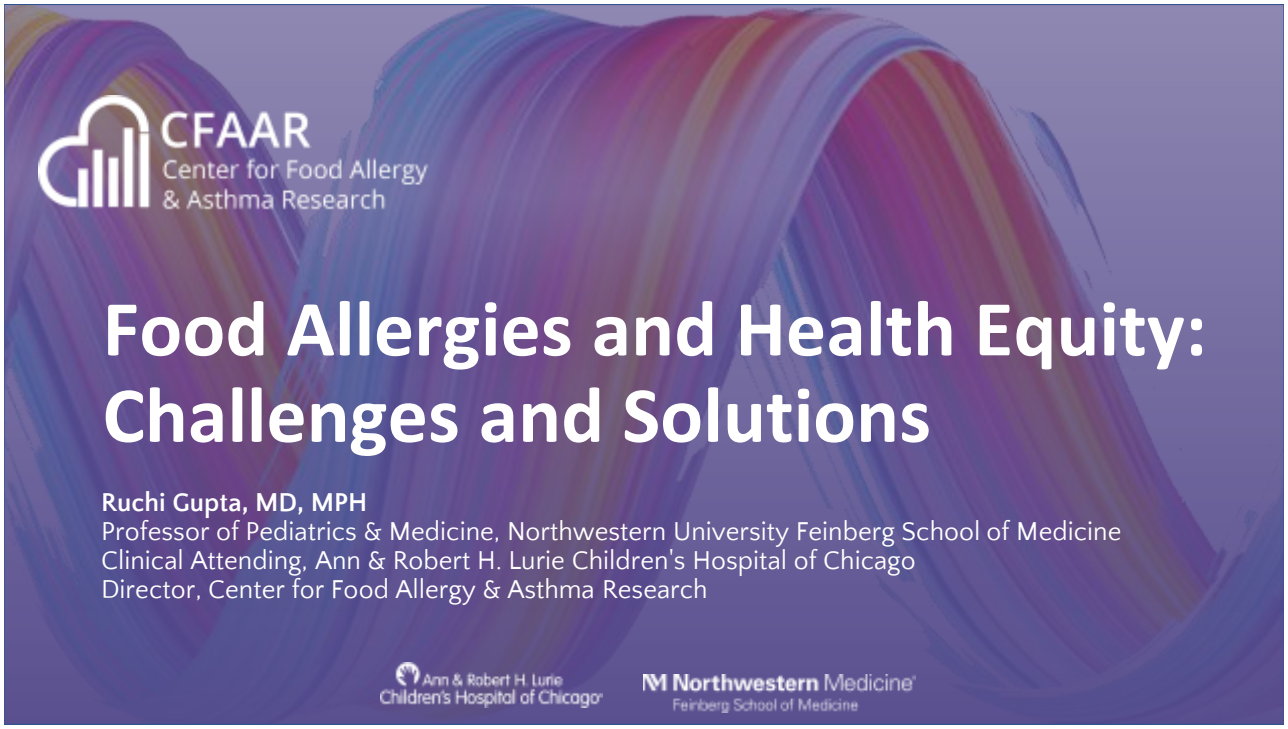

1

Disclosures

- Honorarium provided for this talk by Nutricia
- Research support provided by: National Institutes of Health (NIH), Food Allergy Research & Education (FARE), Melchiorre Family Foundation, Sunshine Charitable Foundation, Novartis, Genentech
- Medical Consultant/Advisor for: Genentech, Novartis, Food Allergy Research & Education (FARE), OWYN™, Kaléo®, Aquestive® Therapeutics, Bryn Pharma
- Ownership Interest: Yobee® Care, Inc.

The opinions reflected in this presentation are those of the speaker and independent of Nutricia North America and the speaker's employer

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Learning Objectives

1. Understand racial disparities in food allergies.
2. Assess access to allergy care.
3. Discuss the importance of epinephrine in managing severe allergic reactions and strategies to improve its use.
4. Identify strategies to address and reduce racial disparities in food allergy diagnosis and treatment.

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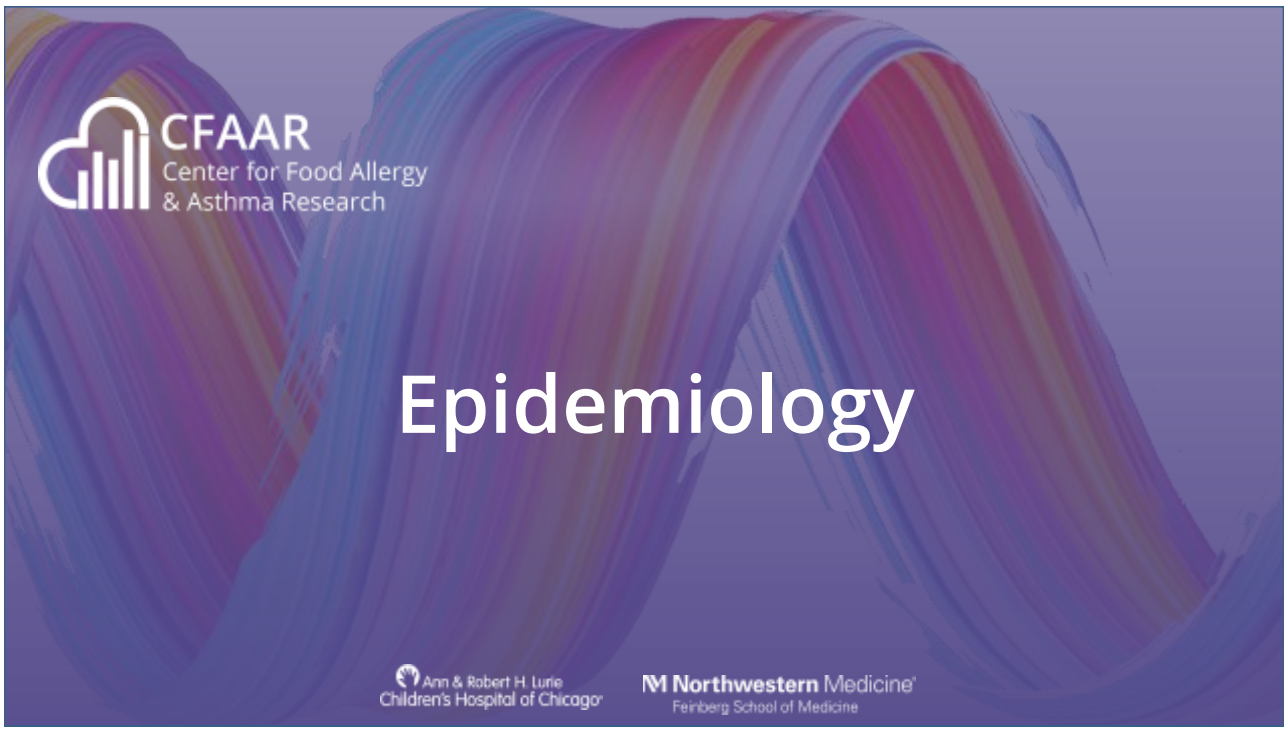
3



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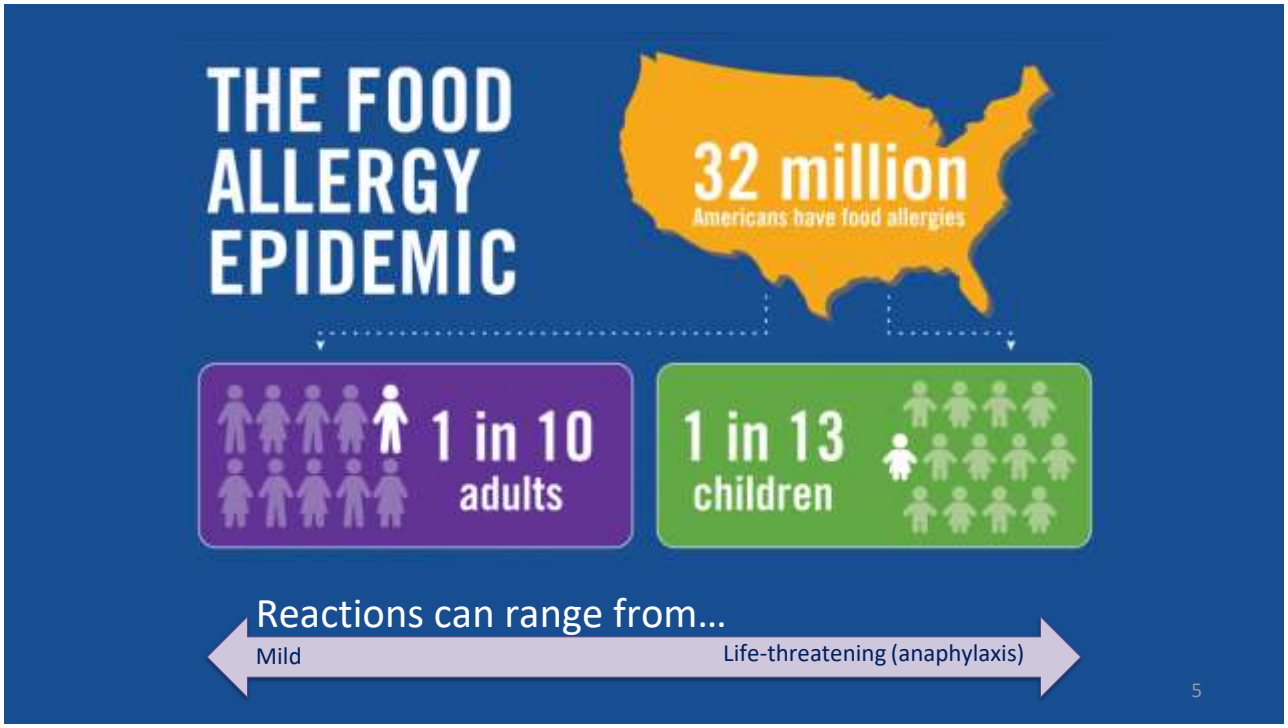

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The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States

Ruchi S Gupta , Christopher M Warren, Bridget M Smith, Jesse A Blumenstock , Jialing Jiang , Matthew M Davis, Kari C Nadeau
Pediatrics. 2019 Mar;143(3):e20183835. doi: 10.1542/peds.2018-3835.PMID: 30819972

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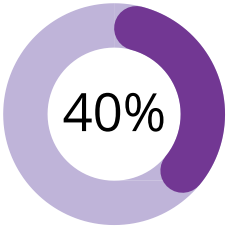
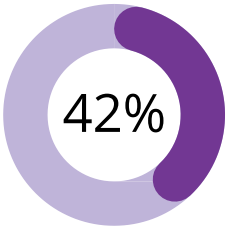
Childhood Food Allergy Prevalence in the U.S.

