



ORIGINAL ARTICLE

# Prevalence of psychiatric disorders and associated clinical and environmental factors in children and adolescents with asthma: A cross-sectional parent survey

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## Abstract

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This study aimed to estimate the prevalence of psychiatrist-diagnosed psychiatric disorders in children and adolescents with asthma and to identify associated demographic, perinatal, household environmental, and clinical predictors. This cross-sectional descriptive study was conducted among parents of 235 children aged 6–18 years with physician-diagnosed asthma. Data were gathered through a structured online questionnaire designed by the investigators; all information regarding asthma and psychiatric illness was parent-reported (predominantly by mothers). Categorical variables were compared using the chi-square test, and independent predictors of having at least one psychiatric disorder were evaluated with multivariable logistic regression. The mean age of the children was  $8.39 \pm 2.69$  years, and 47.2% were female. At least one psychiatric disorder was reported in 10.6% (n=25), with attention-deficit/hyperactivity disorder (ADHD) being the most common (8.5%). In univariate analyses, psychiatric disorders were significantly associated with household tobacco smoke exposure ( $p=0.003$ ), home mold or dampness ( $p<0.001$ ), higher need for nebulized or inhaled therapy ( $p=0.049$ ), and worse parent-reported quality of life ( $p=0.017$ ). Vaginal delivery was also associated with



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a higher prevalence of psychiatric disorders (18.2% vs. 7.0%;  $p=0.009$ ). In multivariable analysis, household mold or dampness (OR=2.59) and vaginal delivery (OR=2.54) were the independent predictors. Psychiatric disorders are relatively prevalent in children and adolescents with asthma and appear related to modifiable home environmental exposures and markers of clinical disease burden. Routine mental health screening during asthma follow-up may facilitate more holistic care.

## Introduction

Asthma is one of the most prevalent chronic respiratory conditions in pediatric and adolescent populations, affecting not only physical health but also psychosocial functioning and quality of life [1,2]. Its chronic and unpredictable course—characterized by recurrent symptoms, exacerbations, frequent healthcare visits, and the need for long-term treatment—can substantially disrupt daily activities, school attendance, and overall well-being in children and adolescents [3].

Growing evidence suggests that psychiatric disorders are significantly more common in children with chronic medical conditions than in their healthy counterparts [4]. In children with asthma, attention-deficit/hyperactivity disorder (ADHD), anxiety disorders, and behavioral difficulties are among the most frequently reported psychiatric comorbidities [5,6]. Crucially, these comorbidities are not merely incidental; they may adversely affect asthma control, treatment adherence, symptom perception, and long-term outcomes [7]. The relationship between asthma and psychiatric disorders appears to be bidirectional: while the burden of a chronic, unpredictable illness may predispose children to emotional and behavioral difficulties, pre-existing psychiatric disorders can in turn exacerbate symptom perception, increase exacerbation frequency, and heighten medical resource utilization [8]. Furthermore, household environmental exposures—including tobacco smoke and indoor dampness or mold—as well as perinatal factors, have been identified as shared risk factors for both asthma and mental health disorders, reflecting the complex interplay of biological, environmental, and psychosocial determinants [9,10].

Despite a growing international literature on this topic, population-based studies from Türkiye examining the prevalence of psychiatrist-diagnosed psychiatric disorders and their associated clinical and environmental determinants in pediatric asthma populations remain scarce. The present study therefore aimed to estimate the prevalence of psychiatric disorders in children and adolescents with asthma and to examine their associations with demographic variables, asthma-related clinical factors, and household environmental exposures.

## Materials and methods

### Study design and participants

This cross-sectional descriptive study was conducted following approval by the Eskişehir City Hospital Scientific Research Ethics Committee (Decision No: ESH/BAEK 2025/287; Date: 06 January 2026). Written informed consent was obtained electronically from all participants prior to enrollment.

