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Food Allergy Knowledge, Attitudes, and Beliefs Among Kindergarten Through Fourth-Grade Teachers

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KEYWORDS: Food allergy, children, teachers, school, management, training

ABSTRACT

PURPOSE/OBJECTIVE

This study aimed to evaluate the knowledge, attitudes, and beliefs of teachers regarding food allergies. This project highlighted the importance of training teachers and incorporating food allergy management and protocols to keep children with food allergies safe and in an inclusive environment at school.

METHODS

A cross-sectional online survey was sent to 77 elementary school principals from 20 school districts. The survey was distributed to K-4th grade teachers. The *Chicago Food Allergy Research Survey* was used to measure food allergy knowledge (*n* = 16) and food allergy attitudes and beliefs *(n* = 15). Demographic factors and general knowledge scores underwent a descriptive analysis using Excel. Based on the proportion of knowledge items that were correctly answered, knowledge scores were computed. Using SPSS version 27, frequencies were calculated for the variables relating to attitudes and beliefs.

RESULTS

A total of 42 teachers from 77 elementary school buildings, in 20 school districts participated in the study. For anonymity, the school district and building where the teacher works were not collected. Of the 42 teachers, 36% (*n*=15) reported having a food-allergic child in their class, and 24% (*n*=10) teachers reported having food allergy worksite training. Knowledge of treatment and use of healthcare ranked lowest in this study. Teachers tended to minimize the stigma and acceptability issues children encounter with food allergies with 7% (*n*=3) who believe children with food allergies are teased at school, 45% (*n*=19) believe children with food allergies are treated differently, and 71% (*n*=30) feel children should sit at a table specifically for children with food allergies.

APPLICATION TO CHILD NUTRITION PROFESSIONALS

Teachers are one level in a school that can help manage food allergies. All school staff including recess monitors, substitute teachers, and food service need consistent, structured food allergy education and training to help lower the risk of severe allergic reactions and understand the stigma and quality of life issues food allergic children face. Federal, state, and local policy leaders must collaborate to require allergy training and management at all schools to make them safer and more inclusive learning environments for children with food allergies.

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INTRODUCTION

A negative immunologic reaction to a dietary protein is what is referred to as a food allergy. A wide range of signs and symptoms, including those affecting the skin, gastrointestinal, respiratory, and cardiovascular systems, are linked to food-related reactions (Renn et al., 2019; Santos et al., 2022) and can contribute to reduced quality of life and avoidance of day-to-day activities (Chan et al., 2020; Waserman et al., 2021). Nine allergens comprise 90% of allergic reactions, milk, eggs, fish, shellfish, tree nuts, peanuts, wheat, and soybeans (Beckstead et al., 2021; Renn et al., 2019). The ninth, sesame, was recently added by the Food Allergy Safety, Treatment, Education, and Research (FASTER) Act to the most common food allergy list (U.S Food & Drug Administration, 2023). Approximately 16-18% of children have experienced a food-allergic reaction while at school, and nearly 25% of all first-time reactions happen while a child is at school (Atkas et al., 2019; Beckstead et al., 2021; Canon et al., 2019; Chih-Yin et al., 2019; Dupuis et al., 2019; Hui et al., 2020; Kao et al., 2017).

Allergic conditions have reached epidemic levels, with 8% of U.S. children having a food allergy (Raptis et al., 2020; Lawlis et al., 2017). Children are at risk of food allergen exposure at school due to shared lunches, drinking containers, and utensils, as well as from school-prepared meals, food brought into class, and food-based projects (Girsch et al., 2020; Lawlis et al., 2017). Currently, no standardized food allergy protocols exist for schools (Chih-Yin et al., 2019; Dupuis et al., 2019; Greenhawt et al., 2020; Koa et al., 2017; Santos et al., 2022). The Americans with Disabilities Act of 1990 (ADA) includes students with food allergies and section 504 of the U.S. Rehabilitation Act of 1973 disallows discrimination against those with disabilities. The use of a 504 plan or an Individualized Health Care Plan can be used for food-allergic children to set up specific accommodations so that the student has equal access to education (Michigan Alliance for Families, n.d). These tools, however, are not school protocol, and the burden lies on the parent or caregiver to initiate (Greenhawt et al., 2020; Hui et al., 2020; Leroy et al., 2017; Wang et al., 2018; Waserman et al., 2021). Though some schools implement a protocol to help minimize exposure, like the allergen-free table, these tend to isolate and can cause bullying to the allergic child (Girsch et al., 2020; Rocheleau et al., 2020; Wang et al., 2017).

