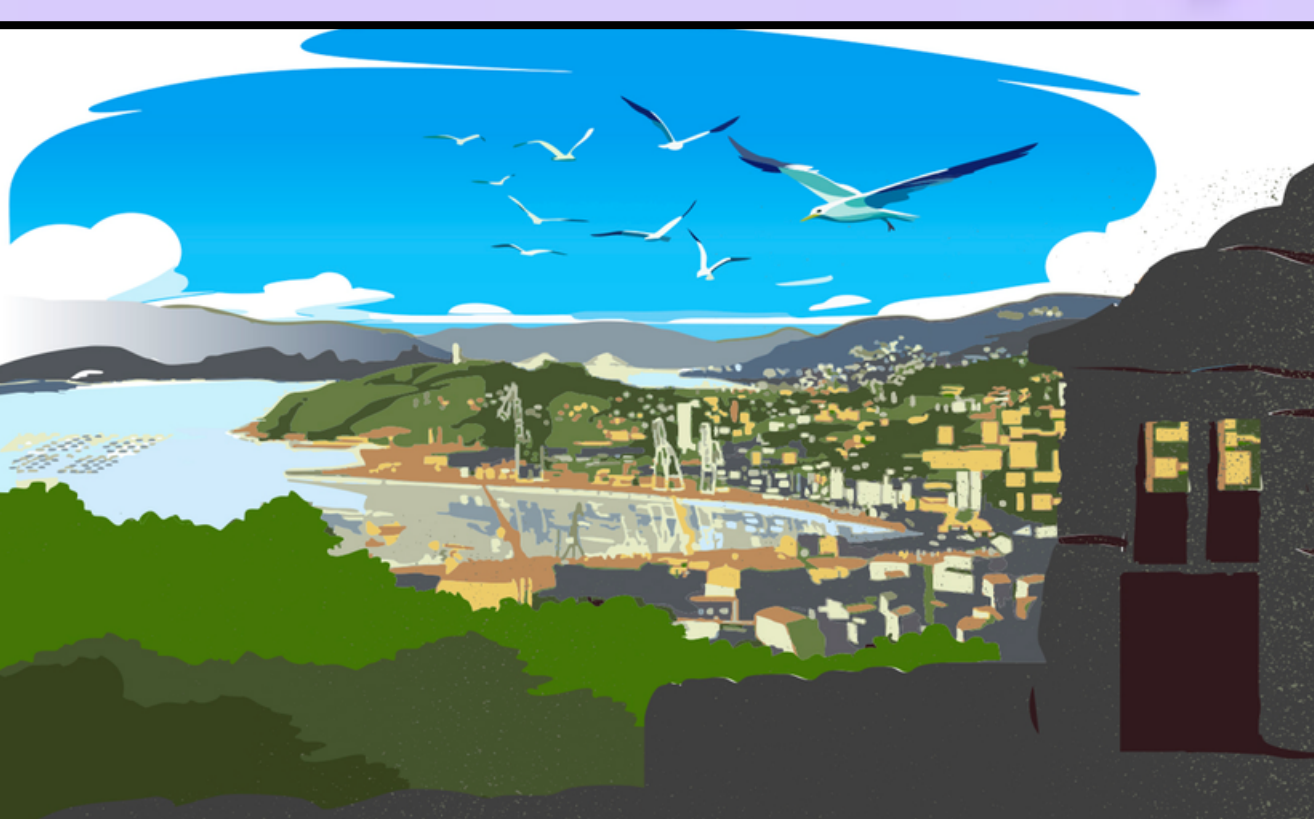




Evolution of invasive pneumococcal disease in the adult population in Spain (2009–2026): Potential vaccine coverage and impact of pneumococcal conjugate vaccines



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INTRODUCTION

Streptococcus pneumoniae remains a major public health concern, particularly among older adults and individuals with underlying conditions.

