



Screening for Asthma- and Allergy-related Symptoms and Associated Factors in Children: A School-based Cross-sectional Study

Çocuklarda Astım ve Alerjiyle İlişkili Semptomlar ile İlişkili Faktörlerin Taranması: Okul Temelli Kesitsel Bir Çalışma

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ABSTRACT

Aim: This school-based cross-sectional study aimed to determine the proportion of school-age children who screened positive for asthma- and allergy-related symptoms and to identify associated child- and parent-level factors.

Materials and Methods: This cross-sectional study was conducted among children attending grades 2-7 at a single school in İstanbul. Data were collected using a structured Child and Parent Information Form and the School-Based Asthma and Allergy Screening Questionnaire (SBASQ), which comprises a parent/caregiver questionnaire (PQ) and a student questionnaire (SQ). SBASQ cut-off scores were used to identify screening-positive results for asthma- and allergy-related symptoms. A total of 379 children with complete questionnaires were included in the analysis.

Results: The mean age of participants was 10.09 ± 1.97 (7-14) years, and 62.8% were aged 7-10 years. Based on the PQ, 27.7% of children screened positive for asthma-related symptoms and 68.1% for allergy-related symptoms; corresponding proportions based on the SQ were 25.3% and 63.6%, respectively. Antibiotic use during the first year of life and a history of respiratory disease before the age of two years were significantly associated with higher screening-positive rates for both asthma- and allergy-related symptoms across both PQ and SQ analyses ($p < 0.05$ for all comparisons). Positive screening for asthma-related symptoms according to the PQ was more frequent among boys ($p = 0.041$), children with low birth weight ($p = 0.035$), and those with a history of hospitalization due to pneumonia ($p = 0.018$). For allergy-related symptoms, positive screening according to the PQ was significantly associated with maternal asthma/allergy ($p = 0.012$) and frequent consumption of packaged/processed foods ($p = 0.017$).

Conclusion: This study demonstrated that a substantial proportion of school-age children screened positive for asthma- and allergy-related symptoms. Several child- and parent-level characteristics were associated with positive screening results. These findings suggest that symptom-based school screening may help identify children who could benefit from further clinical evaluation, without implying a clinical diagnosis.

Keywords: Asthma, allergy, children, school, screening

ÖZ

Amaç: Bu okul temelli kesitsel çalışma, okul çağı çocuklarında astım ve alerji ile ilişkili semptomlar açısından pozitif tarama sonucuna sahip olanların oranını belirlemeyi ve çocuk ve ebeveyn düzeyindeki ilişkili faktörleri tanımlamayı amaçlamıştır.

Gereç ve Yöntem: Bu kesitsel çalışma, İstanbul'da tek bir okulda 2-7. sınıflarda öğrenim gören çocuklar arasında yürütüldü. Veriler, yapılandırılmış Çocuk ve Ebeveyn Bilgi Formu ile ebeveyn/bakıcı anketi (EA) ve öğrenci anketinden (ÖA) oluşan Okul Temelli Astım ve Alerji Tarama Anketi (OTATA) kullanılarak toplandı. OTATA kesme puanları, astım ve alerji ile ilişkili semptomlar açısından pozitif tarama sonuçlarını belirlemek amacıyla kullanıldı. Anketleri eksiksiz dolduran toplam 379 çocuk analize dahil edildi.

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Bulgular: Katılımcıların yaş ortalaması $10,09 \pm 1,97$ (7-14) yıl olup, %62,8'i 7-10 yaş grubundaydı. EA'ya göre çocukların %27,7'si astım ile ilişkili semptomlar, %68,1'i ise alerji ile ilişkili semptomlar açısından pozitif tarama sonucuna sahipti; ÖA'ya göre karşılık gelen oranlar sırasıyla %25,3 ve %63,6 olarak bulundu. Yaşamın ilk yılında antibiyotik kullanımı ve iki yaşından önce solunum yolu hastalığı öyküsü, hem EA hem de ÖA analizlerinde astım ve alerji ile ilişkili semptomlar açısından daha yüksek pozitif tarama oranları ile anlamlı düzeyde ilişkiliydi (tüm karşılaştırmalar için $p < 0,05$). EA'ya göre astım ile ilişkili semptomlar açısından pozitif tarama; erkek çocuklarda ($p = 0,041$), düşük doğum ağırlığı olanlarda ($p = 0,035$) ve pnömoni nedeniyle hastaneye yatış öyküsü bulunanlarda ($p = 0,018$) daha sık görüldü. Alerji ile ilişkili semptomlar açısından pozitif tarama ise EA'ya göre annede astım/alerji öyküsü ($p = 0,012$) ve paketlenmiş/işlenmiş gıdaların sık tüketimi ($p = 0,017$) ile anlamlı düzeyde ilişkili bulundu.

