

BACKGROUND

- **Containment measures during COVID-19 pandemic:** effective to reduce transmission of SARS-CoV-2, but also other (bacterial) pathogens transmitted via respiratory droplets: *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Haemophilus influenzae* and *Neisseria meningitidis*
- **Respective four pathogens are leading causes of invasive bacterial infections (IBI) associated with high morbidity and mortality**
- **End of 2022: high number of patients with severe acute respiratory infections** (alerts for group A streptococcal infections in Europe), coinciding with intense viral circulation (e.g. RSV, influenza)
- **Incidence of these infections in Belgium before, during and after COVID-19**

METHODS

- Number of invasive infections caused by these four pathogens for **2017-2023: country-wide surveillance** by the four different Belgian National Reference Centers (NRCs)
- **Mean case numbers pre-COVID (2017-2019)** used to evaluate the evolution of bacterial invasive diseases during (2020-2021) and post-pandemic (2022-2023)
- **Yearly incidence rates per 100,00 individuals evaluated for 2017-2023: children (≤ 18 years) and adults (> 18 years)** – surveillance coverage of 90%, except for 70% for *S. pyogenes*, was considered to correct incidence rates

RESULTS

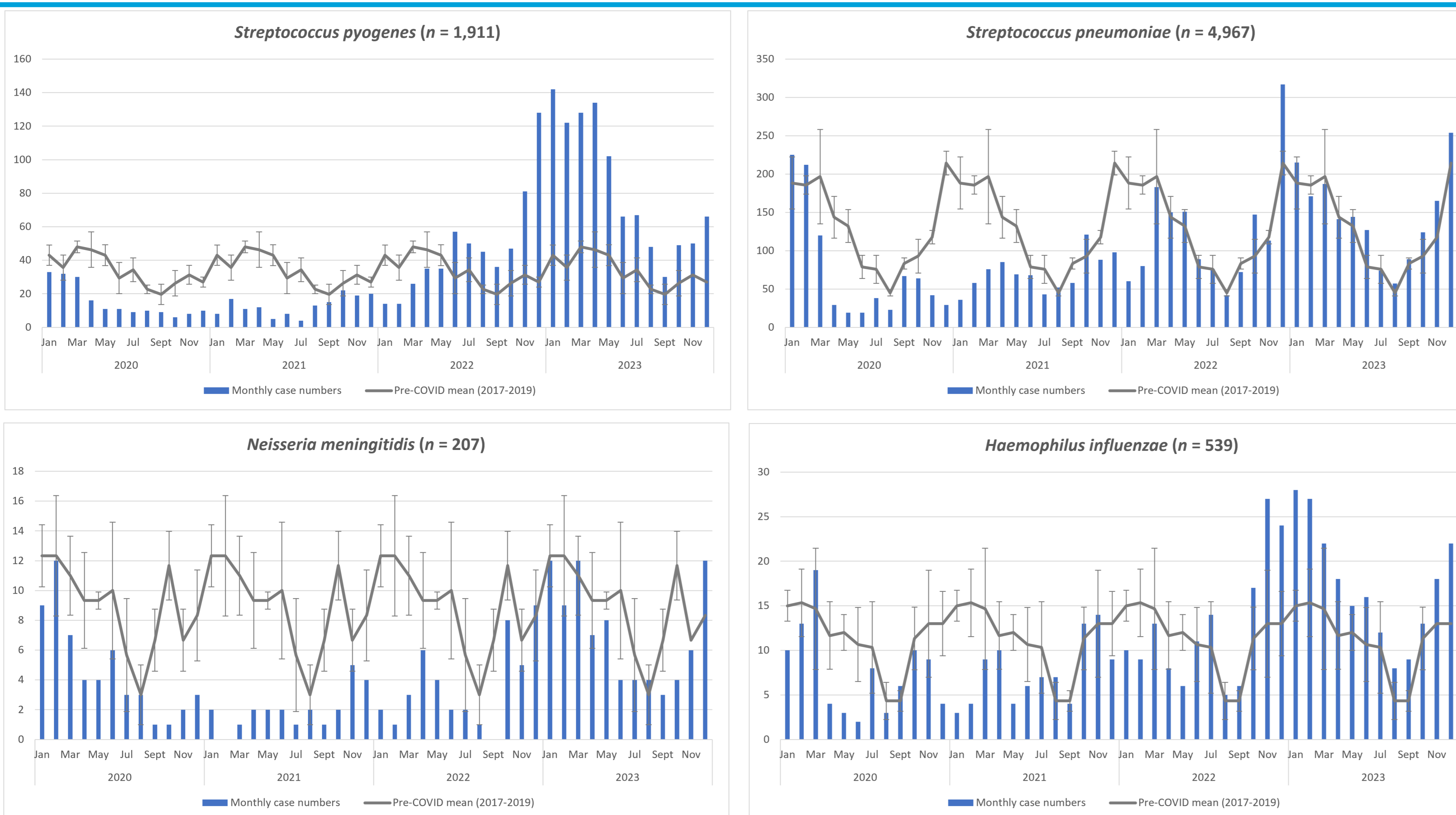