The study population consisted of parents of children aged 6–18 years with a physician-confirmed diagnosis of asthma. Exclusion criteria included: (1) absence of a physician-confirmed asthma diagnosis, (2) incomplete or inconsistent questionnaire responses, (3) inability of parents to complete the questionnaire reliably, and (4) presence of other major chronic systemic diseases.



### Data collection instrument

A structured questionnaire was developed by the investigators, informed by a review of the literature and clinical expertise. The instrument comprised four sections: (1) demographic and perinatal information, (2) household and environmental factors, (3) asthma-related clinical characteristics, and (4) mental health history. Content validity was confirmed through expert review, and items were pilot-tested for clarity and comprehensibility. Information on psychiatric disorders was derived from parental reports (provided predominantly by mothers) of diagnoses that had been previously established by a child and adolescent psychiatrist. These reports were based on parental recall of clinician-assigned diagnoses and were not verified against medical records; accordingly, recall bias cannot be excluded.

### Statistical analysis

All statistical analyses were conducted with IBM SPSS Statistics 30.0 (IBM Corp., Armonk, NY, USA). Continuous variables are presented as mean  $\pm$  standard deviation (SD) and, where the distribution may be non-normal, as median and interquartile range (IQR); categorical variables are presented as frequencies and percentages. Relationships among categorical variables were assessed using the chi-square test. Multivariable logistic regression was performed to identify independent determinants associated with having at least one psychiatric disorder. A  $p$ -value  $< 0.05$  was considered statistically significant.

### Results

A total of 235 children with asthma and their parents were enrolled in the study. The children ranged in age from 6 to 18 years, with a mean age of  $8.39 \pm 2.69$  years and a median age of 8.00 years (IQR: 6.00–10.00). Among the participants, 47.2% were female ( $n = 111$ ) and 52.8% were male ( $n = 124$ ). Most children were born at term (75.3%), and 24.7% had a history of neonatal intensive care unit (NICU) admission. With respect to mode of delivery, 67.2% were born by cesarean section and 32.8% by vaginal delivery.

Regarding household characteristics, natural gas was the predominant heating source (84.7%). Tobacco smoke exposure varied: 45.1% of households reported no indoor smoking, 49.8% reported smoking restricted to balconies or near windows, and 5.1% reported active smoking inside the home. Pets were present in 12.3% of households. Household mold or dampness was confirmed by 8.9% of respondents, while 14.5% were uncertain about its presence (Table 1).

**Table 1.** Demographic and household characteristics of the participants.

Variable	Value
<b>Age (years), mean <math>\pm</math> SD</b>	8.39 $\pm$ 2.69
Age (years), median (IQR)	8.00 (6.00–10.00)
<b>Sex</b>	
Female	111 (47.2%)
Male	124 (52.8%)
<b>Mode of delivery</b>	
Cesarean section	158 (67.2%)
Vaginal delivery	77 (32.8%)
<b>NICU admission</b>	
No	177 (75.3%)
Yes	58 (24.7%)
<b>Reasons for NICU admission*</b>	
Neonatal jaundice	20 (34.5%)
Respiratory distress	14 (24.1%)
Low birth weight	7 (12.1%)
Infection	3 (5.2%)
Other	14 (24.1%)
<b>Household heating system</b>	
Natural gas	199 (84.7%)
Central heating	21 (8.9%)
Stove (coal/wood)	8 (3.4%)
Air conditioning/electric	7 (3.0%)
<b>Smoking inside the home</b>	
None	106 (45.1%)
Balcony/window only	117 (49.8%)
Inside the home	12 (5.1%)
<b>Presence of pets</b>	
Yes	29 (12.3%)
No	206 (87.7%)
<b>Household mold/dampness</b>	
Yes	21 (8.9%)
No	180 (76.6%)
Uncertain	34 (14.5%)

\*Percentages are calculated among children with a history of NICU admission.

IQR: interquartile range; NICU: Neonatal Intensive Care Unit; SD: standard deviation.

