European Centre for Disease Prevention and Control

Antimicrobial resistance and antimicrobial consumption in the EU/EEA: latest data and update from ECDC

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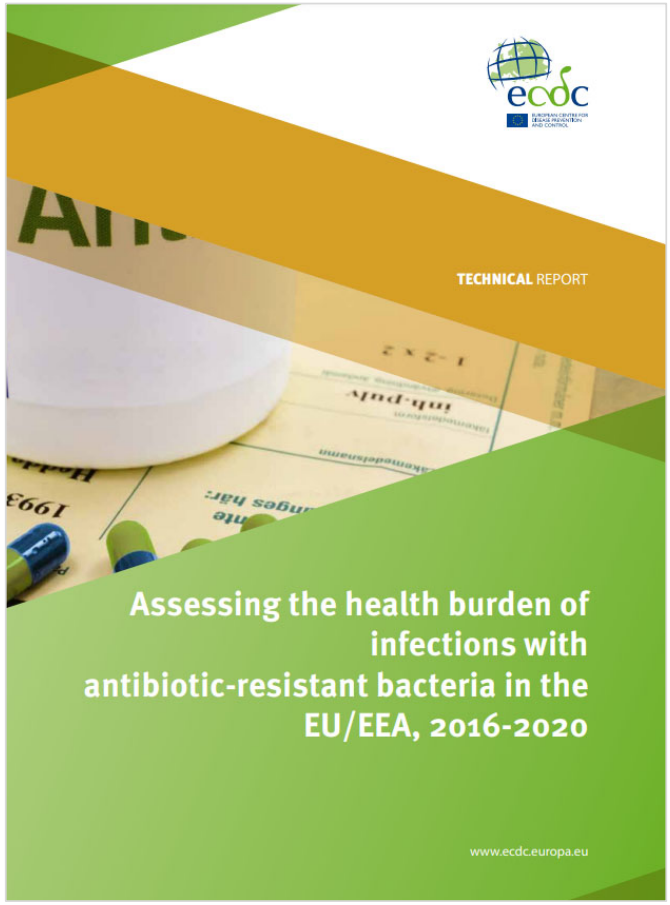
Cross-Sectoral One Health Conference on Antimicrobial Resistance, Riga Stradins University, Riga, 7 December 2023

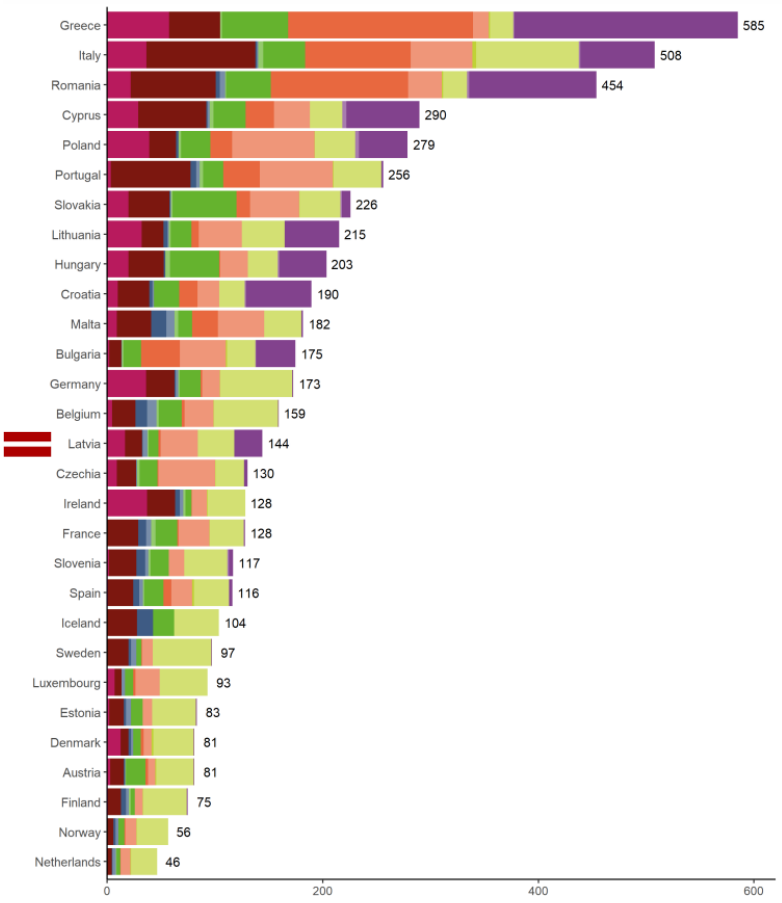
Health burden of infections with antibiotic-resistant bacteria by country, EU/EEA, 2016-2020

