

## CASE REPORT

# Holistic Management of Pediatric Patients with Asthma through the Family Medicine Approach: A Case Series

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## ABSTRACT

**Introduction:** Asthma is a global problem, with around 100-150 million people estimated to suffer from this disease. Based on data from the Centers for Disease Control and Prevention (CDC), around 8.4% of people in the United States suffer from asthma. Asthma requires holistic treatment, one of which is family medicine. However, there is a lack of data or research discussing this matter. Hence, this case report aims to provide an overview of family medicine in asthma, especially in children.

**Case:** This study is a case series report involving four pediatric patients with asthma. Data collection was performed by conducting home visits and hetero-anamnesis. Many things affect asthma treatment apart from pharmacology, including family medicine. In this case series, the role of the family proved significant in the patient's healing and daily functioning.

**Conclusion:** Family medicine is a type of holistic management critical in various diseases, especially asthma. Support from the patient's family and environment has an essential role in the success of asthma therapy in children.

## INTRODUCTION

Asthma is a disease characterized by coughing, shortness of breath, wheezing, and a feeling of tightness in the chest due to airflow limitation from respiratory tract inflammation. Approximately 100-150 million people worldwide will develop asthma, with an additional 180,000 yearly. This number continues to increase, especially among children. Based on data from the Centers for Disease Control and Prevention (CDC), 8.4% of people in the United States suffer from asthma. A high prevalence of these cases begins in the childhood phase, which impacts school activities, although it can occur at various ages.<sup>1</sup>

Asthma in children needs comprehensive management with pharmacological and non-pharmacological interventions. The pharmacological treatments based on the Global Initiative for Asthma (GINA) are reliever and controller medications and non-pharmacological treatments such as rehabilitative therapy and family medicine.<sup>2</sup> Data on family medicine for childhood asthma are still lacking. In fact, in daily practice and the context of child development, most asthma management is performed by the child's family.<sup>3</sup> To bridge this gap, this case report examined the role of family medicine in managing asthma cases in children.

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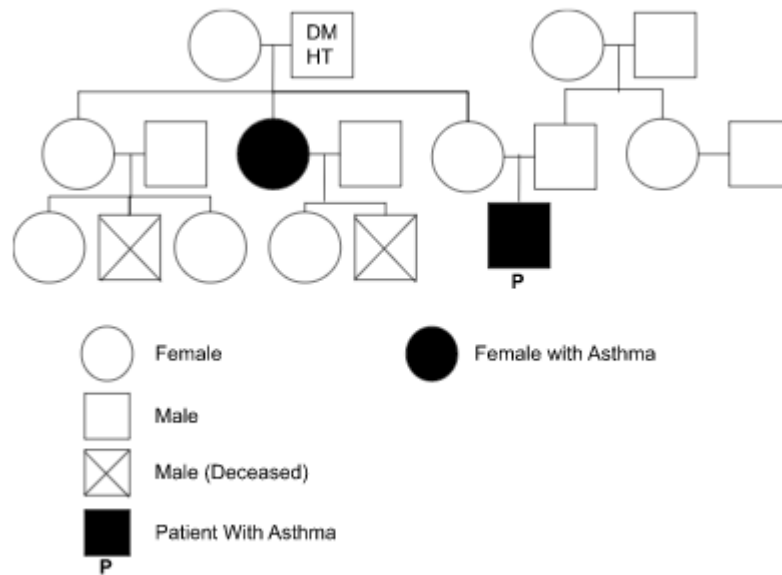
**CASE**

**Case 1**

A 7-year-old boy with a main complaint of coughing came to the primary health center. The cough had lasted for three days and was getting worse. It was followed by chest tightness, wheezing, and sleep disturbance at night, but he could still speak in sentences. These symptoms appeared after the child drank cold drinks. After nebulization with salbutamol, the symptoms improved, and he was discharged. There was no chest tightness or wheezing during the home visit. He has relapsed three times in the past year, with the last recurrence occurring three months prior. He had a history of previous asthma attacks but did not know when they started, and he was not regularly taking asthma controller medications. When these attacks

occurred, he was only taken to the health center. His growth and development were normal.