Sonuç: Bu çalışma, okul çağı çocuklarının önemli bir bölümünün astım ve alerjiyle ilişkili semptomlar açısından pozitif tarama sonucuna sahip olduğunu göstermiştir. Çocuklara ve ebeveynlere ait çeşitli özelliklerin pozitif tarama sonuçları ile ilişkili olduğu saptanmıştır. Bu bulgular, klinik tanı anlamına gelmemekle birlikte, daha ileri değerlendirmeden yarar görebilecek çocukların belirlenmesinde semptom temelli okul taramasının potansiyel değerini ortaya koymaktadır.

Anahtar Kelimeler: Alerji, astım, çocuk, okul, tarama

INTRODUCTION

Asthma and other allergic diseases, including allergic rhinitis (AR), atopic dermatitis (AD), and food allergies, represent a major public health concern in childhood¹. According to the World Health Organization, approximately 300 million individuals worldwide are affected by asthma, and its burden continues to rise globally².

Data from the Global Asthma Network Phase I study, which included 14 countries, reported a prevalence of asthma of 9% among children aged 6-7 years and 11% among those aged 13-14 years³. Similarly, the prevalence of allergic diseases in children has increased markedly over recent decades⁴. The distribution of asthma and allergic conditions varies across regions and is influenced by multiple environmental and host-related factors, including urbanization, air pollution, exposure to tobacco smoke, respiratory infections, dietary habits, genetic predisposition, and perinatal characteristics⁵.

In school-age children, asthma and allergic diseases may adversely affect school attendance, academic performance, and participation in daily and social activities, particularly when symptoms remain unrecognized or undiagnosed. Delayed recognition may contribute to ongoing symptom burden and potentially preventable morbidity. Early identification of children with asthma- and allergy-related symptoms is therefore critical to enable timely clinical assessment and appropriate management⁶.

School-based screening approaches may offer a practical opportunity to detect children with previously unrecognized asthma- or allergy-related symptoms and to examine associated child- and parent-level characteristics within the community setting. Evidence from prior school-based initiatives supports the feasibility of such programs in identifying undiagnosed or poorly controlled asthma and facilitating care coordination⁷. At the same time, qualitative evidence from school-based health providers suggests that screening practices and the integration of contextual and social risk information may vary depending on available resources and implementation capacity⁸.

This study aimed to determine the proportion of school-age children with positive screening results for asthma- and allergy-related symptoms and to examine associated child- and parent-level factors within a school-based cross-sectional framework.

MATERIALS AND METHODS

Study Design and Setting

This school-based cross-sectional study was conducted among primary and secondary school students aged 7-14 years attending grades 2-7 in a school located in the Gaziosmanpaşa district of İstanbul, Türkiye. The selected school was randomly chosen from schools in the district and was classified as representing a middle socioeconomic level based on available administrative indicators, including parental educational attainment, household income distribution, and neighborhood characteristics. This approach was intended to approximate the average urban population and to minimize potential confounding related to socioeconomic extremes, which are known to influence the prevalence and reporting of asthma and allergic diseases.

Sample size was determined pragmatically based on feasibility within the selected school. A total of 600 questionnaires were distributed (300 to primary school students in grades 2-5 and 300 to secondary school students in grades 6-7) to ensure balanced representation across age groups and school levels while anticipating a response rate of approximately 75-80%. This approach yielded sufficient participants for reliable prevalence estimation of asthma- and allergy-related symptoms in a school-based setting.