In 2013 the Centers for Disease Control (CDC) released the Voluntary Guidelines for Managing Food Allergies in Schools to help prevent and manage severe allergic reactions (CDC, 2022). There is limited study on the uptake of these guidelines, and they remain voluntary (Stukus, 2017). Elijah's Law was created and passed in New York in 2019 to protect children in early childcare by requiring the facilities to take concrete steps in managing food allergies with protocols, education, and prevention measures. Illinois and Virginia have also enacted Elijah's Law, with bills introduced in Pennsylvania and California (Child Care Policies for Food Allergy: Elijah's Law Report for the U.S. | AAFA.org, 2022b). The School Access to Emergency Epinephrine Act was signed into law on November 13, 2013. This law encourages states to require schools to supply a stock of epinephrine auto-injectors. This stock may be used on anyone suspected of anaphylactic distress (*Government Relations | School Access to Emergency Epinephrine Act,* n.d.). Twelve states thus far have signed legislation making this a mandate.

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Food allergy management in schools is multidisciplinary involving parents, school food service providers, school nurses, teachers, food manufacturers, and more (Sauer et al., 2018). Educational sessions for school teachers and staff can provide another layer of safety for children with food allergies. A multidisciplinary training program can improve teachers' self-efficacy in managing students with food allergies (Canon et al., 2019; Polloni et al., 2020). An Epinephrine auto-injector is the only proven treatment for anaphylaxis, yet it is often not used as the first response (Chih-Yin et al., 2019; Hogue et al., 2017; Pham et al., 2019). The delay in the use of epinephrine is the main factor in severe or fatal food allergy outcomes in the school setting (Wang et al., 2018). Allergen avoidance is the main prevention tool. This includes reading ingredient labels and taking measures so that no cross-contact occurs. With the continued increase in the prevalence of food allergies, there is an increase in the need for policies and training, including in the school setting (Pham et al., 2019).

The literature indicates that there is a gap in knowledge, attitude, and beliefs about food allergies in school-aged children. To establish a safer, more welcoming learning environment for kids with food allergies, the current study evaluated a sample of kindergarten through fourth-grade teachers' knowledge, attitudes, and beliefs regarding food allergies, which also found a gap. Future training for teachers, food service, school administrators, along with policy change in Michigan may be guided by the findings.

METHODOLOGY

A cross-sectional online survey was sent to 77 elementary school principals from 20 school districts. The survey was distributed to K-4th grade teachers.

Research Questions

What is the knowledge level of food allergic anaphylaxis signs, symptoms, and management among schoolteachers? What are teachers' attitudes and beliefs regarding food allergies among food allergic children?

Research Approval

All study protocols were reviewed and approved by the first author's university's Institutional Review Board (IRB), study number 23-119-H.

Sample and Recruitment

Kindergarten through fourth-grade teachers in Kent County, Michigan were the intended sample. The Kent County Intermediate School District (Kent ISD) provides instructional services to 20 different school districts. A directory of 77 elementary school principals was obtained from the Kent ISD public website (Kent Intermediate School District, 2023). Recruitment materials were emailed in January 2023 to the 77 elementary school principals inviting their teachers to participate in the online survey addressing food allergies. Inclusion criteria included currently teaching kindergarten through fourth grade. A reminder email was sent one week later. An amendment was submitted and accepted by the IRB for data collection extension due to low participation. Data collection took place for a total of three weeks closing on February 7, 2023. As an incentive for participating, 16 gift cards worth $25 each from Amazon were awarded to those who elect to be included in the random drawing. Four names were drawn with Random.org on four consecutive days as per the lottery law in Michigan.