As for his family history, his grandmother had hypertension and type 2 diabetes mellitus, and his aunt had a history of asthma as a child but never had an attack (Figure 1). The patient had good personal hygiene, bathed twice daily, and none of his family members had any infectious disease. He regularly ate thrice daily, slept at 9 p.m., woke up at 5 a.m., and took an afternoon nap from 3-4 p.m. He was in a stable emotional state and could communicate well for his age. His parents made decisions for him, and he had no drug dependence. He attended recreational activities with his family twice a year. He and his family were Moslems and prayed regularly with guidance from his parents. Their family's APGAR score was nine, meaning their family function was reasonable.



**Figure 1.** Genogram of Case 1

Based on the home visit evaluation, their house had an area of 90 m<sup>2</sup>. It had painted plastered walls with no rooftop ceilings, tiled floors, adequate lighting, and ventilation ranging from 10-15% of the floor area. The house had nine rooms, which were not very clean. Their drinking source was water from gallons. There was only one toilet with a size of 3x1 m<sup>2</sup> on a plaster floor, and it was a squat toilet with a septic tank less than 10 m away from it. The water supply was healthy, as it was clear, colorless, and odorless. The terrace was 3x6 m in size, and it was swept daily. The household's wastewater flowed into ditches. Regarding waste management, organic waste was buried, and non-organic waste was burned. They did not have pets.

From a personal point of view, during home visits, the patient's mother hoped that he would not have asthma attacks again. As a result, he was often permitted to participate in school activities. This caused

his mother to worry because it could interfere with the patient's learning. Internal risk played a role in the manifestation of the disease, where it is known that the patient's aunt had a history of asthma since childhood but had never had an asthma attack.

From the external risk aspect, the patient's family controlled his ability to live healthily and control his asthma. His parents helped care for him daily and accompanied him to the hospital when his asthma relapsed. They also understood the illness, and his mother submitted a request for permission from his school to allow him to receive treatment. When asthma attacks occurred, he could not engage in activities optimally and needed permission for school activities.

Family intervention, such as education regarding asthma, was performed through home visits. His family was informed about asthma, the relapse mechanism, risk factors, triggers, examination and management,

prevention, complications, warning signs that may occur during an asthma attack, and healthy lifestyles for asthma patients. His family already had Indonesian Universal Health Coverage from the Social Security for Health Agency (BPJS), which fully supported the patient's asthma management.

### Case 2

A 26-month-old boy had had asthma for about one year. He had no complaints at the time. His grandmother said that he experienced shortness of breath and wheezing when his asthma relapsed. He could not sleep, only sat hunched over, and could only speak a word at a time but remained conscious. His asthma was first diagnosed in May 2021, and it was initially triggered by cigarette exposure. The trigger for his asthma's recurrence was exposure to cigarette smoke and vehicle fumes. In about a year, he relapsed two times, and the last relapse occurred two months before the writing of this report. His grandmother, mother, and sister had been diagnosed with asthma since childhood (Figure 2) but denied a history of food allergies. His growth and development were normal. He

lived with his grandparents because his parents worked out of town and only met once weekly. His father was a heavy smoker with five cats in his home.

Based on the home visit, he had a normal physical examination. He lived in a 9x10 m<sup>2</sup> house with an extended family consisting of four other people, his grandparents, aunt, and older sister. He was the youngest of two siblings. The decision-makers regarding his health were his parents and grandmother. Their family's APGAR score was nine, meaning their family function was in good condition.

The patient's family hoped the asthma could be controlled and not relapse to maximize his quality of life and daily activities. They were worried that the symptoms would relapse and not be controlled due to exposure to dust and fumes from vehicles, which would impact his life in the future. From the genetic aspect, his grandmother had a history of asthma with exposure to dust as a trigger. His mother and two aunts also had a history of asthma since childhood, with cigarette smoke and vehicle fumes as triggers. His sibling also had a history of asthma, with cold air as the trigger.

