

## Epidemiology of Atypical Pneumonia Among Children Roles of Public Health in Prevention Measures

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### Abstract

Pneumonia continues to be a prominent public health problem among children under the age of five in the study region, with rates that are higher than the norms for the nation. Predictors of pneumonia included the use of domestic fuel as the source of energy for cooking, cooking in the living room, overcrowding, a history of acute respiratory infections (ARI) in the child, a history of ARI in the family, and acute malnutrition. Community-based initiatives that emphasize on improving housing conditions, reducing the use of household biofuels, ensuring appropriate and balanced food intake, while also ensuring that infants are exclusively breastfed, and providing early treatment for acute respiratory infections (ARIs). There is a significant responsibility for the public health sector to play in raising awareness among the general community about the preventative actions that could lead to a reduction in the number of cases of pneumonia in children.

**Keywords:** acute respiratory infections (ARI), Pneumonia.

### Introduction

Pneumonia is a severe form of acute lower respiratory infection that is also responsible for high morbidity and mortality rates among children under the age of five. It is a huge concern to public health all over the world. Pneumonia is the greatest cause of death among

children around the world, accounting for around 6.0% of the 5.9 million deaths that occurred in children under the age of five in 2015. In 2015, pneumonia was responsible for the deaths of approximately 900,000 children. Every day, it is responsible for the deaths of

more than 2,500 children, which is equivalent to more than 100 children every hour [1].

Previous research has found a number of common characteristics that are related with pneumonia in children under the age of five. These risks include overcrowding, a number of other environmental problems, malnutrition and poverty, a lack of ventilation, and indoor air pollution [2]. Nevertheless, the impact of these elements differs from one group of youngsters to another from population to population. As an illustration, the level of indoor air pollution is typically higher in peri-urban settlements, which are characterized by a greater reliance on biomass fuels for cooking and heating purposes due to a lack of access to alternative types of energy generation [3].

Community-acquired pneumonia, often known as CAP, is a prevalent respiratory illness that leads to morbidity and mortality in youth. The term "atypical pneumonia" is derived from the clinical characteristics that are distinct from those of typical bacterial pneumonia caused by *Streptococcus pneumoniae*. This type of pneumonia is characterized by mild symptoms that gradually escalate into pneumonia of varying severity and extrapulmonary manifestations that do not respond to  $\beta$ -lactam antibiotics [4]. In general, all infections that are not represented by the typical microorganisms are considered to be atypical pathogens. The pathogens *Mycoplasma pneumoniae*, *Chlamydophila pneumoniae*, and *Legionella pneumophila* are regarded to be atypical pneumonia pathogens. However, this classification is narrowly defined.

*Chlamydia pneumoniae*, *Chlamydia psittaci*, and *Chlamydia trachomatis* are the most prevalent species in the Chlamydiaceae family that are harmful to humans. These species have the ability to infect the respiratory system and reproductive tract, as well as cause trachoma, pneumonia, and digestive issues. For children, the risk of contracting *C. pneumoniae* may be significantly higher than for adults. Recent research, on the other hand, suggests that the frequency of chlamydia infection is probably underestimated due to a lack of knowledge or difficulties in testing. Furthermore, there are

studies that suggest that having a *Chlamydia* infection is a risk factor for a number of diseases, including Alzheimer's disease, cardiovascular disease, and asthma [5].

### Review:

According to estimates, there are around 120–156 million cases of acute lower respiratory infections (ALRI) that occur annually across the world, with roughly 1.4 million of these cases resulting in death. Among these, pneumonia is responsible for the death of over one million children under the age of five every year. It is also responsible for fifteen percent of deaths that occur in children under the age of five, with ninety-five percent of these deaths occurring in poor countries. South Asia and Sub-Saharan Africa collectively bear the burden of more than half of the total cases of pneumonia in children anywhere in the globe. The majority of pneumonia episodes in children under the age of five occur in just 15 nations, with South Asia and Sub-Saharan Africa being the regions that experience the greatest burden. Overcrowding, passive smoke exposure, indoor fuel exposure, poor housing, overcrowding, and the winter season are all risk factors for community-acquired pneumonia (CAP). Furthermore, the risk factors include age (less than one year), malnutrition, premature birth, immunosuppression, and overcrowding. The epidemic of the human immunodeficiency virus (HIV) has made the burden of disease both more severe and more widespread.<sup>14</sup> The elevated CAP burden of disease in African and South Asian settings is also significantly influenced by other co-existing disorders, such as malaria and diarrhea, which are also important contributing factors [6,7].

At various phases of disease and with clinical characteristics that are difficult to differentiate from those of other prevalent pediatric disorders, severe acute respiratory distress syndrome (CAP) can manifest itself in children. Symptoms of CAP, such as fever, cough, dyspnea, wheeze, chest or abdominal pain, lethargy, vomiting, and headache, can also be indicators of sepsis, congenital heart disease, profound anemia,

malaria, or acute asthma. Additionally, the typical examination findings of tachypnea, tachycardia, hypoxia, respiratory distress (grunting, nasal flaring, recession, and abdominal breathing), and crackles or wheeze on auscultation can also be indicators of these conditions.