8% of US Children have a food allergy

~ 2 kids per classroom



are allergic to multiple foods



have experienced a severe reaction

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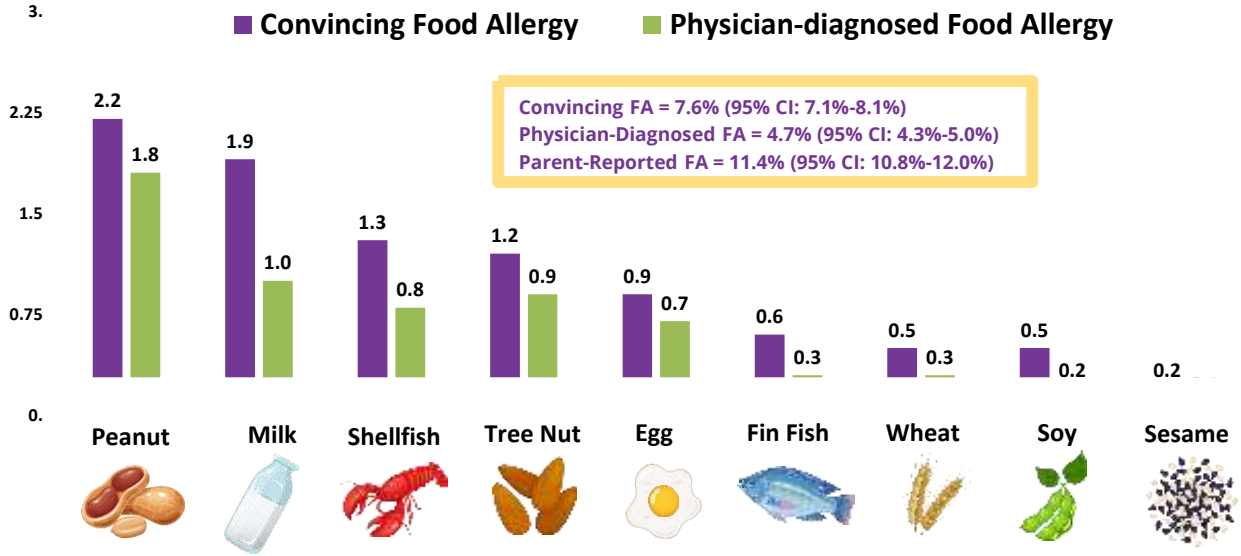
Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

7

Childhood Food Allergy Prevalence in the U.S.



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Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent- Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

8

Food Allergen Prevalence by Age

	Peanut	Tree Nut	Milk	Shellfish	Egg	Fin Fish	Wheat	Soy	Sesame
<1 Year	20.2%	9.0%	53.0%	7.1%	13.5%	2.6%	14.9%	15.4%	4.6%
1 Y	24.6%	8.0%	37.8%	5.1%	22.8%	6.4%	6.0%	16.6%	4.9%
2 Y	24.5%	10.9%	43.5%	11.5%	14.1%	6.0%	9.9%	8.6%	2.3%
3-5 Y	25.1%	15.9%	33.6%	13.0%	15.0%	6.2%	6.6%	6.9%	2.7%
6-10 Y	32.8%	17.6%	24.4%	18.4%	10.8%	7.8%	6.4%	6.5%	3.3%
11-13 Y	30.5%	21.3%	14.9%	20.2%	12.8%	7.1%	6.2%	3.6%	1.8%
>14 Y	29.5%	13.3%	16.0%	21.3%	6.6%	7.9%	5.4%	3.0%	2.1%

Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

9

Patterns of Convincing Multi-Food Allergy Among US Children

	Peanut	Tree Nut	Sesame	Milk	Egg	Fin Fish	Shellfish	Soy	Wheat
Peanut	100	61	55	15	29	38	25	33	22
Tree Nut	33	100	44	9	18	24	14	24	18
Sesame	5	8	100	3	6	9	5	11	13
Milk	13	15	23	100	35	15	11	37	43
Egg	12	13	26	17	100	20	11	25	21
Fin Fish	9	11	23	4	12	100	24	14	12
Shellfish	15	15	31	7	16	57	100	20	21
Soy	7	10	26	9	13	12	7	100	26
Wheat	5	8	31	11	12	11	8	27	100

(% of children with convincing column allergy who are also allergic to the row allergen)

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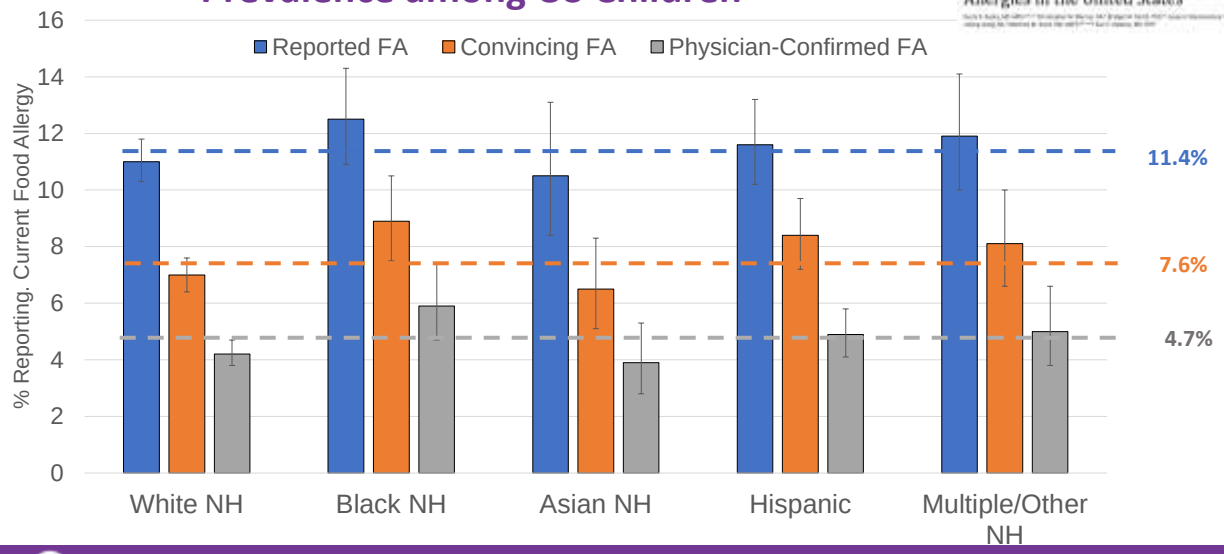
Warren CM, Aktas ON, Manalo LJ, Bartell TR, Gupta RS. The epidemiology of multifood allergy in the United States: A population-based study. Annals of Allergy, Asthma & Immunology. 2023 May 1;130(5):637-48.

10

Racial and Ethnic Differences in Current Food Allergy Prevalence among US Children

PEDIATRICS
The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States



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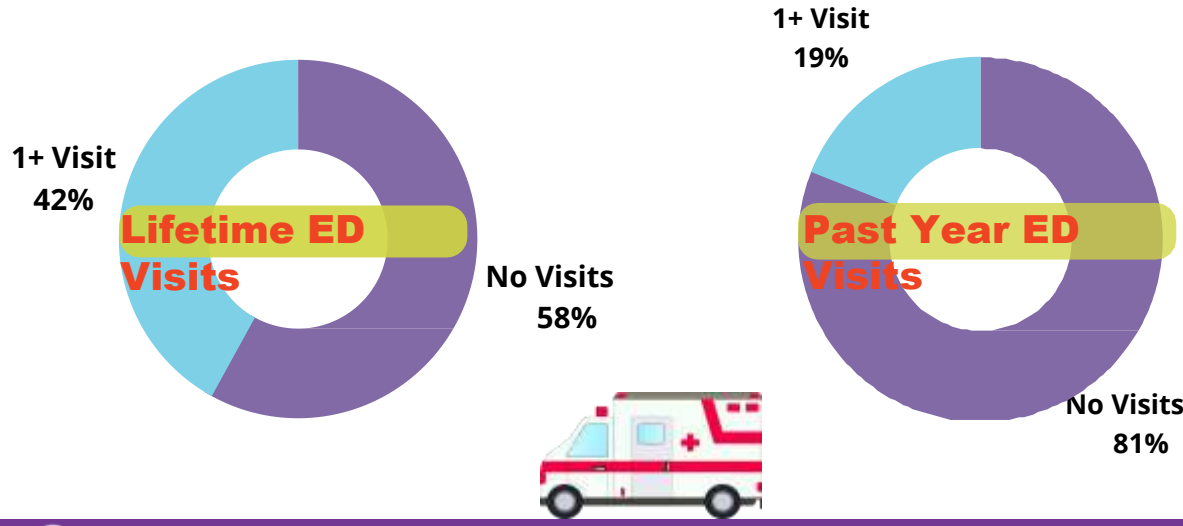
Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

