Hur arbetar Folkhälsomyndigheten mot antibiotikaresistens?

Villa Källhagen, 15 mars 2023

Stephan Stenmark

Infektionsläkare

Utredare på Folkhälsomyndigheten

Vår vision

En folkhälsa som stärker samhällets utveckling.

Korta fakta om Folkhälsomyndigheten

- bildades 1 januari 2014.

- Nationell kunskapsmyndighet med ett övergripande ansvar för folkhälsofrågor.

- Verksamheten i Solna och i Östersund.

- Drygt 600 anställda.

Antibiotikaresistens orsakade > 1 miljon dödsfall globalt 2019

Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis

Antimicrobial Resistance Collaborators*

Summary

Background Antimicrobial resistance (AMR) poses a major threat to human health around the world. Previous publications have estimated the effect of AMR on incidence, deaths, hospital length of stay, and health-care costs for specific pathogen–drug combinations in select locations. To our knowledge, this study presents the most comprehensive estimates of AMR burden to date.

Methods We estimated deaths and disability-adjusted life-years (DALYs) attributable to and associated with bacterial AMR for 23 pathogens and 88 pathogen–drug combinations in 204 countries and territories in 2019. We obtained data from systematic literature reviews, hospital systems, surveillance systems, and other sources, covering 471 million individual records or isolates and 7585 study-location-years. We used predictive statistical modelling to produce estimates of AMR burden for all locations, including for locations with no data. Our approach can be divided into five broad components: number of deaths where infection played a role, proportion of infectious deaths attributable to a given infectious syndrome, proportion of infectious syndrome deaths attributable to a given pathogen, the percentage of a given pathogen resistant to an antibiotic of interest, and the excess risk of death or duration of an infection associated with this resistance. Using these components, we estimated disease burden based on two counterfactuals: deaths attributable to AMR (based on an alternative scenario in which all drug-resistant infections were replaced by drug-susceptible infections), and deaths associated with AMR (based on an alternative scenario in which all drug-resistant infections were replaced by no infection). We generated 95% uncertainty intervals (UIs) for final estimates as the 25th and 975th ordered values across 1000 posterior draws, and models were cross-validated for out-of-sample predictive validity. We present final estimates aggregated to the global and regional level.

Länk

Tre vanliga tillstånden:
- Lunginflammation
- Sepsis (blodförgiftning)
- Bukinfektioner

Länk
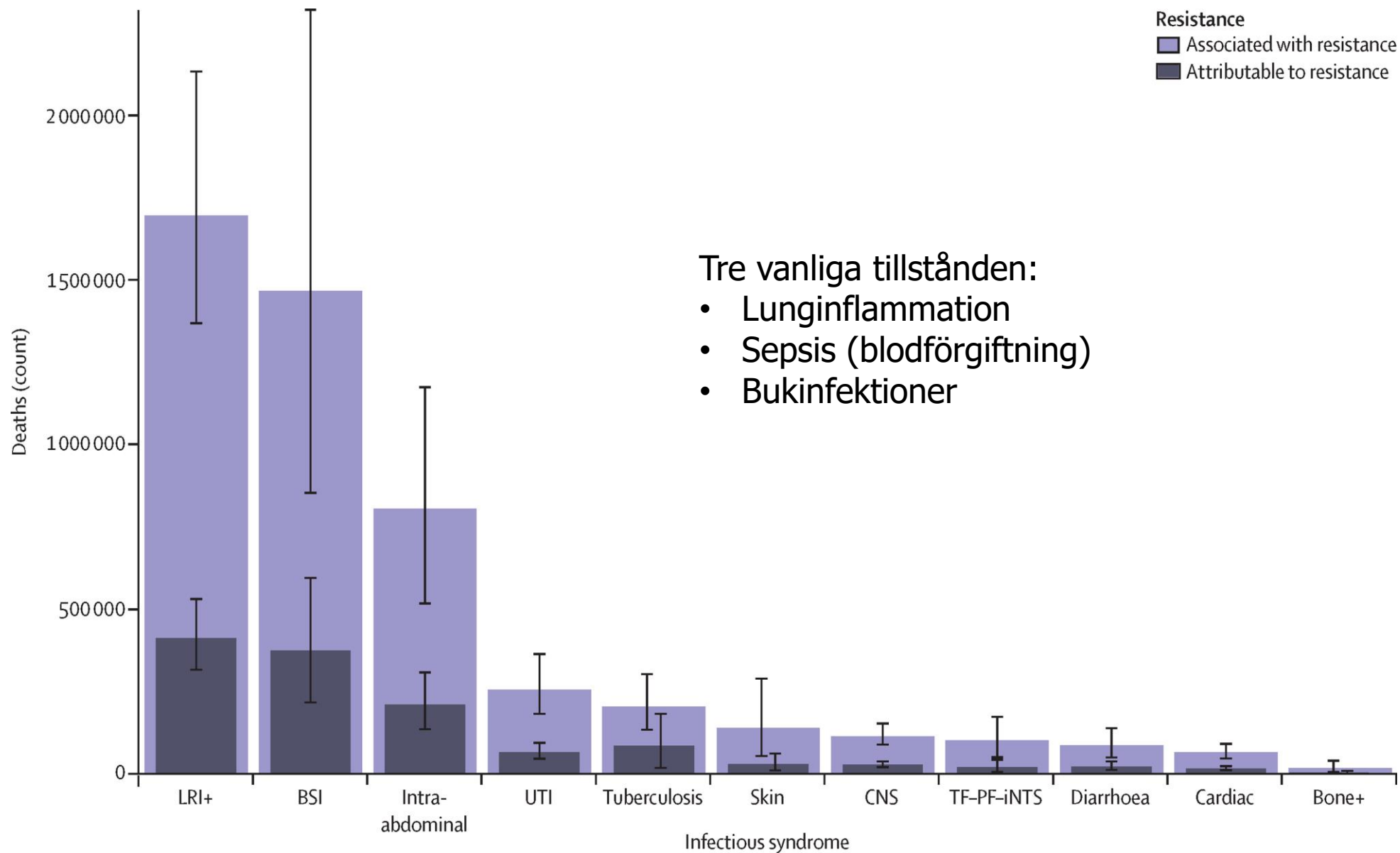
Antibiotikaresistens orsakade > 100 000 dödsfall i Europa 2019