Instrument

The authors used a 44-question survey which was replicated and adapted from previously validated measures within the *Chicago Food Allergy Research Survey* (Gupta et al., 2009). The first question of the survey provided consent to participate in the study. The survey consisted of four demographic questions, 19 food allergy knowledge questions (Gupta et al., 2009), 15 food allergy attitudes and beliefs (Gupta et al., 2009), and four background questions. The knowledge-based questions consisted of 16 true or false, three multiple-choice, and were divided into six domains as per the Gupta et al. survey. These domains consist of definition and diagnosis, symptoms and severity, triggers and environmental risks, perceptions of susceptibility and prevalence, treatment and use of healthcare, and policy. Attitudes and beliefs questions were answered using a 5-point Likert scale and were broken down into four domains, stigma and acceptability, perceptions of quality of life, treatment and use of health care, and policy issues. The final question asked the participants if they would like to be entered into the incentive drawing.

Upon selecting the link, the participant was forwarded to the consent form in Qualtrics, which would then forward the participant to the food allergy knowledge, attitudes and beliefs survey that took approximately 5-10 minutes to complete. Data collection was conducted for a total of three weeks.

Data Analysis

Data was exported from Qualtrics into MS Excel for data cleaning and analysis. Descriptive analysis was conducted for demographic variables and overall knowledge scores. Knowledge scores were calculated based on the percentage of true or false knowledge items (n =16) answered correctly. Frequencies were conducted for the attitudes and beliefs variables using SPSS version 27.

RESULTS AND DISCUSSION

Demographic

A total of 52 teachers from 77 elementary schools contacted within the 20 school districts accessed the survey and 42 respondents provided consent and completed all questions (*N*=42) (Table 1). For anonymity, the building and school district of the respondents were not collected. The majority of teachers were female 95.2% (*n* = 40). Over half 57.1% (*n* = 24) had sixteen plus years of teaching experience and 50% (*n* = 21) were in the 45-65 age range. Table 1 summarizes the full demographics of the study.

Table 1. *Demographic Characteristics of the Sample Population (N = 42)*

Characteristic	n (%) of the Sample
Age Group	
18–24	2 (4.8)
25–44	18 (42.8)
45–65	21 (50.0)
65+	1 (2.4)
Sex	
Male	1 (2.4)
Female	40 (95.2)
Prefer not to say	1 (2.4)
Years Taught	
1–5	6 (14.3)
6–10	10 (23.8)
11–15	2 (4.8)
16+	24 (57.1)

Food Allergy Background

For the initial question, "Do you know anyone with a food allergy?" of the 42 teachers who responded, 95% (*n* = 39) responded yes. Subsequent response rates may vary based on their experience with food allergies outside of

the school setting. Currently having a diagnosed food-allergic child in the classroom was reported by 36 % (*n* =15) of teachers. Worksite training was provided for 24% (*n* = 10) of teachers, with 64% (*n* = 27) that reported "no", and 12% (*n* = 5) answering "unsure."

Table 2. *Teachers Scores of the Knowledge True or False Questions (N= 42)*

Question	% answered correctly
Definition and diagnosis	
An allergic reaction can happen when the body considers a food to be harmful. (T)	90.0
Lactose intolerance (trouble digesting dairy products) is the same as having a milk allergy. (F)	79.0
Symptoms and severity	
A person can die from having a food allergy reaction. (T)	100.0
Hives (red bumps or blotches on the skin that can be itchy) are a common symptom of a food allergy reaction. (T)	98.0
Triggers and risk	
People with food allergies can have an allergic reaction after touching food. (T)	95.0
A person with a milk allergy can still drink low-fat milk without having an allergic reaction. (F)	64.0
Foods eaten by a mother can be passed to her child through her breast milk. (T)	98.0
Acidic food (like lemons, oranges, and tomatoes) commonly causes food allergy. (F)	31.0