11

Pediatric FA Emergency Department Visits



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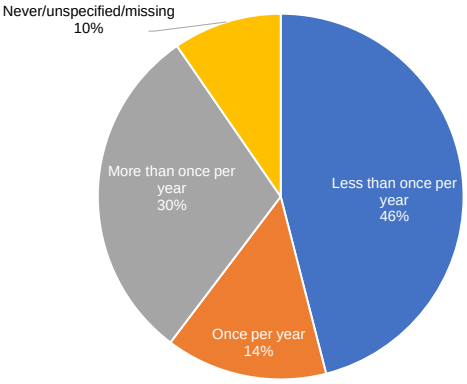
Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent- Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

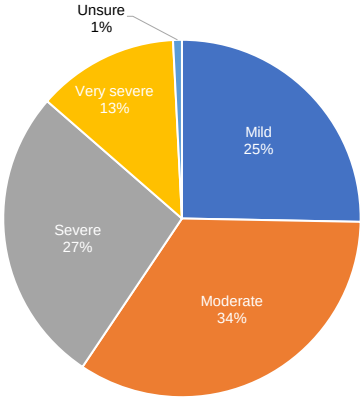
12

Parent-Reported Reaction History

National Patient Registry



Average Number of Reactions



Perceived Severity of Most Recent Reaction

CFAAR Center for Food Allergy & Asthma Research

Fierstein, J. L., Brown, D., Gupta, R., & Bilaver, L. (2021). Understanding Food-Related Allergic Reactions Through a US National Patient Registry. The Journal of Allergy and Clinical Immunology: In Practice, 9(1), 206-21

13

Pediatric Atopic Comorbidities

Rates of physician-diagnosed atopic conditions were **significantly higher among children with convincing FA** compared with other children

Physician Diagnosed Comorbid Conditions	All Children	Children with FA	P-Value
Asthma	12.2 (11.4–13.0)	**32.6 (29.5–35.9)***	<.001*
Atopic Dermatitis	5.9 (5.3–6.5)*	**14.9 (12.5–17.7)***	<.001*
Eosinophilic Esophagitis (EoE)	0.2 (0.10-0.2)*	**0.7 (0.4–1.1)***	<.001*
Allergic Rhinitis	12.8 (12.0–13.6)*	**30.4 (27.6–33.4)***	<.001*
Other Chronic Condition	4.2 (3.7–4.7)*	**10.1 (8.2–12.3)***	<.001*

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Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

14

Prevalence and Severity of Food Allergies Among US Adults

Ruchi S Gupta, Christopher M Warren, Bridget M Smith, Jialing Jiang, Jesse A Blumenstock, Matthew M Davis, Robert P Schleimer, Kari C Nadeau

JAMA Network OPEN. 2019 Jan 4;2(1):e185630. doi: 10.1001/jamanetworkopen.2018.5630.

Gupta RS, Warren CM, Smith BM, Jiang J, Blumenstock JA, Davis MM, et al. Prevalence and Severity of Food Allergies Among US Adults. JAMA Netw Open. 2019 Jan 4;2(1):e185630. PMID: 30646188

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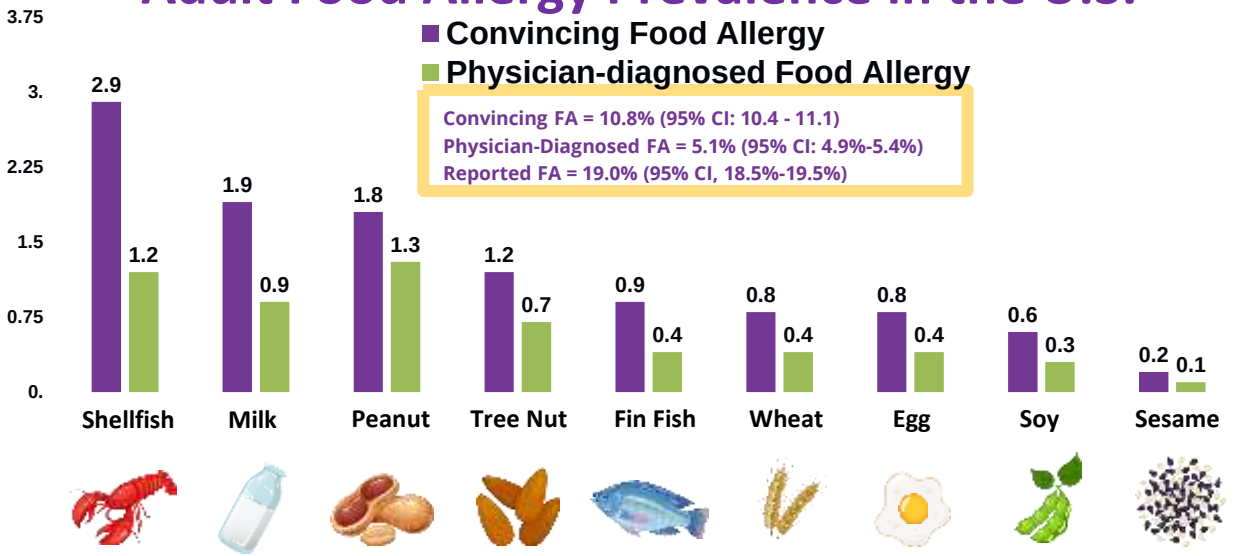
15

Adult Food Allergy Prevalence in the U.S.



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Gupta RS, Warren CM, Smith BM, Jiang J, Blumenstock JA, Davis MM, Schleimer RP, Nadeau KC. Prevalence and Severity of Food Allergies Among US Adults. JAMA Network Open. 2019;2(1):e185630.

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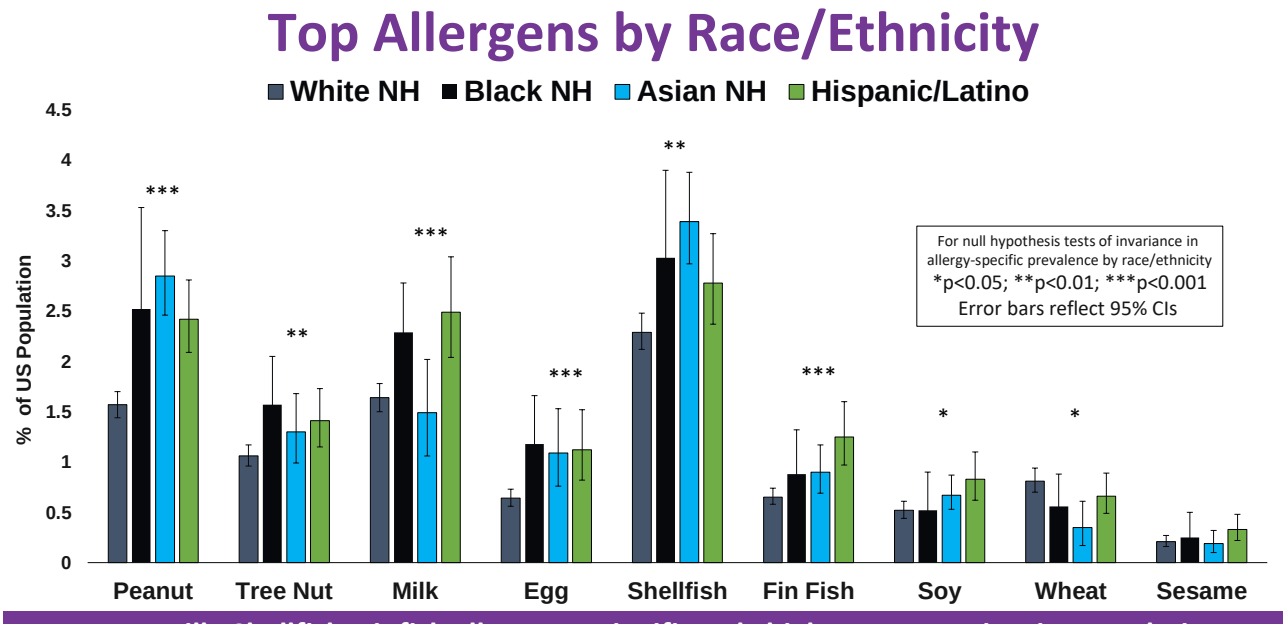
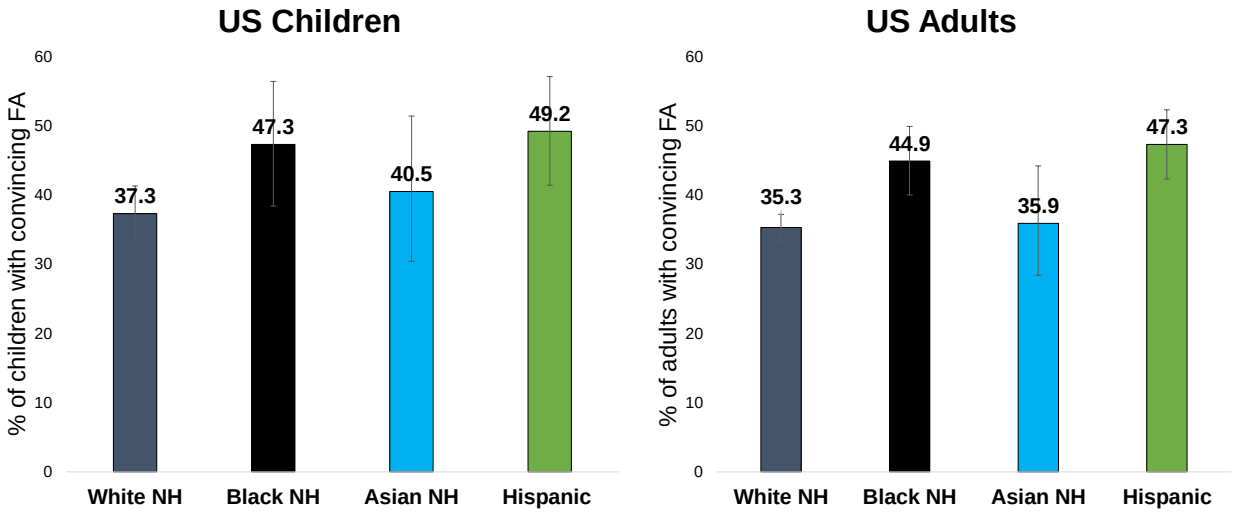


