Scientific Research Publishing

Open Journal of Pediatrics, 2025, 15(5), 945-952
https://www.scirp.org/journal/ojped
ISSN Online: 2160-8776
ISSN Print: 2160-8741

Epidemiological Heikh, Clinical, Radiological and Evolutionary Profile of Lower Respiratory Infections in the Pediatric Department of the Cheikh Ahmadoul Khadim National Hospital Center in Touba, Senegal

Sadio Konate[1*], Aliou Mar Condoul[1], Abdoul Aziz Faye[2], Ndiogou Seck[1], Ibrahima Diagne[1], Papa Moctar Faye[3]

[1]Saint-Louis Regional Hospital Center, Saint-Louis, Senegal
[2]Albert Royer National Children's Hospital in Dakar, Dakar, Senegal
[3]Cheikh Ahmadoul Khadim National Hospital Center in Touba, Touba, Senegal
Email: *dr.sadio18@gmail.com

How to cite this paper: Konate, S., Condoul, A.M., Faye, A.A., Seck, N., Diagne, I. and Faye, P.M. (2025) Epidemiological Heikh, Clinical, Radiological and Evolutionary Profile of Lower Respiratory Infections in the Pediatric Department of the Cheikh Ahmadoul Khadim National Hospital Center in Touba, Senegal. *Open Journal of Pediatrics*, **15**, 945-952.
https://doi.org/10.4236/ojped.2025.155089

Received: August 29, 2025
Accepted: September 22, 2025
Published: September 25, 2025

Copyright © 2025 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).
http://creativecommons.org/licenses/by/4.0/

Open Access

Abstract

Introduction: Lower respiratory infections (LRIs) in children include infectious diseases of the lung parenchyma, bronchi, and trachea. They represent a major public health problem, associated with high hospitalization and mortality rates, particularly in developing countries. In Senegal, there is little recent hospital data in rural areas; hence, the objectives of our study were to measure the frequency of IRB and to describe their epidemiological, clinical, paraclinical, therapeutic and evolutionary characteristics of IRB in children hospitalized in the Pediatric Department of the Cheikh Ahmadoul Khadim National Hospital Center in Touba. **Methodology:** This was a descriptive retrospective study of children aged 2 months to 15 years hospitalized for a lower respiratory infection in the Pediatric Department of the Cheikh Ahmadoul Khadim National Hospital Center in Touba, over a period of 8 months between September 1, 2022 and April 30, 2023. Included were hospitalized patients who presented with a lower respiratory infection whose file was usable. **Results:** Among these admissions, IRBs represented 12.4%, mainly affecting children under 6 years old (81.25%). A marked predominance of the male sex was observed, with a sex ratio of 1.46. During the cooler period in Touba, specifically between January and March, 55.3% of hospitalizations for lower respiratory infections were recorded among the cases studied. The predominant clinical presentations were pneumonia (47.92%), superinfected asthma attacks (12.5%) and bronchiolitis (11.45%). The majority of patients had a favorable outcome,

with a relatively low mortality rate of 4.2%, of which three cases were also associated with severe malnutrition. Frequently observed complications included sepsis (8.3%, including eight cases diagnosed with pleuropulmonary staphylococcal disease) and acute respiratory failure syndrome (7.29%). **Conclusion:** These findings highlight the importance of careful monitoring of IRBs in hospitalized children, as well as the need for specific management strategies to minimize the risk of severe complications.

Keywords

Lower Respiratory Infections, Child, Epidemiology

1. Introduction

Respiratory infections (RIs) are defined as any infectious attack of the respiratory tract. It is a real public health problem with high morbidity and mortality, especially in developing countries [1].

Pneumonia is responsible for 29% of all deaths in children under 5 years of age in developing countries [2].

In Senegal, few recent hospital data on the frequency and distribution of IRBs in rural areas are available in the literature. Their study is of particular interest in pediatric settings, due to their higher frequency and increased severity, in order to better prevent and treat these conditions.

Depending on the location of the upper or lower respiratory infection, the clinical manifestations differ, mainly with difficulty breathing and coughing.

