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## The Relationship Between the Smoking Habits of Family Members and The Incidence of Respiratory Infections of Children Under 5 Years in Indonesia: A Literature Review

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### ABSTRACT

Reducing under five mortality is one of the SDGS aims for ensuring a healthy life and supporting wellbeing for all ages. When it comes to causes of death in babies and young children, acute respiratory infections always come in first. Cigarette smoke is one of the air pollutants that increases the occurrence of respiratory system disorders. The goal is to examine the connection between family members' smoking behaviors and the prevalence of ARI in young children. Methods: This literature review is sourced from various research articles, and official websites published in 2018-2022. Search articles using keywords, inclusion and exclusion criteria. Article assessment use CASP and article processing uses the Mendeley application Results: Determined 6 sources of articles that are feasible and relevant to be used after passing the critical appraisal stage. Conclusion: There is a connection between family members' smoking behaviors and the prevalence of acute respiratory infections

Keywords: Acute Respiratory Infection, Cigarette, Smoke

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## INTRODUCTION

Reducing under-five mortality is one of the SDGs' goals for ensuring healthy lives and promoting wellbeing for all ages. The globe still worries about acute respiratory infection (ARI), which also affects Indonesia. The primary cause of death in children under the age of five is an acute respiratory infectious disease called pneumonia<sup>1</sup>. The incidence of ARI rises yearly in Indonesia. According to the Indonesian Ministry of Health, the incidence of ARI in 2016 reached 533,187 with 18 provinces having a prevalence above the national rate. In 2018 it reached 19.167% with the highest ARI prevalence occurring in the age group one to four years (13.7% ). In 2019 the number increased to 19.167%. ARI often occurs in children, and episodes of cold and cough in children under five years in Indonesia are estimated 3-6 times per year (4 times per year on average)<sup>2</sup>.

An upper or lower respiratory tract infection is referred to as an acute respiratory infection. Common symptoms of ARI are fever, dizziness, cough, runny nose, shortness of breath, sore throat, nausea, and vomiting<sup>3</sup>. ARI may be caused by 300 types of bacteria, viruses, and rickettsiae<sup>2</sup>. According to several studies around the world, one of the risk factors for ARI is smoking parents. In addition, according to WHO, several factors increase the risk of acute respiratory infections, including environmental issues like air pollution; household density; Humidity; hygiene; season and temperature; availability and efficacy of medical care and infection prevention and control (IPC) measures to prevent the spread, such as vaccinations, access to healthcare facilities, and isolation capacity; Individual factors such as age, the ability of an individual to convey infection, immune status, nutritional status, previous or concomitant inflammation with other pathogens, as well as inherent medical conditions and pathogen characteristics such as mode of transmission, transmissibility, and virulence factors, all influence the risk of infection. such as toxin-coding genes and microbial load (inoculum size)<sup>4,5</sup>. Untreated ARI may cause lungs and meninges infection, decreased consciousness, and even death<sup>6</sup>.

The prevalence of children exposed to cigarette smoke is still high in Indonesia<sup>7</sup>. The smoking behavior of family members increases the risk of ARI, particularly in children under the age of five, due to a reduction in macrophages' ability to kill bacteria and damage to the local resistance of the lungs, such as the inability to clean the mucociliary, which facilitates the occurrence of respiratory tract infections<sup>8</sup>. Herawati and Sriwaty discovered that 97.5% of children under the age of five who had ARI in 2020 had family members who smoked. It was discovered that there was a link between smoking in the family and the occurrence of ARI in young children. The results of this study agreed with those of Milo's earlier research, Ismanto, and Kallo in 2015, in which children under five years living in the same house with their parents who smoke had the opportunity to increase the incidence of ARI by 7.83 times compared to the children whose parents did not smoke. However, according to a study by Gunawan et al in 2020, There was no correlation between the incidence of ARI in children between the ages of one

and five, as well as family members' smoking habits in the Talang Padang Health Center's service area. Meanwhile, girls are more likely than boys to develop ARI <sup>9</sup>.

Contradictory results were obtained from numerous research exploring the relationship between cigarette smoke exposure and the occurrence of acute respiratory infection (ARI) in children under the age of five. Therefore, a literature review is needed as a summary of those studies to facilitate researchers with the data. We were interested in conducting a study titled A literature review entitled "The Relationship between the Smoking Habits of Family Members and the Incidence of Acute Respiratory Infections of Children Under 5 Years in Indonesia" looked into the connection between family members' smoking habits and the occurrence of ARI in young children.