In the past, the World Health Organization (WHO) established guidelines for the recognition of pneumonia based on tachypnea as an indicator of community-acquired pneumonia (CAP) that required treatment with oral antibiotics. This approach prioritized sensitivity over specificity in order to prevent the absence of cases of disease in situations where a delayed diagnosis could lead to an increase in mortality. According to the findings of an observational study conducted in four hospitals in India, such a method may result in an excessive number of diagnoses. During the follow-up of 516 children who were diagnosed with WHO-defined pneumonia at the time of presentation and were examined by pediatricians four days later, only 35.9% of the children were determined to have pneumonia. The remaining children were recategorized as having wheeze (42.8%), mixed disease (18.6%), and nonrespiratory illness (2.7%) [9]. Therefore, this strategy does not differentiate between different pulmonary illnesses, which may result in an excessive amount of antibiotics being administered. It has been found that there is an overdiagnosis of pneumonia in cases of wheezing, which leads to an underdiagnosis of asthma, which in turn leads to severe respiratory morbidity and possibly even mortality [10]. This was discovered through study that was conducted in low-income countries and focused on the utilization of the WHO guidelines.

On the other hand, the updated WHO guidance for CAP is advantageous since it allows for the utilization of straightforward clinical indicators to direct the most appropriate antibiotic treatment. For instance, children between the ages of 2 and 59 months who have a cough and/or difficulty breathing can be treated with oral amoxicillin if there are no red flag indicators present. These red flag signs include an inability to drink, recurrent vomiting, seizures, lethargy, impaired consciousness,

stridor, or severe malnutrition [11]. Generally speaking, industrialized nations have a higher access to computed tomography (CXR) as a diagnostic adjunct in children who have been brought to the hospital. Consolidation, infiltrates, and air bronchograms can be seen in a lobar or diffuse pattern on the ultrasound. The significance of chest radiography is readily apparent when it comes to excluding problems such as pleural effusion, necrotizing pneumonia, or other diagnosis, such as heart failure with pulmonary edema. However, it is essential to keep in mind that clinical symptoms and chest radiography frequently do not coincide with one another in ambulatory patients. As a result, the BTS guidelines do not recommend routine chest X-rays in clinically suspected cases of childhood acute respiratory distress syndrome (CAP) that are handled in the community. On the other hand, there have been efforts made to establish a correlation between clinical signs and radiological evidence of pneumonia in order to produce more effective clinical tools that may be utilized in settings with limited resources. According to research conducted in the United States and the United Kingdom, tachypnea is the most significant factor in determining sensitivity, and additional symptoms, such as dyspnea and hypoxia or fever and hypoxia, may also improve sensitivity [12].

Bacteria are typically the primary cause of CAP; however, isolating bacteria does not necessarily establish causation. This is because the validity of the results may vary based on the body fluid sample that was collected, and there are numerous viral factors that can cause CAP. *Chlamydomphila pneumoniae*, *Mycoplasma pneumoniae*, and *Streptococcus pneumoniae* are the next most common bacteriological pathogens that cause pneumonia in children [13]. *Streptococcus pneumoniae* is the one that causes the most cases of pneumonia in children.

A number of different infections, including *S. aureus*, *Staphylococcus epidermidis*, *E. coli*, *H. influenzae*, and *K. pneumoniae*, were shown to have varying degrees of antimicrobial resistance across the numerous antibiotics that are utilized in China, according to the findings of one study. In contrast, *S. aureus* was very sensitive to quinupristin/dalfopristin (98.6%) and resistant

to penicillin (3.3% sensitivity), according to the findings. For example, *H. influenzae* and *K. pneumoniae* were both highly susceptible to meropenem, with each of them being 100% sensitive to the antibiotic. Moreover, *S. epidermidis* exhibited a high level of sensitivity to quinupristin/dalfopristin (96.7%), however it did not exhibit any sensitivity to penicillin (2.3%). With the exception of ampicillin (48.9%) and amoxicillin (4.3%), *E. coli* was 100 percent responsive to meropenem and imipenem, however it was less sensitive to both of these antibiotics. In a study that was very comparable to this one, antimicrobial resistance to Hib was investigated. It was revealed that ampicillin had the highest resistance rate of 22.2% when compared to ampicillin/sulbactam and cefaclor, both of which were effective against the pathogen hundred percent of the time [14,15].

In another study, antibiotic resistance to *S. pneumoniae* was investigated, and the results revealed that the bacteria were vulnerable to the majority of the antibiotics that were attempted to treat them. In contrast, the level of resistance to erythromycin was the highest, coming in at 99.7%, when compared to penicillin (1.8%), ofloxacin (0.3%), and imipenem (1.5%). According to the findings of another study, *S. pneumoniae* is completely resistant to penicillin and erythromycin (at 100% for each), followed by clindamycin (at 96.8%), tetracycline (at 93.5%), and trimethoprim-sulfamethoxazole (TMP-SMX) (at 83.9%) [16,17].

### Conclusion:

There are atypical microorganisms that are responsible for atypical pneumonia. These bacteria are not identifiable with Gram stain and cannot be cultivated using the conventional laboratory techniques. Among the organisms that are responsible for atypical pneumonia, *Mycoplasma pneumoniae*, *Chlamydia pneumoniae*, and *Legionella* species are the most frequently encountered. There is a distinction between the therapeutic method taken for atypical pneumonias and the approach taken for conventional pneumonias. disruption

of the lactam. The findings provide strong evidence that pneumonia can be prevented through community-based interventions that achieve ventilated and improved housing conditions, separate kitchens, less use of domestic biofuels, adequate and balanced food intake, including exclusive breastfeeding of infants, and early treatment of acute respiratory infections (ARIs). According to the findings of our research, the high frequency of pneumonia may be the result of weaknesses in community-based pneumonia care and prevention initiatives, as well as a failure to fully cover peri-urban populations.

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