

Identification of sociodemographic and risk factors contributing to Lower Respiratory Tract Infections (LRTIS) among children: A community-based cross-sectional study

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Abstract

Lower Respiratory Tract Infection (LRTI) is one of the leading causes of morbidity and mortality among children worldwide, particularly in low- and middle-income countries. Several sociodemographic, environmental, and clinical factors contribute to the occurrence and recurrence of LRTIs in children. This community-based cross-sectional study was conducted to identify the sociodemographic and risk factors associated with LRTI among children in Eraviperoor Grama Panchayat, Thiruvalla, Kerala. A total of 200 children below 18 years of age were included in the study through caregiver interviews using a structured questionnaire.

Among the 200 children included in the study, 134 children (67%) had a history of LRTI. Pneumonia was identified as the most common type of LRTI followed by bronchitis and bronchiolitis. Several important risk factors were identified including premature birth, low birth weight, caesarean delivery, passive smoking, overcrowding, poor vaccination status, exposure to pets, family history of respiratory diseases, and inadequate breastfeeding practices. Environmental exposure and poor hygiene practices were also significantly associated with recurrent respiratory infections in children.

The study highlights the strong association between sociodemographic characteristics and modifiable risk factors with LRTI occurrence in children. Early identification of these factors and implementation of targeted preventive strategies including vaccination awareness, smoking cessation, improved hygiene, breastfeeding promotion, and reduction of environmental exposure may significantly reduce the burden of LRTI in children.

Keywords: Lower Respiratory Tract Infection; Risk Factors; Sociodemographic Factors; Passive Smoking; Premature Birth; Vaccination

1. Introduction

Lower Respiratory Tract Infection (LRTI) is an infection affecting the lungs and lower airways, resulting in inflammation and breathing difficulties. LRTIs include bronchitis, bronchiolitis, and pneumonia. These infections remain a major public health concern among children and are associated with significant morbidity and mortality worldwide, especially in developing countries.^(1,3)

LRTIs are commonly caused by viral or bacterial pathogens including respiratory syncytial virus (RSV), influenza virus, *Streptococcus pneumoniae*, and *Haemophilus influenzae*.⁽⁷⁾ These pathogens spread through respiratory droplets, contaminated surfaces, and close contact with infected individuals. Children are particularly vulnerable because of their immature immune system and increased exposure to environmental risk factors.⁽²⁾

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Several sociodemographic and environmental factors contribute to the development and recurrence of LRTIs among children.^(4,6) Factors such as overcrowding, low socioeconomic status, poor parental education, passive smoking, malnutrition, inadequate breastfeeding, low birth weight, premature birth, and lack of immunization significantly increase the susceptibility to respiratory infections.^(8,10)

Environmental pollution and indoor smoke exposure are major preventable contributors to childhood respiratory diseases.⁽⁸⁾ Children exposed to tobacco smoke and biomass fuel have a greater risk of recurrent respiratory infections and hospitalization.⁽¹⁰⁾ Furthermore, poor awareness regarding preventive measures and delayed healthcare-seeking behavior among caregivers may worsen disease outcomes.⁽⁹⁾

Understanding the sociodemographic and modifiable risk factors associated with LRTIs is essential for developing preventive strategies, improving child health outcomes, and reducing the burden of respiratory infections in pediatric populations.

Objective

The objective of this study was to identify the sociodemographic and risk factors associated with Lower Respiratory Tract Infections (LRTIs) among children in Eraviperoor Grama Panchayat, Thiruvalla, Kerala.

2. Materials and methodology

A community-based cross-sectional study was conducted among children below 18 years of age in Eraviperoor Grama Panchayat, Thiruvalla, Kerala. The study was conducted from December 2024 to May 2025 after obtaining approval from the Institutional Review Board of Nazareth College of Pharmacy.

A total of 200 children were enrolled in the study through caregiver interviews using a pre-designed structured questionnaire. Children with a history of lower respiratory tract infection were included in the study. Caregivers who were unwilling to participate were excluded.