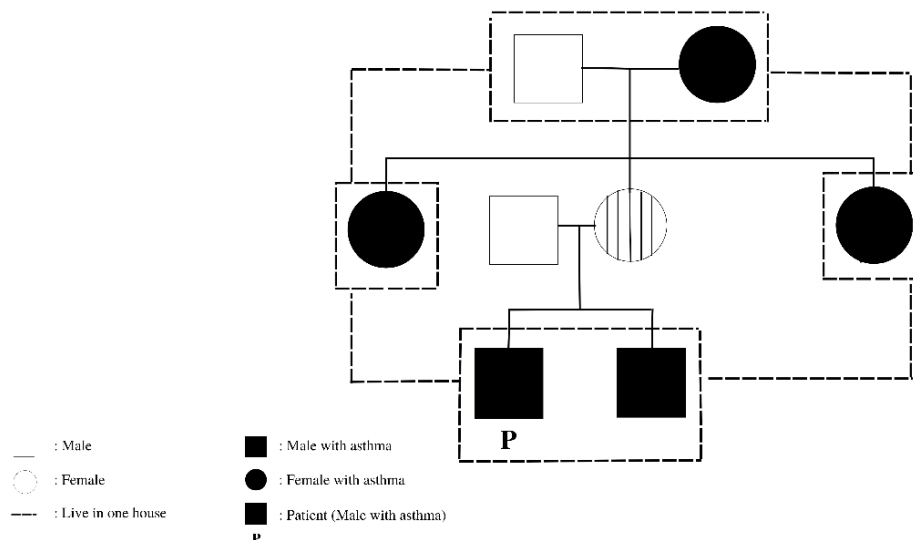


Figure 2. Genogram of Case 2

He received support and attention from his extended family. His grandmother constantly supervised him daily to prevent cigarette smoke, dust, or vehicle fumes exposure. She also cooked healthy and non-fried food every day because if he ate a lot of oily food, he usually coughed. His family had been paying for treatment costs independently because they had not registered him with BPJS. The patient could move and function properly if not exposed to vehicle dust or fumes. His growth and development were within normal limits.

### Case 3

A 17-month-old girl came to the primary health center because her asthma medicine had run out. Her mother said that she had wheezing and coughing fits about seven months ago when exposed to dust or cold air. In the past month, her mother admitted that she relapsed 4-5 days a week, getting worse when the air was cold and getting better by taking medicine and being in a half-sitting position. She felt shortness of breath when walking long distances and more difficulty than usual when performing daily activities such as eating, drinking, and sleeping.

She was hospitalized thrice two months before the time of this report because the complaints were more severe than usual. There was a history of allergy to paracetamol with bumps and itching as symptoms, and she also had a history of hives when exposed to rain (cold). Her mother also had a history of allergies that appeared with cold air (Figure 3), but none of her other relatives had a history of allergies or asthma.

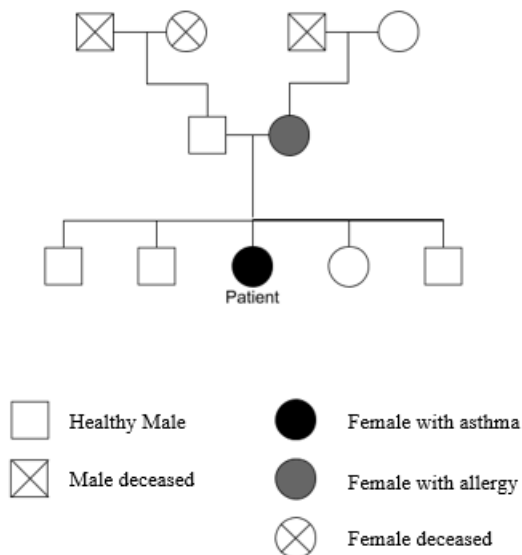


Figure 3. Genogram of Case 3

Based on the home visit, the physical examination was normal. The familial aspects were in good condition. There were no hereditary or communicable diseases within the patient's family. She claimed to diligently wash her hands after traveling or finishing her activities. Her diet consisted of 2-3 meals daily in moderate portions (1 cup of rice with vegetables and side dishes), mostly cooked at home. She always told her parents when she experienced/had problems. The decision-makers in her family were her parents, and they discussed issues together. Their regular recreation activity was going to Taman Benteng every Sunday to walk with friends. They prayed five times daily at the mosque or sometimes at home. Her family form was the nuclear family, consisting of the parents and five siblings. Their family's APGAR score was 9, meaning their family function was good.