Inclusion and Exclusion Criteria

Children aged 7-14 years whose parents provided written informed consent and who were able to understand and respond to the study questionnaires were eligible. Children with communication barriers (including hearing or speech impairment and cognitive impairment) affecting themselves and/or their parents, as well as children whose parents were

illiterate, were excluded. Children whose parents did not provide written informed consent or whose questionnaires had missing data were excluded, as detailed in Figure 1.

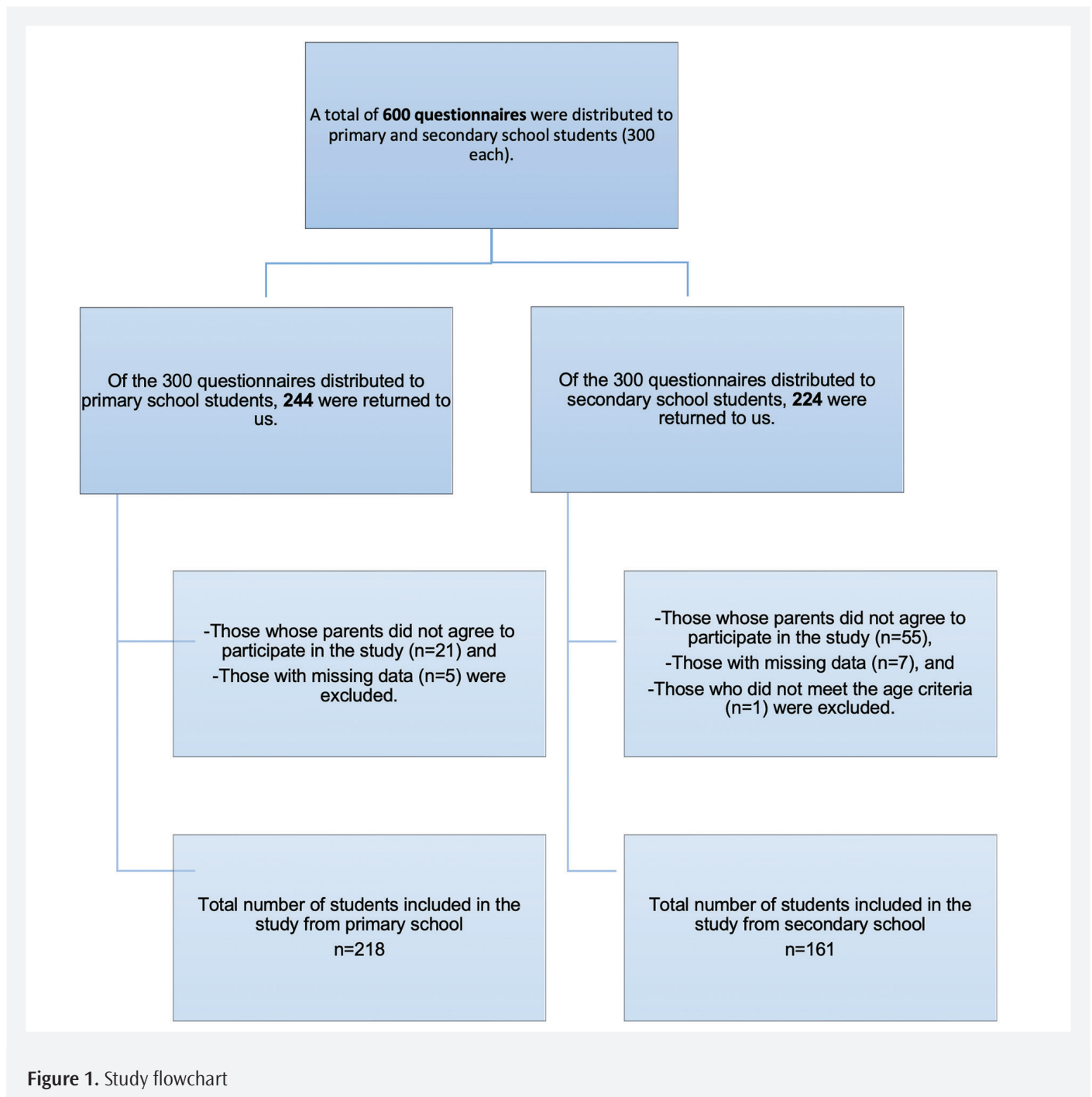
Ethics approval was obtained from the University of Health Sciences Türkiye, Gaziosmanpaşa Training and Research Hospital Ethics Committee (approval no: 398, date: 22.12.2021) and the İstanbul Governorship Provincial Directorate of National Education (24.02.2022, no: E-59090411). Parents were informed about the study objectives and procedures through written information sheets provided together with the