## METHOD

This study used the literature review method which is sourced from various research articles with ISSN and the articles on official websites in Indonesian. Sources were accessed through Google Scholar, Garuda Journal, Pubmed, and several official websites, such as the website run by WHO and the Indonesian Ministry of Health. The keywords used in the search for articles were "acute respiratory infection", cigarettes, smoke, children younger than five, and infants. The articles were supposed to be published from 2018 to 2022 with a quantitative design. The articles in national and international journals were searched using the literature study method. The search yielded 1,135 articles and six articles were obtained by filtering them based on their relevancies to the topics, their methods, and the results of their studies. The selection of sources was based on predetermined inclusion criteria, which were the full-text articles in English or Indonesian, presented research results, presence of data analysis, children under five years diagnosed with ARI as the study population, and family members who smoked in the house. In addition, exclusion criteria were also set for children with other co-morbidities. The critical appraisal was performed using CASP and article processing was conducted using Mendeley.

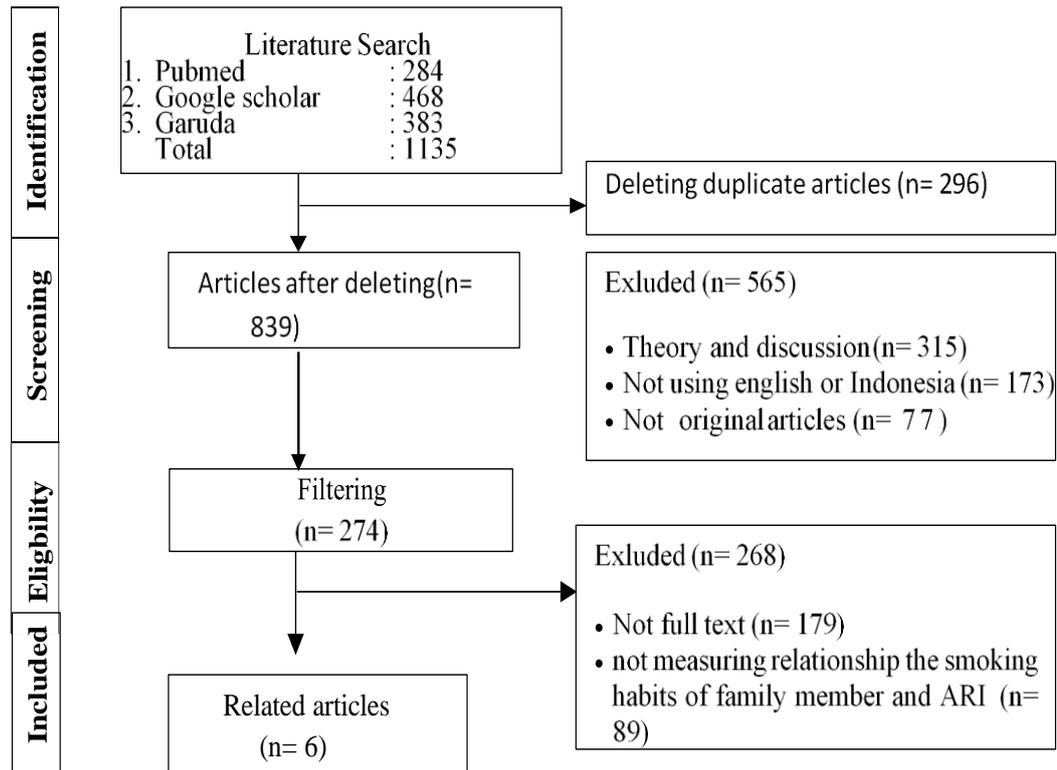


Figure 1. Process of Picking and Choosing Articles to be Used as Literature

Table 1. Literature Review Results

No	Author, year	Heading	Research design and samples	Result
1.	Zulfikar, Supriadi / 2021	The Relationship between Room Occupancy Density and Opinion Habits in the House with Respiratory Tract Infections in Toddlers in Tingkem Bersatu Village, Bukit District, Bener Meriah Regency.	A cross-sectional design methodology was employed in this investigation. Total sampling yielded 58 responders for the sample	There is a correlation between smoking in the home and the occurrence of respiratory illnesses ARI obtained p value = 0.041 (p <0.05)
2.	Haerani, Sri Ningsih, Siti Usmia, dkk / 2020	A review of smoking behaviors among family members of toddlers with acute respiratory symptoms infection (ARI) in Ponre Community Health Center Work Area	This research uses descriptive approach design. The sample was 50 respondents by purposive sampling	Most of the family members of toddlers with ARI are smokers.