The personal aspect assessment found that her family hoped that her illness could be treated and complaints of shortness of breath, coughing, and wheezing could disappear. They hoped her health would be restored to maximize their family's quality of life and work performance. Her family was worried that her asthma would get worse or could not be cured, which could be a hassle and impact the family's finances. Her family also feared that her illness might interfere with her future because she often experienced relapses and would not be able to study for exams. Her family was

also worried about the complications that would occur. None of her family had a history of asthma. However, her mother had a history of dust allergy. She lived in a healthy environment. Her family sourced clean water from a well that was odorless and colorless. Her house measured 20x10 m<sup>2</sup> and was in a messy condition, though often cleaned, but it got dirty quickly because it was located around rice fields. The house also had a terrace, living room, kitchen, three bedrooms, and two bathrooms, all with tiled floors. Each room had good ventilation and lighting. All bathrooms were sized 2x3 m<sup>2</sup>, had plaster floors, were clean, and had squat toilets with the septic tank less than 10 m from the toilet. Household waste was channeled into gutters in front and on the sides of the house. Garbage was removed daily and sometimes burned in vacant areas near the surrounding homes. She did not have pets. Recently, it was discovered that there was burnt corn crop residue in the area around her house.

She ate a fairly balanced nutritional diet. Her family supported her treatment and considered illness a form of ordeal. Her mother admitted that the illness burdened her mind, and sometimes she cried because she thought about her daughter's illness. Due to this, it is necessary to ensure that the disease can be controlled through regularly taking medication and avoiding triggers that cause asthma to recur.

#### Case 4

A 7-year-old girl was diagnosed with asthma around November 2021 and experienced a cough and fever at that time. At night, she was breathing heavily during her sleep. Her chest was partially inflated, and she seemed restless when sleeping. Thus, her mother took her to the primary health center. During the examination, it was found that she had an asthma attack and underwent nebulization. In November 2022, she experienced two asthma attacks. The first was in early November 2022, and her asthma was treated with salbutamol nebulization at the primary health center. The second was at the end of November 2022. Her mother said that a common cold always triggered her asthma. She often had a common cold, but it improved in the last year.

Her mother's allergy manifested in itchy skin, and her cousin had cold-induced asthma (Figure 4). Based on the home visit, her physical examination was normal. The family members were in good condition at the time and had no hereditary or communicable diseases. She claimed to diligently wash her hands after traveling or completing her activities. She ate three times a day in moderate portions (1 cup of rice with mixed vegetables and side dishes), with most meals cooked at home. She always told her parents when she experienced/had problems. The decision-

makers in the family were her parents, and they discussed issues together. She was an elementary school student and attended school from 06.30 a.m. to 11.00 a.m. On Tuesdays, she studied the Quran at the nearby mosque. On Wednesdays, she took part in the dance extracurricular at school and the vocal extracurricular on Thursdays. Her father had smoked since he was 22 years old. Before his daughter was diagnosed with asthma, her father often smoked inside the house. However, after her diagnosis, her father no longer smoked inside the house and began reducing his smoking intensity. The patient and her family were Moslems and prayed regularly.

She was the oldest of two siblings. However, her little brother passed away in September 2021. She lived with her parents. Her family form was the nuclear family, consisting of the parents and herself. According to the Duvall family cycle, her family cycle was in stage IV, namely families with school children. Their family's APGAR score was nine, meaning their family function was good. Their family still prioritized curative treatment, only going for a check-up when there were complaints. The distance from their house to the health center was  $\pm 2$  km.