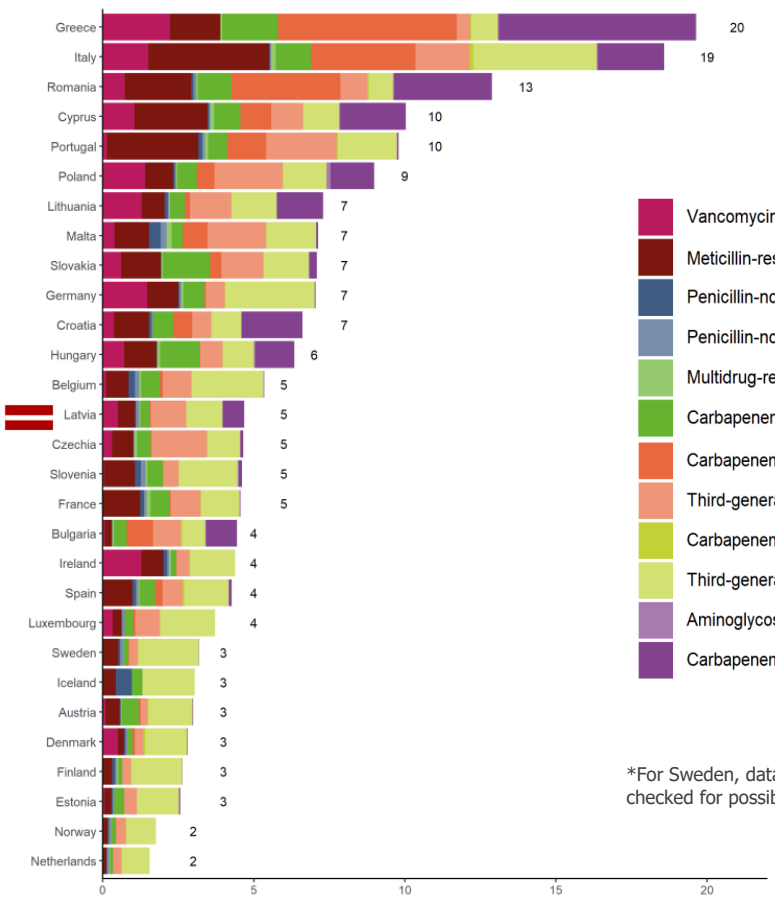


- In 2020 in the EU/EEA:
  - More than **800,000 infections** with antibiotic-resistant bacteria
  - More than **35,000 attributable deaths**
  - More than **1 million disability-adjusted life years (DALYs) lost**
  - More than **70% linked to healthcare-associated infections.**
- This burden:
  - Remains comparable to that of influenza, tuberculosis and HIV/AIDS combined
  - Increased between 2016 and 2020, although there was a small decrease in 2020 compared to 2019

Source: ECDC, 17 November 2022. https://www.ecdc.europa.eu/en/publications-data/health-burden-infections-antibiotic-resistant-bacteria-2016-2020

Health burden of infections with antibiotic-resistant bacteria by country*, EU/EEA, 2020





- Vancomycin-resistant *E. faecalis / E. faecium*
- Meticillin-resistant *S. aureus*
- Penicillin-non-wild-type and macrolide-resistant *S. pneumoniae*
- Penicillin-non-wild-type *S. pneumoniae*
- Multidrug-resistant *P. aeruginosa*
- Carbapenem-resistant *P. aeruginosa*
- Carbapenem-resistant *K. pneumoniae*
- Third-generation cephalosporin-resistant *K. pneumoniae*
- Carbapenem-resistant *E. coli*
- Third-generation cephalosporin-resistant *E. coli*
- Aminoglycoside- and fluoroquinolone-resistant *Acinetobacter* spp.
- Carbapenem-resistant *Acinetobacter* spp.

*For Sweden, data reported to EARS-Net for 2016-2020 could not be checked for possible duplicate cases reported from the same patient.

