

Food allergy is associated with an increased risk of asthma

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Clinical and Experimental Allergy

Summary

Background The atopic march is well documented, but the interrelationship of food allergy (FA) and asthma is not well understood.

Objective The aim of this study was to examine the strength of the association and temporal relationships between FA and asthma.

Methods This analysis included 271 children ≥ 6 years (older group) and 296 children < 6 years (younger group) from a family-based FA cohort in Chicago, IL. Asthma was determined by parental report of physician diagnosis. FA status was determined based on the type and timing of clinical symptoms after ingestion of a specific food, and results of prick skin test (Multi-Test II) and allergen-specific IgE (Phadia ImmunoCAP). Analyses were carried out using logistic regression accounting for important covariates and auto-correlations among siblings. Kaplan–Meier curves were used to compare the time to onset of asthma with the FA status.

Results Symptomatic FA was associated with asthma in both older [odds ratio (OR) = 4.9, 95% confidence interval (CI): 2.5–9.5] and younger children (OR = 5.3, 95% CI: 1.7–16.2). The association was stronger among children with multiple or severe food allergies, especially in older children. Children with FA developed asthma earlier and at higher prevalence than children without FA (Cox proportional hazard ratio = 3.7, 95% CI: 2.2–6.3 for children ≥ 6 years, and hazard ratio = 3.3, 95% CI: 1.1–10 for children < 6 years of age). No associations were seen between asymptomatic food sensitization and asthma.

Conclusions Independent of markers of atopy such as aeroallergen sensitization and family history of asthma, there was a significant association between FA and asthma. This association was even stronger in subjects with multiple food allergies or severe FA.

Keywords asthma, child, food allergy

Submitted 27 May 2008; revised 20 October 2008; accepted 27 October 2008

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Cite this as: A. Schroeder, R. Kumar, J. A. Pongracic, C. L. Sullivan, D. M. Caruso, J. Costello, K. E. Meyer, Y. Vucic, R. Gupta, J. S. Kim, R. Fuleihan and X. Wang, *Clinical and Experimental Allergy*, 2009 (39) 261–270.

Introduction

Food allergy (FA) is a prevalent pediatric condition affecting 2–6% of children [1–4] and 1–3.2% of adults [4, 5]. Asthma is even more common, with 5–8% of the US population suffering from asthma [6, 7]. Over the past decades, both diseases have shown an increasing prevalence in children in the USA [8–10] and world-wide [11, 12]. Prior large epidemiological studies [13, 14] have suggested that FA precedes asthma in the average age of onset. Other studies have suggested that food allergen sensitization [15–19] is a risk factor for the development of asthma. Indeed, these diseases are often co-morbid [20,

21], and the relationship of these atopic diseases has often been described as 'the atopic march' [13, 14].

Most studies have focused on the relationship of food allergen sensitization with either aeroallergen sensitization or asthma [13, 18, 19]. There are fewer studies evaluating the association between clinical FA and asthma [22, 23]. These studies have either had smaller numbers of subjects [22], or only followed the children through pre-school years [23]. Notably, these studies have had conflicting results. Similarly, previous primary prevention trials of asthma which have included food avoidance have had equivocal results when taken as a whole [24–27].

In addition, the underlying reason for the association of FA and asthma is not well studied. While FA and asthma may share some common risk factors such as atopy, it is also possible that they are causally related. One prior study found the association of FA and asthma to be independent of aeroallergen sensitization [16]. This finding, while intriguing, has not been replicated. Studies of oral food challenges have found changes in bronchial hyper-reactivity or lung function [28, 29] to be associated with clinical reactivity to food.

Finally, study of the interrelationship of these two diseases is complicated by the fact that the natural history including age of onset for FA and asthma appears to be different [30, 31]. As such, studies may be variably affected by older children having outgrown FA and by a number of younger children not having developed the outcome of asthma. It is possible that the interrelationship of FA and asthma may differ by age group in children. To date, there is a lack of in-depth analysis on the interrelationship between FA and the development of asthma by age group in a sample of US children.

We studied a sample of well-phenotyped children from a family-based FA study cohort enrolled in Chicago. We sought to determine (1) the strength of the association between FA (clinically symptomatic) and asthma, and also between asymptomatic sensitization and asthma; (2) the dose-response relationship between numbers of food allergies and severity of FA and the odds of having been diagnosed with asthma. As part of this analysis, we sought to determine whether any association was independent of measures of atopy and aeroallergen sensitization. We also carried out a secondary analysis to explore the temporal relationship between these two diseases. A better understanding of the relationship between these two diseases may provide new insight into the natural history of FA and asthma, and measures for early intervention.

Methods

Study population and data collection

This report included a total of 567 children (271 children 6 years of age and older and 296 children less than 6 years of age). These children were enrolled as part of an ongoing family-based FA study in Chicago, IL, which includes families both with and without FA. Families were recruited through general medical and allergy specialty clinics, community support groups and advertisements in media. Families with FA were derived primarily from allergy specialty clinics, community support groups and advertisements in media, while those without FA were primarily derived from general medical clinics and advertisements in media. Of the total 567 children included in this study, 410 were seen at Children's Memorial Hospital, and 136 were patients in the Division of Allergy and

Immunology. Eligible families were those having (1) either one or both parents willing to be enrolled and (2) at least one biological child (aged 0–21 years) with or without FA. The presence of asthma was not an eligibility or exclusion criterion.

Information regarding the food allergies and medical history of each family member was collected through a questionnaire-based interview conducted by trained research staff. A clinical evaluation, including height, weight, blood pressure and prick skin tests (PSTs), was performed on each participating family member. Venous blood samples were collected from each participating family member. For those children receiving care in the Allergy and Immunology Clinic at Children's Memorial Hospital, ICD-9 codes were collected and compared with parent report.

The Institutional Review Board of Children's Memorial Hospital approved the study protocol. All participating families provided written informed consent.

Total and specific immunoglobulin E measurement

Total serum IgE, specific IgE (sIgE) for nine food allergens (egg white, sesame, peanut, soy, milk, shrimp, walnut, cod fish and wheat) and sIgE for six aeroallergens (*Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*, cat dander, dog dander, German cockroach and *Alternaria alternata*) were measured for each subject using the Phadia ImmunoCAP system (Phadia US Inc., Portage, MI, USA). The calibration range for total IgE was from 2.0 to 5000 kU/L, while for sIgE it was from 0.1 to 100 kUA/L. Total and sIgE assays were performed by the Clinical Immunology Laboratory at Children's Memorial Hospital, a CLIA-certified laboratory for the ImmunoCAP assay.

Prick skin test

Skin testing was performed on the volar surface of the arms on normal skin using Multi-Test II (Lincoln Diagnostics, Decatur, IL, USA). Subjects were tested to 14 allergens, including five aeroallergens [*Alternaria tenuis*, house dust mite mix (equal parts mixture of *D. farinae* and *D. pteronyssinus*), cat hair, dog epithelia, cockroach mix (American and German cockroach)] and nine foods [cow milk, egg white, soybean, wheat, peanut, English walnut, sesame seed, fish mix (cod, flounder, halibut, mackerel, tuna), and shellfish mix (clam, crab, oyster, scallops, shrimp)] plus negative (50% glycerinated saline) and positive (histamine, 1.0 mg/mL) controls (Greer, Lenoir, NC, USA). The results were measured 15 min after application. The test was considered positive if the mean weal diameter was 3 mm or greater than the saline control. Data was excluded if the saline control was ≥ 3 mm, the histamine control was < 3 mm or if the difference of histamine minus saline was < 3 mm.

Definition of food allergy

FA status was determined by applying a set of clinical criteria to data gathered from the questionnaire-based interview performed by study staff and results of sIgE measurements and PST. Clinical criteria for symptomatic FA were met if tests (sIgE or PST) corroborated typical symptoms of an allergic reaction to a food with onset within 2 h of ingestion. Symptoms included any one of the following: skin – hives or angioedema; respiratory tract – difficulty breathing, shortness of breath, repetitive coughing, wheezing, chest tightness; oropharyngeal – throat tightness, choking, or difficulty swallowing, tongue swelling; cardiovascular – fainting, dizziness, lightheadedness or decreased level of consciousness; or gastrointestinal – vomiting. Tests were considered corroborative if sIgE was present for the reported food allergen (≥ 0.1 kUA/L for ImmunoCAP) or if there was a positive PST as defined above. Children were considered food allergic if they met the above criteria for at least one specific food. Those with negative PST or Immunocap levels were not included as cases even if the parent reported history was supportive, because the prevalence of FA by self-report is inflated compared with other methods such as food challenge [32]. Also, individuals with both negative immunocap and negative skin tests are very unlikely to have a positive challenge [33, 34].

FA was also characterized as severe (suggestive of anaphylaxis) or non-severe (all other symptomatic cases meeting our clinical criteria) based on symptoms. The criteria for severe allergy could be met in one of two possible ways. First, subjects could have involvement of the skin, mucosal tissue or both and at least one manifestation of respiratory compromise or cardiovascular dysfunction as described above. Second, subjects could have any one of the above-listed symptoms along with persistent gastrointestinal symptoms (vomiting).

Asymptomatic food sensitization was defined as either a detectable level (0.1 kUA/L) of sIgE or a positive PST as defined above to a particular food, but no reported clinical symptoms to that food. The earliest age of FA symptoms was based on parental report in a questionnaire-based interview performed by study staff. A subset of 129 children received specialty medical care in the Allergy and Immunology Clinic at Children's Memorial Hospital. In this subset, 100% of our study subjects who were defined as having FA by our criteria were also diagnosed as having FA in the Allergy and Immunology Clinic.

Ascertainment of asthma

This analysis focused on current asthma, which was defined as parental report of physician diagnosis and being symptomatic in the year before the survey. These outcomes and the earliest age of reported asthma symp-

toms were determined by questionnaire-based interview performed by study staff.

A subset of children ($n = 69$) with parent-reported asthma was also followed by the Allergy and Immunology clinic at Children's Memorial Hospital. Asthma status was verified by physician diagnosis in 94.2% of this subset of study participants.

Statistical analysis

Our primary analyses were carried out in an age group-stratified manner (< 6 years of age and ≥ 6 years of age), with a focus on current FA and asthma. The rationale for stratified analyses was that the associations between FA and asthma may vary by age group due to differences in the age of onset and natural history between FA and asthma. Children may develop tolerance to some food allergies as they grow. Younger children with physician diagnosis of asthma may include a proportion with transient wheezing, whereas older children with physician diagnosis of asthma may be more likely to be true asthma cases [31].

We carried out logistic regression modelling to assess the association between FA diagnosis (Supporting information Table S1), asymptomatic sensitization (Supporting information Table S2a and b), number of food allergies (Table 2) and severity of food allergies (Table 3 and Supporting information Table S3) and the risk of asthma, adjusting for covariates as specified below, as well as adjusting for the correlation between siblings in the same family as a random effect.

Potential confounding variables included basic demographic measures, socio-economic status measures, and factors known from the literature to be associated with asthma or FA. We then examined each of these possible confounders individually (univariate modelling) in a model with the dependent variable of asthma and independent variable of FA, adjusting for intrafamilial correlation. This included addition of the potential confounder to the univariate relationship between FA and asthma, evaluating whether this resulted in a shift in the odds ratio (OR) for asthma. Confounders that were significant in univariate models and resulted in a shift in the OR (of greater than 0.2) for the relationship were then adjusted for in the multiple regression analyses.

The confounders that were adjusted for in the multiple regression models were age (continuous), race (minority vs. white/unknown), gender, sensitivity to aeroallergens (positive skin test for alternaria, cat, dog, dust mite or cockroach), household income and family history of asthma (either mother or father reported current or outgrown asthma). In our initial models, we included total IgE in addition to sensitization to aeroallergens, but this variable was not significant in the model and did not change the results. As such, this variable was not included in final models.