Confirmation of the etiological diagnosis requires bacteriological and viral samples and allows for better management.

In order to better prevent and treat these conditions, our study aims to measure the frequency of IRBs and to describe their epidemiological, clinical, paraclinical, therapeutic and evolutionary characteristics.

2. Methodology

This is a descriptive retrospective study over a period of 8 months between September 1, 2022 and April 30, 2023. Children aged between 2 months and 15 years who were hospitalized in the pediatric department of the Cheikh Ahmadoul Khadim National Hospital Center in Touba were included during this study period.

On the other hand, incomplete or unrecovered files, and hospitalized patients who developed a lower respiratory infection during hospitalization.

Patients diagnosed with a lower respiratory infection but not hospitalized were not included.

Data were collected from computerized patient records on Cubix Software, hospitalization records, and laboratory records.

They are recorded on a data collection sheet. The epidemiological, sociodemographic, clinical, paraclinical, therapeutic and evolutionary parameters were stud-

ied. The data were entered and analyzed using Sphinx software (version 5.0) and Microsoft Office Excel 2007 under Windows 10.

3. Results

During the study period, we collected 96 files on 768 patients who represent all the patients hospitalized for IRB whose records were usable during the study period. The incidence thus amounts to 12.5%, the sex ratio was 1.46, and the 6 - 36-month age group was more represented.

We identified the presence of malnutrition in 35 children, or 36.5%.

Fever, respiratory distress and cough were the main reasons for consultation, representing 94.8%, 92.7% and 78.12% respectively.

Pulmonary condensation syndrome was present in 77.08% of our patients, respiratory distress in 51.04% of patients and 22.83% of patients had bronchial obstruction syndrome.

65 patients had alveolar involvement on standard chest X-ray, 35 children had bronchial syndrome, 17 patients had interstitial syndrome, pleural fluid effusion was found in 7 patients and pneumothorax in 1 patient.

Biologically, hyperleukocytosis was present in 85 patients, with a clear predominance of neutrophils, representing 88.54% of cases. Anemia was found in 41 patients (42.7%). Thrombocytopenia was found in 35 patients (36.45%). CRP was positive in 83.8%, with an average of 75.3 mg/dl. Bacteriological examination was performed in 12 patients, all of which were negative. Expert gene testing on gastric tubing was performed in 15 cases, with a positivity of 3.12%. No respiratory tract samples were taken for pathogen detection.

Diagnostically, pneumonia was present in 46 cases, or 47.92%, while a superinfected asthma attack was confirmed in 12 patients, representing 12.5%, and bronchiolitis was found in 11.45% cases. Pulmonary tuberculosis was identified in 8 children, or 8.33%. In addition, 5 patients presented with pleuropulmonary staphylococcal disease, corresponding to 5.2% of the sample (Table 1).

Table 1. Distribution according to positive diagnoses.

Positive diagnosis	Effective	Percentage
Pneumonia	46	47.92%
Superinfected asthma attack	12	12.5%
Bronchiolitis	11	11.45%
Bronchopneumopathy	11	11.45%
Tuberculosis	8	8.33%
Pleuropulmonary staphylococcal disease	5	5.2%
Pleurisy	3	3.12%

Prophylactic antibiotic therapy was started based on 3rd generation cephalosporin,

prescribed in 64 cases (61.44%), or amoxicillin-clavulanic acid in 13 cases (14.01%) (Table 2). Evolutionary arguments were the only ones used for adaptation of antibiotic therapy; a combination with a macrolide in 7 cases (7.12%), an aminoside in 11 patients (11.45%). Vancomycin was prescribed in 8 cases (8.33%). The evolution was favorable in the majority of cases (95.83%) with a mortality of 4.16%, 75% of which were on the grounds of severe acute malnutrition.

Table 2. Distribution of initial antibiotic therapy.