Peanut, Milk, Shellfish, Finfish allergy are significantly higher among minority populations compared to White Americans

Gupta RS, Warren CM, Smith B, Jiang J, Blumenstock J, Davis MM, Schleimer R, Nadeau K. Estimates of the Distribution, Determinants, and Severity of Food Allergies Among US Adults. *JAMA Network OPEN* 2019. Jan 4;2(1):e185630.

18

Lifetime FA-related Emergency Department Visits Higher in Black and Hispanic Populations

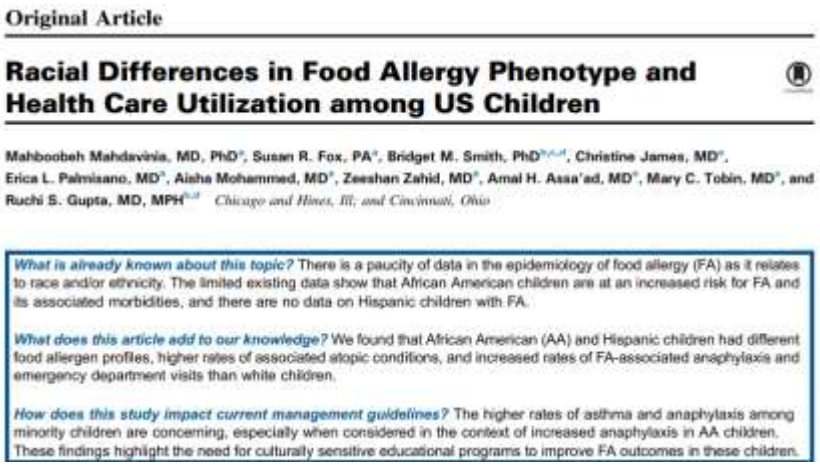


Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

Gupta RS, Warren CM, Smith BM, Jiang J, Blumenstock JA, Davis MM, Schleimer RP, Nadeau KC. Prevalence and Severity of Food Allergies Among US Adults. JAMA Network Open. 2019;2(1):e185630.

19

Retrospective Analysis Uncovers Pronounced Racial Differences in Food Allergy Phenotype and Health Care Utilization



Original Article

Racial Differences in Food Allergy Phenotype and Health Care Utilization among US Children

Mahboobeh Mahdavinia, MD, PhD[a], Susan R. Fox, PA[a], Bridget M. Smith, PhD[b,c,d], Christine James, MD[a], Erica L. Palmisano, MD[a], Aisha Mohammed, MD[a], Zeeshan Zahid, MD[a], Amal H. Asaa'ad, MD[a], Mary C. Tobin, MD[a], and Ruchi S. Gupta, MD, MPH[b,d]

Chicago and Hines, Ill; and Cincinnati, Ohio

What is already known about this topic? There is a paucity of data in the epidemiology of food allergy (FA) as it relates to race and/or ethnicity. The limited existing data show that African American children are at an increased risk for FA and its associated morbidities, and there are no data on Hispanic children with FA.

What does this article add to our knowledge? We found that African American (AA) and Hispanic children had different food allergen profiles, higher rates of associated atopic conditions, and increased rates of FA-associated anaphylaxis and emergency department visits than white children.

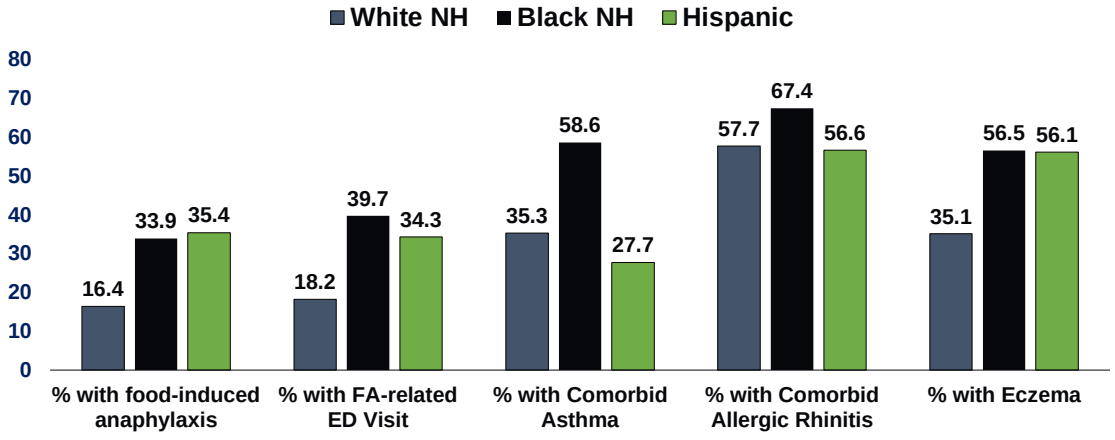
How does this study impact current management guidelines? The higher rates of asthma and anaphylaxis among minority children are concerning, especially when considered in the context of increased anaphylaxis in AA children. These findings highlight the need for culturally sensitive educational programs to improve FA outcomes in these children.

- **Multi-center, retrospective cohort study of children aged 0-17 years with FA seen in allergy/immunology clinics at 2 US urban tertiary care centers**
- **N=817: 35% Black, 12% Hispanic, 53% non-Hispanic white**

Mahdavinia M, et al. (2017). "Racial Differences in Food Allergy Phenotype and Health Care Utilization among US Children." J Allergy Clin Immunol Pract 5(2): 352-357 e351.

20

Racial Differences in Food Allergy Phenotype and Health Care Utilization



Mahdavinia M, et al. (2017). "Racial Differences in Food Allergy Phenotype and Health Care Utilization among US Children." J Allergy Clin Immunol Pract 5(2): 352-357 e351.

21

FORWARD

- Original 5-year, multi-site, NIH/NIAID funded R01 study (R01 ID #AI130348) to examine food allergies in White, Black, and Hispanic/Latinx populations
- Clinical EMR data extraction, quarterly surveys, biospecimen collection
- **Goal: Understand differences in food allergy phenotypes/endotypes, diagnosis, management, quality of life by race/ethnicity in order to improve equitable care**



22

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Prevention

Ann & Robert H. Lurie Children's Hospital of Chicago
Northwestern Medicine
Feinberg School of Medicine

23

iREACH: NIH/NIAID U01AI138907

Goal:

To improve pediatric clinician adherence to the early introduction guidelines to ultimately reduce peanut allergy incidence

Details:

- Practice-based, randomized controlled trial in Illinois
- Study Period: Five Years 7/1/2019 - 6/30/2024

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Study Aims

Primary Aim:

To determine the effectiveness of the iREACH intervention in increasing pediatric clinician adherence to the PPA Guidelines.

Secondary Aim:

To determine the effectiveness of iREACH intervention in decreasing the incidence of peanut allergy in children by age 2.5 years old.

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25

Clinician Training Modules

Training video summarizes the guidelines, a clinical decision support tool, and classifications of eczema

CME & MOC opportunities were offered to iREACH participants to encourage participation

CFAAR https://feinberg.northwestern.edu/sites/cfaar/resources/video-library.html#IREACH

26

Atopic Derm Scorecard

Scorecard to assist physicians in classifying eczema severity in diverse skin tones

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Infant Atopic Dermatitis Severity Scorecard

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27

Intervention in Well Child Care (WCC): Clinical Decision Support (CDS) Tool

What is the iREACH intervention?

An EHR-integrated CDS tool embedded in:

- 4- and 6-month WCC templates to support pediatrician decision-making.
- 9- month WCC templates to ask parents about inclusion of peanut products in their child's diet.