The burden of bacterial antimicrobial resistance in the WHO European region in 2019: a cross-country systematic analysis

*European Antimicrobial Resistance Collaborators**

Summary

Background Antimicrobial resistance (AMR) represents one of the most crucial threats to public health and modern health care. Previous studies have identified challenges with estimating the magnitude of the problem and its downstream effect on human health and mortality. To our knowledge, this study presents the most comprehensive set of regional and country-level estimates of AMR burden in the WHO European region to date.

Methods We estimated deaths and disability-adjusted life-years attributable to and associated with AMR for 23 bacterial pathogens and 88 pathogen–drug combinations for the WHO European region and its countries in 2019. Our methodological approach consisted of five broad components: the number of deaths in which infection had a role, the proportion of infectious deaths attributable to a given infectious syndrome, the proportion of infectious syndrome deaths attributable to a given pathogen, the percentage of a given pathogen resistant to an antimicrobial drug of interest, and the excess risk of mortality (or duration of an infection) associated with this resistance. These components were then used to estimate the disease burden by using two counterfactual scenarios: deaths attributable to AMR (considering an alternative scenario where infections with resistant pathogens are replaced with susceptible ones) and deaths associated with AMR (considering an alternative scenario where drug-resistant infections would not occur at all). Data were solicited from a wide array of international stakeholders; these included research hospitals, surveillance networks, and infection databases maintained by private laboratories and medical technology companies. We generated 95% uncertainty intervals (UIs) for final estimates as the 25th and 975th ordered values across 1000 posterior draws, and models were cross-validated for out-of-sample predictive validity.

Findings We estimated 541 000 deaths (95% UI 370 000–763 000) associated with bacterial AMR and 133 000 deaths (90 100–188 000) attributable to bacterial AMR in the whole WHO European region in 2019. The largest fatal burden of AMR in the region came from bloodstream infections, with 195 000 deaths (104 000–333 000) associated with resistance, followed by intra-abdominal infections (127 000 deaths [81 900–185 000]) and respiratory infections (120 000 deaths [94 500–154 000]). Seven leading pathogens were responsible for about 457 000 deaths associated with resistance in 53 countries of this region; these pathogens were, in descending order of mortality, *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Enterococcus faecium*, *Streptococcus pneumoniae*, and *Acinetobacter baumannii*. Methicillin-resistant *S aureus* was shown to be the leading pathogen–drug combination in 27 countries for deaths attributable to AMR, while aminopenicillin-resistant *E coli* predominated in 47 countries for deaths associated with AMR.