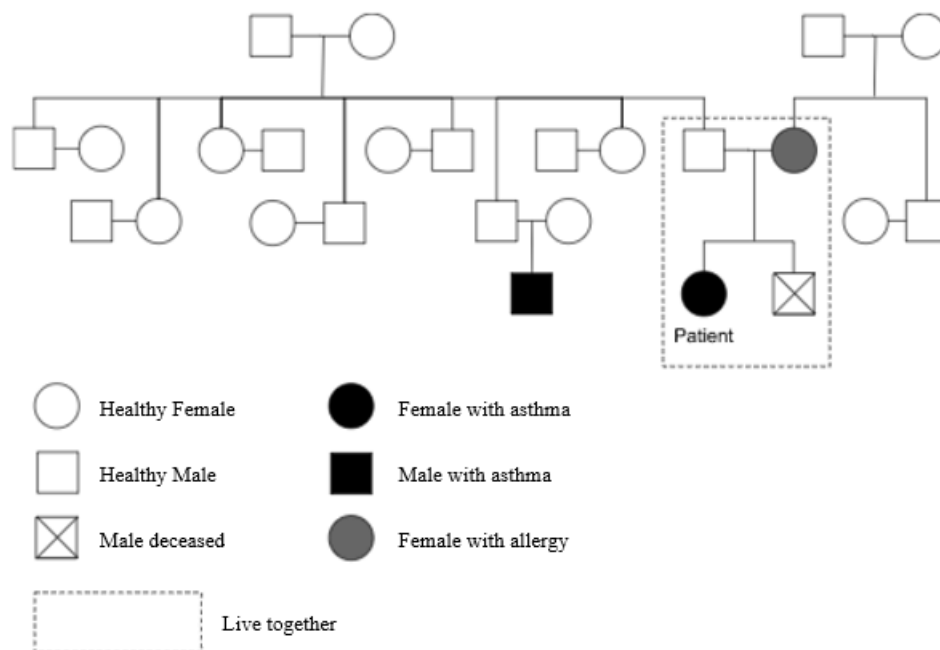


Figure 4. Genogram of Case 4

She lived with her parents in a rented house measuring 6x12 m without a floor, with only one terrace, living room, family room, bedroom, playroom, storeroom, kitchen, and bathroom. The house had tiled floors, brickwork walls, a tiled roof without a ceiling, minimal ventilation, and poor lighting. The house was cleaned daily by sweeping and mopping, but it tended to get messy because many belongings piled up.

Their water source was well water, and their drinking water was boiled well water. Household waste was channeled into gutters in front and on the sides of the house. There was one bathroom with a squat toilet with sufficient cleanliness. They did not have pets. Garbage was removed daily and sometimes burned in vacant areas near surrounding homes, and there was burnt corn crop residue around their house.

From a personal perspective, the patient's mother hoped she would not experience another attack for her daughter's quality of life to improve. Her family was worried that asthma attacks could occur at any time if

the disease could not be appropriately treated, which might have endangered her life. From the internal risk aspect, it was found that her mother had a history of allergies in the form of itchy skin when they recur. The patient also had a cousin with asthma triggered by cold air. She ate a balanced nutritional diet, rarely engaged in physical activity, and rarely washed her hands. She wore a mask at school. She also used squat latrines, and excreta were still disposed of in a septic tank. Wastewater was discharged into ditches. Her father smoked but had not smoked near or in the house since she was diagnosed with asthma. She received full support to live a healthy life. Her parents helped take care of her daily and accompanied her to the doctor if any complaints arose. Her father made decisions regarding her health problems. She could still perform activities well and take care of herself without the help of others. As a result, it can be concluded that the patient had a functional aspect of one degree.