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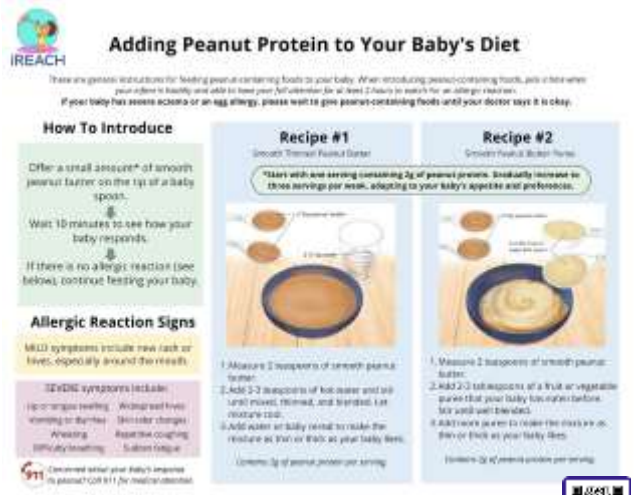
Intervention in 4- and 6-month WCC Visit: Parent-Caregiver Handout



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New Parent Solid Food And Peanut Introduction

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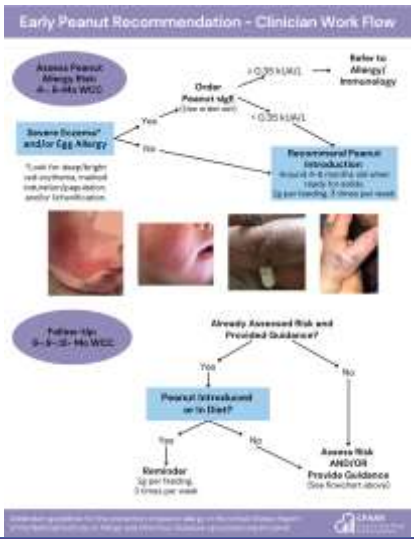
Clinic Resources



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Prevent Peanut Allergy in your Baby – English and Spanish

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Early Peanut Recommendation Clinician Work Flow

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30

Results: Low Risk Infants

- Pediatric clinician adherence to the guidelines:
  - **80% of infants in intervention arm**
  - **26% of infants in control arm**

- Adjusted odds ratio for training and CDS tools increasing pediatric clinician adherence to guidelines:
  - **Low risk infants: 22.1 (p<0.001)**

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Results: High Risk Infants

- Pediatric clinician adherence to the guidelines:
  - **17% of infants in intervention arm**
  - **8% of infants in control arm**

- Adjusted odd ratio for training and CDS tools increasing pediatric clinician adherence to guidelines:
  - **High risk infants: 3.7 (p=0.0256)**

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32

Results: High Risk Infants

	Intervention	Control
Received Correct Recommendation (s)	17 %	8 %
Referred to Allergy	9.8 %	8 %
Ordered peanut sIgE	6.8 %	0 %
Both referral and sIgE	0.4 %	0 %
Recommended peanut introduction	69 %	49 %
Received any recommendation (s)	86 %	57 %
No recommendation (s)	14 %	43 %

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Conclusions

- Training was effective in **improving knowledge** of the PPA guidelines
- The intervention was effective in **increasing pediatric clinician adherence** to the PPA guidelines
- Future analyses will measure effectiveness of the intervention in reducing peanut allergy incidence by 2.5 years of age

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34

National Food Allergy Caregiver Survey

Objective:
- To understand current parent/caregiver attitudes, beliefs, and behaviors regarding introduction of key allergenic solids during infancy

- **Methods:**
- Surveyed nationally representative sample of caregivers of children aged 7 months to 3.5 years old
- Interviews conducted in English & Spanish via web and phone
- 3,062 interviews completed between January 21 and February 15, 2021

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Warren CM. Samady W; Nimmagadda S; Venter C; Jiang J; Zaslavsky J; Ibrahim K; Vincent E; Gupta RS. Knowledge, Attitudes and Behaviors Regarding Peanut Protein Introduction During Infancy—a US population-based survey of parents/caregivers. Presented at 2022 Meeting of the Pediatric Academic Societies

35

Demographics

N=3,062

Predominately 30-44 year old caregivers
- 49.4% White NH
- 27.9% Hispanic/Latino
- 13.9% Black
- High school graduate
- Annual income <$30,000

Of all respondents, **328** had a child with eczema

	All Respondents N (%)
Race/Ethnicity	
White, NH	1513 (49.4)
Black, NH	425 (13.9)
Other, NH	44 (1.4)
Hispanic	855 (27.9)
2+, NH	96 (3.1)
Asian, NH	128 (4.2)
Education level	
<High School	442 (14.4)
High School Grad	863 (28.2)
Vocational Tech School	751 (24.5)
Bachelor's Degree	611 (19.9)
Postgraduate/Professional	395 (12.9)
Annual Household Income	
<$30,000	1006 (32.8)
$30,000-$59,999	776 (25.3)
$60,000-$99,999	704 (23.0)
$100,000+	576 (18.8)

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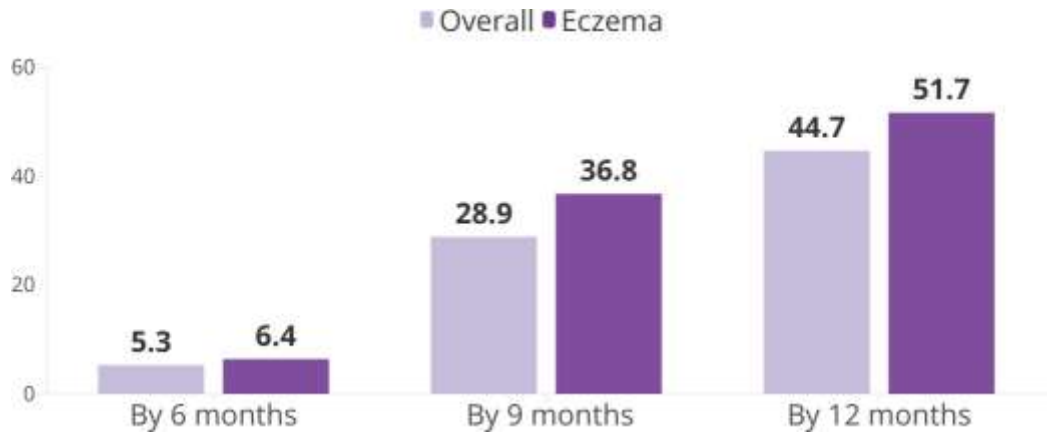
36

Time of Peanut Introduction



Overall, less than half of caregivers are introducing peanuts to their infants by age 1

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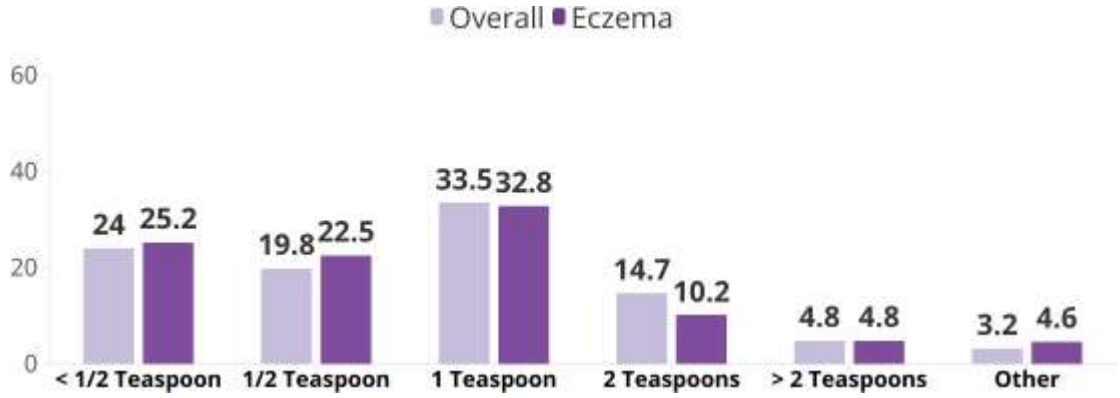
Warren CM. Samady W; Nimmagadda S; Venter C; Jiang J; Zaslavsky J; Ibrahim K; Vincent E; Gupta RS. Knowledge, Attitudes and Behaviors Regarding Peanut Protein Introduction During Infancy—a US population-based survey of parents/caregivers. Presented at 2022 Meeting of the Pediatric Academic Societies

37

Quantity of peanut fed during typical feeding during 1st month of feeding?



Only 15% of respondents introduced the recommended amount

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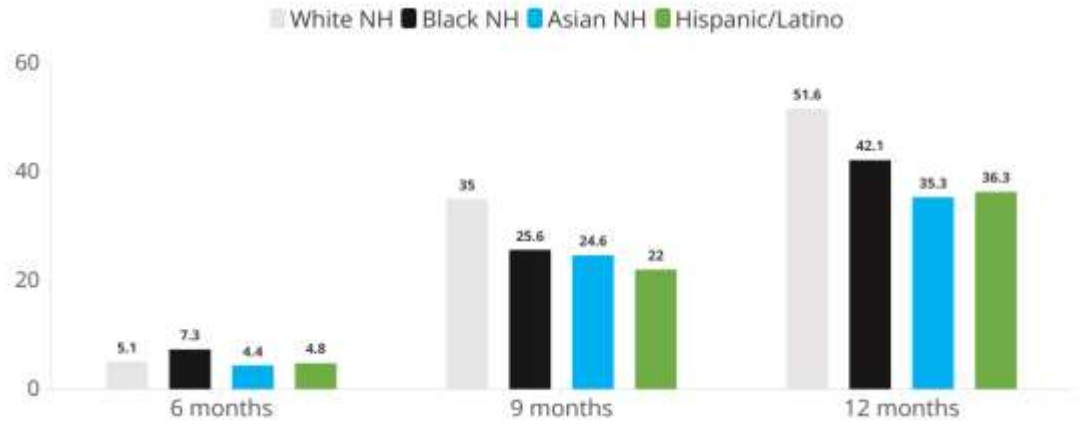
Warren CM. Samady W; Nimmagadda S; Venter C; Jiang J; Zaslavsky J; Ibrahim K; Vincent E; Gupta RS. Knowledge, Attitudes and Behaviors Regarding Peanut Protein Introduction During Infancy—a US population-based survey of parents/caregivers. Presented at 2022 Meeting of the Pediatric Academic Societies

38

Timing of Peanut Introduction by Race / Ethnicity



The rates of peanut introduction by 6 months are low for all races
White families significantly more likely to introduce peanuts by 12 months

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Warren CM. Samady W; Nimmagadda S; Venter C; Jiang J; Zaslavsky J; Ibrahim K; Vincent E; Gupta RS. Knowledge, Attitudes and Behaviors Regarding Peanut Protein Introduction During Infancy—a US population-based survey of parents/caregivers. Presented at 2022 Meeting of the Pediatric Academic Societies

39

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Prevention: What Can We Do?