Data regarding sociodemographic characteristics, environmental exposure, birth history, vaccination status, breastfeeding practices, family history of respiratory diseases, passive smoking exposure, overcrowding, and hygiene practices were collected.

The collected data were entered into Microsoft Excel and analyzed using descriptive statistical methods. Results were expressed as frequencies and percentages.

3. Results

3.1. Distribution of children born full term versus prematurely

Among the children with recurrent LRTIs, a significant majority of 54 individuals (82%) were born preterm, whereas only 12 individuals (18%) were born full term. In contrast among children with non-recurrent LRTIs, majority of 63 individuals (93%) were born full term, while only 5 individuals (7%) were preterm.

3.2. Distribution of Gestational age at birth

Among 54 children with recurrent LRTIs, that is the highest proportion were late preterm (28 children, 42%) followed by moderate preterm (17 children, 26%) and very preterm (9 children, 14%). Notably, no case of recurrent or non-recurrent LRTIs were observed in the extreme preterm group. In non-recurrent group the majority were also born moderate or late preterm with 3 individuals (4%) and 2 individuals (3%) respectively.

3.3. Distribution of Birth Weight

Among the 66 individuals with recurrent LRTIs, a significant majority had low birth weight, according for 38 individuals (57.5%), followed by 15 individuals (23%) with very low birth weight. Only 12 individuals (18%) with recurrent LRTI had normal birth weight and just 1 individual (1.5%) involved a child with high birth weight. In contrast, among the 68 individuals with non-recurrent LRTIs, 63 individuals (93%) had normal birth weight, with very few cases in the low (3%) and high (4%) birth weight groups.

3.4. Distribution of delivery type

Among the 66 individuals with recurrent LRTIs a striking 85% (56 individuals) were delivered via caesarean section, whereas only 15% (10 individuals) were delivered through normal vaginal birth. In contrast, of the 68 children with non-recurrent LRTIs, the majority 78% (53 individuals) were born via normal delivery, only 22% (15 individuals) were delivered by caesarean section.

3.5. Distribution of subjects with and without any medical conditions.

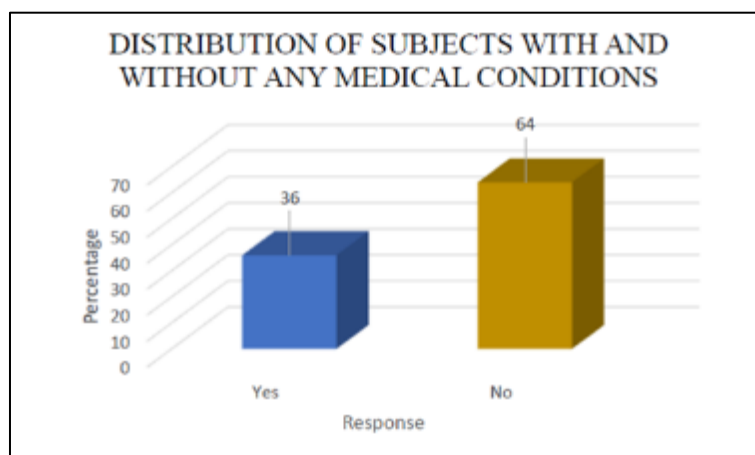


Figure 1 Distribution of subjects with and without any medical conditions.

Among the 134 individuals with LRTI, 86 individuals (64%) had no other medical conditions, while 48 individuals (36%) had other underlying medical conditions.