## DISCUSSION

The role of family medicine in children's asthma is still rare.<sup>4</sup> There is a direct relationship between family factors and psychosocial adjustments in children with asthma. Efforts in the field of public health are increasingly directed at psychosocial factors related to the risk of uncontrolled asthma and contribute to health differences in asthma. This shows its multifactorial nature and the complexity of its psychosocial effects.<sup>5,6</sup> It was found that negative family bio-behavioral factors contributed to the severity of asthma in children.<sup>3</sup> It is important to understand the contextual system that reflects the two-way relationship between children with asthma and their families because of its relation to children's well-being.<sup>3,7</sup>

Each case involved different symptoms, recurrence, triggers, and genetic characteristics. One of them was also influenced by the patient's environment and family. Cold air, fatigue, smoke, environmental allergens, and genetic history are all factors that may trigger asthma attacks and must be considered.<sup>8</sup> In most cases, it was discovered that asthma recurrence was triggered by exposure to smoke.<sup>9</sup> In Case 4, the patient's condition was exacerbated by smoke from burning corn crop residue near her house because the asthma attacks always happened after the corn harvest season in November. Studies in Australia found that exposure to smoke from forest fires causes acute and persistent asthma symptoms in nearby residential areas.<sup>10</sup>

Prolonged exposure to cigarette smoke from an early age is related to the severity and risk of childhood asthma development and respiratory infections.<sup>11</sup> Some of the patients had fathers who were heavy smokers, and it is known that cigarette smoke can potentiate symptoms of respiratory tract infections.<sup>12</sup> The development of various asthma phenotypes is influenced by the role of various hereditary allergic diseases.<sup>13,14</sup> Parental allergic diseases are associated with late-onset asthma, where genetics plays a significant role. Asthma has a complex hereditary component involving several genes in its pathogenesis. Apart from parents, grandparents with a history of asthma also increase the risk of the grandchildren developing asthma.<sup>13,14</sup> In Case 2, the patient had a cat, which is generally known to affect exacerbations in asthma because early life sensitization to animal fur is a potent predictor of asthma development in children.<sup>15-17</sup>

In family medicine, many factors are considered, including personal, clinical, internal and external risk, and functional aspects. The personal aspect in each case was almost the same. Each patient's family wanted their child's asthma to be appropriately controlled and not interfere with their daily activities. Data from the CDC shows that asthma is closely related to negative impacts on children's and their caregivers' quality of life, finances, and activities.<sup>18-21</sup>

The different family forms in each case also affected the asthma recurrence rate. Various factors were influenced by family structure. For instance, single mothers or families with three or more children had fewer health office visits and asthma-related health difficulties.<sup>22,23</sup> Through the home visit, it was discovered that the patients' families still had several misconceptions about asthma. However, they had been informed that it is impossible to guarantee a full recovery from asthma. Instead, attempts should be made to reduce the frequency of exacerbations by mopping the floor instead of sweeping it or using wet clothes to wipe dirty surfaces to prevent dust from scattering. The house must also be prevented from getting damp to avoid the growth of fungi. Smoke should be avoided, including smoke coming from burning trash. Nutritional food also has to be considered.<sup>24</sup>

As the patients utilized BPJS for health coverage, the primary health care center did not provide reliever inhalers and only prescribed oral salbutamol. However, it was not enough to relieve the symptoms during exacerbation. Out-of-pocket healthcare payments may burden household spending, which does not align with one of the three critical principles of universal health coverage, financial protection and equity in finance. Given the current asthma epidemiology in Indonesia, there should be advocacy for assessing the distribution of necessary reliever and controller drugs in primary healthcare centers.

The family's APGAR in all cases showed overall highly functional families.<sup>25</sup> Consistently positive family factors, such as inter-family communication, cohesion, and ability to solve problems, were emphasized in the family system model.<sup>3</sup> Thus, in disease management and health outcomes, this suppresses various emerging stressors, thereby minimizing the physiological reactivity that can trigger asthma symptoms.<sup>3,26</sup> Details of each family's problems and the relevant interventions for each family can be seen in Table 1.