*Collaborators are listed at the end of the Article

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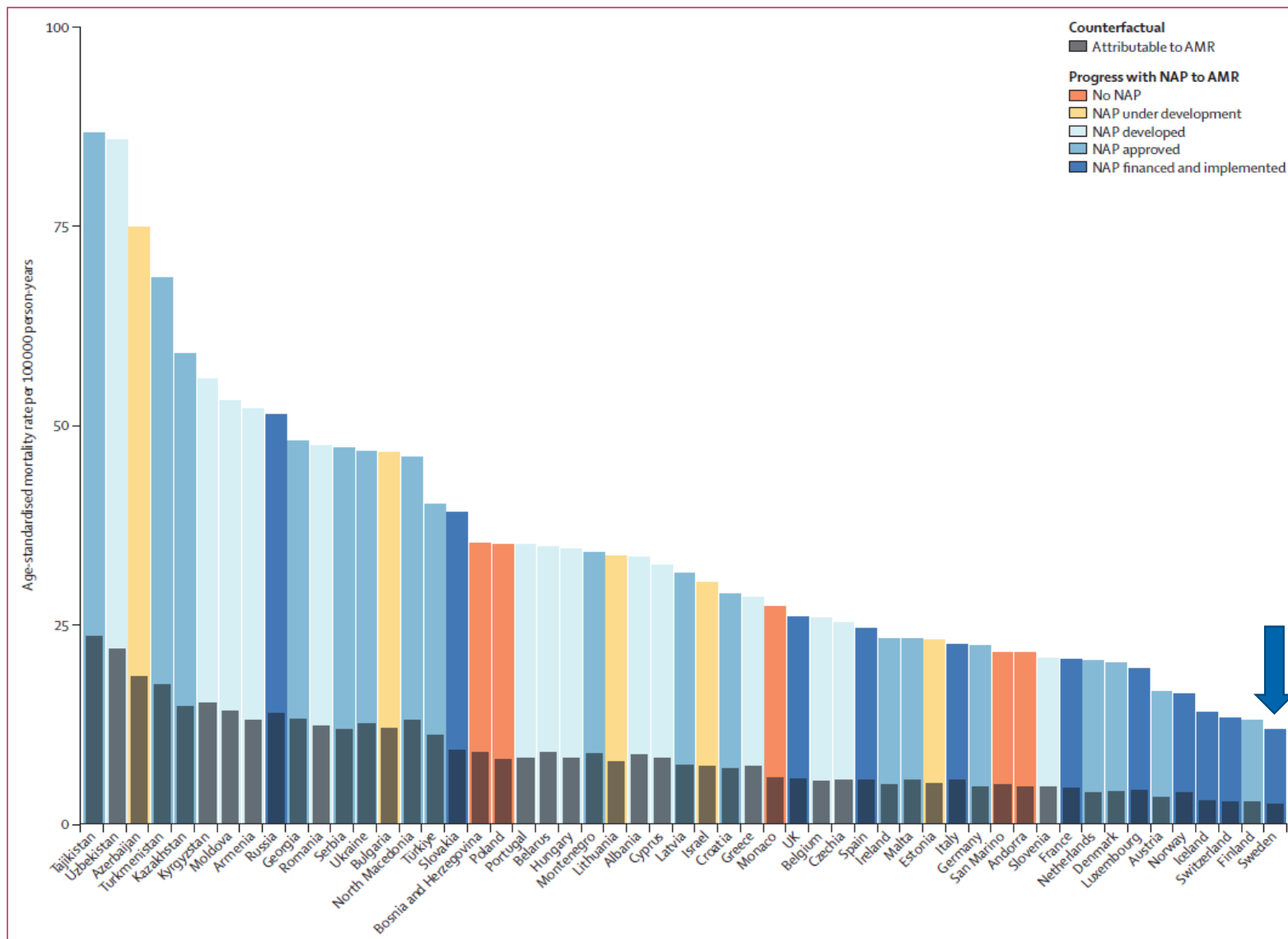nagham@uw.edu

Figure 5: Age-standardised mortality rate associated with and attributable to AMR in relation to the status of NAPs for the countries in the WHO European region

Rates per 100 000 person-years associated with AMR are coloured according to NAP status, while rates attributable to AMR are grey. The category "no NAP" also includes countries that did not provide data about its status. NAP data was acquired from the 2020–21 Country Self-assessment Survey responses.[21] Estimates were aggregated across drugs, accounting for the co-occurrence of resistance to multiple drugs. AMR=antimicrobial resistance. NAP=national AMR action plan.