Initial antibiotic therapy	Effective	Percentage
3rd generation cephalosporin	64	61.44%
Macrolide (erythromycin, azithromycin)	7	7.29%
Amoxicillin clavulanic acid	13	14.01%
Gentamycin	11	11.45%
Vancomycin	8	8.33%
Metronidazole	3	3.03%

4. Discussion

The number of patients hospitalized during our study period for lower respiratory infection represented 12.5%. Diop, in his study on 996 hospitalizations in 2017, found similar results: 103 cases or 10.4% [3]. On the other hand, the report of the Demographic and Health Survey continued in 2016 in Senegal found a lower figure of 3% in community among children under 5 years old [4].

In 2009, Thiongane [5] and Sow [6] reported lower rates, respectively 2.66% and 2.15%, in their studies of 5-year-olds.

In our study, the sex ratio was 1.46. Previous studies in Senegal conducted by Thiongane [5] and Sow [6] also highlighted this male predominance, with respective sex ratios of 1.28 and 1.53. This similarity shows a recurrence in male children.

In our study, we found that lower respiratory infections mainly affected young children, with 81.25% of cases occurring in children under 6 years of age.

Previous studies conducted in Senegal also highlight this trend. In 2020, Sidi [7] reported that 74.8% of children affected by lower respiratory infection were in an age group below 5 years.

In Africa, studies conducted in Togo by Bakonde *et al.* [8] in 1998 and in Burkina Faso by Dao [9] in 1997 also highlighted a strong predominance of children under 5 years of age in cases of lower respiratory infections requiring hospitalization.

Our study found malnutrition in 35 children, representing 36.5% of cases, of which 28 patients, or 29.2%, were severely malnourished. Previous studies conducted by Thiongane [5], Sow [6], and Gaye [10] in 2009 reported quite high malnutrition rates, ranging from 44.9% to 52.3%. On an African scale, Moyen and colleagues [11] reported a malnutrition rate of 45% in Congo Brazzaville.

Malnutrition is a contributing factor to the development of infections in children,

leading to a decrease in immunity. These observations highlight the high prevalence of precarious nutritional situations in the studies mentioned.

The most common reasons for consultations were fever, cough and respiratory distress.

The prevalence of fever was significant, with 85.54% of the cases studied. Comparatively, Thiongane [5] in Senegal had previously recorded a fever rate of 71.9%.

Our data indicate that almost all patients (92.7%) presented with polypnea, while a large majority (78.12%) suffered from cough.

Similar studies conducted in Senegal by Diop [3] in 2017 and in Congo by Moyen *et al.* [11] also reported high rates of polypnea, 98% and 100% respectively.

Regarding cough, Diop [3] observed a rate of 55.6%, Thiongane [5] of 75%, Sow [6] of 71%, and Gaye [10] of 78%, figures consistent with our findings in most cases.

Polypnea and cough are common symptoms in lower respiratory infections (LRIs).

Pulmonary condensation was observed in 77.08% of patients in our study, the most common clinical manifestation, followed by bronchial syndrome found in 20.83% of cases. On the other hand, fluid effusion syndromes were less common, representing only 8.33% of the situations studied.

Comparatively, research carried out in Senegal by Diop [3] in 2017 highlighted rates of 58% for pulmonary condensation, 44% for bronchial syndrome and 34% for bronchiolar syndrome.

Previous studies by Thiongane [5] and Sow [6] in 2009 reported varying percentages, including 6.6% and 63.5% for pulmonary condensation, with discrepancies for other syndromes. These differences may result from the diversity of clinical cases examined.

Research conducted in Burkina Faso by Dao [9] noted 100% of cases with pulmonary condensation, while bronchial syndrome represented 31.8% and bronchiolar syndrome 15.4%. Our results, in agreement with those of Moyen *et al.* [11], seem to reflect a similarity in the frequency of the pulmonary syndromes studied. The discrepancies between studies could be attributed to the diversity of populations, methodological approaches and diagnostic criteria used.

In our study, each patient underwent a chest X-ray, which allowed us to identify several types of radiological syndromes. Among the findings, alveolar syndrome was present in 67.07% of patients, while bronchial syndrome was noted in 36.45% of them. In addition, interstitial syndrome was detected in 17.7% of patients, followed by pleural effusion syndrome diagnosed in 7.29% of cases. Finally, gas effusion syndrome was noted in 1.04% of patients.