questionnaires, and written informed consent was obtained prior to participation.

Data Collection Tools

Child and Parent Information Form

A structured form developed by the authors based on the relevant literature was used to collect data on sociodemographic characteristics (age, sex, grade level), early-life factors (maternal age at delivery, mode and timing of birth, birth weight,



breastfeeding history, antibiotic use during the first year of life, respiratory disease before age two, history of hospitalization due to pneumonia), dietary habits (packaged/processed food consumption), and known medical conditions. Parental sociodemographic and medical characteristics, including age, educational level, household income, asthma/allergy history, chronic disease status, and smoking status, were also recorded.

School-based Asthma and Allergy Screening Questionnaire

The School-based Asthma and Allergy Screening Questionnaire (SBASQ) was developed by Redline et al.⁹ in 2004 to identify school-aged children who may be at increased risk for asthma and allergic conditions, particularly those who have not been previously diagnosed. The Turkish validity and reliability study was conducted by Kilic et al.¹⁰. The SBASQ consists of two components: a parent/caregiver questionnaire (PQ) and a student questionnaire (SQ). The final four items in both components, which relate to physician diagnosis and medication use, are excluded from scoring, as they are not part of the symptom-based screening score. According to the scoring system, a total score of ≥ 3 indicates asthma-related screening positivity, while a score of ≥ 1 indicates allergy-related screening positivity. In the present study, these cut-off values were operationally interpreted as indicating positive screening results rather than clinical diagnosis. The Turkish version demonstrated acceptable internal consistency, with Cronbach's alpha coefficients of 0.72 for the SQ and 0.80 for the PQ¹⁰.

Study Procedure

Data collection was conducted between March 1 and April 5, 2022. Questionnaires were distributed to 600 students (300 primary school and 300 secondary school) via their teachers and completed at home by the children and their parents/caregivers. Of these, 468 questionnaires were returned (response rate: 78%). After excluding 76 cases due to parental non-consent and 13 cases with incomplete data or failure to meet age criteria, a total of 379 complete and eligible questionnaires were included in the final analysis (Figure 1).

Statistical Analysis

All statistical analyses were conducted using IBM SPSS Statistics version 22. The distributional properties of continuous variables were evaluated using the Kolmogorov-Smirnov and Shapiro-Wilk tests. Continuous variables were summarized as mean $\pm$ standard deviation, whereas categorical variables were expressed as frequencies and percentages. Associations between categorical variables were examined using the chi-square test. Yates' continuity correction was applied when appropriate, and Fisher's exact test was used when expected cell counts were low. All analyses were two-sided, and a p -value < 0.05 was considered statistically significant.

RESULTS

The study included 379 children aged 7-14 years, with a mean age of 10.09 ± 1.97 years. The mean age of mothers was 36.9 ± 5.5 years (range: 26-56), and the mean age of fathers was 41.3 ± 5.2 years (range: 29-57). A physician-diagnosed history of asthma and/or allergy was reported in 89 children (23.5%). Among the 89 children (23.5%) with a physician-diagnosed respiratory/allergic condition, 70 (18.5%) had asthma (with or without allergy) and 56 (14.8%) had allergy (with or without asthma). The sociodemographic and clinical characteristics of the children and parents are summarized in Table 1 and Table 2, respectively.

According to the PQ, 27.7% of the children screened positive for asthma-related symptoms, and 68.1% screened positive for allergy-related symptoms. Based on the SQ, 25.3% of the children screened positive for asthma-related symptoms, and 63.6% screened positive for allergy-related symptoms (Table 3).