Using a similar approach, we also examined the association between specific food allergies and asthma (Supporting information Table S1). We also evaluated the association of asymptomatic food allergen sensitization with asthma (Supporting information Table S2). This secondary analysis included as cases only those subjects who had asymptomatic sensitization (positive skin test or sIgE > 0.1 kUA/L) and no clinical symptoms associated with food ingestion. The reference group for the analyses involving asymptomatic sensitization was the same as the main analysis, and included only those individuals with no clinical FA and no evidence of sensitization to foods. Because of sample size limitations, Table S2a present unadjusted statistics. In Table S2b, where possible, significance was determined adjusting for the limited subset of the covariates. Some models of the individual food allergens did not converge due to small cell sizes. For other food allergens with very few numbers, unadjusted statistics are presented as specified in Table S2b and S3.

We also compared time to asthma onset between children with and without FA in Fig. 1, using Kaplan–Meier estimates implemented in SAS. Significance for the comparison of age of asthma onset between those with and without FA was determined using Cox proportional hazard modelling, adjusting for the covariates specified above in the main regression model.

All statistical analyses were conducted in SAS 9.1 (SAS Institute, Cary, NC, USA). The level of significance used was $\alpha < 0.05$ (two-sided).

Results

This analysis included 271 children who were 6 years of age and older and 296 children who were less than 6 years

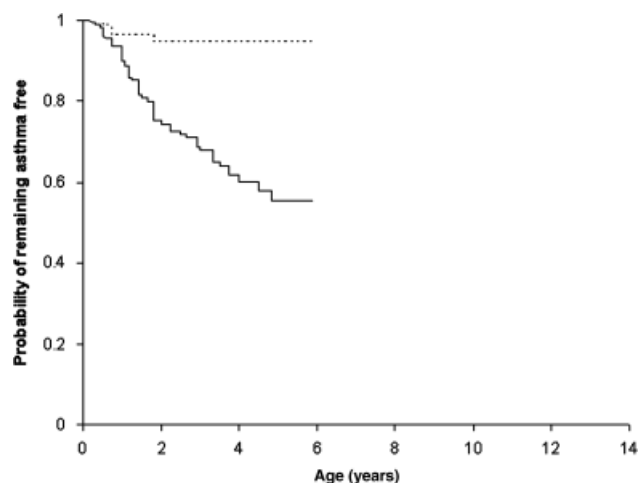


Fig. 1. Age of onset for asthma for children <6 years old with and without food allergy (FA). Groups represented are as follows: dashed line represents children without FA and the solid line represents children with FA.

of age at the time of study entry. The characteristics of these two groups of children are presented in Table 1. This is a predominantly Caucasian population ranging from middle to high-income families, from urban to suburban Chicago. The prevalence of FA and asthma is 71% and 24% in the younger age group, and 56% and 48% in the older age group. Among asthmatic children, 94.4% and 80.2% had coexistence of FA in the younger and older age group, respectively. By way of validation, a subset of 129 children was seen in the Allergy and Immunology Clinic at Children's Memorial Hospital, and 100% who were defined as having FA by our criteria also had a corroborative physician diagnosis of FA. Likewise, of a subset of 69 children with parent-reported asthma seen in the Allergy and Immunology Clinic at Children's Memorial Hospital, 94.2% had a physician diagnosis of asthma to validate the parent report.

The median time difference from time of first reaction to study evaluation was approximately 3 years for all foods. Between initial symptoms and enrolment in the study, the median time lapse and interquartile range for the common foods evaluated were 3.68 years (1.61–6.25 years) for peanut, 3.35 years (1.36–5.84 years) for egg and 3.90 years (1.65–6.35 years) for milk, respectively. The overall median age and interquartile range of the cohort at initial assessment were 5.33 years (3.34–8.53 years).

The presence of a symptomatic allergy to any food allergen that met our criteria was strongly associated with having an asthma diagnosis in both the older children [OR = 4.9, 95% confidence interval (CI): 2.5–9.5, $P < 0.0001$] and the younger children (OR = 5.3, 95% CI: 1.7–16.2, $P = 0.0034$). This association between symptomatic FA and asthma persisted even after controlling for age, gender, ethnicity (white vs. non-white), intrafamilial correlations, household income, family history of asthma and aeroallergen sensitization. In the older children, we also evaluated the associations of asthma with specific type of FA as a secondary analysis (Supporting information Table S1), finding similar associations.

We evaluated the independent contribution of asymptomatic food allergen sensitization to asthma among the group of children that did not have clinical symptoms of FA as compared with those without symptoms and without sensitization in both the younger and older children. No statistically significant associations were observed between asymptomatic sensitization as determined by PST and asthma (Supporting information Table S2a). Similarly, merely having detectable levels of sIgE to food allergens failed to reach statistical significance (Supporting information Table S2b) except for a marginal association with soy.

Table 2 shows the relationship between the number of food allergies and asthma in the study population. As compared with children without FA, the association with asthma illustrates a striking dose effect in older children

Table 1. Epidemiological and clinical characteristics of study children, stratified by age groups

	Total	Children aged <6	Children aged 6 or older
N: Children	567	296	271
N: Families	403	234	208
Number of children with food allergy	361	209 (71%)	152 (56%)
Number of children with asthma	201	72 (24%)	129 (48%)
Age, mean (SD)		3.3 (1.5)	10.2 (3.2)
Median (range)		3.3 (0.3–6.0)	9.3 (6.0–20.8)
Gender: male (%)		66	53
Caucasian (%)		90	85
Aeroallergen sensitization (%)		52	56
Family income(%)			
\$0–20 000		1	7
\$20 000–40 000		5	7
\$40 000–100 000		17	15
\$ > 100 000		77	70
Mother's education (%)			
High school or less		4	7
College degree or less		55	62
Graduate or professional		41	31
Father's education (%)			
High school or less		4	12
College degree or less		60	50
Graduate or professional		36	38
Attended daycare (%)		64	81
Pet in home (%)		53	63
Breastfed (%)		93	86
Exclusively		24	27
Mother smoked during pregnancy (%)	5	6	
Mother smoked postnatally (%)		4	6
Child exposed to passive smoke (%)	13	17	
Family history (%) atopy		86	89
Family history (%) asthma		44	44

Table 2. Relationship between the number of food allergies and risk of asthma*

Number of food allergies	Number with food allergy	Asthma diagnosis: Yes (N = 71)	OR	95% CI Lower bound	Upper bound	P
Children < 6 years old (N = 296)						
0 = None	87	4 (5%)	1.0	n/a	n/a	n/a
1	119	35 (29%)	5.1	1.6	16.2	0.0053
2+	90	32 (36%)	5.8	1.8	18.9	0.0033
Number of food allergies	Number with food allergy	Asthma diagnosis: Yes (N = 121)	OR	95% CI Lower bound	Upper bound	P
Children ≥ 6 years old (N = 271)						
0 = None	119	24 (20%)	1	n/a	n/a	n/a
1	77	41 (53%)	3.2	1.5	6.7	0.0021
2+	75	56 (75%)	8.6	3.8	19.3	< .0001

* Adjusted for age, gender, ethnicity (white vs. non-white), intrafamilial correlations, household income, family history of asthma and aeroallergen sensitization.

OR, odds ratio; CI, confidence interval.

as the number of food allergies increases. Older children with one FA were found to have 3.2 times greater odds for having an asthma diagnosis than children without FA (OR = 3.2, 95% CI: 1.5–6.7, $P=0.0021$). For children with two or more food allergies, the association is even stronger (OR = 8.6, 95% CI: 3.8–19.3, $P<0.0001$). In the children under 6 years of age, a dose response was less obvious. Younger children with one FA were found to have 5.1 times greater odds for having an asthma diagnosis (OR = 5.1, 95% CI: 1.6–16.2, $P=0.0053$), and for those with two or more food allergies, the OR increased to only 5.8 (95% CI: 1.8–18.9, $P=0.0033$).

We also evaluated whether increasing severity of FA was associated with a greater odds of having an asthma diagnosis. We found that a severe FA to at least one food was strongly associated with the diagnosis of asthma, as shown in Table 3. Older children with a severe allergy to any food had a 6.0-fold (95% CI: 3.0–12.4, $P<0.0001$) increased risk of developing asthma compared with children without FA, whereas those with a non-severe FA to any food allergen had only a 2.9 (95% CI: 1.2–7.0, $P=0.0174$) greater odds of having asthma. A similar pattern was seen in the children <6 years of age. Younger children with severe food allergies had a 6.2-fold (95% CI: 2.0–19.3, $P=0.0017$) increased risk of developing asthma, while those with non-severe food allergies had a 3.8 (95% CI: 1.1–13.2, $P=0.0322$) increased risk. The associations for specific food allergens were evaluated in older children, and for severe allergies to milk, egg and peanut, all three of these reached statistical significance in a model including age, gender, ethnicity, intrafamilial correlations, family history of asthma and aeroallergen sensitization (Supporting information Table S3). Other food allergens had insufficient numbers for adjusted analyses. These analyses of severity of reaction to specific food allergens did not exclude those with multiple food allergens due to sample size issues.

The time from age of first FA onset and age of asthma onset was evaluated for both the older and the younger

age groups using time to asthma analysis (Figs 1 and 2). In the older age group, for children with FA the median age of onset of asthma was 5 years (95% CI: 4–7). In the younger children, the median age of onset of asthma in children with FA was 2.3 years (95% CI: 1.8–3.3). Children in our sample with FA developed asthma significantly earlier than children without FA. Cox proportional hazards modelling, adjusted for age, gender, ethnicity (white vs. non-white), intrafamilial correlations, household income, family history of asthma and aeroallergen sensitization, demonstrated earlier onset of asthma in children with FA than those without it. Younger children with FA were at 3.3 times of hazard for developing asthma (HR = 3.3, 95% CI: 1.1–10.0, $P=0.0362$) and older children with FA were at 3.7 times of hazard for developing asthma (HR = 3.7, 95% CI: 2.2–6.3, $P<0.0001$) than their non-allergic peers.

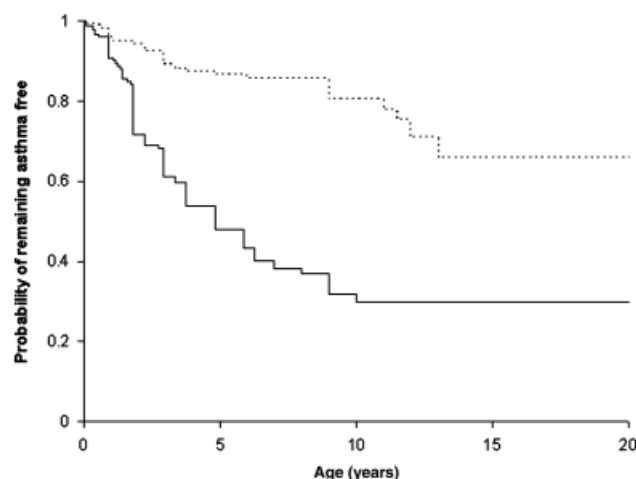


Fig. 2. Age of onset for asthma for children ≥ 6 years old with and without food allergy (FA). Groups represented are as follows: dashed line represents children without FA and the solid line represents children with FA.