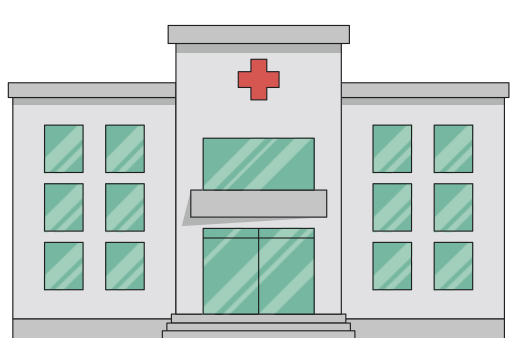
The progressive introduction of broader **pneumococcal conjugate vaccines** (PCVs) has reduced disease caused by vaccine-covered serotypes and reshaped the epidemiology of invasive pneumococcal disease (IPD). However, an increasing prevalence of non-vaccine serotypes, some associated with antimicrobial multidrug resistance, has been observed

Continuous surveillance is therefore essential to monitor changes in **serotype distribution** and **antimicrobial resistance** and to assess the potential impact of these vaccines in real-world settings.

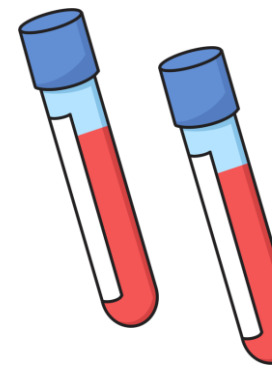
We analysed IPD-causing serotypes in Spanish adults from 2009 to 2026, focusing on serotypes shared by PCV20 and PCV21, vaccine-specific serotypes, and non-vaccine serotypes.

METHODODOLOGY

1 Bacterial isolates



National longitudinal
surveillance study



All adult IPD isolates from
hospitalized patients (≥18 years)



From 2009 to
2026

2 Serotype classification

Common PCV20-21	Unique-PCV20	Unique-PCV21	Non-vaccine
3, 6A, 7F, 8, 10A, 11A, 12F, 15B/C, 19A, 22F, 33F	1, 4, 5, 6B, 9V, 14, 18C, 19F, 23F	9N, 15A, 16F, 17F, 20, 23A, 23B, 24F, 31, 35B	All other serotypes

Serotypes 15B and 15C were classified as common PCV20-21 due to cross-reactivity

3 Data processing



Age groups:
• 18 to 64
• 65 to 74
• 75 to 84

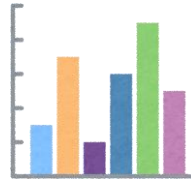


Reference years
2009 (pre PCV-13) 2019 (pre Covid-19) 2025 (post pandemic)



Data source:
• Population: Spanish National Statistics Institute
• Corrected incidence: 80% population capture

4 Statistical analysis



Incidence:
cases per 100,000 population and year



Analysis: Incidence Rate Ratio (IRR) between periods using Poisson regression



Software:
• STATA v. 14
• GraphPad Prism 8

OBJECTIVE

To evaluate the epidemiological evolution of unique pneumococcal serotypes covered by either PCV20 or PCV21, common serotypes by both vaccines and non-vaccine serotypes in adults from January 2009 to June 2026.