As shown in Table 4, children who had received antibiotics during the first year of life showed significantly higher positive screening rates for both asthma- and allergy-related symptoms according to both the PQ (34.1% and 73.2%, respectively; $p=0.009$ and $p=0.043$) and the SQ (30.2% and 71.5%, respectively; $p=0.040$ and $p=0.002$). Similarly, a history of respiratory disease before the age of two years was associated with markedly higher screening-positive rates in both the PQ (50.0% and 87.1%) and the SQ (44.3% and 82.9%) ($p<0.001$ for all comparisons). Positive screening for asthma-related symptoms based on the PQ was also more frequent among boys than girls ($p=0.041$).

As presented in Table 5, maternal history of asthma or allergy was associated with significantly higher positive screening rates for allergy-related symptoms according to both the PQ (84.3%) and the SQ (78.4%) ($p=0.012$ and $p=0.027$, respectively). Paternal history of asthma or allergy was associated with higher positive screening rates for asthma-related symptoms according to the PQ (47.8%) and for both asthma-related (47.8%) and allergy-related (87.0%) symptoms according to the SQ ($p=0.047$, $p=0.021$, and $p=0.029$, respectively).

DISCUSSION

In this school-based cross-sectional screening study, 27.7% of children screened positive for asthma-related symptoms and 68.1% for allergy-related symptoms according to parent reports, with similar proportions observed in the student component. These rates exceeded the prevalence of physician-diagnosed asthma and/or allergy in the study population, reflecting the broader symptom burden captured by screening-based assessment. Screening-positive results were associated with male sex, early-life respiratory morbidity and antibiotic

exposure, low birth weight, and parental history of asthma or allergy. Although screening positivity does not equate to clinical diagnosis, these findings highlight the presence of potentially unrecognized respiratory and allergic symptoms in school-age children and suggest a gap between symptom experience and formal diagnosis.

Large-scale international studies have consistently demonstrated wide cross-country variation in the prevalence of asthma symptoms and physician-diagnosed asthma, with rates differing markedly across regions and age groups¹¹⁻¹⁴. National data from Türkiye similarly indicate considerable heterogeneity

in asthma and allergic disease prevalence among school-age children^{15,16}. Within this context, the proportion of physician-diagnosed asthma observed in the present study (18.5%) falls within previously reported ranges, whereas the higher screening-positive proportions are consistent with the broader symptom patterns typically identified through questionnaire-based assessment.

Discrepancies between symptom-based screening results and physician-diagnosed asthma have been reported in pediatric community populations, where questionnaire-based tools often identify children with unrecognized respiratory symptoms¹⁷⁻¹⁹.

Table 1. Sociodemographic, clinical, and environmental characteristics of children

		n	%
Sociodemographic characteristics			
Gender	Female	191	50.4
	Male	188	49.6
Age (years)	7-10	238	62.8
	11-14	141	37.2
Number of siblings	None	28	7.4
	1-3	289	76.2
	4 and above	62	16.4
Clinical characteristics			
Physician-diagnosed asthma and/or allergy	Yes	89	23.5
	No	290	76.5
Perinatal and early-life characteristics			
Mode of delivery	Vaginal delivery	201	53.0
	Cesarean section	178	47.0
Time of birth	Term	326	86.0
	Preterm	34	9.0
	Postterm	19	5.0
Birth weight	Normal	337	88.9
	Low	35	9.2
	High	7	1.8
Breastfeeding history	Yes	366	96.6
	No	13	3.4
Antibiotic use during the first year of life	Yes	179	47.2
	No	200	52.8
Respiratory tract disease before the age of two	Yes	70	18.5
	No	309	81.5
History of hospitalization due to pneumonia	Yes	29	7.7
	No	350	92.3
Packaged/processed food consumption	Never/almost never	31	8.2
	Rarely	257	67.8
	Often	91	24
Household smoking exposure	Yes	182	48.0
	No	197	52.0
Data presented as number (%) of participants			

Such differences are often attributed to under-recognition and variability in healthcare access. In this context, school-based screening may be viewed as a complementary strategy that enhances early detection of symptom burden rather than as a measure of confirmed disease prevalence.