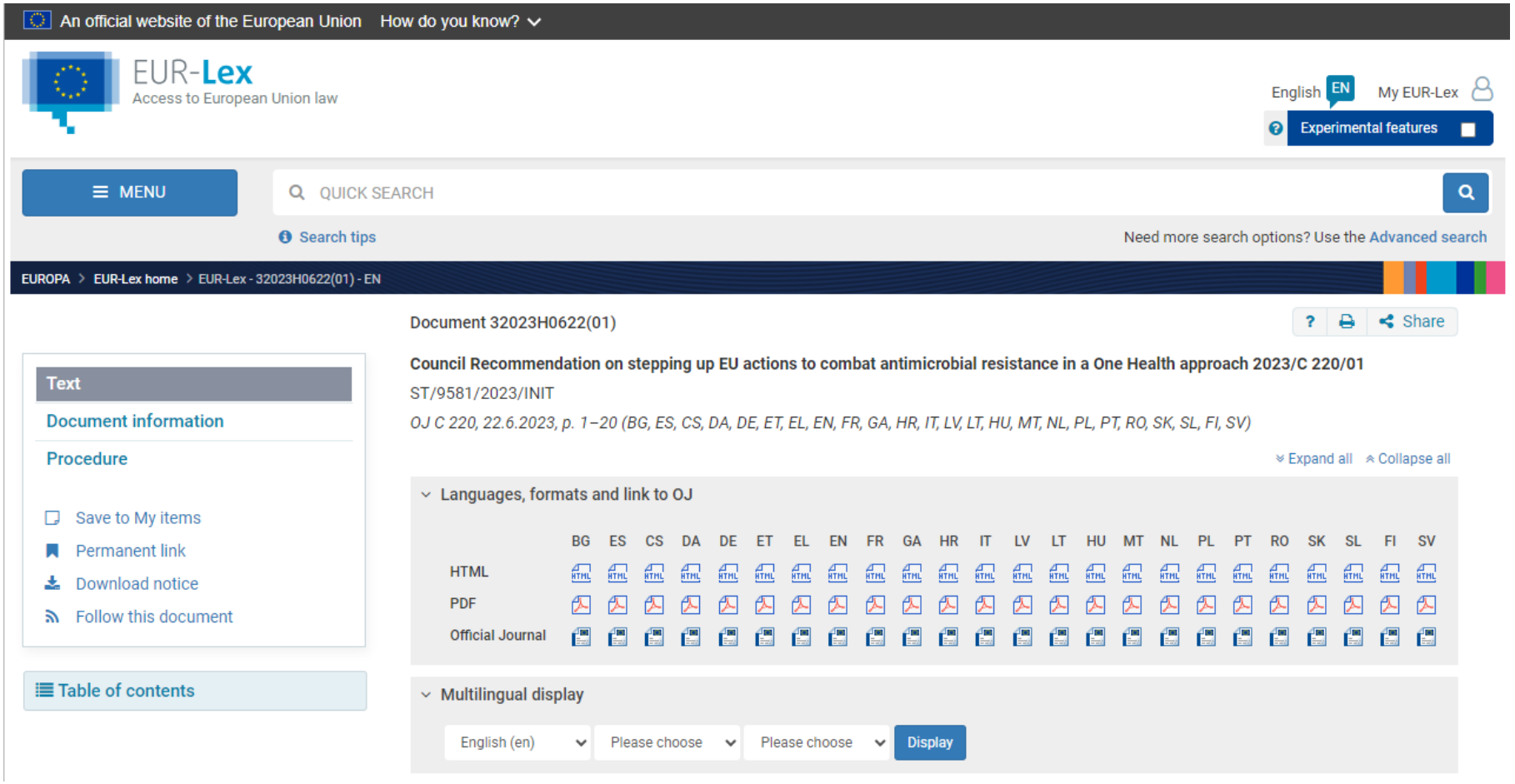
Source: ECDC, 17 November 2022 (includes country profiles as Annex 2 of the ECDC report).

Areti’s story

- Areti was just 13 years old when she was diagnosed with acute lymphoblastic leukaemia, a cancer of the white blood cells.
- During her cancer treatment, she developed an infection with *Klebsiella*, a difficult-to-treat bacterium, which had developed resistance to most broad-spectrum antibiotics.
- The *Klebsiella* strain isolated from Areti’s bloodstream was resistant to most antibiotics, including a class of last-line antibiotics, the carbapenems.
- Besides the struggle to eliminate the infection, Areti's chemotherapy also had to be put on hold, thereby severely jeopardising her chances to fight cancer.
- After many days of treatment with last-resort antibiotics, the infection was finally eliminated, and her cancer chemotherapy could be resumed.
- Today, 12 years later, she is alive and healthy.