The Lancet public health oct 2022

Global mortality associated with 33 bacterial pathogens in 2019: a systematic analysis for the Global Burden of Disease Study 2019
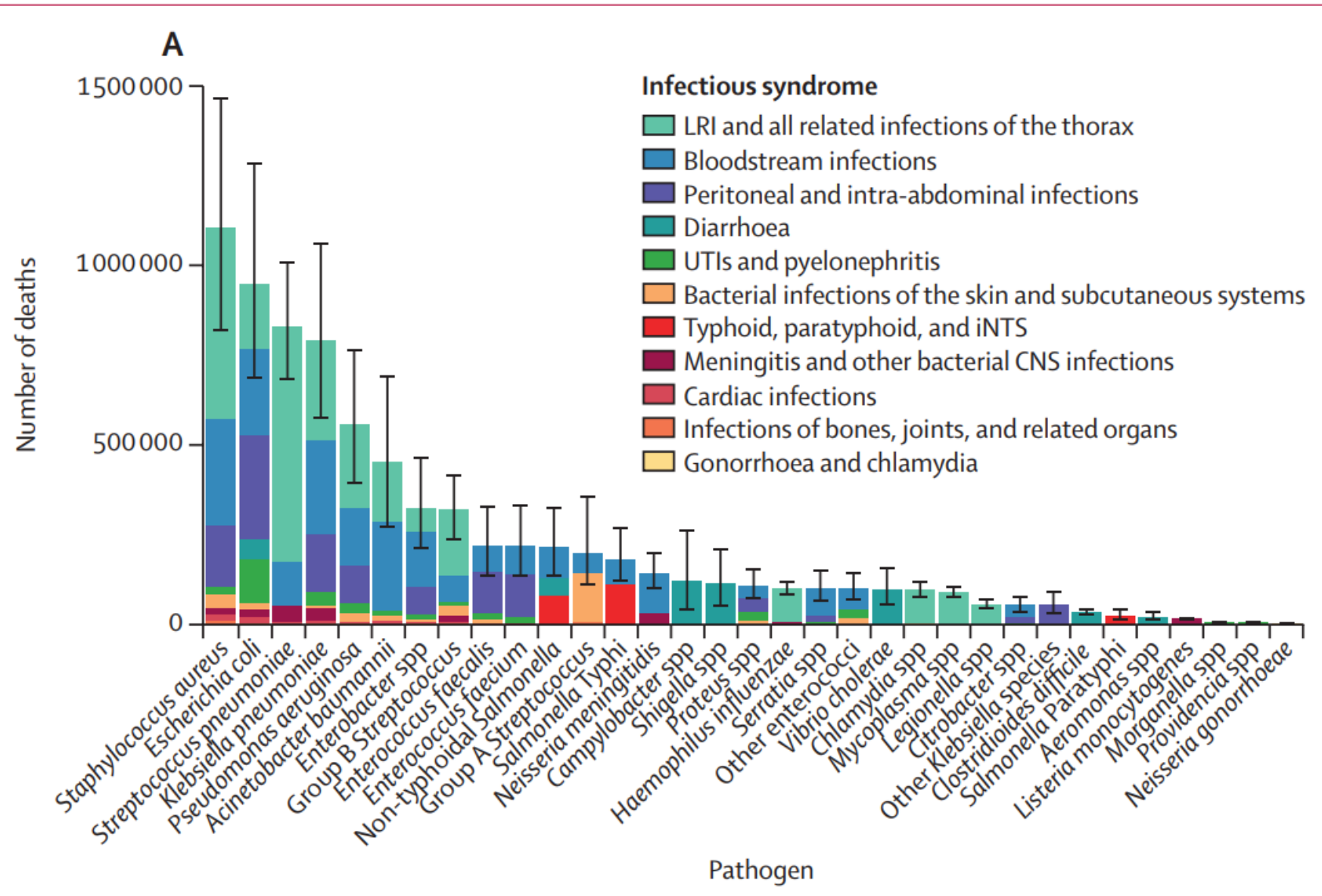
*GBD 2019 Antimicrobial Resistance Collaborators**