Early-life biological vulnerability and familial predisposition are well-established determinants of susceptibility to asthma- and allergy-related symptoms^{20,21}. Longitudinal evidence demonstrates that early respiratory infections, antibiotic exposure in infancy, and perinatal factors contribute to later

Table 2. Sociodemographic and clinical characteristics of parents

		n	%
Parental educational level			
Mother	Literate	20	5.3
	Primary school	145	38.3
	Middle school	95	25.1
	High school	93	24.5
	University	26	6.9
Father	Literate	10	2.6
	Primary school	141	37.2
	Middle school	97	25.6
	High school	103	27.2
	University	28	7.4
Parental smoking status			
Mother	Current smoker	93	24.5
	Former smoker	22	5.8
	Never smoker	264	69.7
Father	Current smoker	210	55.4
	Former smoker	57	15
	Never smoker	112	29.6
Parental asthma/allergy history			
Mother	Yes	51	13.5
Father	Yes	23	6.1
Household income level	Low	123	32.5
	Middle	225	59.4
	High	31	8.2

Data presented as number (%) of participants

Table 3. SBASQ score distribution and screening-positive results for asthma- and allergy-related symptoms

Distribution of SBASQ scores	Min-max	Mean ± SD (median)
Asthma (PQ)	0-8	1.8±2.1 (1)
Allergy (PQ)	0-2	0.9±0.7 (1)
Asthma (SQ)	0-7	1.6±1.8 (1)
Allergy (SQ)	0-2	0.8±0.7 (1)
Screening-positive results based on SBASQ cut-off scores	n	%
Asthma-related symptoms (PQ)	105	27.7
Allergy-related symptoms (PQ)	258	68.1
Asthma-related symptoms (SQ)	96	25.3
Allergy-related symptoms (SQ)	241	63.6

Data are presented as mean ± SD (median) and minimum-maximum values
 Screening-positive results were defined according to SBASQ cut-off scores (≥3 for asthma-related symptoms and ≥1 for allergy-related symptoms)
 PQ: Parent/caregiver questionnaire, SQ: Student questionnaire, SBASQ: School-Based Asthma and Allergy Screening Questionnaire, SD: Standard deviation

Table 4. Distribution of screening-positive results for asthma- and allergy-related symptoms according to child characteristics