The mean age at asthma diagnosis was  $4.3 \pm 2.7$  years. Asthma was most commonly diagnosed by pediatric allergy specialists (51.9%), followed by general pediatricians (35.7%) and pediatric pulmonologists (11.5%). In the preceding year, 95.7% of children had used at least one controller medication. Asthma-related school absenteeism was reported in 82.6% of children, with 31.5% missing 10 or more school days in the previous year.

Regarding the impact of asthma on physical activity, 25.5% of children were reported to experience frequent limitations during play or sports, while 35.7% experienced occasional limitations; only 25.1% were reported to be unaffected. Asthma-related clinical characteristics of the participants are summarized in Table 2.

**Table 2.** Asthma-related clinical characteristics of the participants.

Variable	Value
<b>Age at asthma diagnosis (years), mean <math>\pm</math> SD</b>	4.3 $\pm$ 2.7
<b>Family history of asthma, allergic rhinitis, or eczema</b>	
Yes	39 (16.6%)
No	196 (83.4%)
<b>Physician who established asthma diagnosis</b>	
Pediatric allergist	122 (51.9%)
Pediatrician	84 (35.7%)
Pediatric pulmonologist	27 (11.5%)
Other physician	2 (0.9%)
<b>Method of asthma diagnosis</b>	
Clinical evaluation only	176 (74.9%)
Pulmonary function testing	32 (13.6%)
Clinical evaluation + pulmonary function testing	27 (11.5%)
<b>Use of controller medication in the last year</b>	
Always	82 (34.9%)
Frequently	75 (31.9%)
Sometimes	68 (28.9%)
Never	10 (4.3%)
<b>Perceived benefit of controller therapy</b>	
Moderate benefit	88 (37.4%)
Highly beneficial	57 (24.3%)
Slight benefit	45 (19.1%)
Marked improvement	24 (10.2%)
No benefit	15 (6.4%)
Not using controller therapy	6 (2.6%)
<b>Asthma-related school absenteeism (last year)</b>	
>10 days	74 (31.5%)
4–10 days	62 (26.4%)
1–3 days	58 (24.7%)
No absenteeism	41 (17.4%)
<b>Impact of asthma symptoms on play/sports activities</b>	
Frequently	60 (25.5%)
Sometimes	84 (35.7%)
Rarely	32 (13.6%)
Not affected	59 (25.1%)
<b>Quality of life score (1–5)</b>	
1 – Very poor	10 (4.3%)
2 – Poor	36 (15.3%)
3 – Moderate	122 (51.9%)
4 – Good	58 (24.7%)
5 – Very good	9 (3.8%)
<b>Nebulized/inhaled treatment requirement (per year)</b>	
0–2 times	50 (21.3%)
2–5 times	71 (30.2%)
5–10 times	50 (21.3%)
>10 times	64 (27.2%)
<b>Systemic corticosteroid use (per year)</b>	
None	130 (55.3%)
Once	33 (14.0%)
Twice	24 (10.2%)
Three times	20 (8.5%)
Four times	12 (5.1%)
$\geq$ 5 times	16 (6.8%)
<b>Hospital admission due to asthma (last year)</b>	

None	197 (83.8%)
Once	28 (11.9%)
Twice	8 (3.4%)
Three times	2 (0.9%)

*SD: standard deviation.*

Among the 25 children with at least one psychiatric disorder, ADHD was the most frequent ( $n=20$ ; 80%), followed by anxiety disorders ( $n=7$ ; 28%) and other diagnoses including sleep disorders, OCD, and behavioral disorders ( $n=17$ ; 68%); some children carried more than one diagnosis (total diagnoses = 44, mean diagnoses per affected child = 1.76). Due to the small size of this subgroup, formal comparison of individual diagnosis types was not performed. The subsequent analyses examined demographic, environmental, and clinical factors associated with having at least one psychiatric disorder, which constituted the primary outcome of the study.