Table 3. Relationship between the severity of food allergy and asthma prevalence in children*

	Severity	Number with food allergy	Asthma diagnosis: Yes	OR	95% CI Lower bound	Upper bound	P
< 6 years old (N = 296)	None	87	4 (5%)	1.0	n/a	n/a	n/a
	Non-severe	63	15 (24%)	3.8	1.1	13.2	0.0322
	Severe	146	52 (36%)	6.2	2.0	19.3	0.0017
≥ 6 years old (N = 271)	None	119	24 (20%)	1.0	n/a	n/a	n/a
	Non-severe	41	21 (51%)	2.9	1.2	7.0	0.0174
	Severe	111	76 (68%)	6.1	3.0	12.4	<.0001

*Adjusted for age, gender, ethnicity (white vs. non-white), intrafamilial correlations, household income, family history of asthma and aeroallergen sensitization.

Cochran–Armitage test for trend (unadjusted) $P<.0001$ (<6 years old).

Cochran–Armitage test for trend (unadjusted) $P<.0001$ (≥ 6 years old).

OR, odds ratio; CI, confidence interval.

Discussion

Asthma and FA have been described as part of the 'atopic march'; however, there is a lack of in-depth analysis on the interrelationship between symptomatic FA and the development of asthma. This study has several strengths. We examined FA both in terms of clinically symptomatic FA and asymptomatic sensitization. We examined FA as a whole, specific food allergies, as well as number and severity of FA. We studied the FA-asthma relationship in a large sample of US children stratified by age group (<6 years vs. ≥ 6 years) to account for the differences in the age of onset and natural history of these two diseases. Our analysis also accounted for important covariates or confounders such as family history, total IgE and aeroallergen sensitization.

Our study confirmed a number of findings of other studies. Consistent with a prior report [15], we found a strong association between symptomatic FA and asthma. Furthermore, we found that this effect was independent of family history and aeroallergen sensitization, which is corroborated by one other study which also accounted for sensitization to aeroallergens [16]. Both egg and milk allergy have been specifically implicated as risk factors for the development of asthma [35–38]. Our study corroborated this, but also found that other allergens such as peanut and tree nut were also strongly associated with the development of asthma.

Our study has contributed several novel observations to the literature as well. We found evidence of a dose effect in terms of both number and severity of food allergies with the likelihood of having a diagnosis of asthma. In contrast, we found no association between asymptomatic sensitization to food allergens and asthma. While one smaller study also had showed no association of individual food allergen sensitization and asthma [17], this finding is in contrast to other studies that showed an association with sensitization in general [15, 18, 19]. However, compared with these other studies, our analysis of sensitization was limited to children who were sensitized but without any clinical manifestations of FA. The implication of our findings is that there may be other links between FA and asthma aside from atopy alone, and that this relationship becomes stronger with the presence of greater severity and numbers of food allergies.

While limited by recall bias and the cross-sectional nature of the study, our data suggested temporal relationships between FA and asthma, with FA being diagnosed earlier than asthma. The Kaplan–Meier curve shows that with the presence of FA, the time to first asthma symptoms is earlier than that for children without FA. This is consistent with the prior literature on the atopic march [13, 35].

Our study was careful to study the older and younger (<6 years of age) children separately for a number of

reasons. The older children were ≥ 6 years of age at enrolment and had a current diagnosis of asthma, making this unlikely to simply be transient wheezing [31]. In the younger children, transient wheezing cannot be excluded. On the other hand, some of the children may outgrow their FA by the time they are 6 years of age. Nevertheless, the overall pattern of the FA-asthma association was consistent across the age groups.

There are a number of considerations and cautions in interpreting our findings. Food allergies were not confirmed by food challenge but by fulfilling clinical criteria which included having a corroborative allergy test in the presence of typical (self-reported) symptoms of a food-allergic reaction within 2 h of ingesting the food. The symptoms included muco-cutaneous symptoms of urticaria or angioedema, respiratory symptoms or cardiovascular symptoms. Gastrointestinal symptoms were only included as indicative of a reaction in the presence of one of the other symptoms mentioned.

While this is not equivalent to the results of a challenge, it is better than self-report or physician diagnosis alone. Our approach is consistent with other published studies of FA in which food challenge was not required to establish the existence of FA [39–42], and in some cases, our approach is more strenuous as we incorporated serologic criteria in addition to clinical history [43]. Finally, the types of patients described as having FA in this study would be consistent with those who would be diagnosed as having FA in a specialist clinic as noted by the fact that 100% of the subset of subjects seen in a tertiary care Allergy Immunology Clinic were diagnosed as having FA. Certainly, those with severe FA by our definition would be classified as having anaphylaxis, and such patients were not challenged in other studies that have utilized challenge as a gold standard [41].

Furthermore, there may be some concern as to whether some children assessed in our study may have outgrown their FA by the time of assessment. The median age of the children in our study was 5.3 years, with the median time lapse from initial symptoms to participation in the study assessment being 3 years. While it is possible that some children could have outgrown the allergy by the time of participation, this may be less likely at this age, given some recent studies of food-allergic cohorts [40, 42]. Also, there were very few individuals who were excluded from being cases on the basis of negative allergy testing after having met our clinical criteria for symptoms and timing.

With regard to asthma, physician diagnosis in the younger age group may be inclusive of individuals with transient wheezing. This would explain the weaker findings in this age group. There is also a chance that subjects are more likely to be diagnosed with asthma if they have FA based on physician judgment. This could be a source of bias in the younger children. Ongoing follow-up of these children will help to ascertain the extent to which this is a

problem. Physician diagnosis of asthma in those older than 6 years is unlikely to represent simply transient wheezing in our sample [31]. However, the rate of asthma in the children over 6 years of age was 20%. Thus, there is some oversampling of asthmatic children in the group of children over 6 years of age. As such, our results are biased towards the null hypothesis, implying that the actual effect sizes are even greater than those which we report. Also, the association of the severity of the reaction and the presence of a diagnosis of asthma does not prove that anaphylaxis increases the risk of asthma. As noted in prior literature [44, 45], asthma itself may be a risk factor for severe FA reactions.

There are a few potential sources of selection bias in this study. One point should be noted, the strongest associations were seen in the older age group. One possible reason for this may be due to the fact that this group represents individuals who are more likely to have persistent FA. Exclusion of some subjects who may have outgrown their FA may have augmented some of these findings and made this sample less representative of the general population with FA. However, this is in keeping with our other findings that those with multiple or severe food allergies are more likely to have asthma. A second point is that the controls were aware that the study was evaluating FA. While it is possible that the parents in these families may have been more interested if there was a family history of atopic disease, our rates of asthma in this population are not out of keeping with what would be expected with 8.9% of the children over 6 years of age having a diagnosis of asthma in control families. Even if there was a higher incidence of atopic family history (and hence asthma in the offspring) in control families compared with the general population, this would bias our results towards the null hypothesis and not be an explanation for our findings. Another potential source of bias towards a positive association is that a diagnosis of asthma is more likely in the younger age group if the child has recurrent wheezing and has a FA as stated above. However, in a subset of 129 children with accessible medical records, a diagnosis was made by pediatric allergists in our tertiary care hospital who use asthma predictive indices in their assessments [46]. A total of 35 children <6 years of age had asthma by report and were also seen at our institution. The rate of agreement for a specialist diagnosis of asthma in this subgroup under 6 years old with self-report of an asthma diagnosis was 30/35 diagnosed as asthma and 5/35, given a symptomatic diagnosis of 'wheezing'. Finally, because this is not a population-based study and there may be some degree of selection bias as outlined above, caution is needed when extrapolating our findings to the general population.

Our data evaluating the temporal relationship were derived from a cross-sectional analysis and may be subject to recall bias. As such, these findings are suggestive

and need confirmation in a large, longitudinal birth cohort study. Notably, longitudinal studies of sensitization have shown a similar temporal pattern for food allergen sensitization and the development of asthma, but did not specifically address clinical FA (as opposed to sensitization) as a primary determinant [15, 18, 19]. While similar predictions between FA and what was termed asthma at 24 months have been noted in the past [23], that study had not followed children beyond an age where diagnoses of asthma may be distinguished from transient wheezing. Also, a prior study evaluating this issue in a longitudinal fashion may not have found an association with asthma at 7 years of age due to insufficiently large sample size [22]. Therefore, the significantly earlier onset of asthma in those with FA needs to be explored in large longitudinal birth cohorts.

Despite the limitations, our data is valuable for hypothesis generation and planning of future studies. The dose effect and the fact that these findings are independent of aeroallergen sensitization and family history of atopy imply that there may be more than just the common link of atopy which may contribute to this association. Indeed, there is some suggestion that those with FA may have more of a neutrophilic type of airway inflammation [47], which is associated with more severe asthma [48]. Our study raised the possibility of certain common environmental and genetic factors underlying both FA and asthma, which warrant additional investigations.

Our findings, if replicated by future studies, may have important clinical implications. FA may play a role in patients in whom asthma is poorly controlled with increased levels of health care utilization [20, 21]. Similarly, if FA is a risk factor for asthma development, a logical question would be how to reduce the risk of asthma among children with FA. One topic that was explored previously was whether infant-feeding interventions could modify the risk of asthma. This is particularly relevant given the recent AAP task force statement [49]. This area is highlighted by the contradictory nature of the previous literature including prevention studies with a dietary component [24–27, 50], and studies evaluating the role of breastfeeding in children of asthmatic or atopic mothers [51–53]. While it is possible that interventions to prevent or mitigate FA in early life could reduce the risk of asthma, more prospective studies or intervention trials are needed.

In summary, our data indicated a strong association, a dose effect and a possible temporal relationship between symptomatic FA and asthma. Our findings add to the literature that FA may be one of the risk factors for the development of asthma. Because these findings are derived from a cross-sectional analysis and are not sufficient to imply causality [54] especially in a complex disease such as asthma, further prospective birth cohort studies are needed to validate these findings. Also, further studies

are necessary to evaluate underlying mechanisms behind this association aside from the common risk factor of atopy.

Acknowledgements

Source(s) of support: This study is in part supported by the Food Allergy Project and grant M01 RR-00048 from the National Center for Research Resources, National Institutes of Health, the Chicago Community Trust (C2007-01166); the Sacks Family Fund; and Excellent in Academic Medicine Award by the State of Illinois.

Conflicts of interest: Dr Kumar has a unrestricted grant (<\$10000) from Verus Pharmaceuticals for an unrelated project.

The authors would like to thank the participating families of the Children's Memorial Food Allergy Project.

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Supporting information

Additional supporting information may be found in the online version of this article:

Table S1. Relationship between symptomatic food allergy and asthma in children ≥ 6 years old ($n = 443$).

Table S2a. Relationship between skin test positivity to food allergens and asthma in children ≥ 6 years old with asymptomatic sensitization.

Table S2b. Relationship between detectable levels of specific IgE to food allergens and asthma in children ≥ 6 years old with asymptomatic sensitization.

Table S3. Severity of food allergy and asthma prevalence in children ≥ 6 years (total subjects = 271) CMH Food Allergy Baseline Interview Questionnaire Please note: Wiley-Blackwell is not responsible for the content or functionality of any supporting materials supplied by the authors. Any queries (other than missing material) should be directed to the corresponding author for the article.

Online Repository:

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Source(s) of support: The parent study is in part supported by the Food Allergy Project, NIEHS (PI: Wang, R21 ES011666), and NICHD (PI: Wang, R01 HD041702).