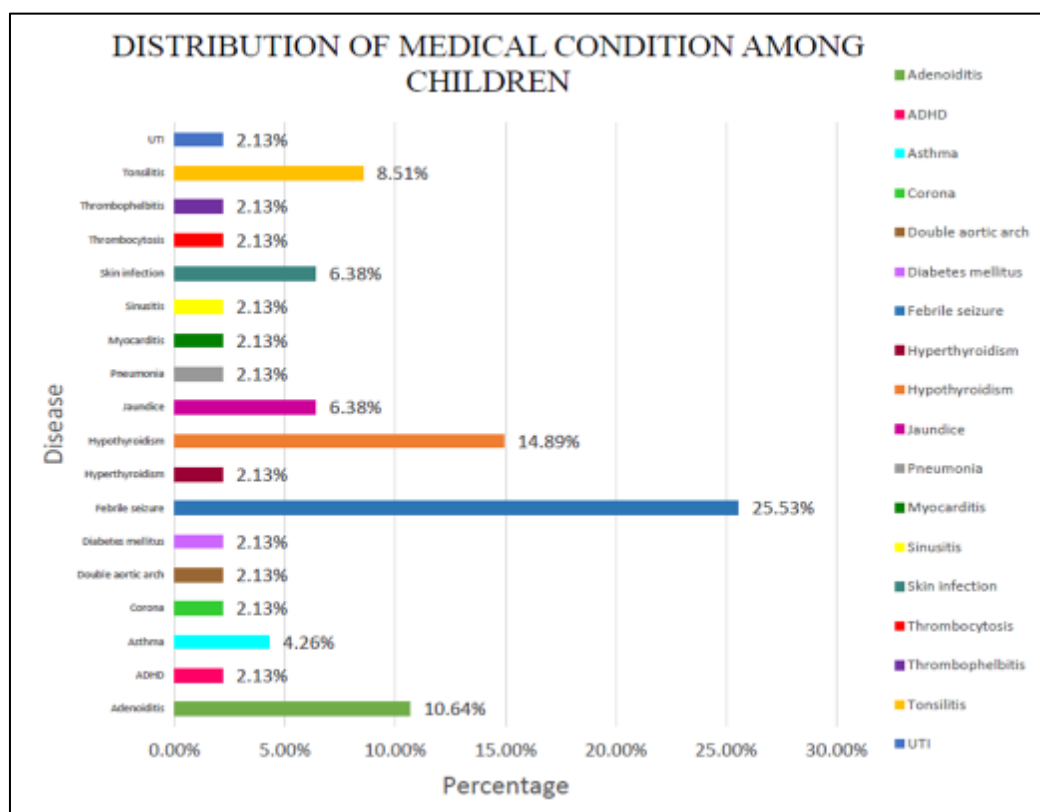


Figure 2 Distribution of medical condition among children

Among the 134 individuals with LRTI, about 47 individuals have diseases of which a range of coexisting conditions including 12 cases (25.53%) of febrile seizure, 7 cases(14.89%) of hypothyroidism, 5 cases(10.64) of adenoiditis, 4 cases(8.51%) of tonsilitis, 3 cases(6.38%) of jaundice, 2 cases(4.26%) of asthma, 1 cases(2.13%) of UTI, 1 case (2.13%) of Thrombophlebitis, 1 case(2.13%) of Thrombocytosis, 1 case (2.13%) of Sinusitis, 1 case(2.13%) of Myocarditis, 1 case(2.13%) of Pneumonia, 1 case(2.13%) of Hyperthyroidism, 1 case(2.13%) of Diabetes mellitus, 1 case(2.13%) of Double aortic arch, 1 case (2.13%) of Corona and 1 case (2.13%) of ADHD.