RESULTS

1 Evolution of IPD in adult population

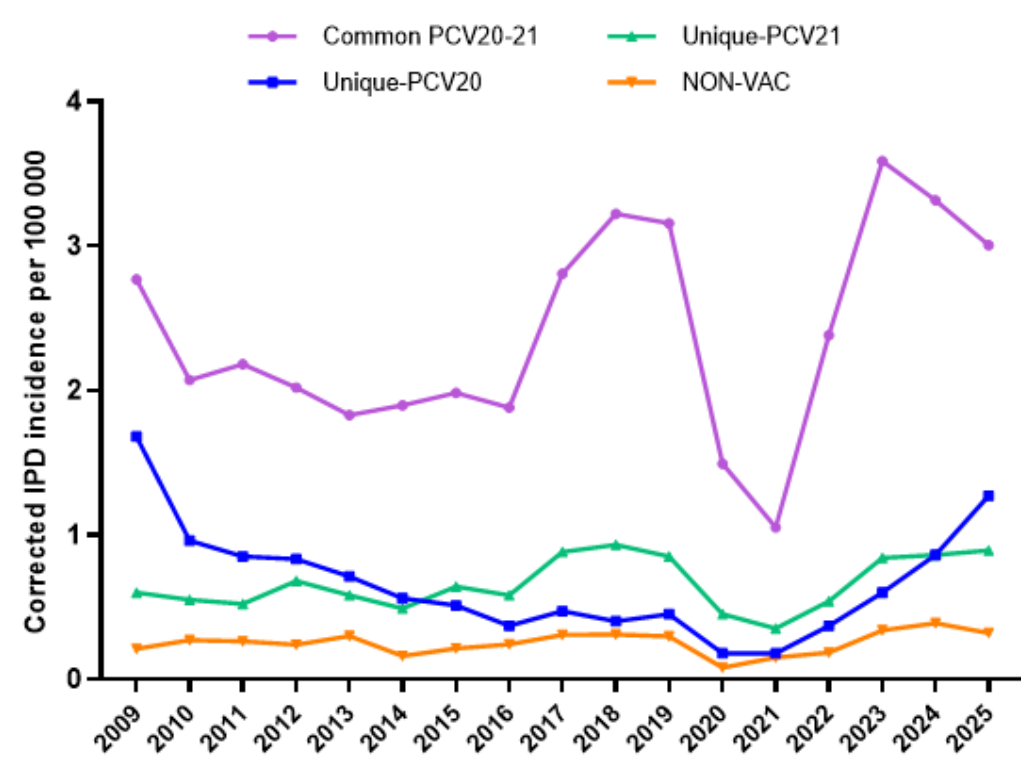


Fig. 1: Evolution of IPD corrected incidence in 18-64 years old adults of during 2009-2025

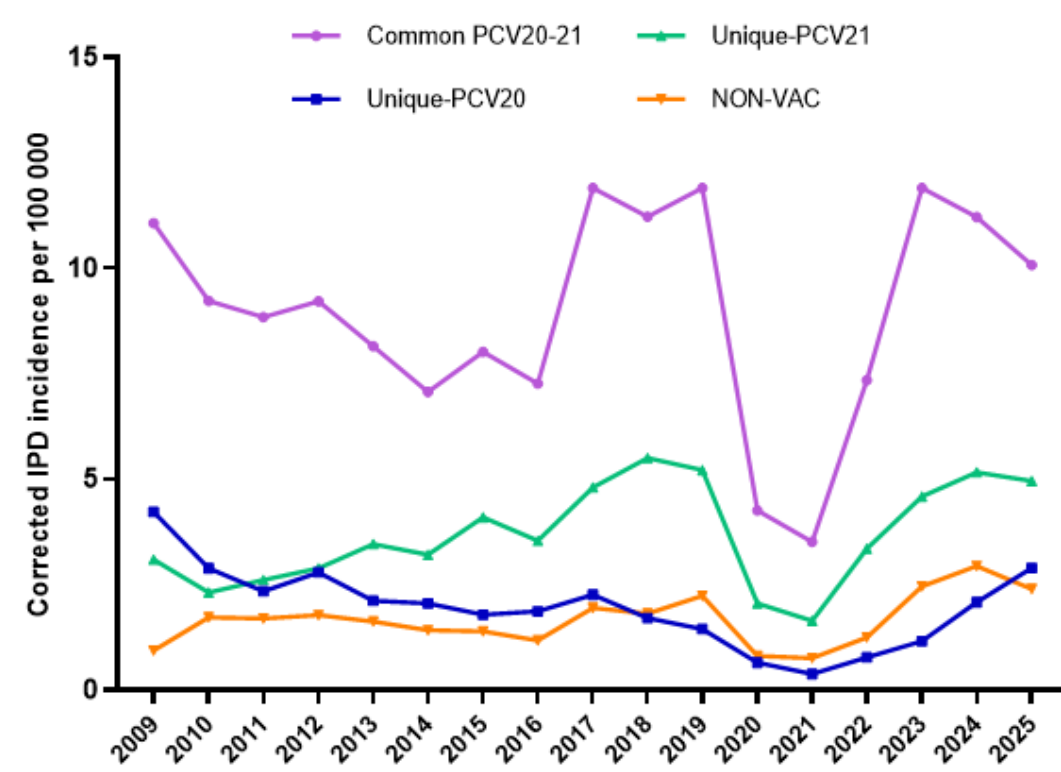


Fig. 2: Evolution of IPD corrected incidence in adults ≥ 65 years of age during 2009-2025