Source: ECDC, 2023. https://antibiotic.ecdc.europa.eu/en/patient-stories

Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01)



https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023H0622%2801%29

European Surveillance of Antimicrobial Consumption Network (ESAC-Net)

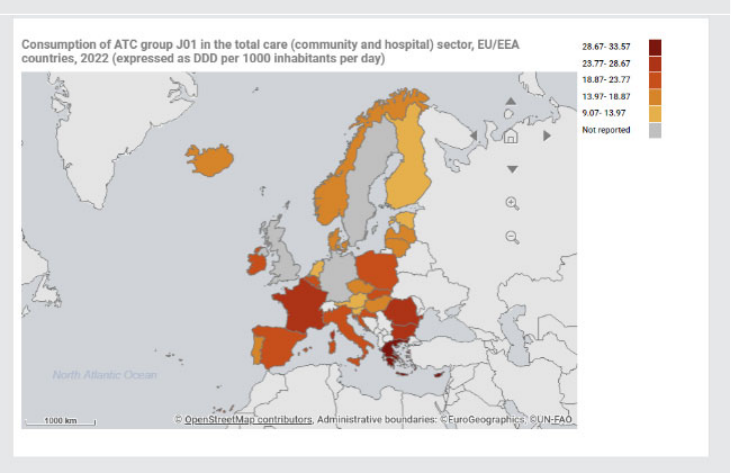
https://www.ecdc.europa.eu/en/about-us/partnerships-and-networks/disease-and-laboratory-networks/esac-net

Antimicrobial consumption in the EU/EEA:

- Summary of the latest data
- Annual epidemiological report for 2022
  https://www.ecdc.europa.eu/en/antimicrobial-consumption/surveillance-and-disease-data/report-protocol

Antimicrobial consumption dashboard (ESAC-Net)

Tools for public health



https://www.ecdc.europa.eu/en/antimicrobial-consumption/surveillance-and-disease-data/database

European Antimicrobial Resistance Surveillance Network (EARS-Net)

https://www.ecdc.europa.eu/en/about-us/networks/disease-networks-and-laboratory-networks/ears-net-data

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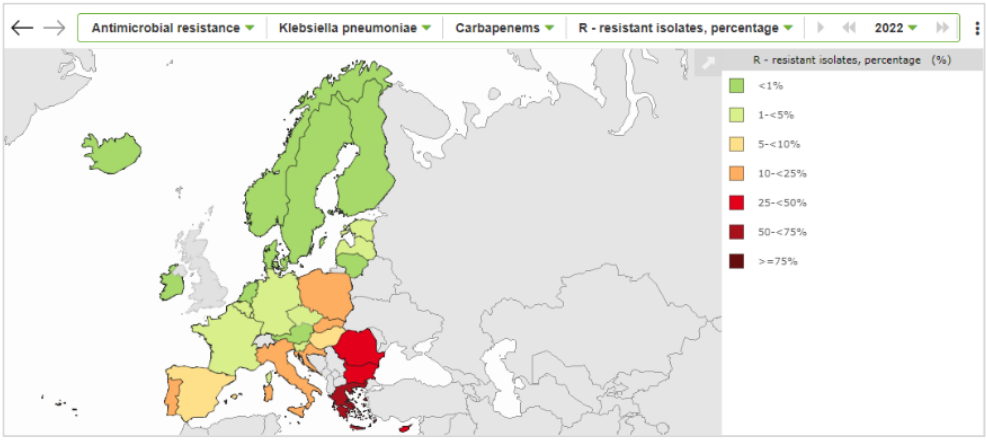
Surveillance Atlas of Infectious Diseases

Data



https://www.ecdc.europa.eu/en/surveillance-atlas-infectious-diseases

Source: ESAC-Net and EARS-Net; ECDC, 2023.