Note: T (true), F (false) represent the correct answer to each question

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Table 2. *Teachers Scores of the Knowledge True or False Questions (N= 42)*

Question	% answered correctly
Perceptions of susceptibility and prevalence	
Allergic conditions run in families. (T)	50.0
Food allergies can go away as a person gets older. (T)	79.0
Food allergy is more common in children than adults. (T)	62.0
The number of children in the United States who have a food allergy has been increasing over the past ten years. (T)	90.0
Treatment and use of healthcare	
There is a cure for food allergy. (F)	69.0
The only way to prevent an allergic reaction is to stay away from the food that causes the allergy. (T)	69.0
A person can take medicine every day to prevent having food allergy reactions. (F)	55.0
Policy	
There is a law in the United States that requires all foods to be labeled with allergy information. (T)	86.0

Note: T (true), F (false) represent the correct answer to each question

Knowledge of Food Allergy

Overall, 76% of the 16 true or false knowledge-based questions were answered correctly. For analysis due to lack of time, we did not score the three multiple-choice questions. Itemized scores are detailed in Table 2. Scores by domain are summarized as follows.

Definition and diagnosis. On average, teachers correctly answered 85% of questions regarding the definition and diagnosis of food allergy.

Symptoms and severity. On average, teachers correctly answered 99% of questions regarding symptoms and severity. This domain showed the strongest knowledge. This could be due to knowing somebody with a food allergy, or from teaching 16+ years.

Triggers and environmental risk. On average, teachers correctly answered 72% of questions regarding triggers and environmental risk.

Perceptions of susceptibility and prevalence. Teachers correctly answered 70% of questions regarding perceptions of susceptibility and prevalence of food allergy.

Treatment and use of health care. Knowledge in this domain was weakest. On average, teachers correctly answered 64% of questions regarding food allergy treatment and use of health care. This was similar to the Gupta et al., 2009 study of the general public (Gupta et al., 2009).

Policy issue. The only question in this domain made it the smallest. Most of the teachers, 86%, were aware that there is a law in the United States requiring all foods to be labeled with information regarding potential allergens.

Food Allergy Attitudes and Belief

Perceptions regarding food allergies were answered across a 5-point Likert scale, ranging from strongly agree to strongly disagree. Of the teachers (*N*=42) who completed the food allergy attitudes and belief section of the survey, 45% (*n* =19) believe people with food allergies are treated differently, 7% (*n* = 3) believe children with food allergies are teased at school, and 71% (*n* = 30) feel schools should have a special table for food allergic children to eat in the lunchroom, which can cause stigma, isolation and bullying (Rocheleau et al., 2020). If a child could not eat their peanut butter sandwich due to somebody's allergy, 35% (*n* = 15) of teachers felt that would be unfair. Table 3 provides a summary.

Table 3. *Teachers Attitudes and Beliefs Regarding Food Allergies (N= 42)*

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
Stigma and acceptability					
Food allergy (FA) is a serious health problem in the US	10 (23.8)	22 (52.4)	8 (19)	0	2 (4.8)
FA people are treated differently	2 (4.8)	17 (40.5)	9 (21.4)	2 (4.8)	12 (28.6)
Children with FA have overprotective parents	1 (2.4)	9 (21.4)	10 (23.8)	11 (26.2)	11 (26.2)
Children with FA are teased at school	0	3 (7.1)	11(26.2)	20 (47.6)	8 (19)

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Table 3. *Teachers Attitudes and Beliefs Regarding Food Allergies (N= 42)*