With respect to perinatal characteristics and their relationship to the primary outcome, psychiatric disorder prevalence was significantly greater in children born via vaginal delivery than in those born by cesarean section (18.2% vs. 7%,  $p=0.009$ ). No significant associations were observed between psychiatric disorders and gestational age at birth or history of NICU admission ( $p>0.05$ ). Although mode of delivery is not a direct component of asthma pathophysiology, perinatal exposures are increasingly recognized as contributors to neurodevelopmental trajectories and long-term mental health risk; its inclusion was therefore pre-specified as a demographic covariate of interest.

Regarding environmental and clinical predictors—which represent the primary focus of this study—several significant associations were identified. Household tobacco smoke exposure was associated with a significantly higher prevalence of psychiatric disorders compared with non-smoking homes (16.2% vs. 6.6%,  $p=0.003$ ). Similarly, the rate of psychiatric disorders was markedly higher among children living in homes with reported mold or dampness than among those without (20% vs. 7.8%,  $p<0.001$ ). Presence of pets was also associated with higher rates of psychiatric disorders in univariate analysis ( $p=0.040$ ), although this association did not persist in the multivariate model. Greater frequency of nebulized or inhaled treatment requirement was associated with a higher proportion of psychiatric disorders ( $p=0.049$ ), as was worse parent-reported quality of life ( $p=0.017$ ). No significant associations were identified between psychiatric disorders and systemic corticosteroid use, hospital admissions, or limitations in physical activity ( $p>0.05$ ). Characteristics related to psychiatric diagnoses are summarized in Table 3.

**Table 3.** Characteristics related to psychiatric diagnoses.

Variable	Category
<b>Presence of psychiatric disorder</b>	
Yes	25 (10.6%)
No	210 (89.4%)
<b>Types of psychiatric diagnoses*</b>	
Attention-deficit/hyperactivity disorder (ADHD)	20 (8.5%)
Anxiety disorder	7 (3%)
Other diagnoses (sleep disorders, OCD, behavioral disorders, etc.)	17 (7.3%)
<b>Psychiatric medication prescription among diagnosed children **</b>	
No	7 (26.9%)
Yes, regularly used	17 (65.7%)
Yes, prescribed but not used	2 (7.4%)
<b>Reported outcome after psychiatric medication **</b>	
Marked improvement	3 (10.3%)
Partial improvement	3 (10.3%)
No change	11 (37.9%)
Worsened	9 (31.0%)
Uncertain	3 (10.3%)
<b>Reported clinical change after psychiatric medication **</b>	



Marked improvement	3 (12.5%)
No change	13 (54.2%)
Condition worsened	2 (8.3%)

\*More than one psychiatric diagnosis could be reported per participant; therefore, totals exceed the number of children with psychiatric disorders.

\*\*Percentages are calculated among children with a psychiatric diagnosis.

OCD: obsessive-compulsive disorder.

## Multivariable analysis

Multivariable logistic regression identified independent predictors of having at least one psychiatric disorder. After controlling for child's age, systemic corticosteroid use, and household tobacco smoke exposure, vaginal delivery (OR = 2.54, 95% CI: 1.06–6.12,  $p=0.037$ ) and household mold or dampness (OR = 2.59, 95% CI: 1.05–6.43,  $p=0.040$ ) remained the only statistically significant independent predictors. The model demonstrated adequate fit (Nagelkerke  $R^2=0.149$ ) with an overall correct classification rate of 89.8% (Table 4).

**Table 4.** Logistic regression analysis of factors associated with psychiatric disorders.

Variable	B	SE	Wald	$p$	OR	95% CI (OR)
Child's age	0.143	0.075	3.670	0.055	1.153	0.997–1.333
Mode of delivery (1 = cesarean section)	0.932	0.448	4.330	0.037	2.541	1.056–6.117
Systemic corticosteroid use for asthma (yes)	0.571	0.480	1.418	0.234	1.770	0.690–4.544
Household tobacco smoke exposure (yes)	0.740	0.484	2.338	0.126	2.097	0.812–5.416
Household mold/dampness (yes)	0.952	0.463	4.227	0.040	2.591	1.045–6.428
Constant	-5.683	1.098	26.796	<0.001	0.003	—

**Model summary:**  $-2 \text{ Log likelihood} = 141.42$ ; Nagelkerke  $R^2 = 0.149$ ; Overall correct classification rate = 89.8%.