Figure 1: Monthly case numbers of invasive bacterial infections between 2020 and 2023: *S. pyogenes*, *S. pneumoniae*, *N. meningitidis* and *H. influenzae*. The mean monthly case numbers for the pre-COVID period (2017-2019) are visualized as a grey line for all four pathogens, with confidence intervals for one standard deviation plotted.

Incidence rates per 100,000 individuals per age group (children vs adults)

- ***N. meningitidis*:**
 - Children: incidence rates decreased from 3,1 (2018) to 0,6 (2022) and increased again to 1,5 (2023) per 100,000 children
 - Adults: more stable incidence rates with a decrease during COVID
- ***S. pneumoniae*:**
 - Children: similar trends as adults with decrease during COVID (10,0 in 2019 to 6,9 in 2021, per 100,000 children), followed by increase to pre-COVID levels
 - Adults: overall higher rates than for children, **highest incidence rates** among the four studied pathogens (up to 17,9 per 100,000 adults in 2023)
- ***S. pyogenes*:** similar incidence rates for both age groups, with a **very sharp increase following COVID**: 1,8-1,9 (2021) to 11,7-14,4 (2023) per 100,000 persons
- ***H. influenzae*:**
 - Children: increase from 1,2 (2017) to 2,3 (2019), followed by a decrease to 1,3 during COVID (2020) and again an increase to 2,4 (2023) per 100,000 children
 - Adults: similar pattern as for children, although overall somewhat lower rates
 - Both *S. pneumoniae* and *H. influenzae* already re-increase in 2021 in children, compared to a more stable or decreasing trend in incidence rates in adults