		Asthma-related symptoms (PQ)	Allergy-related symptoms (PQ)	Asthma-related symptoms (SQ)	Allergy-related symptoms (SQ)
		n (%)	n (%)	n (%)	n (%)
Sociodemographic characteristics					
Gender	Female	44 (23%)	123 (64.4%)	41 (21.5%)	118 (61.8%)
	Male	61 (32.4%)	135 (71.8%)	55 (29.3%)	123 (65.4%)
	¹ p	0.041*	0.122	0.081	0.461
Age	7-10	65 (27.3%)	164 (68.9%)	67 (28.2%)	155 (65.1%)
	11-14	40 (28.4%)	94 (66.7%)	29 (20.6%)	86 (61%)
	¹ p	0.824	0.651	0.101	0.419
Perinatal and early-life characteristics					
Mode of delivery	Vaginal	59 (29.4%)	134 (66.7%)	51 (25.4%)	126 (62.7%)
	C/S	46 (25.8%)	124 (69.7%)	45 (25.3%)	115 (64.6%)
	¹ p	0.446	0.532	0.984	0.698
Time of birth	Term	86 (26.4%)	223 (68.4%)	82 (25.2%)	205 (62.9%)
	Preterm	14 (41.2%)	26 (76.5%)	9 (26.5%)	26 (76.5%)
	Postterm	5 (26.3%)	9 (47.4%)	5 (26.3%)	10 (52.6%)
	¹ p	0.184	0.088	0.981	0.174
Birth weight	Normal	88 (26.1%)	226 (67.1%)	82 (24.3%)	211 (62.6%)
	Low	16 (45.7%)	29 (82.9%)	13 (37.1%)	26 (74.3%)
	High	1 (14.3%)	3 (42.9%)	1 (14.3%)	4 (57.1%)
	³ p	0.035*	0.057	0.201	0.369
Breastfeeding history	Yes	101 (27.6%)	250 (68.3%)	93 (25.4%)	232 (63.4%)
	No	4 (30.8%)	8 (61.5%)	3 (23.1%)	9 (69.2%)
	³ p	0.760	0.563	1.000	0.776
Antibiotic use during the first year of life	Yes	61 (34.1%)	131 (73.2%)	54 (30.2%)	128 (71.5%)
	No	44 (22.0%)	127 (63.5%)	42 (21.0%)	113 (56.5%)
	¹ p	0.009*	0.043*	0.040*	0.002*
Respiratory illness before the age of two	Yes	35 (50%)	61 (87.1%)	31 (44.3%)	58 (82.9%)
	No	70 (22.7%)	197 (63.8%)	65 (21%)	183 (59.2%)
	¹ p	<0.001*	<0.001*	<0.001*	<0.001*
History of hospitalization due to pneumonia	Yes	14 (48.3%)	20 (69%)	10 (34.5%)	20 (69%)
	No	91 (26%)	238 (68%)	86 (24.6%)	221 (63.1%)
	² p	0.018*	1.000	0.338	0.671
Packaged/processed food consumption	Never/almost never	7 (22.6%)	13 (41.9%)	5 (16.1%)	17 (54.8%)
	Rarely	64 (24.9%)	176 (68.5%)	64 (24.9%)	155 (60.3%)
	Often	34 (37.4%)	69 (75.8%)	27 (29.7%)	69 (75.8%)
	¹ p	0.059	0.002*	0.314	0.017*
Household smoking exposure	Yes	50 (27.5%)	127 (69.8%)	47 (25.8%)	122 (67.0%)
	No	55 (27.9%)	131 (66.5%)	49 (24.9%)	119 (60.4%)
	¹ p	0.923	0.493	0.832	0.180

¹Chi-square test, ²Yates' continuity correction, ³Fisher's exact test, *p<0.05

Data presented as number (%) of participants. C/S: Cesarean section, PQ: Parent/caregiver questionnaire, SQ: Student questionnaire

Table 5. Distribution of screening-positive results for asthma- and allergy-related symptoms according to parental sociodemographic and clinical characteristics

		Asthma-related symptoms (PQ)	Allergy-related symptoms (PQ)	Asthma-related symptoms (SQ)	Allergy-related symptoms (SQ)
		n (%)	n (%)	n (%)	n (%)
Maternal smoking status	Current smoker	25 (26.9%)	62 (66.7%)	19 (20.4%)	57 (61.3%)
	Former smoker	5 (22.7%)	15 (68.2%)	7 (31.8%)	18 (81.8%)
	Never smoker	75 (28.4%)	181 (68.6%)	70 (26.5%)	166 (62.9%)
	¹ p	0.832	0.945	0.393	0.180
Paternal smoking status	Current smoker	62 (29.5%)	146 (69.5%)	57 (27.1%)	137 (65.2%)
	Former smoker	18 (31.6%)	42 (73.7%)	19 (33.3%)	37 (64.9%)
	Never smoker	25 (22.3%)	70 (62.5%)	20 (17.9%)	67 (59.8%)
	¹ p	0.302	0.269	0.061	0.614
Maternal asthma/allergy history	No	85 (25.9%)	215 (65.5%)	77 (23.5%)	201 (61.3%)
	Yes	20 (39.2%)	43 (84.3%)	19 (37.3%)	40 (78.4%)
	² p	0.071	0.012*	0.053	0.027*
Paternal asthma/allergy history	No	94 (26.4%)	238 (66.9%)	85 (23.9%)	221 (62.1%)
	Yes	11 (47.8%)	20 (87%)	11 (47.8%)	20 (87%)
	² p	0.047*	0.076	0.021*	0.029*
Household income level	Low	41 (33.3%)	82 (66.7%)	39 (31.7%)	78 (63.4%)
	Middle	57 (25.3%)	156 (69.3%)	48 (21.3%)	140 (62.2%)
	High	7 (22.6%)	20 (64.5%)	9 (29%)	23 (74.2%)
	¹ p	0.225	0.796	0.092	0.430