Common PCV20-21 serotypes accounted for the **largest IPD burden** in both age groups. **Unique-PCV20** serotypes **declined after PCV13** introduction but **increased markedly after the COVID-19 pandemic**.

In adults aged **18–64 years** (Fig. 1), the resurgence of **unique-PCV20** serotypes led them to exceed unique-PCV21 serotypes in 2025. In contrast, **unique-PCV21** serotypes remained more frequent than unique-PCV20 serotypes in adults aged **≥65 years** (Fig. 2). Non-vaccine serotypes remained low in younger adults but showed a greater increase in older adults.

2 Contribution of PCV20/PCV21 in the prevention of adult IPD

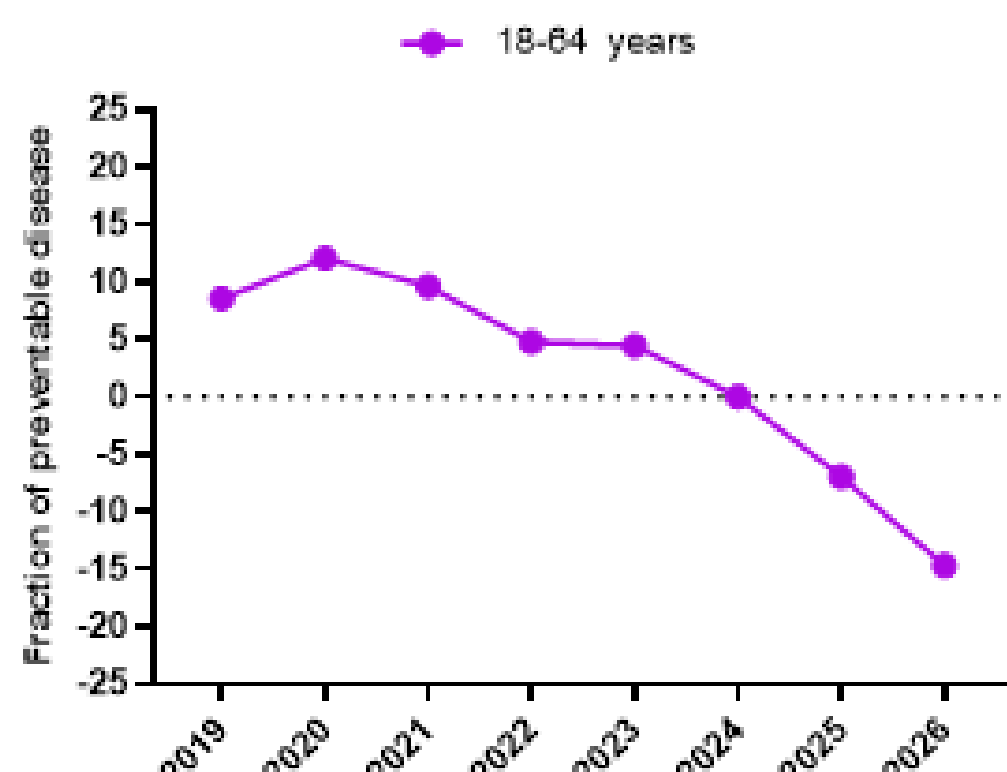


Fig. 3: Fraction of disease (%) that can be prevented with PCV20 or PCV21 in 18-64 years old adults by epidemiological year.