3.6. Distribution of children undergone hospitalizations other than LRTI

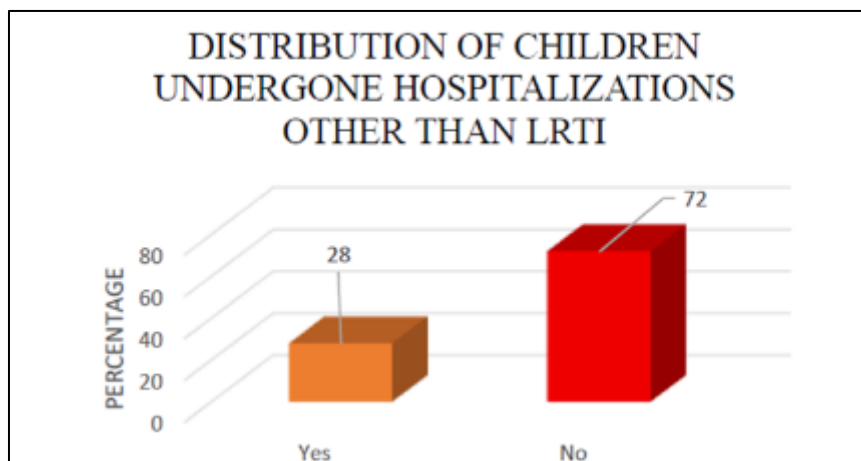


Figure 3 Distribution of children undergone hospitalizations other than LRTI

The above graph illustrates that among 134 individuals in the study, majority of 97 individuals (72%) undergone hospitalisation other than LRTI and 37 individuals (28%) does not undergo hospitalization other than LRTI.

3.7. Distribution of children undergone any surgical procedure

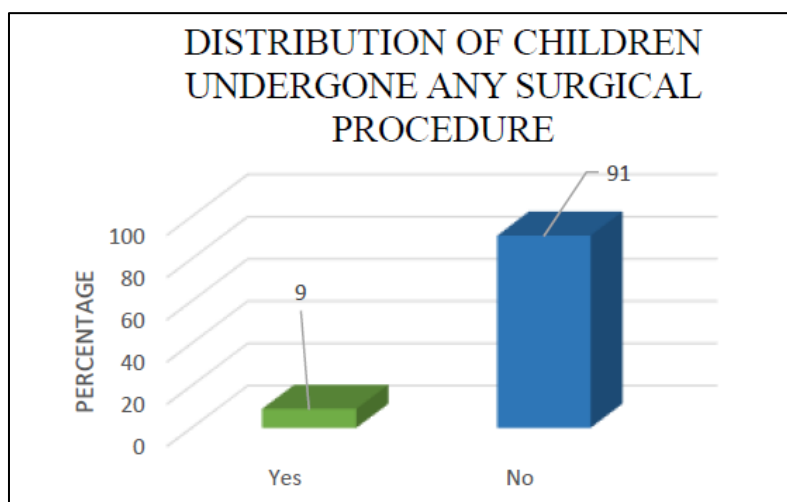


Figure 4 Distribution of children undergone any surgical procedure

The above graph illustrates that among 134 individuals in the study, majority of 122 individuals (91%) does not undergo any surgical procedure while 12 individuals (9%) undergone surgical procedure.

3.8. Distribution of Family history of respiratory diseases

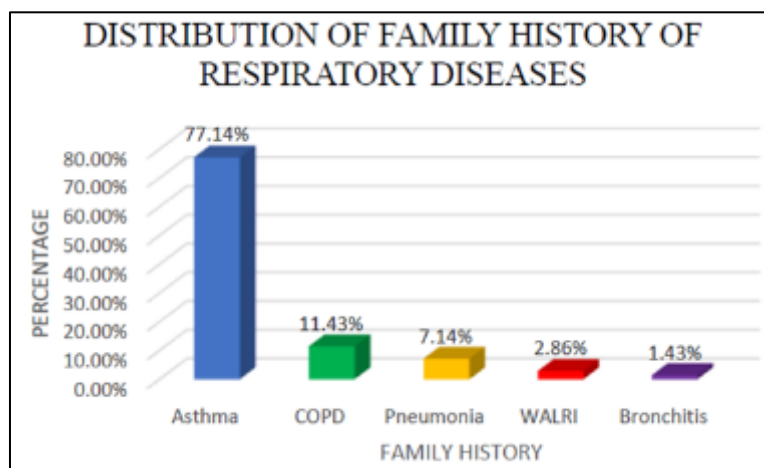


Figure 5 Distribution of Family history of respiratory diseases

The graph presents an overview of 134 individuals in the study, among which 70 individuals have a Family history of respiratory disease, thereby revealing the notable prevalence of 54 (77.14%) asthma cases, 8 (11.43%) COPD cases, 5 (7.14%) pneumonia cases, 2 (2.86%) WALRI cases and one (1.43%) bronchitis cases.