Chest radiography, although essential for diagnosing lower respiratory infections (LRIs), has limited sensitivity. However, it provides a detailed view of lung abnormalities, allowing the identification of various radiological syndromes associated with LRI. It should be noted that despite its usefulness, this method may not detect all potential lung abnormalities.

In our study, hyperleukocytosis, mainly neutrophilic, was observed in 88.54% of

patients, while 42.7% presented anemia.

Similar observations were reported in Senegal by Diop [3] in 2017, with comparable rates of hyperleukocytosis (80%) and a lower prevalence of anemia, at 33%.

In Burkina Faso, Dao reported even higher rates of anemia, reaching 95%, while in Togo, Bakonde *et al.* [8] observed a lower rate, at 16%.

Hyperleukocytosis is a common sign found in the blood counts of patients with lower respiratory infections, although its sensitivity is not absolute.

Regarding anemia, its prevalence varies considerably from one study to another, often multifactorial, linked to inflammatory and deficiency factors, particularly in the presence of malnutrition.

During the period of our study, C-reactive protein (CRP) was found to be positive in 83.8% of cases.

Previous studies conducted by Diop [3], Thiongane [5], and Sow [6] presented rather varied CRP positivity rates, ranging from 48% to 55.4% respectively.

It is crucial to emphasize that the interpretation of CRP positivity alone does not conclusively confirm or exclude the bacterial origin of an infection.

Procalcitonin remains the main test to confirm the bacterial origin of an infection.

Among the different clinical forms observed, pneumonia was the most frequent, representing 47.92% of cases, then, superinfected asthma attacks were observed in 12.5% of patients.

This was followed by bronchiolitis and bronchopneumopathy. Diversities were noted in other studies. In Senegal, for example, the study by Diop [3] in 2017 noted a predominance of bronchiolitis at 39.8%, followed by pneumonia at 22.3%. At the same time, Moyen *et al.* [11] in Congo Brazzaville in 2015 reported a high incidence of acute bronchiolitis at 55.7% of cases, followed by acute pneumonia at 36.2%.

Bakondé *et al.* found in his study in Togo in 1998 a predominance of 62.50% of broncho-pneumopathies, 10.83% of acute bronchiolitis and 4.17% of pleuropulmonary staphylococci [8].

Overall, in Africa, the most common clinical forms of low-grade ARI are pneumonia and bronchiolitis.

In Brazil, it seems that bronchopneumonia is the most prevalent disease, while the rate of pneumonia and bronchiolitis is relatively low.

This observation could be explained by the constant progress of vaccination programs, which particularly target the germs most involved in acute bacterial pneumonia (*Streptococcus pneumoniae* and *Haemophilus influenzae* type B), but at the same time, vaccines against the viruses responsible for bronchiolitis seem to be almost non-existent.

Different treatments were implemented in our study to manage the different clinical forms of lower respiratory infections. The majority of cases of pneumonia, superinfected asthma attacks, bronchopneumopathy and tuberculosis were initially

treated with a 3rd generation cephalosporin in 64 cases (61.44%) or amoxicillin clavulanic acid in 13 cases (14.01%). Gentamycin was administered to 11 patients (11.45%).

In contrast, pleuropulmonary staphylococcal disease and pleurisy were treated with vancomycin in 8 cases (8.33%). Metronidazole was prescribed in 3 patients (3.03%).

This treatment regimen is based on microbiological considerations, such as the efficacy of amoxicillin, ampicillin and 3rd generation cephalosporins against pneumococcus and *Haemophilus influenzae* type B in children under 3 years of age. For older children, macrolides have been preferred due to the frequency of atypical germs such as *Mycoplasma* and *Chlamydiae pneumoniae*, in addition to other molecules [12].

In 2017, Diop [3] also noted a different treatment pattern between children under 3 years of age, treated with 3rd generation cephalosporins and ampicillin, and those 3 years of age and older, who received macrolides in combination with other molecules.

In our study, most patients showed a favorable evolution, with a relatively low death rate of 4.16% (4 cases), 3 of whom were facing severe malnutrition.