Table E1. Relationship between symptomatic food allergy and asthma in children ≥ 6 years old (n=443)

Food Allergy Status	N	Asthma Diagnosis	OR	95% CI		p
		Yes		Lower bound	Upper bound	
Any Food Allergen	152	97(64%)	4.6	2.4	8.8	$<.0001^1$
Milk	50	34(68%)	7.4	2.5	21.4	$<0.01^1$
Egg	49	36(73%)	13.6	4.6	40.3	$<.0001^1$
Peanut	94	64(68%)	5.6	2.3	13.6	$<0.01^1$
Soy	11	9(82%)	17.8	3.6	87.9	$<.0001^2$
Wheat	6	5(83%)	19.8	2.2	177.4	$<0.01^2$
Fish	5	5(100%)	—	—	—	$<0.01^2$
Shellfish	10	7(70%)	9.2	2.2	38.4	$<0.01^2$
Sesame	12	7(58%)	5.5	1.6	19.0	$<0.01^2$
Walnut	30	20(67%)	9.2	2.6	32.8	$<0.01^1$

¹Adjusted for age, gender, ethnicity (white vs non-white), intrafamilial correlation, family history of asthma, and aeroallergen sensitization

²Unadjusted

Table E2A. Relationship between skin test positivity to food allergens and asthma in children ≥ 6 years old with asymptomatic sensitization*

Positive skin test (MWD ≥ 3 mm)	N	Asthma Diagnosis	OR	95% CI		p
		Yes		Lower bound	Upper bound	
Any Food Allergen	45	13(29%)	1.8	0.8	4.0	0.16
Milk	2	1(50%)	4.4	0.3	72.5	0.35†
Egg	0	0(0%)	—	—	—	—
Peanut	21	8(38%)	2.7	1.0	7.3	0.05
Soy	20	5(25%)	1.5	0.5	4.5	0.51
Wheat	2	1(50%)	4.4	0.3	72.5	0.35†
Fish	2	0(0%)	—	—	—	—
Shellfish	14	5(36%)	2.4	0.7	8.0	0.14
Sesame	15	4(27%)	1.6	0.5	5.5	0.49†
Walnut	14	5(36%)	2.4	0.7	8.0	0.14

*Unadjusted

† Fischer's exact test used due to number of observations, all others use Chi square as test statistic.

Table E2B. Relationship between detectable levels of specific IgE to food allergens and asthma in children ≥ 6 years old with asymptomatic sensitization

Detectable specific IgE	N	Asthma Diagnosis	OR	95% CI		p
		Yes		Lower bound	Upper bound	
Any Food Allergen	146	43(29%)	1.5	0.8	2.8	0.17 ¹
Milk	67	17(25%)	1.2	0.6	2.6	0.56 ²
Egg	58	18(31%)	1.6	0.8	3.5	0.19 ²
Peanut	49	16(33%)	1.8	0.8	3.8	0.15 ²
Soy	45	17(38%)	2.2	1.0	4.8	0.04 ²
Wheat	89	21(24%)	1.1	0.6	2.3	0.74 ²
Fish	3	2(67%)	7.3	0.6	84.7	0.13 ²
Shellfish	33	10(30%)	1.6	0.7	3.9	0.31 ²
Sesame	81	22(27%)	1.4	0.7	2.7	0.38 ²
Walnut	34	12(35%)	2.0	0.8	4.7	0.11 ²

¹Adjusted for age, gender, ethnicity (white vs non-white), intrafamilial correlation, family history of asthma, and aeroallergen sensitization.

²Unadjusted

Table E3. Severity of food allergy and asthma prevalence in Children ≥ 6 years (Total subjects=271)

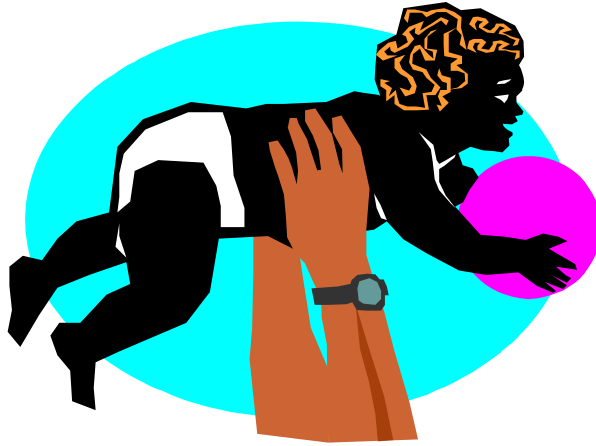
Food Allergen	Severity	N	Asthma Diagnosis		OR	95% CI		p	p-trend*
			N	%		Lower bound	Upper bound		
Milk	None	119	24	20%	1	—	—	—	<0.0001
	Non-severe	8	5	62%	6.9	1.1	44.5	0.041	
	Severe	42	29	69%	7.5	2.4	23.3	<0.01 ¹	
Egg	None	119	24	20%	1	—	—	—	<0.0001
	Non-severe	21	15	71%	12	3.1	46.2	<0.01 ¹	
	Severe	28	21	75%	15.3	4.2	55.6	<.0001 ¹	
Peanut	None	119	24	20%	1	—	—	—	<0.0001
	Non-severe	34	22	65%	5	1.6	15.3	<0.01 ¹	
	Severe	60	42	70%	6	2.3	15.6	<0.01 ¹	
Soy	None	119	24	20%	1	—	—	—	<0.0001
	Non-severe	2	1	50%	4.3	0.7	107.5	0.372	
	Severe	9	8	89%	35.6	3.7	346.4	<0.01 ²	
Wheat	None	119	24	20%	1	—	—	—	0.0025
	Non-severe	1	1	100%	—	—	—	0.212	
	Severe	5	4	80%	15.8	1.7	148.2	<0.01 ²	
Fish	None	119	24	20%	1	—	—	—	<0.0001
	Non-severe	3	3	100%	—	—	—	0.012	
	Severe	2	2	100%	—	—	—	0.042	
Shellfish	None	119	24	20%	1	—	—	—	0.002
	Non-severe	6	4	67%	6.9	0.8	54.1	0.072	
	Severe	4	3	75%	14.8	1.1	200	0.042	
Sesame	None	119	24	20%	1	—	—	—	0.0053
	Non-severe	6	3	50%	4.3	0.4	28.7	0.132	
	Severe	6	4	67%	8.9	1.3	65.3	0.032	
Walnut	None	119	24	20%	1	—	—	—	<0.0001
	Non-severe	10	6	60%	6.6	1.4	30	0.022	
	Severe	20	14	70%	10.1	3.1	33.2	<0.01 ²	

¹Adjusted for age, gender, ethnicity (white vs non-white), intrafamilial correlations, family history of asthma, and aeroallergen sensitization.

²Unadjusted

*Cochran-Armitage Test for Trend (Exact Test)

CMH Food Allergy Baseline Interview Questionnaire

Today's date / / Interviewer's Name Interview is ☐ Complete ☐ IncompleteLocation of Interview If incomplete date of future visit / / **Family ID**

Type of Questionnaire

 B

SCREENING: For Interviewers:

I. Eligibility

Are you this child's biological parent? ☐ Yes ☐ No

Are you this child's legal guardian? ☐ Yes ☐ No

If no to any of the above, thank participant for his/her time. Enrollment is accepted from biological mother or father only if he/she remains legal guardian of child.

If not parent and legal guardian of child:



II. Explain study purpose and procedures and obtain informed consent.
Introduction and instructions to interviewer (to be read to patient).

Everyone who participates in this study will be asked a series of questions. The questions should take about 30 minutes to answer. You may skip any question you feel uncomfortable answering. I'd like to assure you that this information is confidential and will be used solely for research purposes.

Section I: Family Pedigree (Interviewers: fill in the information for each family member, filling in the circles for all health conditions that apply)

Mom- First Initial DOB / / Gender (F,M) **F**

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Dad- First Initial DOB / / Gender (F,M) **M**

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Index Child- First Initial DOB / / Gender (F,M)

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Sibling 1- First Initial DOB / / Gender (F,M)

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Sibling 2- First Initial DOB / / Gender (F,M)

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Sibling 3- First Initial DOB / / Gender (F,M)

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Sibling 4- First Initial DOB / / Gender (F,M)

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Sibling 5- First Initial DOB / / Gender (F,M)

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies

Sibling 6- First Initial DOB / / Gender (F,M)

☐ Food Allergy ☐ Eczema ☐ Asthma ☐ Hay Fever ☐ Drug Allergy ☐ Other Allergies



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IDENTIFYING INFORMATION TO BE DESTROYED UPON STUDY COMPLETION**Information on the parents and the index child**Child's Name: Last

First

Child's Medical Record Number:

Child's Date of Birth:

 -

 -

Gender of Child: ☐ Male ☐ FemaleChild's Home Address:Street #:

 Street Name:

Apt:

City:

 State:

 Zip Code:

Home Phone #: (

)

 -

Mother's Name: Last

First

Mother's Work Phone #: (

)

 -

 Mother's Cell Phone #: (

)

 -

Mother's E-mail:

Father's Name: Last

First

Father's Work Phone #: (

)

 -

 Father's Cell Phone #: (

)

 -

Father's E-mail:



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For interviewers to read aloud: THESE NEXT QUESTIONS ARE ABOUT YOUR CHILD'S HEALTH DURING HIS/HER FIRST YEAR OF LIFE, OR SINCE BIRTH IF UNDER 1 YEAR OLD.

1. How much did your child weigh at birth? lbs oz grams

2. Was your child born

☐ Before the due date? weeks days before due date

☐ At the due date?

☐ After the due date? weeks days after due date

3. Was your child born by C-section? ☐ Yes ☐ No

4. Since birth or up until your child reached one year of age, has your child ever had any of the following illnesses? (DURING THE FIRST YEAR OF LIFE ONLY)

Common Cold

☐ Yes ☐ No ☐ Not Sure

If yes, how many times?

X's

Gastric / intestinal infection

☐ Yes ☐ No ☐ Not Sure

If yes, how many times?

X's

Conjunctivitis / Pink Eye

☐ Yes ☐ No ☐ Not Sure

If yes, how many times?

X's

RSV / Bronchiolitis

☐ Yes ☐ No ☐ Not Sure

If yes, hospitalized?

☐ Yes ☐ No ☐ Not Sure

Bronchitis

☐ Yes ☐ No ☐ Not Sure

5. Antibiotics are medicines that your doctor prescribes for illnesses caused by infections; examples of some names of commonly prescribed antibiotics are amoxicillin and penicillin. During the first year of life (or since birth IF THE CHILD IS UNDER 1 YEAR OLD), did your child take any antibiotics?

☐ Yes ☐ No ☐ Not Sure

If NO skip to question 7

If yes, how many times was your child prescribed an antibiotic medicine since birth (IF UNDER 1 YEAR OLD) or in the FIRST YEAR OF LIFE?

X's

6. Since birth or up until your child reached one year of age, has your child ever had any of the following illnesses? (DURING THE FIRST YEAR OF LIFE ONLY)

Ear infection ☐ Yes ☐ No ☐ Not Sure

If yes, how many times? X's

Pneumonia ☐ Yes ☐ No ☐ Not Sure

If yes, how many times? X's

Skin infection ☐ Yes ☐ No ☐ Not Sure

If yes, how many times? X's

Urinary tract infection ☐ Yes ☐ No ☐ Not Sure

If yes, how many times? X's

Parasite infection ☐ Yes ☐ No ☐ Not Sure

Bone infection (Osteomyelitis) ☐ Yes ☐ No ☐ Not Sure

Meningitis ☐ Yes ☐ No ☐ Not Sure

Bacteremia / Sepsis (blood infection) ☐ Yes ☐ No ☐ Not Sure

Sinus infection ☐ Yes ☐ No ☐ Not Sure

7. During the first year of life (or since birth IF THE CHILD IS UNDER 1 YEARS OLD), did your child ever live in a farming environment?