	Gantarang District, Bulukumba Regency		
3.	Siska, Fera / 2019	The Relationship Between Smoking Habits In The Home And Ari Incident Of Arti In Under-Free Children 0-5 Years At Puskal Health Center, Palembang 2019	This research uses cross sectional approach design. The sample was 30 respondents by purposive sampling  In the Bukit Sangkal Palembang Health Center, statistical studies revealed a substantial correlation between smoking and the incidence of acute respiratory infection (ARI) in babies in 2019 with $p$ value = 0.007 $< \alpha$ (0.05) and OR = 17.143.
4.	Putri, Prima, Melanie Rakhmi Mantu / 2019	The influence of the physical home environment on the incidence of acute respiratory infections in toddlers in the Ciwandan District of Cilegon City from July to August 2016	This research uses cross sectional approach design. The sample was 90 respondents by non random consecutive sampling  34,4% respondents who experienced ISPA, 30 of them had a smoking habit in the house
5.	Stephanie Salim, Lokot Donna Lubis, Cut Adeya Adella, Milahayati Daulay, Eka Roina Megawati / 2021	Analysis of Factors Influencing Acute Respiratory Infection among Under-Five Children in Sering Public Health Centre, Medan Tembung Subdistrict	This study used a descriptive-analytical method with a cross-sectional study approach. Using a questionnaire, data is collected using a technique of successive sampling.  There is no link between gender, birth weight, immunization status, vitamin A supplementation, breastfeeding exclusively, crowding, family income, knowledge, attitude, or conduct and the frequency of ARI. When compared between groups, there is no discernible difference in the incidence of acute respiratory infections for either smoke exposure or mother's level of formal education (ARI).
6.	Aryani, Novita, Henny Syapitro / 2018	The Relationship between Family Members' Smoking Habits in the House with Respiratory Tract Infections in Toddlers at the Helvetia Health Center in 2016	This research uses cross sectional approach design. The sample was 92 respondents by total sampling  The prevalence of acute respiratory infections and household members' smoking habits are significantly correlated (ARI) in toddlers at the health center with $p$ = 0.000

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## RESULTS

The articles that had been found through keywords and met the eligibility criteria would proceed to the critical appraisal. This step was performed to prove that the articles used were appropriate and relevant. In the end, six articles were determined to be used as sources for the literature review.

These articles were cross-sectional and case-control studies. According to the six papers that looked at the relationship between the prevalence of acute respiratory infections (ARI) in children under the age of five and family members who smoke, it was concluded that the children who lived at home with family members who actively smoke were more at risk of experiencing ARI.

A study conducted by Putri and Mantu (2019) identified a substantial correlation between household smoking and the frequency of severe respiratory illness in children under the age of five in Cilegon ( $p = 0.006$ )<sup>10</sup>. The result is in line with the study conducted by Aryani and Syapitro (2018) which The proportion of children under five years old with acute respiratory infection (ARI) was shown to be higher among toddlers exposed to cigarette smoke. This was proven by 92 children under five years with ARI, 66 (71.7%) of them were exposed to cigarette smoke, while the rest were not exposed to cigarette smoke<sup>11</sup>.

According to Zulfikar (2021), out of a total of 40 children under five years with ARI, 32 of them had family members who smoke in the house. Based on the results of the Chi-Square test with a 95% level of confidence, researchers assessed the relationship between household smoking and the prevalence of acute respiratory infection (ARI) in kids under the age of five, it obtained a P value of 0.041 ( $p < 0.05$ ). This demonstrated a statistically significant correlation between parental smoking and the incidence of acute respiratory infection (ARI) in children<sup>8</sup>. This is in line with a study by Fera Siska (2019) concerning The link between parental smoking and the incidence of ARF in children under the age of five. OR value of 17.143 was obtained which showed that children under five years with whose family members at home smoked, had a 17.143 times risk of suffering from ARI compared to those who did not have family members who smoke at their homes<sup>12</sup>. There was a different study conducted by Salim *et al.*, (2021) on 35 children under five years that showed Exposure to cigarette smoke and the frequency of acute respiratory infections were not significantly correlated ( $p=0.988$ )<sup>13</sup>.