## Discussion

The present study examined the prevalence of psychiatrist-diagnosed psychiatric disorders in children and adolescents with asthma, along with their associations with demographic, clinical, and environmental factors. Our findings indicate that approximately one in 10 children with asthma had at least one psychiatric disorder, a figure consistent with rates reported in comparable pediatric asthma cohorts [1–3]. Crucially, environmental exposures and clinical burden markers were the primary correlates of psychiatric comorbidity, while the additional independent association of vaginal delivery with psychiatric disorders highlights the potential contribution of perinatal factors. Taken together, these findings suggest that the mental health burden in pediatric asthma reflects a multifactorial interplay of household environmental conditions, disease burden, and perinatal history—rather than disease severity alone. The chronic daily impact of asthma—including restricted routines, school absenteeism, and reduced physical activity—may progressively erode quality of life, and such ongoing functional impairment is recognized as an important driver of emotional and behavioral disorders in children with chronic illnesses [4].

Consistent with prior literature, ADHD was the most frequently identified psychiatric disorder in our sample [5,6]. The co-occurrence of asthma and ADHD extends beyond coincidental comorbidity; it represents a clinically meaningful interaction with bidirectional influences on disease course. Proposed mechanisms include sleep disturbance, chronic airway inflammation, and impaired attention regulation—all of which are common in children with asthma and may contribute to the development or exacerbation of ADHD symptoms [7]. The prevalence of ADHD in the general pediatric population is estimated at approximately 5–7% [5]. Higher rates have been reported in children with chronic illnesses, and studies specifically in pediatric asthma populations have reported ADHD prevalence ranging from 7% to 15%, depending on the population studied and the diagnostic method used [6,7].



The ADHD prevalence of 8.5% observed in our sample falls within this expected range. Variability in ADHD rates across studies most likely reflects differences in ascertainment methods (parent report vs. structured clinical interviews), demographic heterogeneity, and differences in asthma severity; the reliance on parent-reported diagnoses in the present study may result in both under- and over-reporting compared with clinician-administered assessments.

An unexpected yet noteworthy finding was the independent association between vaginal delivery and psychiatric disorders in the multivariate model. While this may initially appear peripheral to the central hypothesis, it is consistent with growing evidence linking perinatal stress and neuroendocrine responses during labour to early neurodevelopmental programming and subsequent psychiatric risk [9]. Importantly, this association persisted after adjustment for environmental and clinical variables, suggesting a potentially distinct biological pathway. By contrast, no significant associations were found between psychiatric disorders and either preterm birth or NICU admission history, which may reflect the relatively small affected subgroup or the cross-sectional design. These findings underscore the importance of examining a broad range of perinatal variables in future longitudinal studies of psychiatric comorbidity in pediatric asthma. Environmental factors emerged as particularly strong and consistent correlates of psychiatric disorders in this study. Household tobacco smoke exposure and indoor mold or dampness were significant not only in univariate analyses but also retained independent associations in the multivariable model. Indoor air quality has well-documented effects on both respiratory health and neurodevelopmental outcomes [9,10]. Unlike many clinical variables, household tobacco smoke exposure and dampness are potentially modifiable risk factors, and our findings suggest that environmental remediation may have dual benefits—reducing asthma exacerbations while simultaneously lowering the risk of psychiatric comorbidity. These results reinforce calls for integrating environmental assessments into routine asthma management.