☐ Yes ☐ No

8. Were pets present in the home during your child's first year of life (OR SINCE BIRTH IF CHILD IS UNDER 1 YEAR OLD)?

☐ Yes ☐ No

If yes, specify type of pet and how many of each type (Indicate the highest number of pets at any single point in time):

☐ Cat #

☐ Reptile #

☐ Dog #

☐ Rabbit #

☐ Fish #

☐ Guinea Pig #

☐ Bird #

☐ Others

Specify #

Specify #

9. How long has your child lived in your current home?

years months

10. Before the age of five, did someone other than your child's parent help in caring for your child for even part of the day? (nanny, child care, preschool, relative)

☐ Yes ☐ No

If yes, please answer the following questions asking where, how long, how often and # of other children in this care. Please check all that apply.

A. Child care center/preschool? #1 From years months to...

years months

of hours/week # of other children in child's classroom

#2 From years months to...

years months

of hours/week # of other children in child's classroom

#3 From years months to...

years months

of hours/week # of other children in child's classroom

B. Home-based child care? #1 From years months to...
(not in own home)

years months

of hours/week # of other children

#2 From years months to...

years months

of hours/week # of other children

C. In home care (own home, nanny)? From years months to...

years months

of hours/week # of other children

11. Did you breast feed or bottle feed your child, or both?

☐ Breast only ☐ Bottle only ☐ Both

12. For how long did you exclusively breast feed (no formula or food)?

months weeks

13. For how long did you breast feed (with or without the use of formula)?

months weeks

14. During breast feeding, did you take medications for gastrointestinal upset?

☐ Yes ☐ No ☐ Not Sure

if YES, which of the following medications did you take?

☐ Antacids (Mylanta, Rolaid, TUMS, Pepto-Bismol)

☐ H2 Blockers (Pepcid AC, Zantac)

☐ Proton Pump inhibitors (Aciphex, Prilosec, Prevacid, Nexium)

☐ Prokinetic agents (Urecholine, Reglan, Erythromycin)

☐ Not sure

☐ Other, specify

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

15. During pregnancy, did you take medications for gastrointestinal upset?

☐ Yes ☐ No ☐ Not Sure

if YES, which of the following medications did you take?

☐ Antacids (Mylanta, Rolaid, TUMS, Pepto-Bismol)

☐ H2 Blockers (Pepcid AC, Zantac)

☐ Proton Pump inhibitors (Aciphex, Prilosec, Prevacid, Nexium)

☐ Prokinetic agents (Urecholine, Reglan, Erythromycin)

☐ Not sure

☐ Other, specify

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

16. At what age did you introduce the following formula/milk to your child?

Cow's milk formula
(Enfamil, Similac)

☐ Never ☐ Not Sure

--	--

 Year

--	--

 month

--	--

 days

Whey Hydrolyzed formula
(Goodstart)

☐ Never ☐ Not Sure

--	--

 Year

--	--

 month

--	--

 days

Casein Hydrolysate formula
(Nutramigen, Pregestimil,
Alimentum)

☐ Never ☐ Not Sure

--	--

 Year

--	--

 month

--	--

 days

Elemental formula
(Neocate, Elecare, E028)

☐ Never ☐ Not Sure

--	--

 Year

--	--

 month

--	--

 days

Whole Cow's Milk

☐ Never ☐ Not Sure

--	--

 Year

--	--

 month

--	--

 days

Soy formula
(Isomil, Prosobee, Alsoy)

☐ Never ☐ Not Sure

At Year month days

Soy Milk

☐ Never ☐ Not Sure

At Year month days

17. Is your child **younger** than **7 years old**? ☐ Yes ☐ No

If NO skip to question 21

18. In a typical week during a period of breast feeding, how often did you (**THE MOTHER**) eat the following foods?

Cow's Milk/Dairy Products/ Cheese

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Egg

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Peanut (including peanut butter)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Tree nuts (i.e. almond, cashew, filbert/hazel, walnut, brazil, macadamia, pecan, pine, pistachio)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Fish (i.e. salmon, tuna, catfish, cod, flounder, halibut, trout, bass)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Shellfish (i.e., shrimp, crab, lobster, clam, oyster, mussels)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

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Wheat (i.e., pasta, bread, cereal)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Soy/Tofu

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Seeds (i.e. sesame, sunflower, pumpkin)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Green vegetables

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Orange vegetables (carrots, squash, etc.)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Fruits

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Meats (beef, poultry, pork)

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Beans

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Rice

Initially: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Changed diet when child was: years months

New frequency: ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

19. At what age did you first introduce solid food to your child?

☐ Never ☐ Not Sure

At Year month days

20. At what age did you first introduce the following foods to your child?

Cow's milk/Dairy
Products/ Cheese ☐ Never ☐ Not sure

Year Month

Egg

☐ Never ☐ Not Sure

Year month days

Peanut (incl.
peanut butter)

☐ Never ☐ Not Sure

Year month days

Tree Nuts (i.e. almond, cashew, filbert/hazel, walnut, brazil, macadamia,
pecan, pine, pistachio)

☐ Never ☐ Not Sure

Year month days

Fish (i.e. tuna, salmon, cod, flounder, catfish, halibut, trout,
bass)

☐ Never ☐ Not Sure

Year month days

Shellfish (i.e. shrimp, crab, lobster, clam, oyster, mussels)

☐ Never ☐ Not Sure

Year month days

wheat (i.e. pasta, bread, cereal)

☐ Never ☐ Not Sure

At Year month days

Soy/Tofu

☐ Never ☐ Not Sure

At Year month days

Seeds (i.e. sesame, sunflower, pumpkin)

☐ Never ☐ Not Sure

At Year month days

Jar Vegetables (baby food)

☐ Never ☐ Not Sure

At Year month days

Green Vegetables

☐ Never ☐ Not Sure

At Year month days

Orange Vegetables

☐ Never ☐ Not Sure

At Year month days

Fruit Juice

☐ Never ☐ Not Sure

At Year month days

Jar Fruits (baby food)

☐ Never ☐ Not Sure

At Year month days

Fresh Fruits

☐ Never ☐ Not Sure

At Year month days

Meat

☐ Never ☐ Not Sure

At Year month days

Rice Cereal ☐ Never ☐ Not Sure
 At Year month days

21. At present, does your child take any nutritional supplements or vitamins?

☐ Yes ☐ No **If NO skip to question 27**

22. On average how many days per week does your child take a multivitamin/polyvisol?

☐ None ☐ 1-2 days ☐ 3-4 days ☐ 5-6 days ☐ everyday

a) Is the multivitamin infused with iron?

☐ Yes ☐ No ☐ Not Sure

b) Is the multivitamin infused with calcium?

☐ Yes ☐ No ☐ Not Sure

23. On average how many days per week does your child take Trivisol (Vitamins A,C,D)?

☐ None ☐ 1-2 days ☐ 3-4 days ☐ 5-6 days ☐ everyday

24. On average how many days per week does your child take a Calcium supplement?

☐ None ☐ 1-2 days ☐ 3-4 days ☐ 5-6 days ☐ everyday

25. On average how many days per week does your child take Pediasure/Ensure?

☐ None ☐ 1-2 days ☐ 3-4 days ☐ 5-6 days ☐ everyday

26. Other (specify):

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ None ☐ 1-2 days ☐ 3-4 days ☐ 5-6 days ☐ everyday

Other (specify):

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ None ☐ 1-2 days ☐ 3-4 days ☐ 5-6 days ☐ everyday

27. At present, how often does your child eat the following foods per week?

Cow's milk/Dairy Products/Cheese

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Egg

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Peanut(including peanut butter)

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Tree Nuts (i.e. almond, cashew, filbert/hazel, walnut, brazil, macadamia, pecan, pine pistachio)

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Fish (i.e. tuna, salmon, cod, flounder, catfish, halibut, trout, bass)

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Shellfish (i.e. Shrimp, crab, lobster, clam, oyster, mussels)

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Wheat (i.e. pasta, bread, cereal)

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Soy/Tofu

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Seeds (i.e. sesame, sunflower, pumpkin)

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Green Vegetables

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Orange Vegetables (carrots, squash, etc)

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Fruits

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Fruit juice (without calcium) ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Calcium fortified fruit juice ☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Meat

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Beans

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

Rice

☐ None ☐ <1 day ☐ 1-2 days ☐ 3-5 days ☐ 6-7 days

28. Does your child have Eczema?

☐ No

☐ Yes, only when he/she was a baby, but outgrew by age Year(s) Months

☐ Yes, he/she has it now

If **YES**, was your child's eczema diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor?

Year(s) Months Weeks

29. Have you ever used a cream, lotion, or ointment containing steroids on your child's skin; for example: hydrocortisone cream or triamcinolone cream?

☐ Yes ☐ No

30. Has your child ever had asthma?

☐ No

☐ Yes, only when she/he was a baby, but outgrew by age Year(s) Months

☐ Yes, he/she has it now

If **YES**, was your child's asthma diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor?

Year(s) Months

31. Has your child ever used an inhaler or nebulizer? ☐ Yes ☐ No

32. Has your child ever had hay fever or seasonal allergies?

☐ No

☐ Yes, only when she/he was a baby, but outgrew by age Year(s) Months

☐ Yes, he/she has it now

If **YES**, was your child's hay fever diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor?

Year(s) Months

During which season does he/she have seasonal allergies?

☐ Spring ☐ Summer ☐ Autumn ☐ Winter ☐ Year round

33. Has your child ever had pet allergies? ☐ Yes ☐ No

If NO skip to question 34

Has your child ever had a **cat** allergy?

☐ No

☐ Yes, only when she/he was a baby, but outgrew by age Year(s) Months

☐ Yes, he/she has it now

If **YES**, was your child's cat allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor?

Year(s) Months

Has your child ever had a **dog** allergy?

☐ No

☐ Yes, only when she/he was a baby, but outgrew by age Year(s) Months

☐ Yes, he/she has it now

If **YES**, was your child's dog allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor? Year(s) Months

Has your child ever had any **other** pet allergies? ☐ Yes ☐ No **If No, skip to 34**

Other pet allergy #1, specify:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Yes, only when she/he was a baby, but outgrew by age Year(s) Months

☐ Yes, she/he has it now

If **YES**, was your child's allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor?

Year(s) Months

Other pet allergy #2, Specify:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Yes, only when she/he was a baby, but outgrew by age

--	--

 Year(s)

--	--

 Months

☐ Yes, she/he has it now

If **YES**, was your child's allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

34. Does your child have any of the following environmental allergies that have been diagnosed by your doctor?

☐ Pollen ☐ Dust Mite ☐ Cockroach ☐ Mold ☐ Other ☐ None

Specify

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Specify

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Specify

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

35. Has your child ever used anti-allergy medications? (i.e., Benadryl, Zyrtec, Claritin, Atarax)

☐ Yes ☐ No

36. Has your child ever used medications for gastrointestinal upset?

☐ Yes ☐ No

If YES, which medications has he/she taken?

☐ Antacids (Mylanta, Rolaids, TUMS, Pepto-Bismol)

☐ H2 Blockers (Pepcid AC, Zantac)

☐ Proton Pump inhibitors (Aciphex, Prilosec, Prevacid, Nexium)

☐ Prokinetic agents (Urecholine, Reglan, Erythromycin)

☐ Not sure

☐ Other, specify

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

37. Does your child have any drug allergies?

☐ Yes ☐ No

Specify drug:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Was this drug allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was your child when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

Specify drug:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Was this drug allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old was your child when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

Specify drug:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Was this drug allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old was your child when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months38. Has your child been diagnosed with G6PD deficiency? ☐ Yes ☐ No

39. Is your child allergic to insect stings? (for example bee, wasp, yellow jacket. Mosquitoes and spiders don't count)

☐ Yes ☐ No ☐ Don't know/Never been stungIf **Yes**, is it a severe allergy (that is, difficulty breathing, need epi pen or to go to the hospital)?☐ Yes ☐ No40. Is your child allergic to any food(s) at present? ☐ Yes ☐ No41. Has your child ever been allergic to any foods in the past that they have since outgrown? ☐ Yes ☐ No**If NO to question 40 AND 41, skip to Pediatric Sleep Questionnaire (question A1)****Dairy products/ Cheese/ Milk**☐ Current ☐ Outgrown ☐ NeverIf Current/Outgrown, how old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 monthsIf Outgrown, at what age?