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
	n (%)	n (%)	n (%)	n (%)	n (%)
Perception of quality of life					
Staying away from a known food allergen is difficult	5 (11.9)	23 (54.8)	10 (23.8)	3 (7.1)	1 (2.4)
People with FA worry a lot about their allergy	4 (9.5)	23 (54.8)	10 (23.8)	4 (9.5)	1 (2.4)
It is difficult for FA people to safely eat at restaurant	7 (16.7)	26 (61.9)	3 (7.1)	6 (14.3)	0
Treatment					
Having an EPI pen is important for most children with severe food allergies	28 (66.7)	10 (23.8)	0	1 (2.4)	3 (7.1)
Policy					
Schools should have plans for keeping FA children safe at school	28 (66.7)	11 (26.2)	0	1 (2.4)	2 (4.8)
Schools should ban all products with nuts	4 (9.5)	3 (7.1)	10 (23.8)	23 (54.8)	2 (4.8)
Schools should have special tables for FA children in the lunchroom	9 (21.4)	21 (50)	8 (19.0)	2 (4.8)	2 (4.8)
It would be unfair if a child could not eat their peanut butter sandwich	2 (4.8)	13 (31)	9 (21.4)	9 (21.4)	9 (21.4)

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DISCUSSION

Approximately 8% of children in the United States have a food allergy to one or more foods, that is approximately two students in every school classroom (Raptis et al., 2020; Lawlis et al., 2017). Elijah's Law requires training and protocol of food allergy management in early childcare centers and has passed in New York, Virginia, and Illinois which added all schools to their version (Child Care Policies for Food Allergy: Elijah's Law Report for the U.S. | AAFA.org, 2022b). Michigan has not yet passed the bill and does not have a required training or protocol for K-12 schools (Child Care Policies for Food Allergy: Elijah's Law Report for the U.S. | AAFA.org, 2022b). The CDC released the Voluntary Guidelines for Managing Food Allergies in Schools to help prevent and manage severe allergic reactions (CDC, 2022). There is limited study on the uptake of these guidelines, and they remain voluntary for many school districts (Stukus, 2017). The School Access to Emergency Epinephrine Act was signed into law in 2013 encouraging states to require schools to supply undesignated stock epinephrine (Government Relations | School Access to Emergency Epinephrine Act, n.d.). Only twelve states have passed this into law so far, Michigan is one of them. Research into the use of this stock is limited. Studies show that 16% to 18% of children with food allergies have experienced an allergic reaction while at school, with 25% of all first-time reactions happening in the school setting (Wang et al., 2018). The current study explored food allergy knowledge, attitudes, and beliefs among kindergarten through fourth-grade teachers in a large county in the state of Michigan. Of the 42 teachers, 95% reported knowing somebody with a food allergy, 36% reported currently having a food allergic child enrolled in their classroom, and 76% reported not having received worksite training regarding food allergies. Findings show teachers have a range of knowledge depending on the domain (Table 2). This creates a barrier to care. Epinephrine should be given immediately after allergen exposure, yet it is often not used as the first response (Chih-Yin et al., 2019; Hogue et al., 2017; Pham et al., 2019). The teachers' attitudes and beliefs about food allergies were also well distributed between agree and disagree, underestimating the challenges food allergic children face. Prior studies have shown that families of children with food allergies have lower quality of life and avoid certain activities due to food allergies as well as experience more anxiety and worry (Dupuis et al., 2019; Bollinger et al., 2006). Although most agreed, 76%, (n=32), that food allergies are a serious problem in the United States, 45% (n=19) did not agree that food allergic children were teased at school or are treated differently, similar findings to the 2009 Gupta et al. study on the general public. A study reported that around 31% of food allergic children experience bullying in school. This leads to an increase in anxiety and a poorer quality of life for these students. (Shemesh et al., 2017; Wang et al., 2018).