Complications were noted in 8.33% of patients, sepsis and acute respiratory failure syndrome in 7.29%.

Studies conducted in Senegal show variations in mortality rates. Diop [3] reported a death rate of 2.9% in 2017. Their analysis highlighted higher rates of sequelae, focusing on lower respiratory infections of bacterial origin, specifically related to pneumococcus, generally associated with complications such as pachypleuritis following pleuropneumonia.

However, a study by Gaye [10] in 2000 reported a higher mortality rate, reaching 6.98%. This appears to be significantly higher than our study.

Compared to other studies conducted in Africa, our mortality rate appears to be lower. For example, Moyen and colleagues [11] in Congo-Brazzaville reported a mortality rate of 16.25%, Bakonde *et al.* [8] in Togo observed 7.5%, Valian [13] in Burkina Faso in 1991 observed 20.9%, and Dao [9] in Burkina Faso reported 9.4%.

Pleuropulmonary staphylococcus was more responsible for the observed mortalities, explaining the local pulmonary complications (pneumothorax, emphysema, pneumo mediastinum) and the rapidity of its hematogenous dissemination, thus giving rise to septicemia.

5. Conclusion

IRBs require careful monitoring in hospitalized children, as well as the need for specific management strategies to minimize the risks of severe complications, such as malnutrition, which is strongly associated with deaths, suggesting the need for integrated nutritional support in IRB management protocols.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] Rudan, I. (2008) Epidemiology and Etiology of Childhood Pneumonia. *Bulletin of the World Health Organization*, **86**, 408-416. https://doi.org/10.2471/blt.07.048769

[2] WHO and UNICEF (2014) End Preventable Child Deaths from Diarrhea and Pneumonia by 2025. WHO.

[3] Diop, A. (2017) Study of the Epidemiological, Clinical, Radiological and Evolutionary Characteristics of Acute Lower Respiratory Infections in The Pediatric Department of the CHN of Pikine. Medical Thesis, Cheikh Anta Diop University of Dakar.

[4] Dutau, G. (1997) The Scourge of Passive Smoking in Infants and Children. *Journal of Pediatrics and Puériculture*, **8**, 459-469.

[5] Thiongane, A. (2009) Place of Streptococcus Pneumoniae in Pleuropulmonary Infections of Children Aged 0 to 5 Years at Albert Royer Hospital, Senegal. Medical Thesis, Cheikh Anta Diop University of Dakar.

[6] Sow, A. (2009) Acute Lower Respiratory Infections of Bacterial Origin in Children Aged 0 to 5 Years at Albert Royer Hospital, Senegal. Medical Thesis, Cheikh Anta Diop University of Dakar.

[7] Sidi, M. (2006) Acute Respiratory Infections in Children (about 659 Cases Collected in the Pediatrics Department of the King Baudouin Hospital in Guédiawaye). Medical Thesis, Cheikh Anta Diop University of Dakar.

[8] Bakonde, B., Tatagan, K., Kessic, K., *et al.* (1998) Hospital Epidemiology of Lower Acute Respiratory Infections (ARI) in Togolese Infants and Children. *Black African Medicine*, **5**, 45.

[9] Dao, L. (1997) Childhood Pneumonia in a Pediatric Hospital Setting Ouagadougou, Burkina Faso. Medical Thesis, University of Ouagadougou.

[10] Gaye, M. (2000) Acute Bronchiolitis, Senegal. Medical Thesis, Cheikh Anta Diop University of Dakar.

[11] Moyen, E., Kambourou, J., Okoko, A.R., *et al.* (2018) Acute Lower Respiratory Tract Infection in Children; Pediatric Intensive Care Unit of the University Hospital of Brazzaville (Congo). *Open Journal of Pediatrics*, **8**, 32-41.

[12] AFSSAPS (2014) Antibiotic Therapy by General Routes in Current Practice in Lower Respiratory Infections.

[13] Valian, A. (1991) Acute Respiratory Infections in Children Aged 0 to 36 Months. Medical Thesis, University of Ouagadougou.