--	--

 years

--	--

 months**Egg**☐ Current ☐ Outgrown ☐ NeverIf Current/Outgrown, how old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 monthsIf Outgrown, at what age?

--	--

 years

--	--

 months**Peanuts**☐ Current ☐ Outgrown ☐ NeverIf Current/Outgrown, how old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 monthsIf Outgrown, at what age?

--	--

 years

--	--

 months

Tree Nut ☐ Current ☐ Outgrown ☐ Never

If Current/Outgrown, how old was your child when you first noticed his/her food allergy? years months

If **Current**, please choose the specific type (select all that apply):

- ☐ Almond ☐ Cashew ☐ Filbert/hazel ☐ Walnut
☐ Brazil ☐ Macadamia ☐ Pecan ☐ Pine
☐ Pistachio ☐ Other

If Outgrown, at what age? years months

If **Outgrown**, please choose the specific type (select all that apply):

- ☐ Almond ☐ Cashew ☐ Filbert/hazel ☐ Walnut
☐ Brazil ☐ Macadamia ☐ Pecan ☐ Pine
☐ Pistachio ☐ Other

Fish ☐ Current ☐ Outgrown ☐ Never

If Current/Outgrown, how old was your child when you first noticed his/her food allergy? years months

If **Current**, please choose the specific type (select all that apply)

- ☐ Salmon ☐ Tuna ☐ Catfish ☐ Cod ☐ Flounder ☐ Halibut ☐ Trout ☐ Bass

Other

If Outgrown, at what age? years months

If **Outgrown**, please choose the specific type (select all that apply)

- ☐ Salmon ☐ Tuna ☐ Catfish ☐ Cod ☐ Flounder ☐ Halibut ☐ Trout ☐ Bass

Other

Shellfish ☐ Current ☐ Outgrown ☐ Never

If Current/Outgrown, how old was your child when you first noticed his/her food allergy? years months

If **Current**, please choose the specific type (select all that apply)

- ☐ Shrimp ☐ Crab ☐ Lobster ☐ Clam ☐ Oyster ☐ Mussels

If Outgrown, at what age? years months

If **Outgrown**, please choose the specific type (select all that apply)

- ☐ Shrimp ☐ Crab ☐ Lobster ☐ Clam ☐ Oyster ☐ Mussels

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[illegible]

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[illegible]

☐ Sesame ☐ Sunflower ☐ Pumpkin ☐ other

other Foods (specify)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Current ☐ Outgrown

How old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 months

If Outgrown, at what age?

--	--

 years

--	--

 months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Current ☐ Outgrown

How old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 months

If Outgrown, at what age?

--	--

 years

--	--

 months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Current ☐ Outgrown

How old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 months

If Outgrown, at what age?

--	--

 years

--	--

 months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Current ☐ Outgrown

How old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 months

If Outgrown, at what age?

--	--

 years

--	--

 months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Current ☐ Outgrown

How old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 months

If Outgrown, at what age?

--	--

 years

--	--

 months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Current ☐ Outgrown

How old was your child when you first noticed his/her food allergy?

--	--

 years

--	--

 months

If Outgrown, at what age?

--	--

 years

--	--

 months



└─



- └─



⌋

43a. Mouth

[illegible]

43 b/c. Eye/Nose

43. b7c: Eye/Nose										Red/Watery/ Itchy Eye	Swollen Eye	Stuffy/Runny Nose	Sneezing	Itchy Nose
Type of Food														
Cow's Milk/Dairy Products/Cheese										☐	☐	☐	☐	☐
Egg										☐	☐	☐	☐	☐
Peanut										☐	☐	☐	☐	☐
Tree Nuts										☐	☐	☐	☐	☐
Fish										☐	☐	☐	☐	☐
Shellfish										☐	☐	☐	☐	☐
Wheat										☐	☐	☐	☐	☐
Soy/Tofu										☐	☐	☐	☐	☐
Seeds										☐	☐	☐	☐	☐
										☐	☐	☐	☐	☐
										☐	☐	☐	☐	☐
										☐	☐	☐	☐	☐
										☐	☐	☐	☐	☐
										☐	☐	☐	☐	☐
										☐	☐	☐	☐	☐

43 d. Throat

Type of Food	Itching and/or tightness in the throat	Hoarseness/ change of voice	Choking/ Difficulty Swallowing	Throat Clearing
Cow's Milk/Dairy Products/Cheese	☐	☐	☐	☐
Egg	☐	☐	☐	☐
Peanut	☐	☐	☐	☐
Tree Nuts	☐	☐	☐	☐
Fish	☐	☐	☐	☐
Shellfish	☐	☐	☐	☐
Wheat	☐	☐	☐	☐
Soy/Tofu	☐	☐	☐	☐
Seeds	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐
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☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐

43 e. Skin

[illegible]

Type of Food	Shortness of breath	Repetitive coughing	Wheezing	Chest Tightness
Cow's Milk/Dairy Products/Cheese	☐	☐	☐	☐
Egg	☐	☐	☐	☐
Peanut	☐	☐	☐	☐
Tree Nuts	☐	☐	☐	☐
Fish	☐	☐	☐	☐
Shellfish	☐	☐	☐	☐
Wheat	☐	☐	☐	☐
Soy/Tofu	☐	☐	☐	☐
Seeds	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐
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☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐

43 g. Gut

Type of Food	Stomach cramps/pain	Nausea	Vomiting	Diarrhea	Bloating (swelling, gassy feeling)
Cow's Milk/Dairy Products/Cheese	☐	☐	☐	☐	☐
Egg	☐	☐	☐	☐	☐
Peanut	☐	☐	☐	☐	☐
Tree Nuts	☐	☐	☐	☐	☐
Fish	☐	☐	☐	☐	☐
Shellfish	☐	☐	☐	☐	☐
Wheat	☐	☐	☐	☐	☐
Soy/Tofu	☐	☐	☐	☐	☐
Seeds	☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐	☐
☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐	☐	☐	☐	☐	☐



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43 h. Cardiovascular

Type of Food	Pale or turn blue	Dizzy/Light-headed	Passing out/Fainting
Cow's Milk/Dairy Products/Cheese	☐	☐	☐
Egg	☐	☐	☐
Peanut	☐	☐	☐
Tree Nuts	☐	☐	☐
Fish	☐	☐	☐
Shellfish	☐	☐	☐
Wheat	☐	☐	☐
Soy/Tofu	☐	☐	☐
Seeds	☐	☐	☐
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44. Has your child ever experienced a severe allergic reaction that affected the throat, lungs, and/or cardiovascular system? ☐ Yes ☐ No

45. If yes, to what foods? (Select all that apply)

Type of Food	Doctor Diagnosed?	Number of episodes (lifetime)	Number of Episodes (in last year)
Cow's Milk/Dairy Products/Cheese	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Egg	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Peanut	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Tree Nuts	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Fish	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Shellfish	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Wheat	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Soy/Tofu	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
Seeds	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
<table border="1" style="display: inline-table; width: 100px; height: 15px;"></table>	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
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<table border="1" style="display: inline-table; width: 100px; height: 15px;"></table>	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>
<table border="1" style="display: inline-table; width: 100px; height: 15px;"></table>	☐ Yes ☐ No	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>	<table border="1" style="display: inline-table; width: 40px; height: 20px;"></table>

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46. How long does it usually take from eating the food to the onset of the allergic symptoms?

Type of Food

Time until onset of allergic symptoms

[illegible]

47. Has your child ever had an allergic reaction that improved completely and then came back? ☐ Yes ☐ No

If yes, timing to onset of recurrent symptoms:

Type of Food

Time until onset of recurrent symptoms

[illegible]

Pediatric Sleep Questionnaire

Please answer the following questions regarding the behavior of your child during sleep and wakefulness. The questions apply to how your child acts in general, not necessarily during the past few days. When you see the word "usually" it means "more than half the time" or "on more than half the nights."

A. Nighttime and sleep behavior

A1. While sleeping, does your child ever snore?

☐ Yes ☐ No ☐ Don't know

If NO skip to question A5

A2. Does your child snore more than half the time (half the time he/she sleeps)?

☐ Yes ☐ No ☐ Don't Know

A3. Does your child always snore?

☐ Yes ☐ No ☐ Don't Know

A4. Does your child snore loudly?

☐ Yes ☐ No ☐ Don't Know

A5. While sleeping, does your child have "heavy" or loud breathing?

☐ Yes ☐ No ☐ Don't Know

A6. While sleeping, does your child have trouble breathing or struggle to breathe?

☐ Yes ☐ No ☐ Don't Know

A7. Have you ever seen your child stop breathing during the night?

☐ Yes ☐ No ☐ Don't Know

If so, please describe what happened:

A8. Have you ever been concerned about your child's breathing during the night?

☐ Yes ☐ No ☐ Don't Know

A9. Have you ever had to shake your sleeping child to get him or her to breathe or wake up and breathe?

☐ Yes ☐ No ☐ Don't know

A11. Have you ever seen your child wake up with a snorting sound?

☐ Yes ☐ No ☐ Don't Know

A12. Does your child have restless sleep?

☐ Yes ☐ No ☐ Don't Know

A13. Does your child describe restlessness of the legs when in bed?

☐ Yes ☐ No ☐ Don't Know

A13a. Does your child have "growing pains" (unexplained leg pains)?

☐ Yes ☐ No ☐ Don't Know

A13b. Does your child have growing pains that are worst in bed?

☐ Yes ☐ No ☐ Don't Know

A14. While your child sleeps, have you seen brief kicks of one leg or both legs?

☐ Yes ☐ No ☐ Don't Know

A14a. While your child sleeps, have you seen repeated kicks or jerks of the legs at regular intervals (i.e., about every 20 to 40 seconds)?

☐ Yes ☐ No ☐ Don't Know

A15. At night, does your child usually become sweaty, or do the pajamas usually become wet with perspiration?

☐ Yes ☐ No ☐ Don't know

A16. At night does your child usually get out of bed (for any reason)?

☐ Yes ☐ No ☐ Don't Know

A17. At night, does your child get out of bed to urinate?

☐ Yes ☐ No ☐ Don't Know

A17a. If yes, how many times each night, on average?

A21. Does your child usually sleep with the mouth open? ☐ Yes ☐ No ☐ Don't Know

A22. Is your child's nose usually congested or "stuffed" at night?

☐ Yes ☐ No ☐ Don't Know

A23. Do any allergies affect your child's ability to breathe through the nose?

☐ Yes ☐ No ☐ Don't Know

A24. Does your child tend to breathe through the mouth during the day?

☐ Yes ☐ No ☐ Don't Know

A25. Does your child have a dry mouth upon waking up in the morning?

☐ Yes ☐ No ☐ Don't Know

A27. Does your child complain of an upset stomach at night?

☐ Yes ☐ No ☐ Don't Know

A29. Does your child get a burning feeling in the throat at night?

☐ Yes ☐ No ☐ Don't Know

A30. Does your child grind his or her teeth at night? ☐ Yes ☐ No ☐ Don't Know

A32. Does your child occasionally wet the bed? ☐ Yes ☐ No ☐ Don't Know

A33. Has your child ever walked during sleep ("sleep walking")?

☐ Yes ☐ No ☐ Don't Know

A34. Have you ever heard your child talk during sleep ("sleep talking")?