3.9. Distribution of child exposed to passive smoke

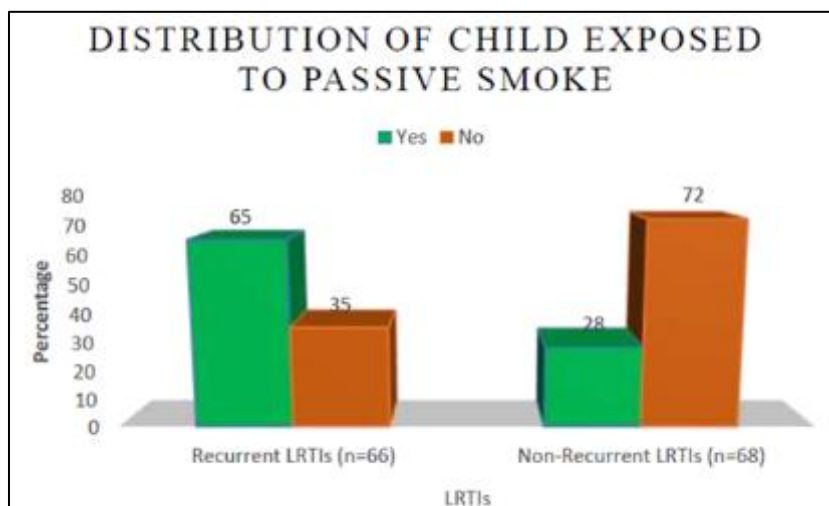


Figure 6 Distribution of child exposed to passive smoke

Among the 66 children, with recurrent LRTIs 43 (65%) were exposed to passive smoking while only 23 (35%) were not exposed. In contrast, among the 68 children with non-recurrent LRTIs, a significant majority 49 children (72%) had no exposure to passive smoke and only 19 children (28%) were exposed.

3.10. Distribution of pet ownership status among respondents

Among the 66 children with recurrent LRTIs a significant proportion of 49 children (74%) reported having pets, while only 17 individuals (26%) did not. Conversely, in the non-recurrent LRTI group the majority of 44 individuals (65%) did not have pets and only 24 individuals (35%) reported pet ownership.

3.11. Distribution of allergic conditions among children

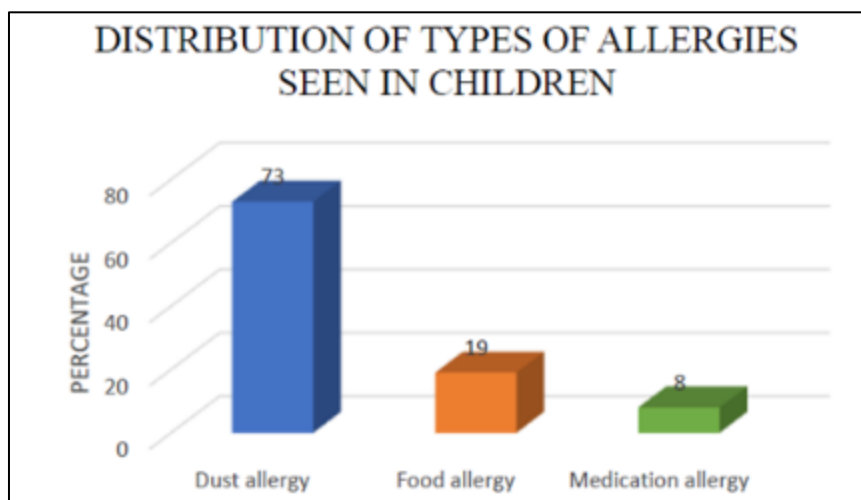


Figure 7 Distribution of allergic conditions among children

The graph presents an overview of 134 individuals in the study, among which 105 individuals have allergies, the most common allergy was dust allergy, affecting 77 individuals (73%), followed by food allergy in 20 individuals (19%) and medication allergy in 8 individuals (8%).