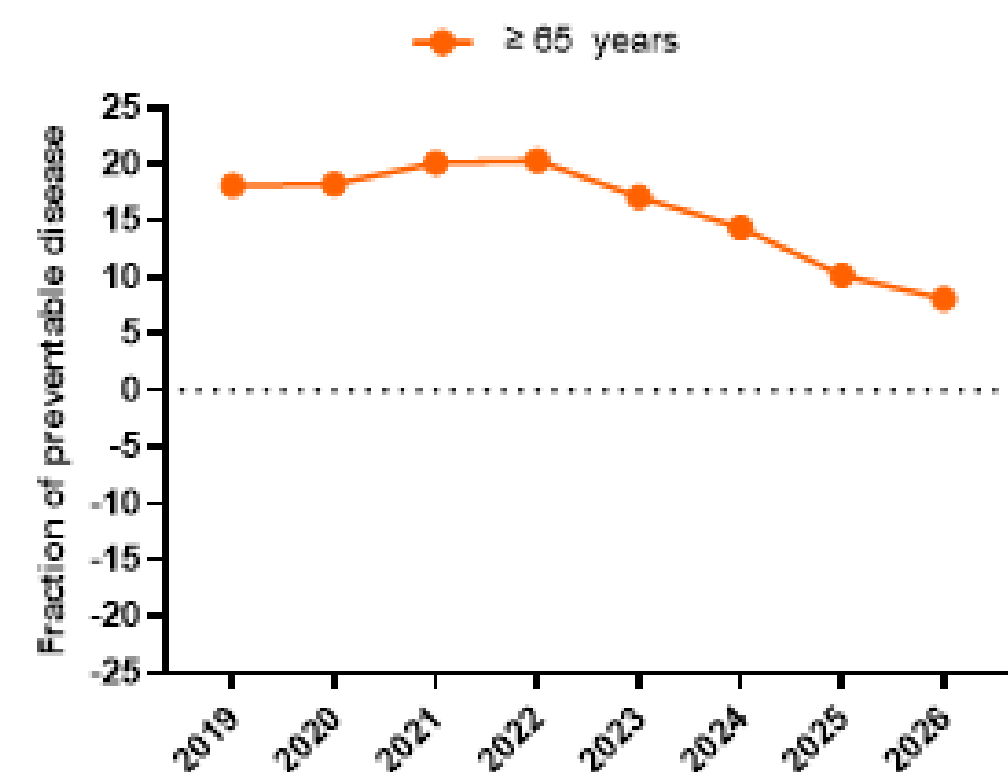


Fig. 4: Fraction of disease (%) that can be prevented with PCV20 or PCV21 in ≥65 years old adults by epidemiological year.

In adults aged **18–64 years**, the difference progressively shifted towards **PCV20**, reaching a 15% higher potential contribution than PCV21 in 2026. In adults **≥65 years**, **PCV21** maintained a higher potential preventable fraction throughout the study period. However, this difference decreased over time, reaching 8% in 2026.