Target 1

Reduce by 20% the total consumption of antibiotics in humans

Defined daily doses (DDDs) per 1 000 inhabitants per day

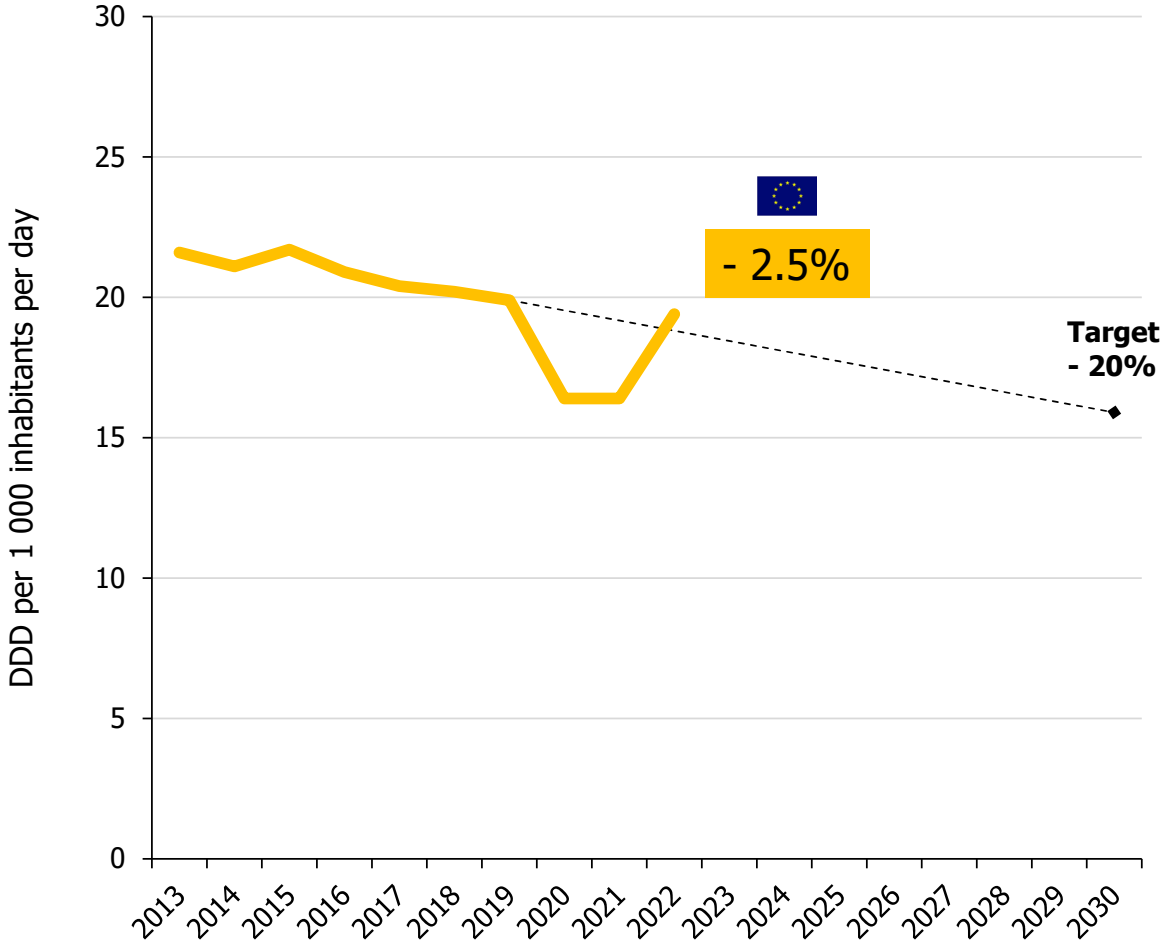
2019 baseline	19.9	-
2022	19.4	-2.5%
2030 TARGET	15.9	-20%

Reduce by 9% the total consumption of antibiotics in humans

Defined daily doses (DDDs) per 1 000 inhabitants per day

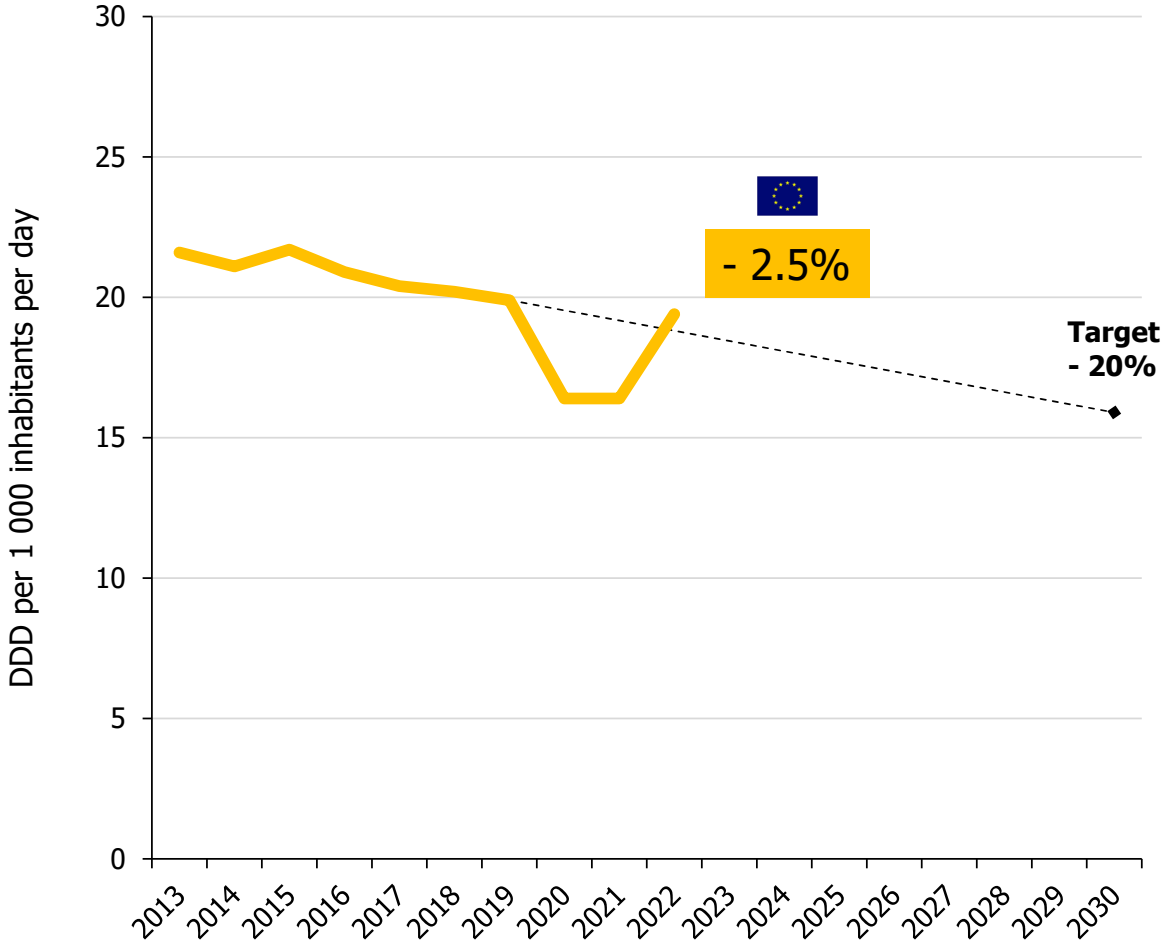
2019 baseline	13.9	-
2022	15	+7.8%
2030 TARGET	12.6	-9%