3.12. Distribution of good hygiene practice adherence among children

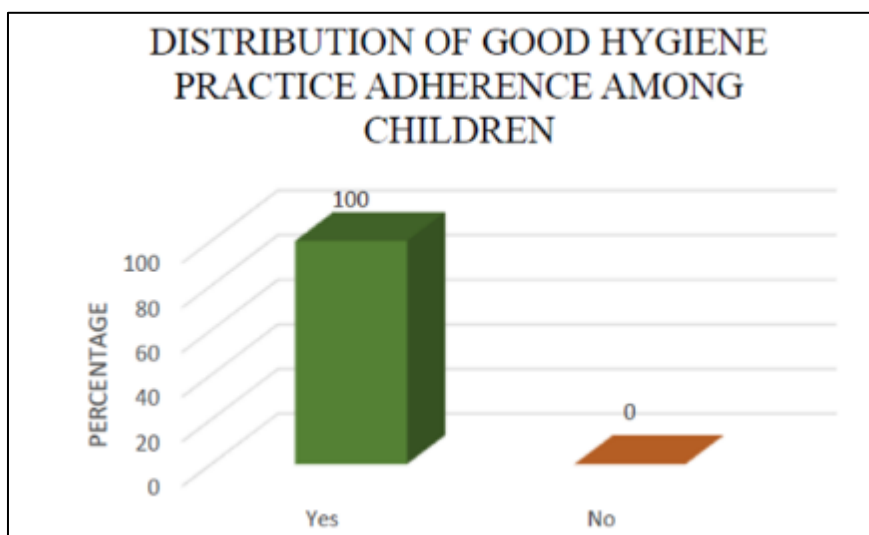


Figure 8 Distribution of good hygiene practice adherence among children

The above graph illustrates that among the 134 participants in the study, the data shows that all 134 participants (100%) follow good hygiene practices.

3.13. Distribution of breastfeeding practices among children

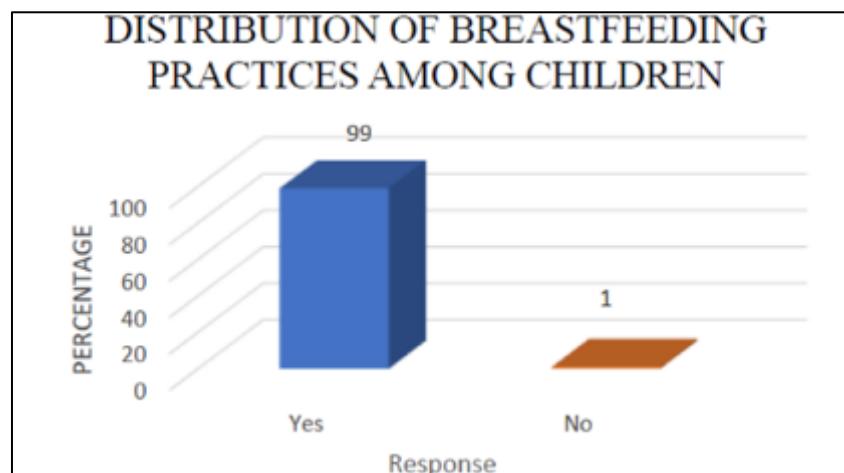


Figure 9 Distribution of breastfeeding practices among children

The above graph illustrates that among 134 individuals in the study, majority of 132 individuals (99%) had received breastfeeding, while 2 individuals (1%) did not receive breastfeeding.

3.14. Distribution of duration of breastfeeding

Among 64 children with recurrent LRTI, majority of 38 children (59%) were exclusively breastfed for 0-6 months followed by 16 children (25%) who were breastfed beyond 12 months, 10 children (16%) who were breastfed for 6-12 months. In contrast among children with non-recurrent LRTI, the large population about 58 children (78%) have been breastfed beyond 12 months, while only 9 children (13%) were breastfed for 6-12 months and a mere 6 children (9%) had exclusive breastfeeding for 0-6 months.