3 Distribution of unique-PCV20/PCV21 serotypes causing IPD in adults

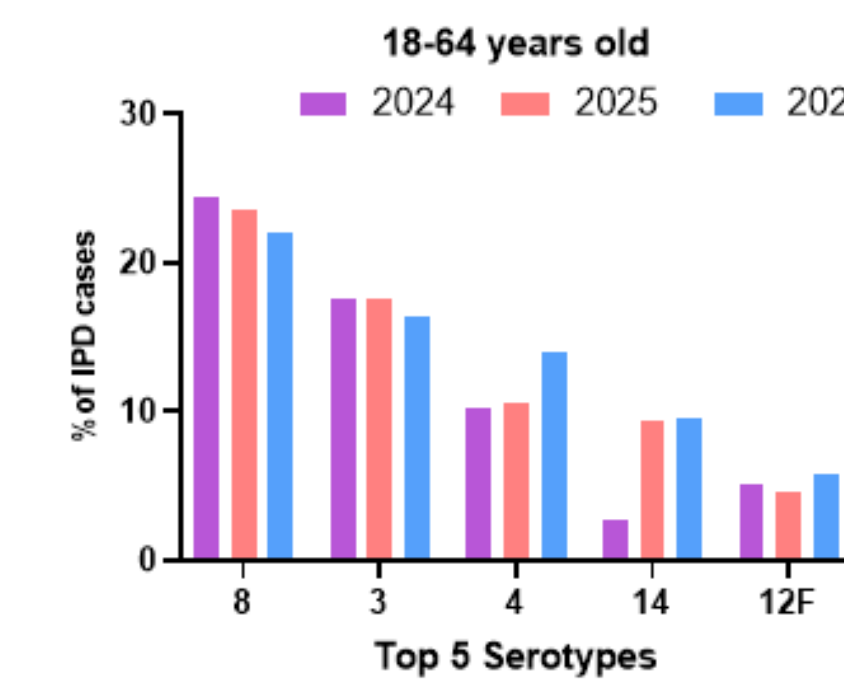


Fig. 5: Proportion of IPD cases in 18-64 years old adults caused by the five most prevalent serotypes in 2026 in comparison to previous years 2024 and 2025.

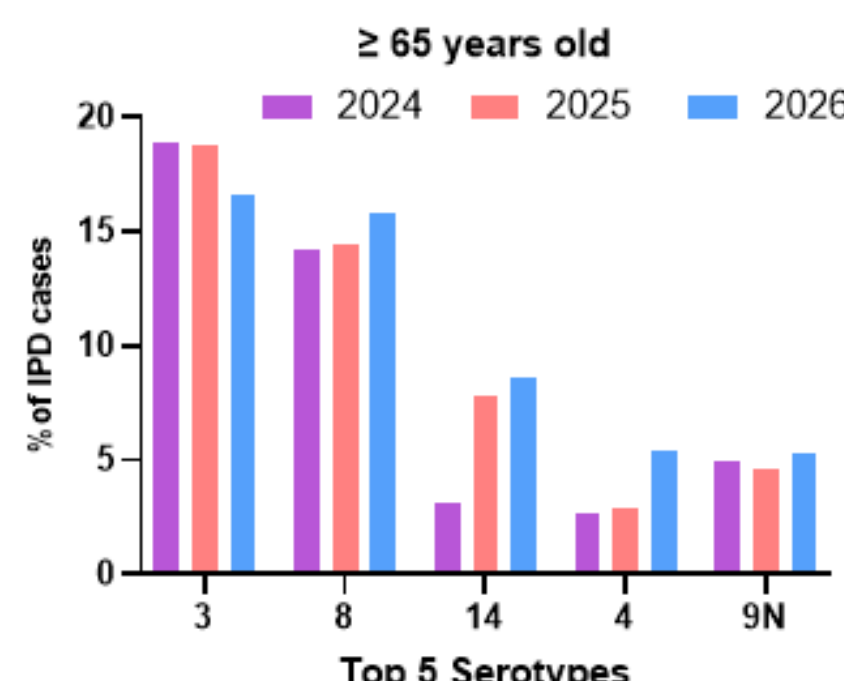


Fig. 6: Proportion of IPD cases in ≥65 years old adults caused by the five most prevalent serotypes in 2026 in comparison to previous years 2024 and 2025.

The distribution of unique-PCV21 serotypes remained relatively stable in both age groups, with **9N, 15A and 24F** among the most prevalent. In contrast, PCV20 **serotypes 4 and 14 increased markedly** in recent years, with this trend observed in both age groups.

CONCLUSIONS

- PCV20 and PCV21 have the potential to prevent a substantial proportion of adult IPD, although their potential impact **differs by age group**.
- The potential contribution of **PCV20** increased in **younger adults**, while **PCV21** maintained a higher potential contribution in **older adults**.
- The recent increase in PCV20-not-PCV21 serotypes, particularly **serotypes 4 and 14**, highlights the changing epidemiology of adult IPD.
- Continuous epidemiological and microbiological surveillance** is essential to monitor serotype replacement and antimicrobial resistance.
- These findings support the periodic evaluation and adaptation of **adult vaccination strategies**, particularly for vulnerable populations.

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