Findings From an estimated 13·7 million (95% UI 10·9–17·1) infection-related deaths in 2019, there were 7·7 million deaths (5·7–10·2) associated with the 33 bacterial pathogens (both resistant and susceptible to antimicrobials) across the 11 infectious syndromes estimated in this study. We estimated deaths associated with the 33 bacterial pathogens to comprise 13·6% (10·2–18·1) of all global deaths and 56·2% (52·1–60·1) of all sepsis-related deaths in 2019. Five leading pathogens—*Staphylococcus aureus*, *Escherichia coli*, *Streptococcus pneumoniae*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*—were responsible for 54·9% (52·9–56·9) of deaths among the investigated bacteria. The deadliest infectious syndromes and pathogens varied by location and age. The age-standardised mortality rate associated with these bacterial pathogens was highest in the sub-Saharan Africa super-region, with 230 deaths (185–285) per 100 000 population, and lowest in the high-income super-region, with 52·2 deaths (37·4–71·5) per 100 000 population. *S aureus* was the leading bacterial cause of death in 135 countries and was also associated with the most deaths in individuals older than 15 years, globally. Among children younger than 5 years, *S pneumoniae* was the pathogen associated with the most deaths. In 2019, more than 6 million deaths occurred as a result of three bacterial infectious syndromes, with lower respiratory infections and bloodstream infections each causing more than 2 million deaths and peritoneal and intra-abdominal infections causing more than 1 million deaths.

Interpretation The 33 bacterial pathogens that we investigated in this study are a substantial source of health loss globally, with considerable variation in their distribution across infectious syndromes and locations. Compared with GBD Level 3 underlying causes of death, deaths associated with these bacteria would rank as the second leading cause of death globally in 2019; hence, they should be considered an urgent priority for intervention within the global health community. Strategies to address the burden of bacterial infections include infection prevention, optimised use of antibiotics, improved capacity for microbiological analysis, vaccine development, and improved and more pervasive use of available vaccines. These estimates can be used to help set priorities for vaccine need, demand, and development.

A

Number of deaths

Infectious syndrome
- LRI and all related infections of the thorax
- Bloodstream infections
- Peritoneal and intra-abdominal infections
- Diarrhoea
- UTIs and pyelonephritis
- Bacterial infections of the skin and subcutaneous systems
- Typhoid, paratyphoid, and iNTS
- Meningitis and other bacterial CNS infections
- Cardiac infections
- Infections of bones, joints, and related organs
- Gonorrhoea and chlamydia