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Feinberg School of Medicine

40

Improve Accuracy in Atopic Dermatitis Diagnosis

- Utilize AD severity score card with diverse skin tones for **improved detection of infants at high-risk for FA development**

- **Visit** https://eczemainskinofcolor.org/ for resources to help physicians differentiate eczema on skin of color from other skin diseases. *Developed by ACAAI and AAN*

ECZEMA in Skin of Color

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41

Share Prevention Guideline Resources with Pediatric Clinicians

- Educational videos on PPA guidelines and eczema severity categorization
- Early introduction clinic flyer
- Clinician workflow handout
- Eczema classification handout

Available on the CFAAR website

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42

Increase Caregiver Knowledge and Confidence in Early Introduction

- **Discuss the process and share resources on early introduction with new parents**
- **Available in English and Spanish on the CFAAR website**

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43

Improve Equitable Access to Safe and Nutritious Foods

- Encourage USDA to expand food packages in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) to include recommended allergens for early introduction.

CFAAR https://www.fns.usda.gov/wic

44

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Access to Diagnosis and Management

Ann & Robert H. Lurie Children's Hospital of Chicago

Northwestern Medicine Feinberg School of Medicine

45

Diagnosis

Prevalence of FA diagnosis among Medicaid-enrolled US children is **substantially lower (0.6%)** compared to previous national estimates using parent surveys (7.6%) and reports of physician confirmation of food allergy (4.7%)

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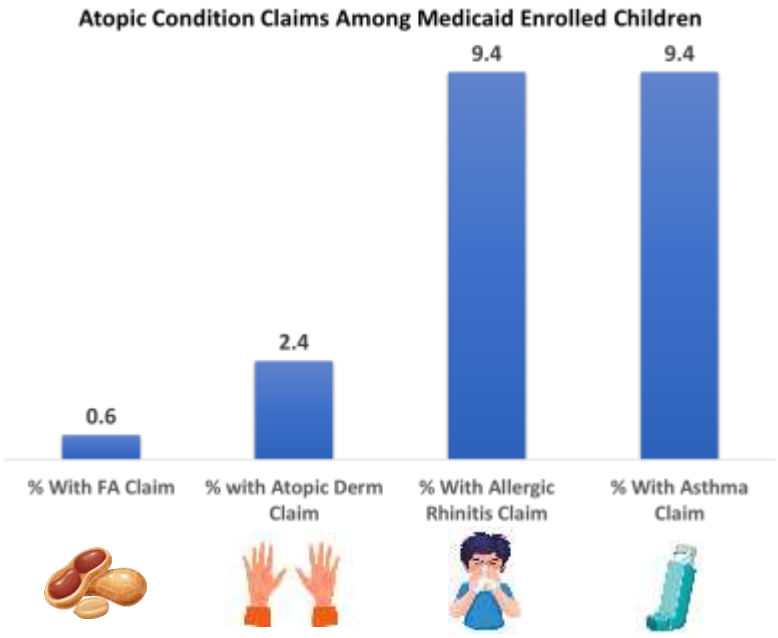
1. Bilaver LA, Kanaley MK, Fierstein JL, Gupta RS. Prevalence and Correlates of Food Allergy Among Medicaid-Enrolled United States Children. *Acad Pediatr*. 2021;21(1):84-92. doi:10.1016/j.acap.2020.03.005
2. Gupta RS, Warren CM, Smith BM, Blumenstock JA, Jiang J, Davis MM, Nadeau KC. The Public Health Impact of Parent-Reported Childhood Food Allergies in the United States. Pediatrics 2018-1235

46



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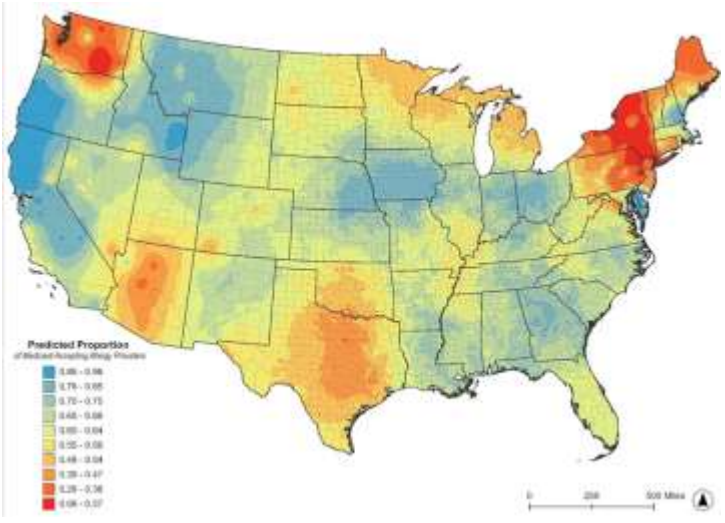
47

Medicaid-Accepting Allergists

- **Only 55.5% of allergists accept Medicaid nationwide**



CFAAR Center for Food Allergy & Asthma Research

Ho FO, Zheng C, Frazier M, Nimmagadda SR, Gupta RS, Bilaver LA. Geographic variability of Medicaid acceptance among allergists in the US. Am J Manag Care. 2024;30(8):374-379. doi:10.37765/ajmc.2024.89588

48

Access to Care

Medicaid-enrolled U.S. children with FA less likely to receive guideline-informed care

Children of color and those living in high poverty counties were:

- Less likely to have visited an allergist for FA or receive diagnostic testing
- More likely to have an FA-related ED visit compared with White children and those not living in a high-poverty county

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Kanaley MK, Dyer AA, Negris OR, Fierstein JL, Ciaccio CE, Gupta RS, Bilaver LA. Guideline-informed care among Medicaid-enrolled children with food allergy. Am J Manag Care. 2020 Dec;26(12):505-512. doi: 10.37765/ajmc.2020.88538. PMID: 33315325.

49

Outcomes and Factors Associated with Pre-Hospital Treatment of Pediatric Anaphylaxis

Children with Medicaid received pre-ED EPI **less frequently** than children with private insurance (24.5% v. 43.8%, p=.001).

Medicaid insurance was associated with **decreased likelihood of pre-hospital EPI** (OR .33 [95% CI .16-.66]).

CFAAR Center for Food Allergy & Asthma Research

Trainor JL, Pittsenbarger ZE, Joshi D, Adler MD, Smith B, Gupta RS. Outcomes and Factors Associated With Prehospital Treatment of Pediatric Anaphylaxis. Pediatr Emerg Care. 2020 Jun 15. doi: 10.1097/PEC.0000000000002146. Epub ahead of print. PMID: 32544141.

50

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Economic Impact

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Northwestern Medicine Feinberg School of Medicine

51

Economic Impact of Food Allergy

Overall Economic Cost

$ 24.8 Billion

Direct Medical Costs

$ 4.3 Billion

Family Cost

$ 20.5 Billion

$4,184 per year/per child

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Gupta R, Holdford D, Bilaver L, Dyer A, Holl JL, Meltzer D. The economic impact of childhood food allergy in the United States. JAMA pediatrics. 2013 Nov 1;167(11):1026-31.

52

Out-of-Pocket Costs

Variable	% Reporting Cost (SE)	Mean Direct Out-of-Pocket Costs, US$ (SE)	Cost Per Child, US$	Overall Annual Cost (in Millions), US$
Non-traditional medicine	**15 (1.6)**	**123 (30)**	**19**	**110**
Costs associated with special diets and allergen-free food	**37.7 (2.0)**	**756 (59)**	**285**	**1689**
Additional/change in childcare	**6.7 (0.8)**	**2158 (323)**	**145**	**857**
Legal guidance	**2.3 (0.6)**	**402 (122)**	**9**	**55**
Counseling or mental health services	**4.5 (0.7)**	**571 (123)**	**26**	**152**
Special summer camp	**3 (0.7)**	**702 (183)**	**21**	**125**
A change in schools was needed due to food allergy	**4.2 (0.7)**	**2611 (497)**	**110**	**650**
Other expenses (e.g., cleaning supplies)	**9.5 (1.1)**	**396 (86)**	**36**	**216**
Any out-of-pocket costs	**74.3 (2.1)**	**1252 (90)**	**931**	**5516**

Out-of-pocket costs: medical costs borne by patient associated with the prevention, diagnosis, and treatment of food allergies. Includes all costs associated with protecting the child from exposure to allergens, including special childcare arrangements. The out-of-pocket costs exclude the top 1% of reported costs in each category.

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Gupta R, Holdford D, Bilaver L, Dyer A, Holl JL, Meltzer D. The economic impact of childhood food allergy in the United States. JAMA pediatrics. 2013 Nov 1;167(11):1026-31.

53

Comparing WTP & Measure of Actual Cost

Characteristic	Annual Costs, US$			
			95% CI	
	Total (in Billions)	Per Child	Total (in Billions)	Per Child
Willingness to Pay (WTP)	**20.8**	**3504**	**(15.7-25.7)**	**(2652-4344)**
Costs borne by families				
Out-of-pocket treatment	**5.5**	**931**	**(4.7-6.4)**	**(793-1080)**
Lost labor productivity	**0.77**	**130**	**(0.53-1.0)**	**(89-175)**
Opportunity	**14.2**	**2399**	**(10.5-18.4)**	**(1771-3104)**
Total				
Direct medical costs	**4.3**	**724**	**(2.8-6.3)**	**(472-1063)**
Reported costs borne by families	**20.5**	**3457**	**(16.7-24.9)**	**(2816-4208)**
Reported costs	**24.8**	**4184**	**(20.6-29.4)**	**(3475-4960)**

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Gupta R, Holdford D, Bilaver L, Dyer A, Holl JL, Meltzer D. The economic impact of childhood food allergy in the United States. JAMA pediatrics. 2013 Nov 1;167(11):1026-31.