Meanwhile, a study by Haerani *et al* (2020) described the characteristics of family members who smoked in 50 children under five years who were diagnosed with ARI. Twenty-one (42%) of them lived with family members who smoked without paying attention to the children around them, and 29 (58.0%) have smoking behaviors by observing a situation in which there were no children surrounding the smokers. Another characteristic was that 20 children under five years old whose family members (40.0%) had only one smoking habit, and 30 children whose family members (60.0%) had more than one smoking habit. Out of a total of 50 children under five years with ARI, 12 of them had family

members who were light smokers, 24 had family in the moderate smoker category and 14 had family in the heavy smoker category<sup>14</sup>.

## DISCUSSION

ARI is an upper and lower respiratory tract infection that lasts for 14 days<sup>15</sup>. ARI may affect the upper respiratory tract organs which consist of the nose, ears, upper throat (pharynx), and lower respiratory tract including the larynx, trachea, bronchioles, and lungs<sup>16</sup>. ARI is caused by 300 types of bacteria, viruses, and rickettsiae<sup>2</sup>. In addition, ARI may also be caused by allergic reactions. Allergies are an exaggerated response of the body to certain substances such as dust, pollen, chemicals, food, and pets<sup>17</sup>.

One of the behaviours or habits that produce air pollution inside and outside the room is smoking. A smoking habit can also be defined as a subject's activity related to smoking behaviour, as measured by intensity, duration, and the function of smoking in daily life<sup>18</sup>. Cigarette smoke is one of the air pollutants that is addictive and contains complex compounds from burning tobacco. Cigarette smoke directly from burning tobacco will be more dangerous than cigarette smoke released from the mouth of an active smoker because cigarette smoke released from active smokers has experienced filtering through the smoker's respiratory system and the cigarette itself. Children under five years who live in the same home as active smokers will indirectly become passive smokers and receive the adverse effects caused by cigarette smoke<sup>19</sup>. This is because smoking interferes with the lung's defence function by interfering with the ciliary and alveolar macrophage cells' function. Both of these methods facilitate the entry of germs into the respiratory tract and harm lung tissue by producing toxins, so facilitating the entry of infectious pathogens. They attach to the walls of the bronchi and bronchioles, proliferate, and subsequently cause inflammation in the body. When an inflammatory reaction occurs, the alveoli air sacs will be filled with exudate fluid which contains lots of protein, inflammatory cells such as neutrophils in the acute phase, then macrophages and lymphocytes in the chronic phase. As a result, the process of diffusion of oxygen and carbon dioxide is disrupted, so patients with this disease will experience hypoxemia and hypercapnia.<sup>20</sup>

The research Putri and Mantu, (2019) identified a strong correlation between smoking in the home and the risk of acute respiratory infection (ARI). This is because cigarette smoke is a pollutant which contains harmful substances or substances that can cause ARI, continuous exposure can make ARI worse<sup>10</sup>. This is in line with research Aryani and Syapitro, (2018) It demonstrates that toddlers exposed to cigarette smoke are more likely to have ARI than other children. This was proven from 92 toddlers with ARI, 66 (71.7%) of them were exposed to cigarette smoke, while the rest were not exposed to cigarette smoke. This is because cigarette smoke can reduce the ability of macrophages to kill bacteria and can damage the local resistance of the lungs, such as the ability to clean mucociliary thereby