Deficiencies in knowledge and attitudes among schoolteachers when addressing food allergies are associated with barriers to care (Canon et al., 2019). A multidisciplinary training program can improve teachers', administrators', and foodservice self-efficacy in managing students with food allergies (Polloni et al., 2020). Though some schools implement a protocol to help minimize exposure, like the allergen-free table or peanut-free building, these tend to isolate and can cause bullying to the allergic child, and there remains a lack of evidence surrounding the benefit or harm (Girsch et al., 2020; Rocheleau et al., 2020; Stukus, 2017). Food allergy is a disability as established in the ADA (Greenhawt et al., 2020; Hui et al., 2020; Leroy et al., 2017; Waserman et al., 2021). Children may hold a 504 plan or an Individualized Health Care Plan, but the burden of initiating these

tools relies on the parents or caregivers and is not required by school protocol (Greenhawt et al., 2020; Hui et al., 2020; Leroy et al., 2017; Waserman et al., 2021).

The higher knowledge scores in this study may have been influenced by previous knowledge outside of the school setting with 95% of teachers knowing somebody with a food allergy, and 76% reporting not having received worksite training. Attitudes and beliefs may have been fostered by old remedies schools have used such as the peanut-free table in the lunchroom (Chan et al., 2020). School protocols usually enact peanuts as the allergen to avoid, when milk and egg are also very common allergens for children. Without updated and mandated training and protocol, these old beliefs about food allergies are ambiguous. Studies have shown that children with food allergies are more anxious than those needing insulin for a diabetes diagnosis (Diwakar et al., 2017). Instead of focusing on allergen-free solutions, perhaps the focus should remain on increasing awareness and education to better manage food allergies in schools (Stukus, 2017).

This study is not without limitations. The survey was distributed to 77 elementary school principals, within 20 school districts to be distributed to their kindergarten through fourth-grade teachers. Participation was lower than desired, having five grades per 77 buildings, some with more than one classroom per grade. The time of year could have been a factor as classes were returning from holiday break, and Martin Luther King Jr. Day fell in this time frame when schools were closed. However, it parallels survey attempts for other food allergy audiences (Cannon et al., 2019). Some school principals needed approval from their administrators before forwarding, which also delayed recruitment. An additional limitation to the study is the lack of knowing the number of teachers per building and from which school district they were from. The building and district information were not collected from the respondents to keep anonymity.

Based on this study, the researchers recommend the following future research. More research needs to be done to understand the social impact on children with food allergies in schools. Evaluation of the food allergy training in states mandating or requiring training can help to provide evidence of efficacy as well. Furthermore, a study comparing the number of anaphylactic reactions in schools between states with and without Elijah's Law could also provide evidence of policy need. To move policy along in Michigan, a statewide study can be done to survey if any school district in the state has a food allergy policy already in place.

CONCLUSION AND APPLICATION

The literature has identified knowledge gaps within school personnel in recognizing and managing food-allergic reactions (Canon et al., 2019; Chih-Yin et al., 2019; Dupuis et al., 2019; Hui et al., 2020; Pham et al., 2019; Santos et al., 2022). Our research also identified gaps in knowledge as well as a disproportionate average of attitudes and beliefs. This study also shows a gap in schools providing worksite training to teachers regarding food allergies. Without training or protocol, parents typically provide the school and teachers with information regarding how to manage their child's food allergy, which may not reach food service or other personnel like recess monitors or administration. All school staff should be required yearly food allergy training that covers the use of epinephrine as well as focuses on the risks and burdens that food-allergic children face.

Opportunities revolve around the knowledge gaps about food allergies in schools (Sauer et al., 2018). Annual training should be conducted, and it should be reviewed following an allergic reaction to assess how people responded and pinpoint improvement opportunities (Wang et al., 2018). The goal of school nutrition programs is to provide all students with wholesome, secure meals, but the presence of students with special dietary requirements emphasizes the significance of assessing best practices for managing food allergies and the obstacles standing in their way. (Sauer et al., 2018).

Teachers and all school staff need to be more informed on food allergies, particularly about treatment and use of healthcare. Additionally, heightened awareness regarding the difficulties faced by children with food allergies may help gain support for uniformed school policies. Federal, state, and local policymakers should work together to make allergy management and training mandatory in every school. These initiatives are essential for safeguarding young children with food allergies and preventing mental health issues, catastrophic illness, and death.

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