**Table 1.** Details of the problems and interventions in each family's case

Case	Problem	Family Intervention
1.	<ul style="list-style-type: none"> <li>- Asthma recurrence</li> <li>- Symptoms appeared after drinking cold drinks</li> <li>- Did not take asthma controller medication regularly</li> <li>- His aunt had a history of asthma</li> <li>- There was no ceiling on the roof</li> <li>- His mother was worried that asthma would interfere with school</li> </ul>	<ul style="list-style-type: none"> <li>- Avoid the trigger<sup>8</sup></li> <li>- Education to take asthma controller regularly<sup>2</sup></li> <li>- Explain that hereditary history of asthma is a risk factor for asthma<sup>13,14</sup></li> <li>- Improve house ventilation<sup>24</sup></li> <li>- Educate his family regarding asthma<sup>3,26</sup></li> </ul>
2.	<ul style="list-style-type: none"> <li>- Asthma recurrence</li> <li>- Exposure to cigarettes, vehicle fumes, and cat dander</li> <li>- Grandmother, mother, and sister diagnosed with asthma since childhood</li> <li>- Worried about uncontrolled recurrence of symptoms that will have an impact on the future</li> <li>- Used independent costs because the family had not registered him with BPJS</li> </ul>	<ul style="list-style-type: none"> <li>- Avoid the trigger<sup>8,9,11,12,15-17</sup></li> <li>- Explain that hereditary history of asthma is a risk factor for asthma<sup>13,14</sup></li> <li>- Educate his family regarding asthma<sup>3,26</sup></li> <li>- Advise family to register as BPJS participants<sup>18-21</sup></li> </ul>
3.	<ul style="list-style-type: none"> <li>- Asthma recurrence</li> <li>- Exposure to dust, cold air, and smoke from burning corn plants around the warehouse</li> <li>- Mother had a history of allergies due to cold air</li> <li>- Her mother was worried that her asthma would get worse/could not be cured, causing complications and disrupting school as well as the future of the child, and impacting family activities and finances</li> <li>- The house got dirty quickly because it was located near a rice field</li> </ul>	<ul style="list-style-type: none"> <li>- Avoid the trigger<sup>8,9,11,12,15-17</sup></li> <li>- Explain that hereditary history of asthma is a risk factor for asthma<sup>13,14</sup></li> <li>- Educate his family regarding asthma<sup>3,26</sup> and to take asthma controller regularly<sup>2</sup></li> <li>- Advise family to register as BPJS participants<sup>18-21</sup></li> <li>- Improve home conditions<sup>24</sup></li> </ul>
4.	<ul style="list-style-type: none"> <li>- Asthma recurrence</li> <li>- The triggers were flu, exposure to cigarette smoke, and burning of corn crop residue</li> <li>- Her mother had an allergy manifesting in itchy skin, and her cousin had cold-induced asthma</li> <li>- Families worried about sudden asthma attacks that were dangerous for children</li> <li>- A house with very minimal ventilation, lighting, and piles of belongings</li> </ul>	<ul style="list-style-type: none"> <li>- Avoid the trigger<sup>8-12,15-17</sup></li> <li>- Explain that hereditary history of asthma is a risk factor for asthma<sup>13,14</sup></li> <li>- Educate his family regarding asthma<sup>3,26</sup> and to take asthma controller regularly<sup>2</sup></li> <li>- Advise family to register as BPJS participants<sup>18-21</sup></li> <li>- Improve home conditions<sup>24</sup></li> </ul>

## CONCLUSION

Family medicine is an important form of holistic asthma management. Family intervention involves positive support from all family members and the environment through family empowerment in various fields, which plays an important role in supporting the successful management of asthma in children.

## Consent

Written informed consent was obtained from the patients.

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## Conflict of Interest

The authors declared there is no conflict of interest.

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## Authors' Contributions

Writing manuscript, collecting data: AMP, DSO, FG, MPK, JNR, LK, and FB. Reviewing and revising: AMP, II, JNP, GSD, ADA, ARR, VIK, and WSPH. All authors have critically reviewed and approved the final draft and are responsible for the content and integrity of the manuscript.

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