¹Chi-square test, ²Fisher's exact test, *p<0.05, screening-positive results were defined according to SBASQ cut-off scores
PQ: Parent/caregiver questionnaire, SQ: Student questionnaire, SBASQ: School-Based Asthma and Allergy Screening Questionnaire

respiratory and allergic outcomes through mechanisms involving immune system maturation and lung development²²⁻²⁵. Parental asthma or allergy further amplifies this risk via both genetic susceptibility and shared environmental influences²⁶. In line with this evidence, our findings showed that early-life exposures—particularly respiratory illness in early childhood and antibiotic use during the first year of life—are associated with higher screening-positive rates for asthma- and allergy-related symptoms, together with established risk factors such as low birth weight and parental atopy. Collectively, these findings support the notion of a cumulative risk profile shaped by interacting biological and familial factors, which can be effectively captured through school-based symptom screening approaches.

Environmental and behavioral influences appear to further modulate these underlying vulnerabilities. Although passive smoke exposure has been widely associated with increased asthma risk, its effects vary across settings, and no significant associations were detected in this study^{27,28}. Conversely, dietary patterns—particularly frequent consumption of packaged/processed foods—were associated with allergy-related screening positivity, underscoring the interplay between lifestyle-related exposures and inherent susceptibility²⁹. Together, these findings illustrate a multifactorial risk landscape in which

biological, familial, and environmental factors converge to shape symptom burden in school-age children.

At a system level, school-based screening can address a critical gap by identifying children who experience symptoms yet remain outside routine clinical detection pathways. Integrating such screening outputs into family medicine follow-up could support earlier evaluation and more timely preventive interventions without replacing clinical diagnosis.

This study has notable strengths, including use of a validated screening instrument incorporating both parent- and student-reported components and a school-based design capturing community-level symptom burden. Inclusion of both child- and parent-level variables enabled multidimensional evaluation of screening-positive profiles.

Study Limitations

Several limitations should be acknowledged. First, the cross-sectional design precludes causal inference. Second, screening-positive results were based on questionnaire responses without clinical confirmation and should therefore be interpreted as reflecting symptom burden rather than diagnosed disease. Third, the study was conducted in a single school representing a middle socioeconomic level, which may limit the generalisability

of the findings to populations with different socioeconomic, environmental, and healthcare-access characteristics, as socioeconomic status is a known determinant of asthma and allergic disease prevalence. In addition, the self-reported nature of early-life and household exposures may introduce under- or misreporting, particularly for socially sensitive variables such as smoking. Finally, as analyses were primarily unadjusted, residual confounding cannot be excluded; multivariate analyses are warranted in future studies.

CONCLUSION

In this school-based cross-sectional screening study, a substantial proportion of school-age children screened positive for asthma- and allergy-related symptoms, with rates appearing higher than those typically reported for physician-diagnosed disease. Positive screening results were associated with several child- and parent-level characteristics, including early-life exposures and family history. Although screening positivity does not constitute a clinical diagnosis, these findings highlight the potential value of school-based screening approaches in identifying children who may benefit from further clinical evaluation. Integration of such strategies with primary care and family medicine practices may enhance early recognition of symptom burden and support timely referral and preventive interventions.

Ethics

Ethics Committee Approval: Ethics approval was obtained from the University of Health Sciences Türkiye, Gaziosmanpaşa Training and Research Hospital Ethics Committee (approval no: 398, date: 22.12.2021) and the İstanbul Governorship Provincial Directorate of National Education (24.02.2022, no: E-59090411).

Informed Consent: Parents were informed about the study objectives and procedures through written information sheets provided together with the questionnaires, and written informed consent was obtained prior to participation.

Footnotes

Authorship Contributions

Concept: Z.Y.E., S.T.K., O.B., Design: Z.Y.E., S.T.K., O.B., Data Collection or Processing: Z.Y.E., S.T.K., Analysis or Interpretation: Z.Y.E., S.T.K., Literature Search: Z.Y.E., S.T.K., Writing: Z.Y.E., S.T.K., O.B.

Conflict of Interest: No conflict of interest was declared by the authors.

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