54

Direct Out-of-Pocket Costs by Household Income

Type of Cost	Mean Annual Costs (SE), US$		
	<$50K	$50K-99K	≥$100K
Total Direct Costs borne by health care system	1374 (274)	1024 (125)	940 (128)
ER and Hospitalization costs*	1021 (209)	434 (106)	416 (94)
Specialist costs**	228 (21)	330 (27)	311 (18)
Total Out-of-Pocket Costs borne by families	3174 (858)	3434 (658)	5062 (1168)
Medication costs***	171 (26)	275 (30)	366 (44)
Special food costs	744 (216)	941 (230)	1545 (347)

*p<0.05, **p<0.01, ***p<0.001 for F-test of equality of means across groups.

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Bilaver, L. A., Kester, K. M., Smith, B. M., & Gupta, R. S. (2016). Socioeconomic Disparities in the Economic Impact of Childhood Food Allergy. *Pediatrics*, *137*(5), e20153678. https://doi.org/10.1542/peds.2015-3678

55

Families with Low Income

Spend 2.5x more on FA **ED Visits and hospitalizations**

Spend less on **specialty** visits

Spend less on out-of-pocket costs for **medications**

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Bilaver, L. A., Kester, K. M., Smith, B. M., & Gupta, R. S. (2016). Socioeconomic Disparities in the Economic Impact of Childhood Food Allergy. *Pediatrics*, *137*(5), e20153678. https://doi.org/10.1542/peds.2015-3678

56

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Food Insecurity

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Northwestern Medicine Feinberg School of Medicine

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Food Insecurity

"I would say the biggest challenge is finding food that fits all of his restrictions"

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Bozen, A., Zaslavsky, J. M., Cohn, D., Samady, W., Lombard, L., Nadeau, K., Gupta, R. S. (2020). Barriers to food allergy management among Americans with low income. Annals of allergy, asthma & immunology: official publication of the American College of Allergy, Asthma, & Immunology, 125(3), 341-343.

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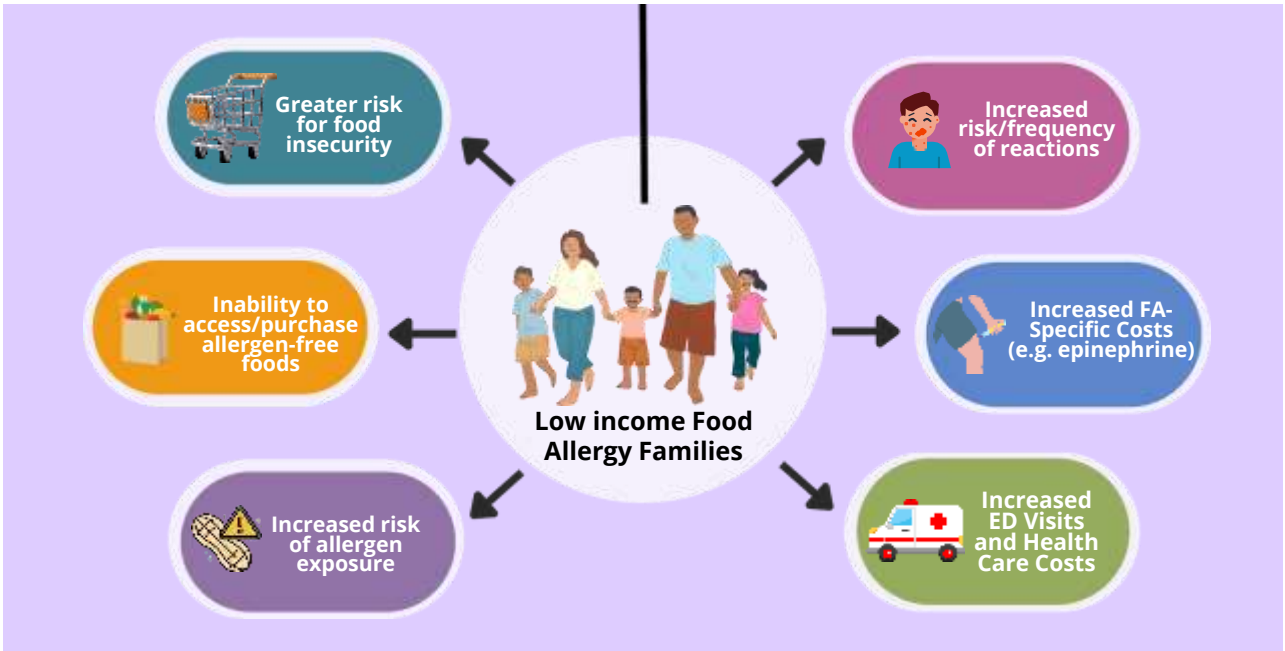

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2. Bilaver LA, Kester KM, Smith BM, Gupta RS. Socioeconomic Disparities in the Economic Impact of Childhood Food Allergy. Pediatrics. 2016 May;137(5):e20153678. doi: 10.1542/peds.2015-3678. PMID: 27244806.

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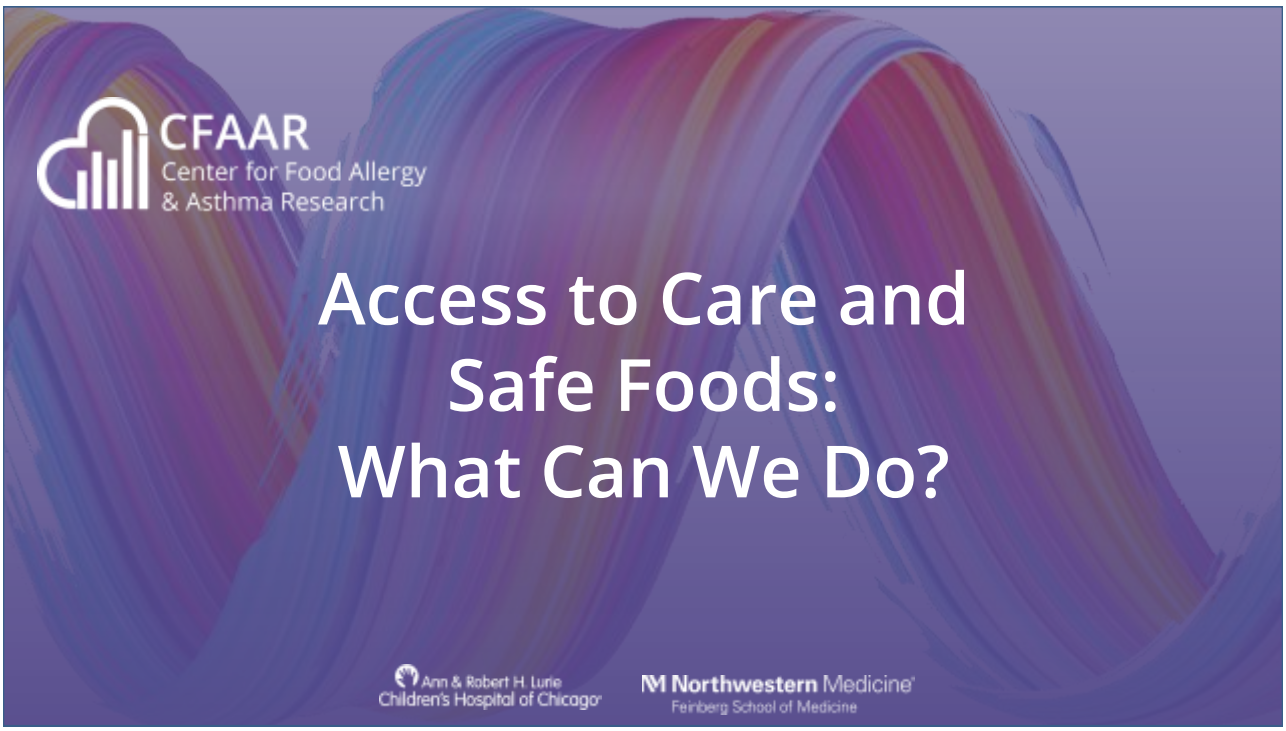

60

Incorporate Food Insecurity Screening into Clinic Workflow

- **Existing food insecurity instruments include:**
  - U.S. Household Food Security Survey Module (USDA)
  - Six-Item Short Form of the Food Security Survey Module (USDA)
  - American Academy of Pediatrics Recommended Hunger Vital SignTM

Example questions to include from Hunger Vital SignTM:

1. **In the past 12 months, we worried whether our food would run out before we got money to buy more.**
   - Often true
   - Sometimes true
   - Never true

2. In the past 12 months, the food we bought just did not last and we did not have money to get more.

- Often true
- Sometimes true
- Never true

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Hager, E. R., Quigg, A. M., Black, M. M., Coleman, S. M., Heeren, T., Rose-Jacobs, R., Cook, J. T., Ettinger de Cuba, S. E., Casey, P. H., Chilton, M., Cutts, D. B., Meyers A. F., Frank, D. A. (2010). Development and Validity of a 2-Item Screen to Identify Families at Risk for Food Insecurity. Pediatrics, 126(1), 26-32. doi:10.1542/peds.2009-3146.