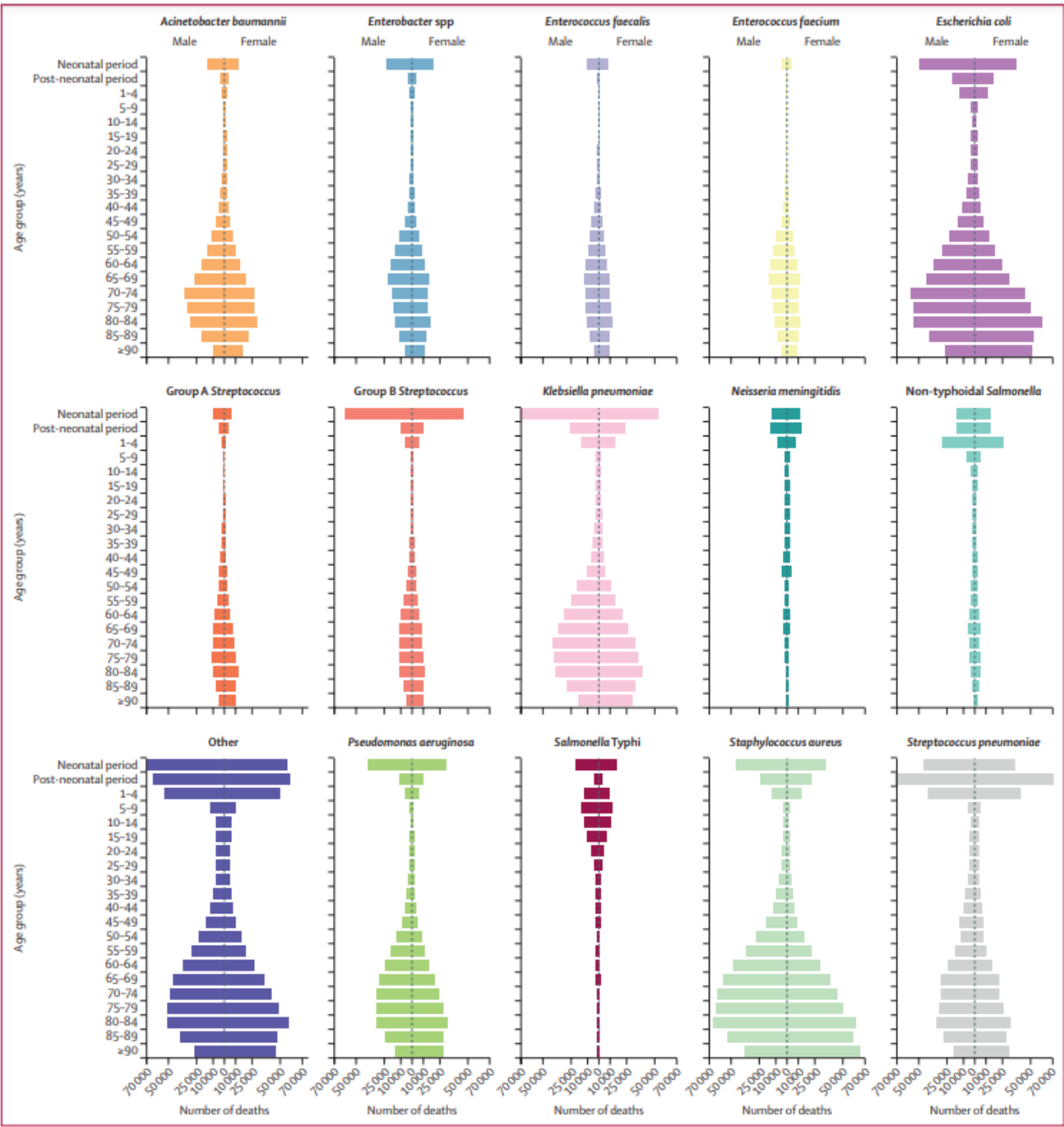Pathogen

Störst risk tidigt och sent i livet

Figure 5: Global number of deaths, by pathogen, age, and sex groups, 2019
Data are presented for the 14 pathogens with the largest number of global deaths; the Other group comprises the additional 19 bacteria estimated in this study. Neonatal=0 days to 27 days old.
Post-neonatal=28 days to <1 year old. Salmonella Typhi=Salmonella enterica serotype Typhi.

Key facts from the study

- **7.7 million** deaths around the world were found linked to bacterial infection. That is 13.6%, or **1 in 8 of all global deaths**.

- This makes bacterial infections the **second-leading cause of death globally**.

- More than half of these deaths are caused by only five types of bacteria:
  – *Staphylococcus aureus*
  – *Escherichia coli*
  – *Streptococcus pneumoniae*
  – *Klebsiella pneumoniae*
  – *Pseudomonas aeruginosa*

- Three types of infections were responsible for more than 75% of the deaths:
  – Lower respiratory infections (such as pneumonia)
  – Bloodstream infections
  – Peritoneal and intra-abdominal infections

- There are large differences in burden as well as distribution of bacterial pathogens across regions. Mortality rate was highest in sub-Saharan Africa, with 230 deaths per 100,000 population, and lowest in high-income countries at 52 deaths per 100,000 population.

The One Health Triad

Sveriges Kommuner och Landsting

Svensk strategi för arbetet mot antibiotikaresistens 2020-2023

Regering och departementet

Folkhälsomyndigheten

Nationella samverkansfunktionen för arbete mot antibiotikaresistens
26 myndigheter och organisationer

Tvärsektoriell handlingsplan mot antibiotikaresistens 2021-2024
Underlag för samverkansgruppens fortsatta arbete

Jordbruks verket · Folkhälsomyndigheten

21 regioner

Nationellt system för Kunskapsstyrning Hälso- och sjukvård

NPO Infektion

NAG Strama

Strama**nätverket** **21 lokala Stramagrupper**

Expertgrupper:

Referensgruppen för antibiotikafrågor **RAF**

Veterinär-Strama
Apotekar-Strama
Tandvårds-Strama

Specialitetsföreningar

-Infektion
-Mikrobiologi FKM
-Vårdhygien SFVH
-Hygienläkare
-Allmänmedicin
-Urologi
-Barn
-ÖNH
-Kirurgi
-Hud/venerologi
-mfl