☐ Yes ☐ No ☐ Don't Know

A35. Does your child have nightmares or awaken at night afraid or appearing tearful once a week or more on average?

☐ Yes ☐ No ☐ Don't know

A35a. If yes, after awakening from one of these episodes, can your child tell you about the dream?

☐ Yes ☐ No ☐ Don't know

A36. Has your child ever woken up screaming during the night? ☐ Yes ☐ No ☐ Don't Know

A37. Has your child ever moved or behaved at night in a way that made you think your child was neither completely awake nor asleep?

☐ Yes ☐ No ☐ Don't know

If so, please describe what happened:

A40. Does your child have difficulty falling asleep at night? ☐ Yes ☐ No ☐ Don't Know

A41. How long does it take your child to fall asleep at night? hrs. min

A42. At bedtime does your child usually have difficult "routines" or "rituals," argue a lot, or otherwise behave badly? ☐ Yes ☐ No ☐ Don't know

A43. Does your child bang his/her head or rock his/her body when going to sleep?

☐ Yes ☐ No ☐ Don't Know

A44. Does your child wake up more than twice a night on average?

☐ Yes ☐ No ☐ Don't Know

A45. Does your child have trouble falling back asleep if he or she wakes up at night?

☐ Yes ☐ No ☐ Don't Know

A46. Does your child wake up early in the morning and have difficulty going back to sleep? ☐ Yes ☐ No ☐ Don't know

A47. Does the time at which your child goes to bed change a lot from day to day?

☐ Yes ☐ No ☐ Don't Know

A48. Does the time at which your child gets up from bed change a lot from day to day?

☐ Yes ☐ No ☐ Don't Know

A49. What time does your child usually go to bed (fall asleep) during the week?

:

A50. What time does your child usually go to bed (fall asleep) on the weekend or vacation?

:

A51. What time does your child usually get out of bed (wake up) on weekday mornings?

:

A52. What time does your child usually get out of bed (wake up) on weekend or vacation mornings?

:

A53. How many hours of sleep does your child usually get on school nights?

hr(s) min

A54. How many hours of sleep does your child usually get on non-school nights?

hr(s) min

B. Daytime behavior and other possible problems:

B1. Does your child wake up feeling unrefreshed in the morning? ☐ Yes ☐ No ☐ Don't Know

B2. Does your child have a problem with sleepiness during the day? ☐ Yes ☐ No ☐ Don't Know

B3. Does your child complain that he or she feels sleepy during the day?

☐ Yes ☐ No ☐ Don't Know

B4. Has a teacher or other supervisor commented that your child appears sleepy during the day? ☐ Yes ☐ No ☐ Don't know

B5. Does your child usually nap during the day? ☐ Yes ☐ No ☐ Don't Know

B5a. If no, during a usual week, how many times does this child take a nap for 5 minutes or more? (Write in "0" if he/she does not take any naps.)

naps/week

B6. Is it hard to wake your child up in the morning? ☐ Yes ☐ No ☐ Don't Know

B7. Does your child wake up with headaches in the morning? ☐ Yes ☐ No ☐ Don't Know

B8. Does your child get a headache at least once a month, on average?

☐ Yes ☐ No ☐ Don't Know

B9. Did your child stop growing at a normal rate at any time since birth?

☐ Yes ☐ No ☐ Don't Know

If so, please describe what happened:

B10. Does your child still have tonsils and/or adenoids? ☐ Yes ☐ No ☐ Don't Know

If not, when were they removed? yr mo

B11. Has your child ever had a condition causing difficulty with breathing?

☐ Yes ☐ No ☐ Don't Know

If so, please describe:

B12. Has your child ever had surgery? ☐ Yes ☐ No ☐ Don't Know

B12a. If yes, did any difficulties with breathing occur before, during, or after surgery?

☐ Yes ☐ No ☐ Don't Know

B13. Has your child ever become suddenly weak in the legs, or anywhere else, after laughing or being surprised by something?

☐ Yes ☐ No ☐ Don't know

B15. Has your child ever felt unable to move for a short period, in bed, though awake and able to look around?

☐ Yes ☐ No ☐ Don't know

B16. Has your child ever felt an irresistible urge to take a nap at times, forcing him or her to stop what he or she is doing in order to sleep?

☐ Yes ☐ No ☐ Don't know

B17. Has your child ever sensed that he or she was dreaming (seeing images or hearing sounds) while still awake?

☐ Yes ☐ No ☐ Don't know

B18. Does your child drink caffeinated beverages on a typical day (cola, tea, coffee)?

☐ Yes ☐ No ☐ Don't know

B17a. If yes, how many cups or cans per day?

☐ Yes ☐ No ☐ Don't Know

M	a	r	i	j	u	a	n	a
---	---	---	---	---	---	---	---	---

--	--

days/month

H	e	r	o	i	n			days/month	C	o	c	a	i	n	e			days/month
---	---	---	---	---	---	----------------------	----------------------	------------	---	---	---	---	---	---	---	----------------------	----------------------	------------

S p e e d days/month P C P days/month

B	e	n	z	o	s		V	a	l	i	u	m				days/month
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L	S	D		H	a	l	l	u	c	i	n	o	g	e	n	s			days/month
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C	r	a	c	k		
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 days/month

P	a	i	n	t		g	l	u	e		i	n	h	a	l	a	n	t			days/month
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B	a	r	b	i	t	u	a	t	e	s			days/month
---	---	---	---	---	---	---	---	---	---	---	--	--	------------

E	c	s	t	a	s	y			days/month
---	---	---	---	---	---	---	--	--	------------

O	x	y	c	o	d	o	n	e
---	---	---	---	---	---	---	---	---

--	--

days/month

Other																						days/month
-------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	------------

☐ Yes ☐ No ☐ Don't Know

days/month

[illegible]

days/month

☐ Yes ☐ No ☐ Don't Know

B20a. If so, at what age did this first develop?

--	--

 yrs.

☐ Yes ☐ No ☐ Don't know

☐ Yes ☐ No ☐ Don't know

☐ Yes ☐ No ☐ Don't know

B26. How would you assess this child's activity level compared to other children of his or her age?

Much More

O 5

Modified Epworth Sleepiness Scale

How likely is your child to doze off or fall asleep in the situation described below, in contrast to just feeling tired?

2= Moderate chance of
dozing

Chance of dozing

7

5

9

5

7

7

11

7

II.B Questions about the mother:

Now I would like to ask you some questions about yourself (the child's biological mother)

48. Do you consider yourself Hispanic/ Latino? ☐ Yes ☐ No

49. Which of these groups best describes your racial background?

- ☐ Black/African American
- ☐ White
- ☐ Asian
- ☐ American Indian/Alaska Native
- ☐ Native Hawaiian or other Pacific Islander
- ☐ More than one race
- ☐ Unknown

50. Were you born in the U.S.? ☐ Yes ☐ No

☐ other country (specify)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

If U.S. skip to question 52

51. If born outside the U.S.: How long have you lived in the U.S.?

--	--

Years

--	--

Months

52. Was your mother born in the U.S.? ☐ Yes ☐ No

☐ other country (specify)

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53. Was your father born in the U.S.? ☐ Yes ☐ No

☐ other country (specify)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

54. What is your native language?

☐ English ☐ Spanish ☐ Haitian Creole ☐ French ☐ Portuguese

☐ Other (Specify)

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

55. What is your present marital status?

☐ Married ☐ Widowed ☐ Divorced ☐ Separated ☐ Single

56. What is the highest grade of school you have completed to date?

- ☐ Elementary School
- ☐ Some secondary school (9th grade and above)
- ☐ High school graduate or GED
- ☐ Some college
- ☐ College degree
- ☐ Graduate school degree
- ☐ Post graduate (PhD / MD/ other)

57. Are you currently working for pay? ☐ Yes ☐ No ☐ Retired

58. What is your occupation/ job title?

[illegible]

59. What field does your occupation fall under?

- ☐ Not Applicable
- ☐ Management/ Business/ Administration
- ☐ Financial/ Computer/ Mathematical
- ☐ Architecture and Engineering
- ☐ Life, Physical, and Social Science
- ☐ Legal occupations
- ☐ Education, Training, and Library
- ☐ Sales, Arts, Design, Entertainment, and Media
- ☐ Athletics (Sports, Dancing, etc)
- ☐ Healthcare
- ☐ Food preparation and Serving
- ☐ Building and Grounds cleaning and Maintenance
- ☐ Personal Care and Service
- ☐ Farming, Fishing, and Forestry
- ☐ Construction Trades
- ☐ Extraction Workers
- ☐ Installation, Maintenance, and Repair Workers
- ☐ Production Occupations
- ☐ Transportation and Material Moving
- ☐ Military Specific
- ☐ Other

60. Do you have a personal history of asthma?

☐ No

☐ Yes, only when I was a child, but outgrew by year (s)

☐ Yes, I have it now

If **YES**, was your asthma diagnosed by a doctor? ☐ Yes ☐ No

How old were you when first diagnosed by a doctor? Year(s) Months

61. Have you ever used an inhaler or nebulizer? ☐ Yes ☐ No

62. Do you have a personal history of eczema?

☐ No

☐ Yes, only when I was a child, but outgrew by Year (s)

☐ Yes, I have it now

If **YES**, was your eczema diagnosed by a doctor? ☐ Yes ☐ No

How old were you when first diagnosed by a doctor? Year(s) Months

63. Have you ever used a cream, lotion, or ointment containing steroids on your skin; for example: hydrocortisone cream or triamcinolone cream? ☐ Yes ☐ No

64. Do you have hay fever or seasonal allergies?

☐ No

☐ Yes, only when I was a child, but outgrew by Year (s)

☐ Yes, I have it now

If **YES**, was your hay fever diagnosed by a doctor? ☐ Yes ☐ No

How old were you when first diagnosed by a doctor? Year(s) Months

Which season(s) do you have seasonal allergies?

☐ Spring ☐ Summer ☐ Autumn ☐ Winter ☐ Year round

65. Do you have any drug allergies? ☐ Yes ☐ No

If **YES**, specify the drug

If **YES**, was your drug allergy diagnosed by a doctor? ☐ Yes ☐ No

How old were you when first diagnosed by a doctor? Year(s) Months

Specify 2nd drug:

Was this drug allergy diagnosed by a doctor? ☐ Yes ☐ No

How old were you when first diagnosed by a doctor? Year(s) Months

66. Have you ever used any anti-allergy medications? (i.e. Benadryl, Zyrtec, Claritin, Atarax) ☐ Yes ☐ No

67. Do you have any of the following environmental allergies that have been diagnosed by your doctor?

☐ Cat ☐ Dog ☐ Pollen ☐ Dust Mite ☐ Cockroach ☐ Mold ☐ Other ☐ None

specify

68. Are you allergic to insect stings? (for example bee, wasp, yellow jacket. Mosquitoes and spiders don't count)

☐ Yes ☐ No ☐ Don't know/Never been stung

If **Yes**, is it a severe allergy (that is, difficulty breathing, need epi pen or to go to the hospital)?