Total* consumption of antibacterials for systemic use (ATC group J01), EU mean† and EU/EEA countries, 2013-2022



Source: ESAC-Net, ECDC, 2023.

Total* consumption of antibacterials for systemic use (ATC group J01), EU mean† and EU/EEA countries, 2013-2022



Source: ESAC-Net, ECDC, 2023.

Change 2019–2022

Target achieved	Progress	Regress

Austria	- 9.5 %	Italy	+ 0.8 %
Belgium	- 4.4 %	Latvia	+ 7.8 %
Bulgaria	+ 24.1 %	Liechtenstein	N/A‡
Croatia	+ 7.3 %	Lithuania	+ 13.5 %
Cyprus	+ 11.4 %	Luxembourg	- 9.9 %
Czechia	+ 1.0 %	Malta	+ 15.7 %
Denmark	- 1.0 %	Netherlands	- 4.3 %
Estonia	+ 5.2 %	Norway	+ 2.3 %
Finland	- 14.9 %	Poland	- 0.3 %
France	- 3.1 %	Portugal	- 2.6 %
Germany	-12 %‡	Romania	+ 7.0 %
Greece	- 3.5 %	Slovakia	+ 7.5 %
Hungary	- 0.3 %	Slovenia	- 4.3 %
Iceland	- 3.6 %	Spain	- 6.7 %
Ireland	+ 1.5 %	Sweden	- 5.4 %

All country data are shown as they are reported to the European Surveillance System at ECDC.