Nationella projekt och innovationsmiljöer

PLATINEA   Antibiotikasmart®

Hela samhället bidrar till att antibiotika fungerar, även i framtiden

Samverkan bekämpar antibiotika-resistens

Internationella samarbeten och organisationer

World Health Organization

ReAct

NDPHS AMR-EG
EURGenCCRE

2023 urval av aktiviteter

- Strama- och Vårdhygien samverkan
  - Stramautbildning
  - Stramadagen

- Nationella samverkansfunktionen
  - Skyddaantibiotikan.se
  - Antibiotikaforum

- Övervakning uppföljning försäljning

- Tillgång och tillgänglighet till antibiotika

- Beteendeinsikter

- Antibiotikasmart Sverige

- Primärvårdskvalitet, PVQ

- ECDC PPM

- HALT-mätning på SÄBO

- Swedres Svarm

- Svebar

- Internationellt

Bevara möjligheten till effektiv behandling av bakteriella infektioner hos människor och djur

| Ökad kunskap genom stärkt övervakning | Fortsatt starka förebyggande åtgärder | Ansvarsfull användning av antibiotika | Ökad kunskap med nya metoder | Ökad kunskap i samhället om antibiotika-resistens | Stödjande strukturer och system | Ledarskap inom EU och interna-tionellt sam-arbete |

Folkhälsomyndigheten

Sambandet mellan vårdrelaterade infektioner (VRI) och antibiotikaresistens. En ond cirkel
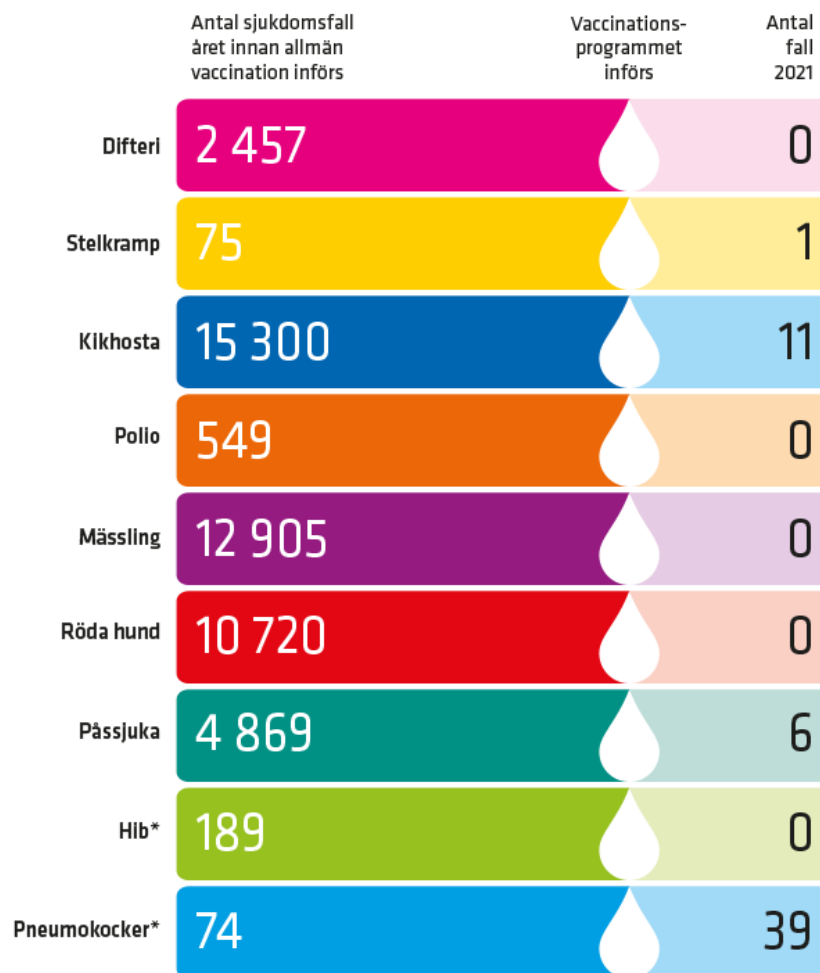