61

Identify Opportunities for Partnerships and Referrals

- Connect with food panties who serve patients with FA
  - https://foodequalityinitiative.org/
  - https://freefrommarket.com/contact-us/
  - https://foodiversity.org/
  - https://securingsafefood.org/

securing safe food

FREEFROM MARKET

Food Equality INITIATIVE

FOODiversity

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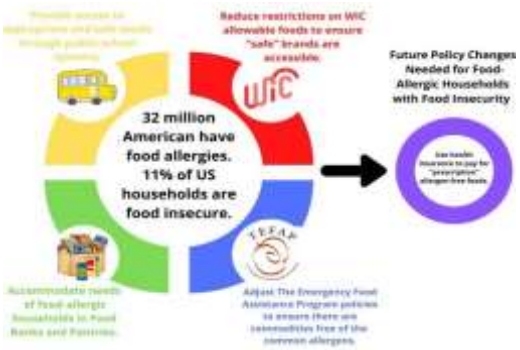
62

Join Working Groups and Advocate for Policy Change

Working Groups:
- ACAAI and AAAAI Working Group

Advocate for policy changes:
- Strengthening federal nutrition programs
- Fewer restrictions on substitutions in the WIC program with more offerings of allergy-friendly foods and nutritionally equivalent offerings
- Insurance coverage on food as medicine



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Brown, E., Das, R., Brewer, A. G., Martinez, E., Bilaver, L. A., & Gupta, R. S. (2020). Food Insecure and Allergic in a Pandemic: A Vulnerable Population. The journal of allergy and clinical immunology. In practice, 8(7), 2149–2151

63

Create an Allergy and Anaphylaxis Action Plan

- **Every child with food allergies needs an action plan**
- The action plan addresses recommended treatment in case of an allergic reaction and is signed by the parent and student's physician
- Should have a new action plan every annual visit

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https://downloads.aap.org/HC/AAP_Allergy_and_Anaphylaxis_Emergency_Plan.pdf

SCAN ME

64

Share Management Tools: Food Allergy Passport

Personalized tool that helps caregivers and children manage their food allergies more easily and with greater confidence.

Available for free on CFAAR website. Create your own/share with patients: www.foodallergypassport.com!

After filling out personalized FA Passport™, it can be printed or sent via email.

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Share Management Tools: Food Allergy Workbook

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Share Management Tools: Peer-to-Peer Educational Videos

K – 3rd Grade

4th - 7th Grade

8th - 12th Grade

Available at cfaar.northwestern.edu

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Provide Resources for Patients

FARE

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Asthma and Allergy Foundation of America

Allergy & Asthma NETWORK

FAACT Food Allergy & Anaphylaxis Connection Team

Advocacy and Support Groups

American College of Allergy, Asthma & Immunology

MOCHA

CURED www.curedfoundation.org

I-FPIES International FPIES Association

Apfed American Partnership for Eosinophilic Disorders

EAACI

American Academy of Allergy Asthma & Immunology

Food Equality INITIATIVE

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68

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Management Options

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Formula Recommendations for CMA

1. Extensively Hydrolyzed formula
2. Amino Acid Based Formula
3. Soy formula

Only an eHF and AAF are considered Hypoallergenic

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Bognanni A, Fiocchi A, Arasi S, et al. World Allergy Organization (WAO) Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA) guideline update XII; Recommendations on milk formula supplements with and without probiotics for infants and toddlers with CMA. World Allergy Organization Journal. 2024;17.

70

When to use eHF vs AAF

Guideline	Anaphylaxis	Atopic Dermatitis	EoE	GERD	FPIES	Protocolitis
DRACMA	AAF	eHF	AAF	eHF	eHF	eHF
ESPGHAN	AAF	eHF	AAF	eHF	eHF	eHF

Consider AAF when:
- ❑ Symptoms not fully resolved on eHF
- ❑ EoE
- ❑ Anaphylaxis
- ❑ Failure to Thrive

1. Vandenplas Y, Broekaert I, Domellöf M, et al. An ESPGHAN position paper on the diagnosis, management and prevention of cow's milk allergy. J Pediatr Gastroenterol Nutr. 2023.
2. Bognanni A, Fiocchi A, Arasi S, et al. World Allergy Organization (WAO) Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA) guideline update XII; Recommendations on milk formula supplements with and without probiotics for infants and toddlers with CMA. World Allergy Organization Journal. 2024;17.

71

Soy Formula Guidelines

DRACMA: Not recommended for infants <6 months
- May be used due to:
  - Economic restrictions
  - Cultural reasons
  - Palatability

ESPAGHAN Committee on Nutrition & AAP: Recommended against the use of soy infant formula significantly below the age of 6 months, because of the risk of co-allergy

When comparing eHF vs. Soy formula
- extensively hydrolyzed formula (eHF) may favor weight gain, but there is no difference in length growth

1. Vandenplas Y, Broekaert I, Domellöf M, et al. An ESPGHAN position paper on the diagnosis, management and prevention of cow's milk allergy. J Pediatr Gastroenterol Nutr. 2023.
2. Bognanni A, Fiocchi A, Arasi S, et al. World Allergy Organization (WAO) Diagnosis and Rationale for Action against Cow's Milk Allergy (DRACMA) guideline update XII; Recommendations on milk formula supplements with and without probiotics for infants and toddlers with CMA. World Allergy Organization Journal. 2024;17.

72

Current Immunotherapy Categories for Food Allergy

- **Epicutaneous Immunotherapy (EPIT)**
  - On the skin
- **Oral Immunotherapy (OIT)- eaten**
  - With and without a period of withdrawal
  - With and without adjunctive therapy
- **Sublingual Immunotherapy (SLIT)- under the tongue**
  - With and without follow up with OIT
- **Biologics**

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73

Oral Immunotherapy (OIT)

- Palforzia™ Approved January 31st, 2020
- Derived from peanut powder, each dose contains the equivalent of small amounts of peanuts
- **Works by desensitizing patients by gradually increasing the dosage of peanut exposure**
- Targeting children ages 4 to 17

Palforzia
Peanut (Arachis hypogaea) Allergen Powder-dnfp

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Palforzia is a trademark of Société des Produits Nestlé S.A.(Société Anonyme (SA); Switzerland) and is not affiliated with Nutricia North America.

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Biologics

- Biologics alone and in combination with OIT are being investigated in peanut allergy
- These biologics block activity in the Type II high inflammatory pathway that affects allergic reactions
- Biologics:
  - Omilizumab (Xolair®)
  - Dupilimab (Dupixent®)
  - Ligelizumab
  - Probiotics

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AnaptysBio announces positive top-line proof-of-concept data for ANB020 in moderate-to-severe baseline adult peanut allergy patients (news release). Ir.anaptysbio.com/news-releases/news-release-details/anaptysbio-announces-positive-top-line-proof-concept-data-anb020. San Diego, CA: Globe Newswire.
Xolair is a registered trademark of Novartis AG and not affiliated with Nutricia North America. Dupixent is a trademark Sanofi Biotechnology of and not affiliated with Nutricia North America.

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Omilizumab (Xolair®)

- Results from Phase III OUtMATCH study showed Xolair significantly increased the amount of peanut, milk, egg, and cashew it took to cause an allergic reaction
- In February 2024, Xolair became the first FDA-approved medication to reduce allergic reactions to more than one type of food after accidental exposure



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https://www.fda.gov/news-events/press-announcements/fda-approves-first-medication-help-reduce-allergic-reactions-multiple-foods-after-accidental
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Dupilumab (Dupixent®)

- Biologic used to treat adults and children 6 months of age and older with moderate-to-severe eczema

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Accessibility

- OIT and SLIT are treatments offered by limited number of allergists and mostly out of pocket
- Additional costs for office visits, travel, time off work, unanticipated ED visits

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78

Looking Forward

- This is the dawn of emerging therapies for peanut immunotherapy
- Presently, these treatments may lead to desensitization – not a cure
  - Importantly, they can improve quality of life
- It is paramount that patients/parents/caregivers understand the risks and benefits of each treatment through shared decision making
  - Avoidance only is still a viable option
  - All patients will still have to have an epinephrine auto-injector

Epinephrine Auto-Injectors

Brands:

EpiPen®
EpiPen Jr.®
Auvi-Q®
Adrenaclick®
Symjepi®

Generic Epinephrine:

Amneal Pharmaceuticals (Adrenaclick)
Teva Pharmaceuticals (EpiPen/EpiPenJr.)
Viatris (EpiPen/EpiPenJr.)

New Alternatives to Auto-Injectors

Epinephrine Nasal Sprays

- neffy®– ARS Pharmaceuticals
  - FDA approved in August 2024
- UTULY™ – Bryn Pharma

Epinephrine Sublingual Film

- AQST-109 - Aquestive Therapeutics

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81

Conclusion

Food allergy prevalence, economic impact, outcomes, access to timely diagnosis and care, and access to safe foods differ significantly by race and socioeconomic status

Physicians, allergists, industry leaders, and policy makers must continue to work together to address these disparities through prioritizing comprehensive education, screening, and systematic policy change to achieve equitable care for all patients

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82

Do the best you can until you know better. Then when you know better, do better.

- Maya Angelou

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83

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84


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College Dietitians: Fuel Your Expertise in Food Allergy Care!
Join us to gain the latest insights on:
• Supporting a nutrient-dense diet in food-allergic patients
• Creating inclusive dining environments in schools and on college campuses
• Empowering families through culinary medicine
2025 CFAAR FOOD ALLERGY SUMMIT
Chicago | June 27 | Pediatric Track
REGISTER TODAY

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86

Thank you! Questions?

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87