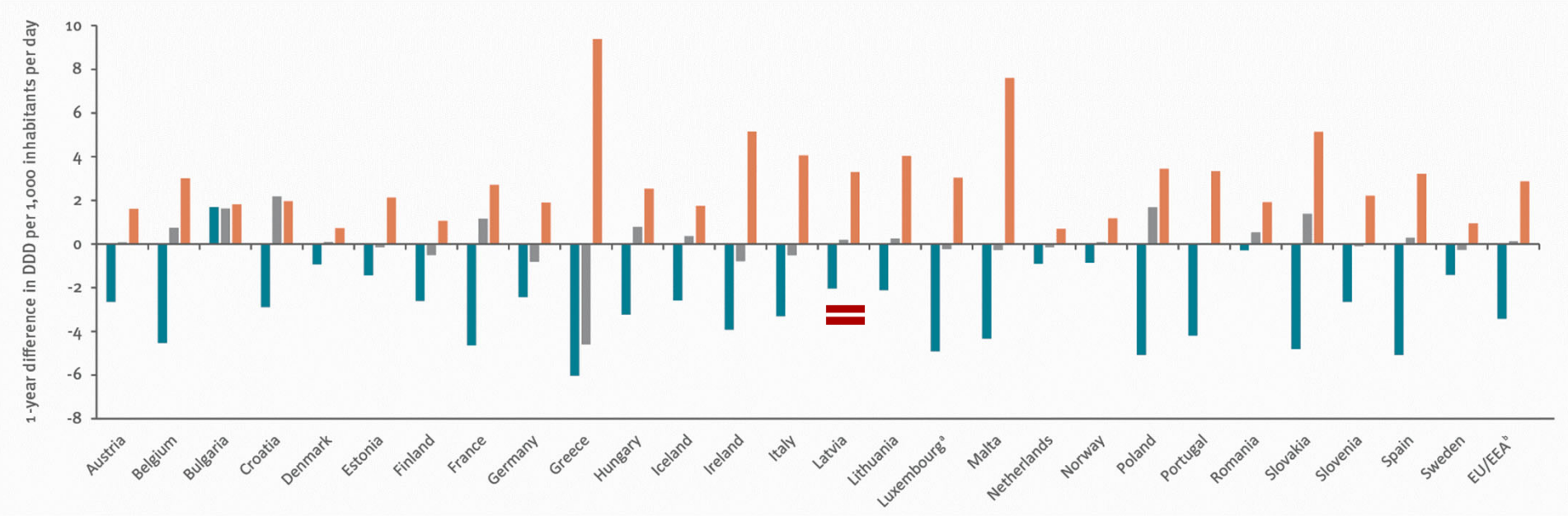
*Community and hospital sector combined

† 'EU mean' refers to the population-weighted mean consumption based on data from all 27 current EU Member States.

‡ Germany did not report consumption data for the hospital sector to ESAC-Net. Total consumption was estimated based on the EU average data proportion of hospital sector consumption as part of the total consumption. Liechtenstein: N/A, antimicrobial consumption data were not reported.

Rebound in community antibiotic consumption after the observed decrease during the COVID-19 pandemic, EU/EEA, 2022

One-year differences in community consumption of antibacterials for systemic use (ATC group J01) in the community, 27 EU/EEA countries



ATC: anatomical therapeutic chemical; DDD: defined daily doses; ECDC: European Centre for Disease Prevention and Control; EEA: European Economic Area; EU: European Union; TESSy: The European Surveillance System.

[a] Luxembourg changed data process between 2019 and 2020, which could impact comparability between the years.

[b] EU/EEA: The population-weighted mean is based on antimicrobial consumption data reported by 26 EU/EEA countries with complete data at ATC level 3 for the community sector for the all years 2019 to 2022 (Austria, Belgium, Bulgaria, Croatia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia and Spain). Sweden did not report complete data at ATC level 3 in 2022 and was excluded from the EU/EEA mean. The population-weighted mean was calculated by multiplying the DDD per 1,000 inhabitants per day for each country with the corresponding Eurostat population and dividing the product by the total population of all participating countries contributing data for the same year.

Data extracted from ECDC TESSy on 4 October 2023.

Adapted from: Ventura-Gabarró C, et al. Eurosurveillance (16 November 2023).

Target 2

At least 65% of the total consumption of antibiotics in humans belongs to the 'Access' group of antibiotics

As defined in the AWaRe classification of the WHO

*Population-weighted mean % consumption in 'Access' group.
**Percentage point difference from 2019.

2019 baseline	61.1% *	-
2022	59.8% *	-1.3% **
2030 TARGET	65%	+3.9% **

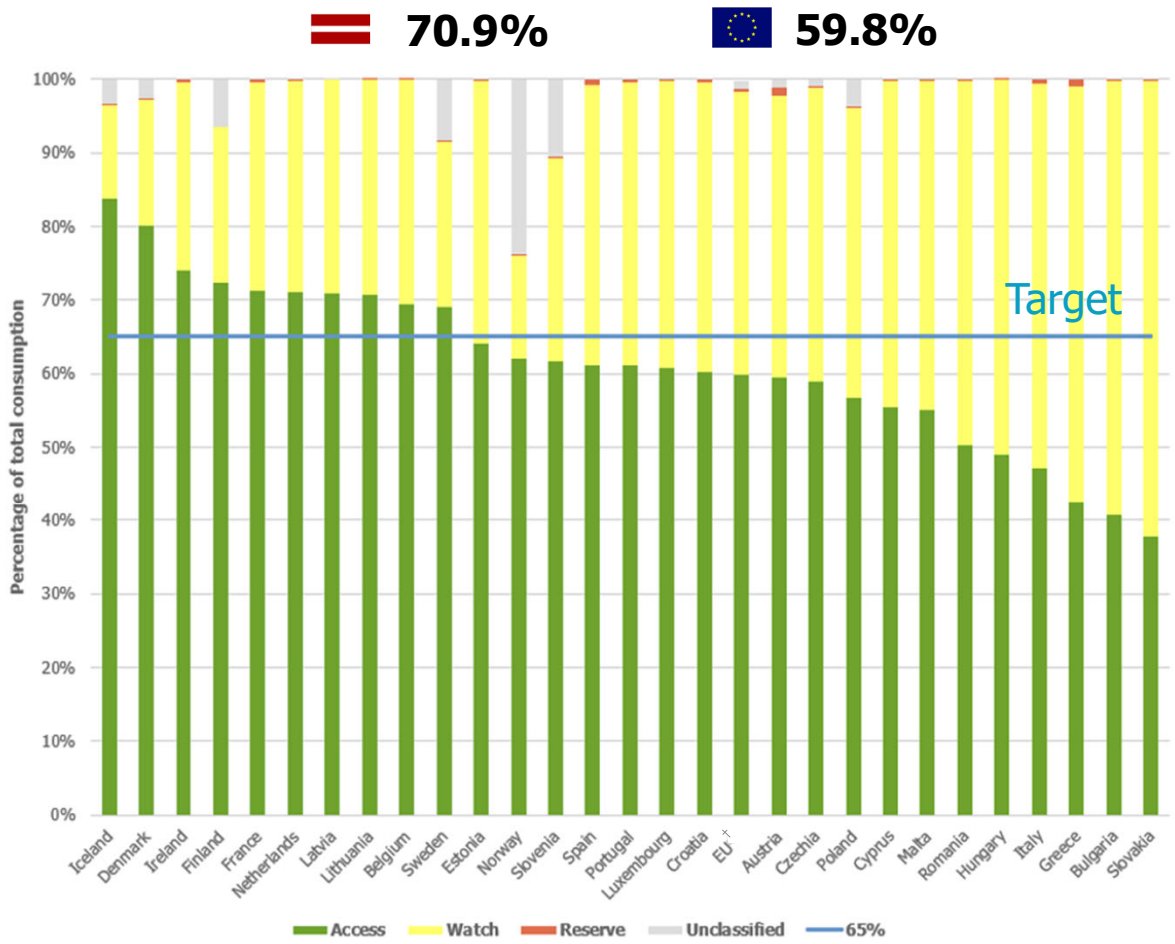
At least 65% of the total consumption of antibiotics in humans belongs to the 'Access' group of antibiotics

