine and Health Sciences, An-Najah National University, Nablus 44839, Palestine

⁵Clinical Research Centre, An-Najah National University Hospital, Nablus 44839, Palestine

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