Indicators of greater asthma-related clinical burden were also significantly associated with psychiatric disorders in the present study. Specifically, greater demand for nebulized or inhaled medications and worse parent-reported quality of life were each independently linked to higher rates of psychiatric comorbidity. The chronic, cumulative burden of managing a relapsing respiratory condition—including treatment demands, activity restrictions, and school absenteeism—creates an environment that is recognized to foster anxiety, attentional difficulties, and behavioral dysregulation [3,7]. Notably, neither systemic corticosteroid use nor hospital admissions reached significance as independent predictors, suggesting that it is the sustained, day-to-day impact of asthma rather than its acute episodes that most strongly relates to psychiatric risk. These findings reinforce the importance of optimizing asthma control not only for respiratory outcomes but also for the preservation of mental health. Taken together, the multivariate findings—identifying vaginal delivery and household mold or dampness as the two independent predictors—support a multifactorial model of psychiatric risk in pediatric asthma that extends beyond disease-specific variables to encompass perinatal history and household environmental conditions [4,9]. This broader perspective has direct implications for clinical practice, as both perinatal data and environmental exposures can be systematically assessed during routine asthma follow-up.

## Limitations

There are several important limitations to this study. First, the cross-sectional nature of the study design prevents us from drawing causal inferences regarding the relationships between asthma-related factors and psychiatric disorders. Second, psychiatric disorders were assessed on the basis of parental reports of previously established clinician-assigned diagnoses, which were not verified through structured clinical interviews or standardized psychiatric assessment instruments. Given that data were collected via an online survey, both reporting bias and recall bias are inherent risks, as all responses were based on subjective parental perceptions. Furthermore, asthma severity and control were not assessed using objective clinical parameters such as spirometry or validated symptom scores; asthma-related



characteristics were derived entirely from parental reports. Nonetheless, the study has notable strengths, including a relatively large sample size and the simultaneous examination of demographic, environmental, clinical, and psychiatric factors within a single analytical framework. This comprehensive approach provides important insights into the multifactorial determinants of psychiatric comorbidity in children and adolescents with asthma. Future studies should employ longitudinal designs to establish causal pathways between asthma and psychiatric outcomes. Validated psychiatric assessment tools and medical record verification, rather than reliance solely on parental reports, would strengthen diagnostic accuracy. Additionally, investigation of the underlying biological mechanisms—such as neuroinflammatory pathways and neuroendocrine effects of chronic airway inflammation—linking asthma and psychiatric comorbidities warrants further research. Multicenter studies with larger and more diverse samples are needed to improve generalizability and allow subgroup analyses by asthma severity and psychiatric disorder type.

Finally, as the majority of questionnaires were completed by mothers, maternal reporting bias may have influenced the characterization of both asthma-related symptoms and psychiatric disorders, potentially affecting the validity of the reported diagnoses. In addition, the relatively high number of reported diagnoses compared to the number of affected children (44 diagnoses among 25 children) may reflect parental interpretation or recall variability, rather than independently verified clinical diagnoses; some diagnoses reported by parents may represent symptoms or concerns rather than formal psychiatrist-assigned diagnostic conclusions.

## **Conclusion**

This study provides evidence that psychiatric disorders are prevalent in approximately one in 10 children and adolescents with asthma, with ADHD being the most common diagnosis. Household tobacco smoke exposure and indoor mold or dampness emerged as the strongest independent environmental predictors of psychiatric comorbidity, while greater treatment needs and worse parent-reported quality of life reflected the role of clinical disease burden. The independent association of vaginal delivery with psychiatric disorders further supports the importance of perinatal factors in shaping long-term neurodevelopmental outcomes in this population. Collectively, these findings underscore that asthma affects not only respiratory health but also mental and psychosocial well-being, and highlight the need for a holistic, multidisciplinary approach to pediatric asthma care. Routine screening for psychiatric symptoms during asthma follow-up visits, combined with early referral to child and adolescent psychiatry services, may facilitate timely intervention and improve both mental health outcomes and overall asthma control.

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## ***Conflict of interest***

The authors declare that there is no conflict of interest related to this study.

## ***Data availability statement***

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.



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