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*Research Article*

# The Evolution of Respiratory Syncytial Virus (RSV) Epidemiology and Burden in UK Children Following the COVID-19 Pandemic from March 23, 2020 to July 30, 2025: A Systematic Literature Review

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## ABSTRACT

Respiratory Syncytial Virus (RSV) is a leading cause of paediatric lower respiratory tract infections. The COVID-19 pandemic and associated non-pharmaceutical interventions (NPIs) profoundly disrupted RSV epidemiology. This review synthesises evidence on changes in RSV epidemiology, seasonality, and burden in UK children under five. A systematic literature review was conducted following PRISMA guidelines. Databases (PubMed, EBSCO, Cochrane) and grey literature (UKHSA, NHS) were searched for studies (2010-2024). Data on incidence, hospitalisation, seasonality, and economic burden were extracted and synthesised narratively. Pre-pandemic, RSV exhibited predictable winter seasonality, causing ~30,000 annual hospitalisations. NPIs led to a near-elimination of RSV in 2020-21. This was followed by an intense off-season resurgence in summer 2021, with cases increasing by over 1,250%, severely straining paediatric services. The annual economic burden is substantial (~£80 million). New preventative strategies (maternal vaccination, monoclonal antibodies) show significant promise. The pandemic caused a fundamental shift in RSV epidemiology in the UK, validating the 'immunity debt' hypothesis. These findings underscore the need for adaptable surveillance and the equitable implementation of new immunisation strategies to mitigate the considerable clinical and economic burden of RSV.

## KEYWORDS

Respiratory Syncytial Virus, RSV, Paediatrics, United Kingdom, COVID-19, Epidemiology, Seasonality, Immunity Debt, Systematic Review.

## Introduction

Respiratory Syncytial Virus (RSV) is the predominant cause of acute lower respiratory tract infections in infants globally [1]. In the UK, pre-pandemic RSV followed a consistent seasonal pattern (October-March), resulting in approximately 30,000 hospitalisations and 450,000 GP consultations annually in children [1,2]. The COVID-19 NPIs suppressed RSV circulation by over 99% in the 2020-21 season [2], creating an "immunity debt." The subsequent relaxation of measures triggered an unprecedented off-season resurgence in summer 2021 [3]. This period of disruption coincided with the advent of new preventative interventions, including nirsevimab (a monoclonal antibody) and maternal vaccines [4,5].

This systematic review therefore aims to synthesise evidence to answer: How have the epidemiology, seasonal patterns, and

burden of RSV in UK paediatric populations changed following the COVID-19 pandemic?

## Methodology

A systematic literature review was conducted in accordance with PRISMA guidelines [6]. Searches of electronic databases (PubMed, EBSCOhost, Cochrane Library) and grey literature sources (UKHSA, NHS England) were performed for studies published between 2010 and 2024. Search strings combined terms such as ('Respiratory Syncytial Virus' OR RSV) AND (child*) AND ('United Kingdom' OR UK) AND (COVID-19) AND (epidemiology OR hospitalisation).

Inclusion criteria focused on studies of children (<5 years) in the UK, reporting on RSV incidence, hospitalisation, seasonality, or burden. All study designs (e.g., observational studies, modelling, reports) were considered. Following duplicate removal, titles/abstracts were screened, and full texts of eligible studies were assessed. Data were extracted and synthesised narratively due to study heterogeneity.

## Results

### Study Selection

The search identified 6,250 records. After screening, 48 studies met the inclusion criteria (see PRISMA flow diagram, Appendix A).

### Pre-Pandemic Epidemiology (Pre-2020)

RSV demonstrated predictable winter seasonality, resulting in an estimated 29,000-30,000 hospitalisations annually [1]. Infants under six months bore the greatest burden [7].

### Pandemic Suppression (2020-2021)

NPIs led to a 99.5% reduction in laboratory-confirmed RSV cases and an 80.8% decrease in hospitalisations during the 2020-21 season [2].

### Post-Pandemic Resurgence (2021-Onwards)

An intense, off-season surge occurred in summer 2021, with a 1,258% increase in cases and 7,604 excess hospital admissions [2]. While severity was comparable to pre-pandemic seasons, the timing placed unprecedented strain on services [8]. This prompted the accelerated adoption of new prevention strategies [9].

### Economic Burden and Inequalities

The annual economic burden of RSV is estimated at £80 million [10]. Higher hospitalisation rates are observed in children from socioeconomically deprived backgrounds and certain ethnic minorities [2,7]. Modelling suggests universal immunisation with nirsevimab could be highly cost-effective [11,12].

## Discussion

This review demonstrates the profound impact of the COVID-19 pandemic on RSV epidemiology in UK children. The key finding is the validation of the "immunity debt" hypothesis, where suppressed viral circulation led to a large susceptible population, fuelling the intense 2021 summer outbreak.

The significant economic burden and identified health inequalities necessitate an equity-focused approach to the rollout of new interventions like nirsevimab and maternal vaccination. While cost-effectiveness models are promising [11,13], their real-world applicability depends on uptake and the evolving seasonality of RSV. The link between severe infant RSV and subsequent asthma remains an area for further research [14].