3.15. Distribution of annual flu vaccination status among children

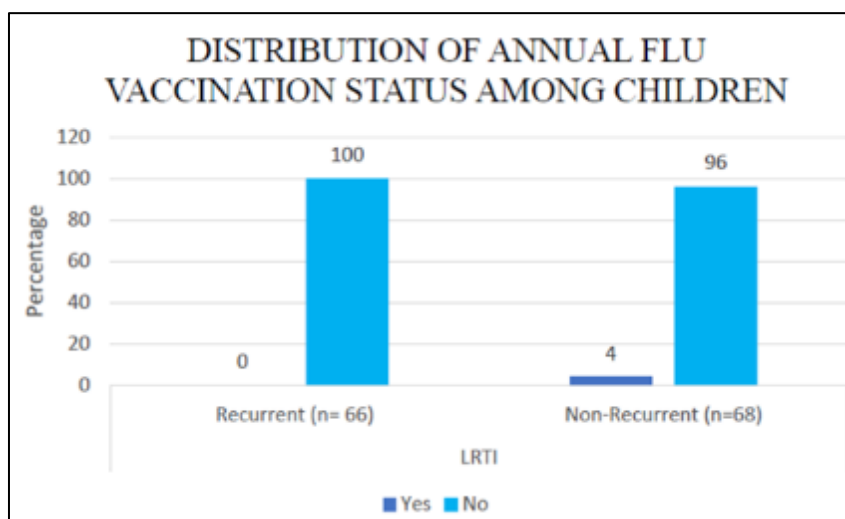


Figure 10 Distribution of annual flu vaccination status among children

Among the 66 children with recurrent LRTI, none had received the annual flu vaccinations, resulting in 100% being unvaccinated. In contrast, in 68 children with nonrecurrent LRTI group, 65 children (95%) had not received the flu vaccine, while only 3 children (4%) were vaccinated.

4. Discussion

The present study identified several sociodemographic and environmental risk factors significantly associated with LRTI among children. The prevalence of LRTI was high among children below 18 years of age, with pneumonia being the most common type of respiratory infection.^(1,3)

Premature birth and low birth weight were strongly associated with recurrent respiratory infections. Similar findings were reported in studies conducted by Ilknur Sürücü Kara et al.⁽⁴⁾ and Noorani Altaf Tabrez et al.⁽⁵⁾, where prematurity and low birth weight were major predictors of recurrent LRTIs.

Environmental exposure including passive smoking, overcrowding, and poor ventilation significantly increased the risk of respiratory infections.^(6,8) Children exposed to tobacco smoke were more susceptible to recurrent respiratory illnesses due to impaired airway defense mechanisms.⁽¹⁰⁾

The poor vaccination coverage observed in the study highlights the importance of improving awareness regarding influenza and routine immunization.⁽⁹⁾ Inadequate breastfeeding and poor hygiene practices were additional modifiable risk factors contributing to disease occurrence.⁽⁶⁾

The study emphasizes the need for targeted public health interventions aimed at reducing environmental exposure, improving caregiver education, encouraging exclusive breastfeeding, and strengthening vaccination programs to reduce the burden of LRTIs among children.

Abbreviations

- LRTI – Lower Respiratory Tract Infection
- RSV – Respiratory Syncytial Virus
- WALRI – Wheeze Associated Lower Respiratory Infection
- WHO – World Health Organization
- ALRI – Acute Lower Respiratory Infection

5. Conclusion

The study concludes that multiple sociodemographic, environmental, and clinical factors are significantly associated with Lower Respiratory Tract Infections among children. Premature birth, low birth weight, passive smoking, overcrowding, poor hygiene, inadequate breastfeeding, and poor vaccination coverage were identified as major risk factors contributing to recurrent LRTIs.

Early identification of modifiable risk factors and implementation of preventive strategies can significantly reduce the burden of respiratory infections and improve pediatric health outcomes. Community-based awareness programs and caregiver education play an important role in preventing childhood respiratory infections.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The authors declare no conflict of interest.

Statement of informed consent

The authors certify that they have obtained consent from the participants involved in this study and their identity has been concealed appropriately.

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