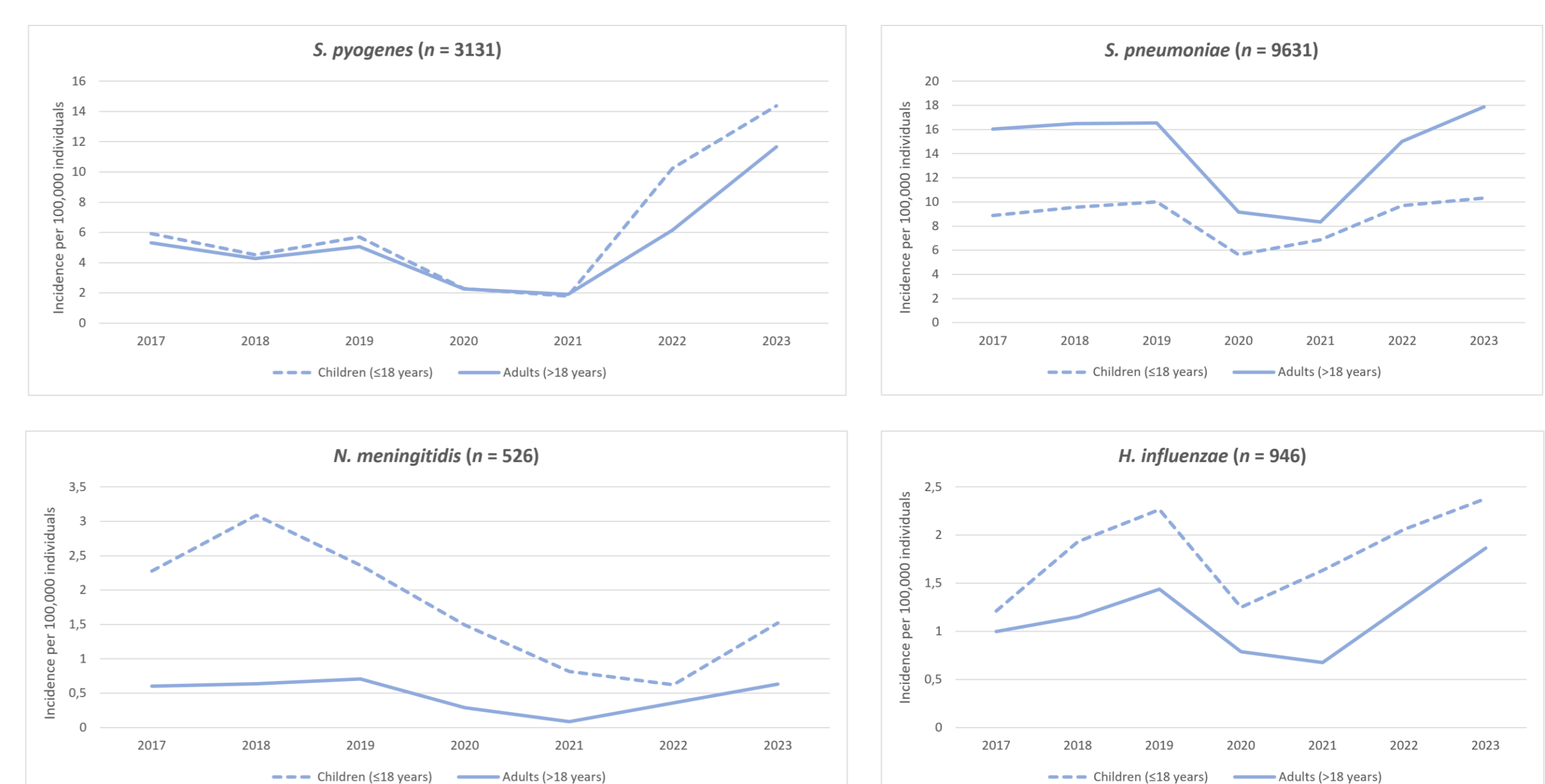


Figure 2: Incidence of invasive bacterial infections (per 100,00 inhabitants) for the period 2017 to 2023: children (≤ 18 years) and adults (> 18 years).

Large impact of COVID-19

- **Large decrease in case numbers for 2020-2021** compared to the mean of 2017-2019:
 - **-62.9% for *N. meningitidis*:** 106 to 40
 - **-58.3% for *S. pyogenes*:** 407 to 170
 - **-44.1% for *S. pneumoniae*:** 1555 to 870
 - **-33.3% for *H. influenzae*:** 136 to 91
- Loss of typical seasonal trends in 2020-2021

Post-COVID (2022-2023) vs pre-COVID

- ***N. meningitidis*:** decreasing trend continued in 2022 (-59.6%, $n = 43$), while in 2023 evolved towards pre-COVID mean ($n = 85$).
- ***S. pneumoniae*:** case numbers stabilized to pre-COVID in 2022 ($n = 1480$) – December 2022: highest number ever received. **For 2023 increase** in cases: +12.4% ($n = 1748$).
- ***S. pyogenes*:** cases increased in 2022: +39.7% ($n = 568$), and 2023: +147% ($n = 1004$). Increase partially associated with predominance of lineage M1_{UK} (Euro Surveill. 2023).
- ***H. influenzae*:** cases increased in 2022: +10.6% ($n = 150$), and 2023: +52.9% ($n = 208$).

CONCLUSION

Numbers of IBI were severely impacted during the COVID-19 pandemic, with for *S. pneumoniae*, *S. pyogenes* and *H. influenzae* cases restabilizing and even increasing in 2022-2023 compared to pre-COVID. *N. meningitidis* was the most impacted with a reduction of almost 63% in case numbers, while it is **post-COVID the only pathogen for which still a lower number of infections is recorded compared to pre-COVID**, mainly due to a lower incidence in children. For the three other pathogens, trends in adults and children were similar. These different evolutions between the pathogens need more detailed study since based on anticipated post COVID-19 immunity decrease, we expected somewhat similar patterns for the four pathogens.

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