

Thesis Title	Signs and Symptoms of Acute Respiratory Infections Association with Air Pollution among Under-Five Years Children in the Marginalized Community of Mae Sai District, Chiang Rai Province
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ABSTRACT

Introduction: In Thailand, the prevalence of fine dust, specifically particles measuring less than 2.5 microns, poses a significant environmental challenge. Annually, Thailand surpasses the standard air pollution threshold, particularly evident in the Mae Sai district where levels of PM2.5 exceed established criteria. This heightened pollution raises concerns for potential health risks, particularly respiratory diseases. Statistical data indicates a correlation between PM2.5 exposure and respiratory infections, with children being the most vulnerable demographic. Groups with limited access to healthcare services or residing in high-risk environments, such as marginalized populations, may experience a higher incidence of respiratory infections among children. However, further research is needed to conclusively determine the exact factors contributing to these infections.

Methods: A community-based cross-sectional study was conducted at Mae Sai district, Chiang Rai Province, Data collection in 2 periods into August-December 2022: before the smog period and January-May 2023 the smog period. by structured questionnaire. 284 participants were randomly selected into the study.

Results: A total of 171 participants who completed the questionnaire were eligible for the analysis in this study. The average age of the children was 2.50 ± 1.47 years, and their mothers or caregivers had a mean age of 34.40 ± 11.1 years. It was found that most of the mothers or caregivers had an education level of 'able to read and write' (31.0%). The majority of the family sizes tended to be large, with 78.9% having more than four members. Hand hygiene, face mask use, and vaccination are crucial in preventing infectious diseases and promoting children's long-term health. In this study, 67.8% of the observed children were fully vaccinated. Most of the children always washed their hands after outdoor activities (77.8%); however, 98.8% did not wear a mask when they went outside. The structure of the house and sanitary facilities are important factors that can contribute to the infection cycle for the children. Most houses in this study had in-house toilets with adequate sewage disposal (74.9%).

Moreover, poor ventilation in the kitchen during cooking activities can exacerbate the problem by trapping smoke and pollutants indoors. It was found that the houses in this study had windows in the kitchen (87.1%), which are essential for ventilating the air while cooking. The sources of energy for cooking were biomass fuels (46.2%), clean fuels (45.0%), and kerosene (8.8%). During the cooking activity, 44.4% of the children were not in the cooking area when their mothers or caregivers prepared the food, with an average time of 28.1 ± 16.2 minutes per session. In addition, smoking and using aerosol spray products are among the causes of indoor air pollution for children. The findings of this study revealed that 40.4% of the families had cigarette smokers. However, when using spray cleaners or deodorants, 60.8% of the families kept the children away for an average time of 21.2 ± 2.97 minutes. Outdoor air pollution was also observed in the study. The results revealed that 95.9% of the families burned trash inside the house area, and 90.1% of the children were indoors during this activity.

Furthermore, PM2.5 from agricultural burning is one of the causes of air pollution in Chiang Rai, particularly from January to May (smog period). The data

analysis in this study indicated a statistically significant association between signs and symptoms of acute respiratory infection and PM2.5 among children under five ($p < 0.05$). During the smog period, all of the five common signs and symptoms of acute respiratory infection among children, including cough (with or without fever) ($OR = 3.91$, 95% CI = 2.50-6.14, $p < 0.001$), rapid breathing or shortness of breath ($OR = 14.4$, 95% CI = 7.64-27.50, $p < 0.001$), difficulty breathing ($OR = 10.2$, 95% CI = 5.82-18.01, $p < 0.001$), wheezing ($OR = 13.4$, 95% CI = 6.42-28.00, $p < 0.001$), and sore throat ($OR = 3.28$, 95% CI = 2.01-5.38, $p < 0.001$) were higher compared to the non-smog period.

Conclusion: Research has demonstrated that during periods of air pollution or when PM2.5 levels exceed standard values, children are at a higher risk of developing signs and symptoms of acute respiratory infections compared to usual conditions. Children under the age of 5 are particularly susceptible and require close monitoring. Caregivers, including mothers, should focus on mitigating both short- and long-term exposure to pollution through careful selection of cooking materials, reducing indoor pollution, and ensuring proper nutrition, vaccination, and healthcare. These measures are essential for protecting children's immune systems, reducing risks, and lowering healthcare costs. Currently, both public and private entities are engaged in campaigns and initiatives, as evidenced by the Ministry of Public Health's efforts in managing smog (Ministry of Public Health, 2019).

Despite these endeavors, it is acknowledged that these issues persist. Prevention of respiratory infections in children necessitates protection both indoors and outdoors. This entails fostering an understanding of the issues, raising awareness about prevention methods, and acknowledging the potential impacts on individuals. Collaboration between the government and private sectors is imperative. Establishing clear guidelines, regulations, and stringent rules, such as those outlined in the Clean Air Act, is essential to mitigating these challenges and promoting sustainable health across all age groups.

Keywords: Acute Respiratory Infection in Children, Air Pollution, Marginalize