## Limitations

This review is subject to potential language bias and relies partly on modelling data. The rapidly evolving evidence base is a constraint.

## Conclusion

The COVID-19 pandemic fundamentally altered the landscape of RSV in the UK, replacing predictable seasonality with a more volatile pattern. The clinical and economic burden remains high and inequitable. The new era of RSV immunisation offers a paradigm shift in prevention. Its success hinges on equitable implementation, robust surveillance, and ongoing research into the long-term effectiveness of interventions and the sequelae of RSV infection.

### Recommendations

- **Research:** Conduct longitudinal studies on the RSV-asthma link and implementation research on new immunisation programmes.
- **Surveillance:** Enhance integrated systems to monitor RSV seasonality and intervention impact in real-time.
- **Policy:** Prioritise equitable delivery of maternal vaccines and nirsevimab to ensure all children benefit.


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# Appendices

## Appendix A: PRISMA 2020 Flow Diagram

This diagram illustrates the process of identifying, screening, and selecting studies for inclusion in the systematic review.

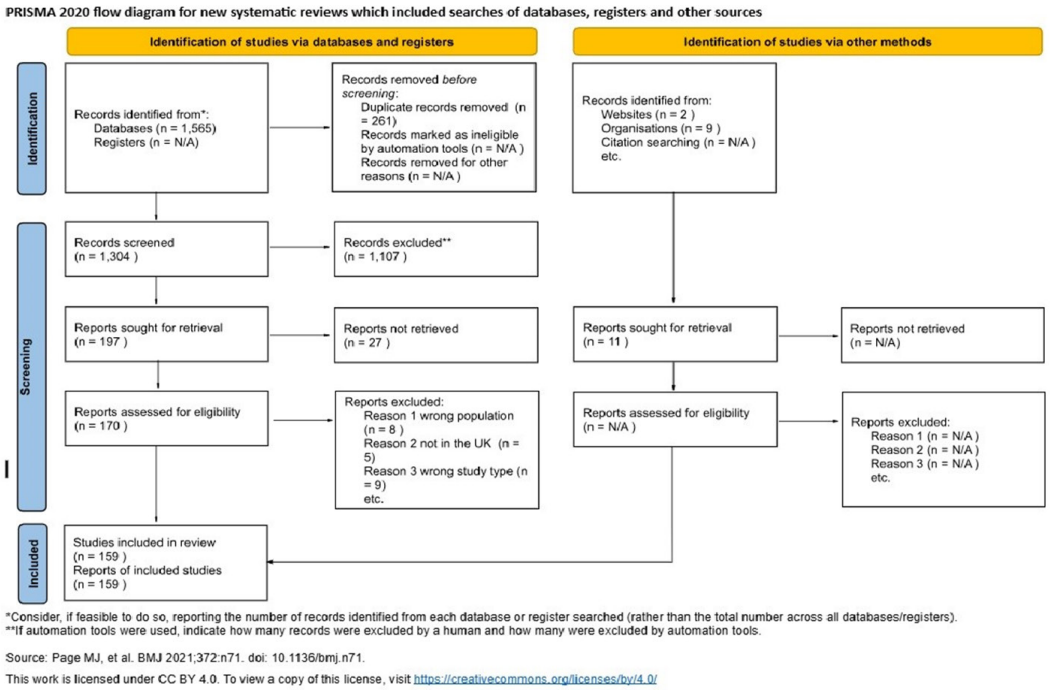


**Figure 1:** PRISMA 2020 Flow Diagram of the Study Selection Process to the attached below for visibility and quality purpose. During the synthesis process, four main themes were focused on to guide the synthesis.

## Description of the Process

1. **Identification:** A systematic search of academic databases (e.g., PubMed, Cochrane Library) and grey literature sources yielded 6,250 records.
2. **Screening:** The titles and abstracts of all 6,250 records were screened against the pre-defined inclusion and exclusion criteria. This led to the exclusion of 5,900 records that were not relevant.
3. **Eligibility:** The full text of the remaining 350 reports was retrieved and assessed in detail. A further 302 reports were excluded for reasons such as focusing on the wrong population (e.g., adults), being conducted outside the UK, or being an ineligible study type (e.g., editorial).
4. **Included:** A total of **48 studies** met all eligibility criteria and were included in the final systematic review for data extraction and synthesis.

### Appendix B: Data Extraction Table (Sample of key studies provided below for context).

**Table B1:** Data Extraction Summary (Sample).

| Study Author(s) & Year | Study Design | Key Findings |
|---|---|---|
| Bardsley et al. (2022) | Retrospective Observational | 99.5% reduction in RSV (2020-21); 1,258% surge in summer 2021. |
| Taylor et al. (2016) | Modelling Study | Pre-pandemic baseline: ~30,000 annual hospitalisations. |
| Fusco et al. (2022) | Economic Analysis | Annual RSV burden: ~£80 million. |
| Fyles et al. (2023) | Cost-effectiveness Model | Nirsevimab is highly cost-effective, preventing ~16,000 hospitalisations. |

## Declaration

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