Antibiotika resistens → Smittöverföring mellan/inom patienter → VRI → Antibiotika användning → Antibiotika resistens
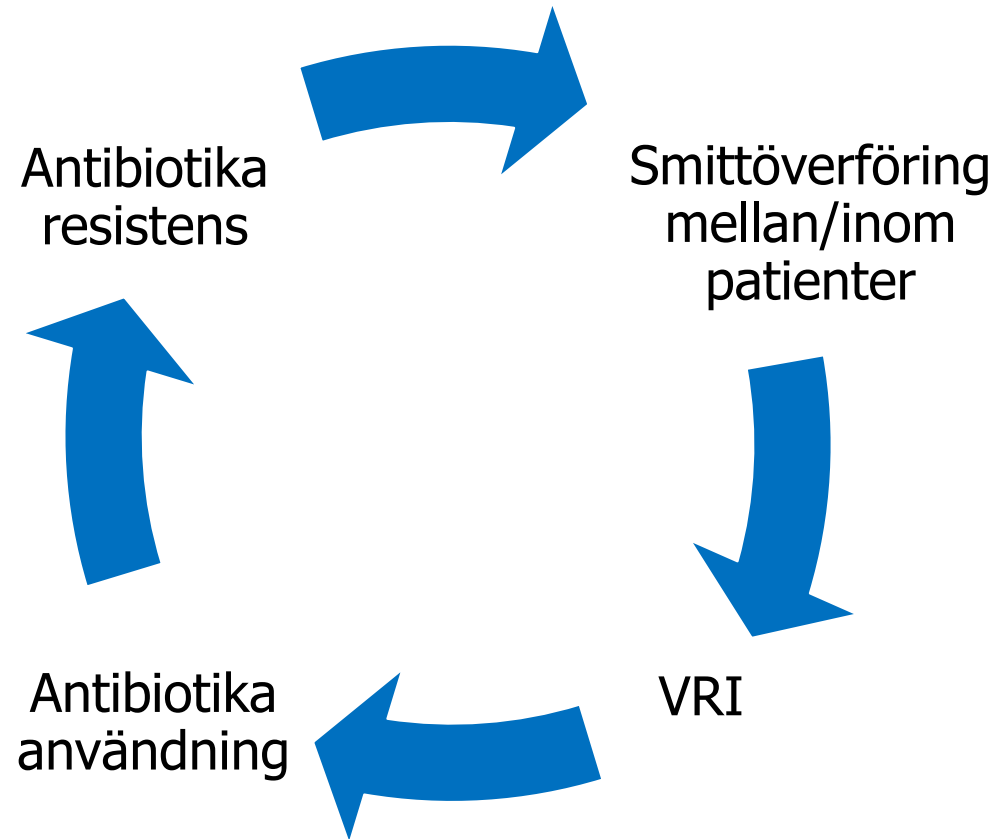
Levnadsvanor påverkar förekomsten av bakteriella infektioner

- **Rökning.** Ökad risk, tex lunginflammation, dosberoende. Rökstopp lönar sig
  - https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7398598/
  - https://academic.oup.com/ntr/article/24/2/204/6357661
- **Alkohol.** Ökad risk, tex lunginflammation. Dosberoende
  - https://bmjopen.bmj.com/content/8/8/e022344
- **Droger.** Ökad risk, tex sårinfektion, sepsis och endokardit
  - https://academic.oup.com/cid/article/71/7/e37/5697426
- **Sexuellt riskbeteende.** Ökad risk, tex klamydia och gonorré
  - https://www.cdc.gov/healthyyouth/sexualbehaviors/index.htm
- **Ohälsosamma matvanor.** Fetma ger ökad risk, tex sår- och luftvägsinfektioner, uvi hos kvinnor. Kopplat till ökad förskrivning av antibiotika i dansk studie
  - https://journals.lww.com/epidem/Fulltext/2015/07000/Obesity_and_Risk_of_Infection__Results_from_the.19.aspx

Förbättrad folkhälsa minskar behovet av antibiotika

Vaccin fungerar

	Antal sjukdomsfall året innan allmän vaccination införs	Vaccinations-programmet införs	Antal fall 2021
Difteri	2 457		0
Stelkramp	75		1
Kikhosta	15 300		11
Polio	549		0
Mässling	12 905		0
Röda hund	10 720		0
Påssjuka	4 869		6
Hib*	189		0
Pneumokocker*	74		39

*antalet fall av Hib och allvarlig pneumokockinfektion gäller barn under fem år

Folkhälsomyndigheten

Tack

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Folkhälsomyndigheten

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