facilitating the occurrence of infections in the respiratory tract. In this study it was not explained further how the researchers obtained primary data related to the smoking habits of family members and did not include a comparison of p values with p counts so as to raise doubts about the conclusions. Sources of cigarette smoke indoors (indoor) are more dangerous than outdoors (outdoor) because some people spend 60-90% of their time for a full day indoors. The population that is vulnerable to secondhand smoke is toddlers, because they breathe air more often than adults<sup>11</sup>. This is consistent with the studies Zulfikar, (2021) shows that there is a statistically significant link between household smoking and the incidence of ARI in infants<sup>8</sup>. The same drawback was found in this study, namely that it was not explained further how the researchers obtained primary data regarding the habits of family members who smoked or not. This is in line with research Admin and Fera Siska, (2019) Regarding the connection between household smoking practices and the prevalence of ARI in children, research indicates that children under the age of five who live with smoking family members are 17.143 times more likely to develop ARI than their counterparts who do not live with smoking family members<sup>12</sup>. While research Salim *et al.*, (2021) There was no link between the frequency of acute respiratory infections and any amount of cigarette smoke exposure (ARI). There are only a few children who aren't exposed to tobacco smoke and most of the parents have shifted to not exclusively breastfeed their child<sup>13</sup>. They also found that parents/caregivers still had low knowledge of ARI, especially subjects on pneumonia.

The study by Haerani *et al.*, (2020) described the characteristics of family members who smoked in 50 children under five years diagnosed with ARI. Twenty-one (42%) of them lived with family members who smoked without paying attention to the children around them, and taking into account the absence of minors in the vicinity of the smokers, 29 58.0% of the sample had smoking habits. Another characteristic was that 20 children under five years old whose family members (40.0%) had only one smoking habit, and 30 children whose family members (60.0%) had more than one smoking habit. Out of a total of 50 children under five years with ARI, 12 of them had family members who were light smokers, 24 had family in the moderate smoker category and 14 had family in the heavy smoker category. However, this study did not explain in detail how the criteria related to smoking pay attention to the children around them, giving rise to doubt about whether it referred to smoking inside the home or outside the home<sup>14</sup>.

A link between family members' smoking habits and the occurrence of acute respiratory infections (ARI) in children under the age of five was found by analyzing six articles. This is in line with a study by Sambominanga *et al.*, (2014). Of the 56 respondents who had ARI, 47 of them were toddlers (1-3 years old) and 9 of them were preschool children (4-5 years old)<sup>21</sup>. This is in line with the theory put forward by Maisyarah *et al.*, (2021) related to the age of children who are susceptible to infectious diseases due to immature tissue so that the body's defence process may not be optimal<sup>22</sup>.

If not handled properly, ARI may cause serious, such as infection of the lungs and meninges, decreased consciousness, respiratory failure, and even cause death<sup>6</sup>. In order to prevent ARI in

newborns under one year of age and to reduce their exposure to indoor air pollution from solid fuels used for cooking, parents should pay more attention to their female children. Families should also watch over their male children when they use the restroom. To stop the spread of microorganisms that could cause an acute respiratory infection, the government, especially the health department, must maintain clean and efficient public restrooms (ARI) <sup>4</sup>.

One form of the government's seriousness in controlling ARI is through the implementation of the ARI Disease Prevention and Control program listed in the 2020-2022 reconciliation action plan (RAP). Efforts attempted in the ARI Disease Prevention and Control program include advocacy, socialization and coordination, technical guidance, monitoring evaluation and assistance, strengthening networks and community participation, preparation of contingency plan documents, preparation/review/update of Norm Standard Procedure and Criteria, data validation meetings, the increasing capacity building and procurement infrastructure (Director-General of Disease Prevention and Control, 2020). The implementation of the program is focused on finding and treating sufferers as early as possible by involving the active role of cadres, with the support of integrated health services and referrals at related health facilities. <sup>2</sup>.

One important element in preventing ARI is controlling risk factors, which include exclusive breastfeeding, avoiding malnutrition in children, preventing low birth weight, reducing indoor and outdoor air pollution, immunization, and limiting population density <sup>24</sup>.

## CONCLUSIONS

ARI in children under five years that does not show a decrease from year to year is still a big task for our government. This is exacerbated by the lack of public awareness, especially among family members, in suppressing risk factors. Prevention must be performed with the cooperation of various parties, both in terms of the community, health centres, and policymakers. At least the community can participate in suppressing the case by refraining from smoking in the house when there are children around and changing clothes contaminated with cigarette smoke when inside the house.

Based on the six research articles described above, It turned out that there was a connection between ARI incidence and the smoking habits of family members. However, more investigation is needed to establish a link between family members' smoking habits and the severity and recurrence of ARI in young children.

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