☐ Yes ☐ No

69. Do you have food allergies? ☐ Yes ☐ No

If **NO** skip to The **BERLIN QUESTIONNAIRE**

70. If you ever had a food allergy, to which food(s) were you allergic...

Milk/Dairy Products/Cheese

☐ No

☐ Yes, only when I was a child, but outgrew by years

☐ Yes, current allergy

If YES, was your food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old were you when first diagnosed by a doctor? Year(s) Months

Egg

☐ No

☐ Yes, only when I was a child, but outgrew by years

☐ Yes, current allergy

If YES, was your food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old were you when first diagnosed by a doctor? Year(s) Months

Wheat☐ No☐ Yes, only when I was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was your food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old were you when first diagnosed by a doctor? Year(s) Months**Soy/Tofu**☐ No☐ Yes, only when I was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was your food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old were you when first diagnosed by a doctor? Year(s) Months**Other Foods**

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☐ No☐ Yes, only when I was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was your food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old were you when first diagnosed by a doctor? Year(s) Months

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☐ No☐ Yes, only when I was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was your food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old were you when first diagnosed by a doctor? Year(s) Months

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☐ No☐ Yes, only when I was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was your food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old were you when first diagnosed by a doctor? Year(s) Months

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☐ No☐ Yes, only when I was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was your food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old were you when first diagnosed by a doctor? Year(s) Months

The Berlin Questionnaire

1. Do you snore? ☐ Yes ☐ No ☐ Don't Know

If NO skip to question 5

2. Snoring loudness ☐ Loud as breathing ☐ Loud as talking ☐ Louder than talking ☐ Very Loud

3. Snoring frequency ☐ Almost every day ☐ 3 to 4 times per week
☐ 1 to 2 times per week ☐ 1 to 2 times per month
☐ Never to almost never

4. Does your snoring bother other people? ☐ Yes ☐ No ☐ Don't Know

5. Has anyone ever noticed that you quit breathing during your sleep?
☐ Almost every day ☐ 3 to 4 times per week
☐ 1 to 2 times per week ☐ 1 to 2 times per month
☐ Never to almost never

6. How often do you feel tired or fatigued after sleep?
☐ Almost every day ☐ 3 to 4 times per week
☐ 1 to 2 times per week ☐ 1 to 2 times per month
☐ Never to almost never

7. How often do you feel tired during waketime?
☐ Almost every day ☐ 3 to 4 times per week
☐ 1 to 2 times per week ☐ 1 to 2 times per month
☐ Never to almost never

8. Have you ever nodded off or fallen asleep while driving a vehicle? ☐ Yes ☐ No

9. Do you have high blood pressure? ☐ Yes ☐ No ☐ Don't Know

Pittsburgh Sleep Quality Index (PSQI)

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month

1. During the past month, when have you usually gone to bed? :

2. During the past month how long (in minutes) has it taken you to fall asleep each night?

3. During the past month, when have you usually gotten up in the morning? :

4. How many actual hours of sleep do you get at night? .

5. During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a. Cannot get to sleep within 30 minutes	☐	☐	☐	☐
b. Wake up in the middle of the night or early morning	☐	☐	☐	☐
c. Have to get up to use the bathroom	☐	☐	☐	☐
d. Cannot breathe comfortably	☐	☐	☐	☐
e. Cough or snore loudly	☐	☐	☐	☐
f. Feel too cold	☐	☐	☐	☐
g. Feel too hot	☐	☐	☐	☐
h. Have bad dreams	☐	☐	☐	☐
i. Have pain	☐	☐	☐	☐
j. Other reasons	☐	☐	☐	☐
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?	☐	☐	☐	☐
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	☐	☐	☐	☐
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?	☐	☐	☐	☐

If so, please describe the other reasons:

9. During the past month, how would you rate your sleep quality overall?

☐ Very Good ☐ Fairly Good ☐ Fairly Bad ☐ Very Bad

Modified Epworth Sleepiness Scale

How likely are you to doze off or fall asleep in the situation described below, in contrast to just feeling tired?

0= No chance of dozing
1= Slight chance of
dozing
2= Moderate chance of
dozing

Situation	Chance of dozing
Sitting and reading	☐
Watching TV	☐
Sitting inactive in a public place (i.e., movie theater or a meeting)	☐
As a passenger in a car for an hour without a break	☐
Laying down to rest in the afternoon when circumstances permit	☐
Sitting and talking to someone	☐
Sitting quietly after lunch	☐
In a car, while stopped for a few minutes in traffic	☐
Total	☐ ☐

Now I would like to ask you some questions about your child's biological father

72. Which one of these groups best describes his racial background?

☐ Black/African American

☐ White

☐ Asian

☐ American Indian/Alaska Native

☐ Native Hawaiian or other Pacific Islander

☐ More than one race

☐ Unknown

73. Was the child's father born in the US? ☐ Yes ☐ No

☐ other country (specify)

[illegible]

74. What is the highest grade of school he has completed to date?

○ Elementary School

☐ Some secondary school (9th grade and above)

☐ High school graduate or GED

☐ Some college

☐ College degree

☐ Graduate school degree

☐ Post graduate (PhD / MD/ other)

75. Is he currently working for pay? ☐ Yes ☐ No ☐ Retired

76. What is his occupation/ job title?

[illegible]

4963099404

What field does his occupation fall under?

- ☐ Not Applicable
- ☐ Management/ Business/ Administration
- ☐ Financial/ Computer/ Mathematical
- ☐ Architecture and Engineering
- ☐ Life, Physical, and Social Science
- ☐ Legal occupations
- ☐ Education, Training, and Library
- ☐ Sales, Arts, Design, Entertainment, and Media
- ☐ Athletics (Sports, Dancing, etc)
- ☐ Healthcare
- ☐ Food preparation and Serving
- ☐ Building and Grounds cleaning and Maintenance
- ☐ Personal Care and Service
- ☐ Farming, Fishing, and Forestry
- ☐ Construction Trades
- ☐ Extraction Workers
- ☐ Installation, Maintenance, and Repair Workers
- ☐ Production Occupations
- ☐ Transportation and Material Moving
- ☐ Military Specific
- ☐ Other _____

77. What is his current height? feet inches or cm

78. What is his current weight? lbs or kg

79. Does he have a personal history of asthma?

- ☐ No
- ☐ Yes, only when he was a child, but outgrew by Years
- ☐ Yes, he has it now
- ☐ Not sure

If YES, was his asthma diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor? Year(s) Months

80. Has he ever used an inhaler or nebulizer? ☐ Yes ☐ No

81. Does he have a personal history of Eczema?

- ☐ No
- ☐ Yes, only when he was a child, but outgrew by Years
- ☐ Yes, he has it now
- ☐ Not sure

If YES, was his eczema diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor? Year(s) Months

83. Does he have any hay fever or seasonal allergies?

☐ Yes, only when he was a child, but outgrew by Years

☐ Not sure

How old was he when first diagnosed by a doctor? Year(s) Months

☐ Spring ☐ Summer ☐ Autumn ☐ Winter ☐ Year round

If **YES**, specify the drug

How old was he when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

How old was he when first diagnosed by a doctor? Year(s) Months

☐ Yes ☐ No ☐ Not Sure

☐ Cat ☐ Dog ☐ Pollen ☐ Dust Mite ☐ Cockroach ☐ Mold ☐ Other ☐ None

specify

[illegible]

87. Is he allergic to insect stings? (for example bee, wasp, yellow jacket. Mosquitoes and spiders don't count)

☐ Yes ☐ No ☐ Don't know/Never been stung

If **Yes**, is it a severe allergy (that is, difficulty breathing, need epi pen or to go to the hospital)?

☐ Yes ☐ No

88. Does he or has he ever had any food allergies? ☐ Yes ☐ No

If NO skip to questions concerning the HOME ENVIRONMENT

89. If he ever had a food allergy, to which food(s) is/was he allergic...

Milk/Dairy Products/Cheese

☐ No

☐ Yes, only when he was a child, but outgrew by years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor? Year(s) Months

Egg

☐ No

☐ Yes, only when he was a child, but outgrew by years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor? Year(s) Months

Peanut

☐ No

☐ Yes, only when he was a child, but outgrew by years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor? Year(s) Months

Tree nut

☐ No

☐ Yes, only when he was a child, but outgrew by years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor? Year(s) Months

If yes, please choose the specific type (select all that apply):

☐ Almond

☐ Cashew

- Filbert/hazel

☐ Walnut

○ Brazil

☐ Macadamia

☐ Pecan

O Pine

○ Pistachio

☐ Other

[illegible]

Fish☐ No☐ Yes, only when he was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old was he when first diagnosed by a doctor? Year(s) Months

If yes, please choose the specific type (select all that apply):

☐ Salmon ☐ Tuna ☐ Catfish ☐ Cod ☐ Flounder ☐ Halibut ☐ Trout ☐ Bass

Other

Shellfish☐ No☐ Yes, only when he was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old was he when first diagnosed by a doctor? Year(s) Months

If yes, please choose the specific type (select all that apply):

☐ Shrimp ☐ Crab ☐ Lobster ☐ Clam ☐ Oyster ☐ Mussels

Other

Seeds☐ No☐ Yes, only when he was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old was he when first diagnosed by a doctor? Year(s) Months

If yes, please choose the specific type (select all that apply):

☐ Sesame ☐ Sunflower ☐ Pumpkin

other

Wheat☐ No☐ Yes, only when he was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old was he when first diagnosed by a doctor? Year(s) Months**Soy/Tofu**☐ No☐ Yes, only when he was a child, but outgrew by years☐ Yes, current allergyIf **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ NoHow old was he when first diagnosed by a doctor? Year(s) Months

Other Foods

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Yes, only when he was a child, but outgrew by

--	--

 years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Yes, only when he was a child, but outgrew by

--	--

 years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Yes, only when he was a child, but outgrew by

--	--

 years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

☐ Yes, only when he was a child, but outgrew by

--	--

 years

☐ Yes, current allergy

If **YES**, was his food allergy diagnosed by a doctor? ☐ Yes ☐ No

How old was he when first diagnosed by a doctor?

--	--

 Year(s)

--	--

 Months

☐ 10 years or less ☐ 11-25 years ☐ 26-50 years ☐ 51-75 years ☐ greater than 75 years

92. Do you (mother of the child) currently smoke or have you ever smoked cigarettes, cigars, or pipes?

- ☐ No, I never smoked
- ☐ I used to smoke but I quit before becoming pregnant with index child
- ☐ I used to smoke but I quit after becoming pregnant with index child
- ☐ Yes, I currently smoke, however I did not smoke during pregnancy with index child
- ☐ Yes, I currently smoke and I did smoke during pregnancy with the index child

If **YES**

What do/did you smoke? ☐ cigarettes ☐ cigars ☐ pipes

Do you smoke inside the home? ☐ Yes ☐ No

How many (cigarettes, cigars, pipes) do you smoke per day?
(Regardless of indoor or outdoor)

93. Does your child's father currently smoke or has he ever smoked cigarettes, cigars, or pipes?

- ☐ No, he never smoked
- ☐ He used to smoke but quit before I became pregnant with index child
- ☐ He used to smoke but quit after I became pregnant with index child
- ☐ Yes, he currently smokes

If **YES**

What does/did he smoke? ☐ cigarettes ☐ cigars ☐ pipes

Does he smoke inside the child's home? ☐ Yes ☐ No

How many (cigarettes, cigars, pipes) does he smoke per day?

94. Do other people who live in your home smoke cigarettes, cigars or pipes? (not including the mother and father of the child)?

☐ Yes ☐ No # of people

How many of them smoke inside the home?

95. Total number of cigarettes smoked inside your home per day

(Not including amount smoked by the mother and father of the child)

96. Do you currently have any pets in your home? ☐ Yes ☐ No

If yes, specify the type of pet and how many of each type:

☐ Cat #

☐ Reptile #

☐ Dog #

☐ Rabbit #

☐ Fish #

☐ Guinea Pig #

☐ Bird #

Others ☐ Yes ☐ No

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#

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#

97. Does the house you live in have any cockroaches? ☐ Yes ☐ No

98. Does the house you live in have any mice/rats? ☐ Yes ☐ No

99. Does the house you live in have any visible mold, mildew, water damage, leakage, or seepage? ☐ Yes ☐ No

100. Do you currently live in a farming environment? ☐ Yes ☐ No