As defined in the AWaRe classification of the WHO

*Percentage point difference from 2019.

2019 baseline	68.6%	-
2022	70.9%	+2.3% *
2030 TARGET	65%	-

Total consumption of antibacterials* according to WHO AWaRe classification, percentage by class, EU† and EU/EEA countries, 2022



Source: ESAC-Net, ECDC, 2023.

AWaRe (Access, Watch and Reserve) classification of antimicrobials (WHO, 2023)

- **'Access'** antibiotics: mostly first-line and second-line therapies that offer the best therapeutic value, while minimising the potential for antimicrobial resistance;
- **'Watch'** antibiotics: broader-spectrum and stewardship efforts should limit empiric use of these drugs to severe infections or infections that are more likely to be resistant to 'Access' antibiotics;
- **'Reserve'** antibiotics: include antibiotics of last resort and should be saved for treatment of multidrug-resistant organisms. All 'Reserve' antibiotics are categorized as either high priority or highest priority in the WHO list of critically important antimicrobials for human medicine

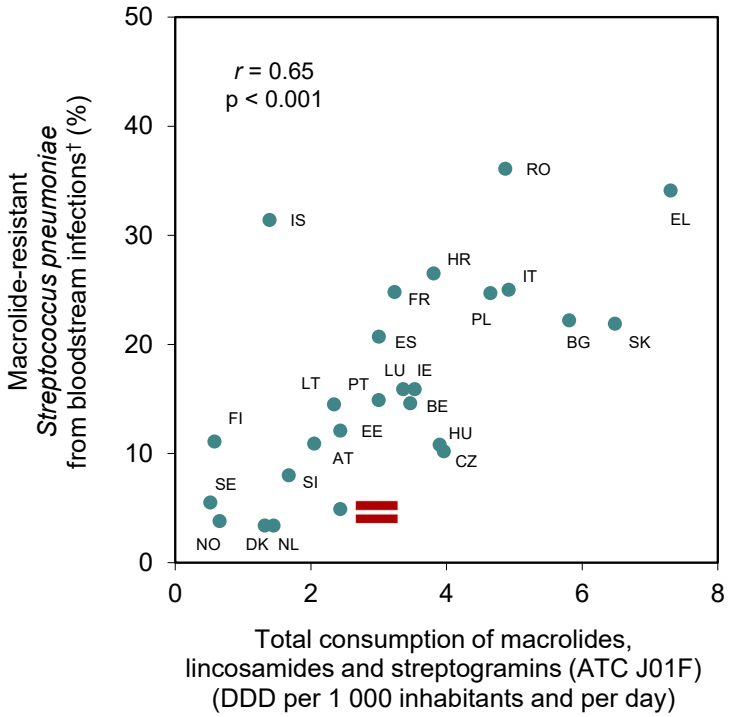
All country data are shown as they are reported to the European Surveillance System at ECDC.

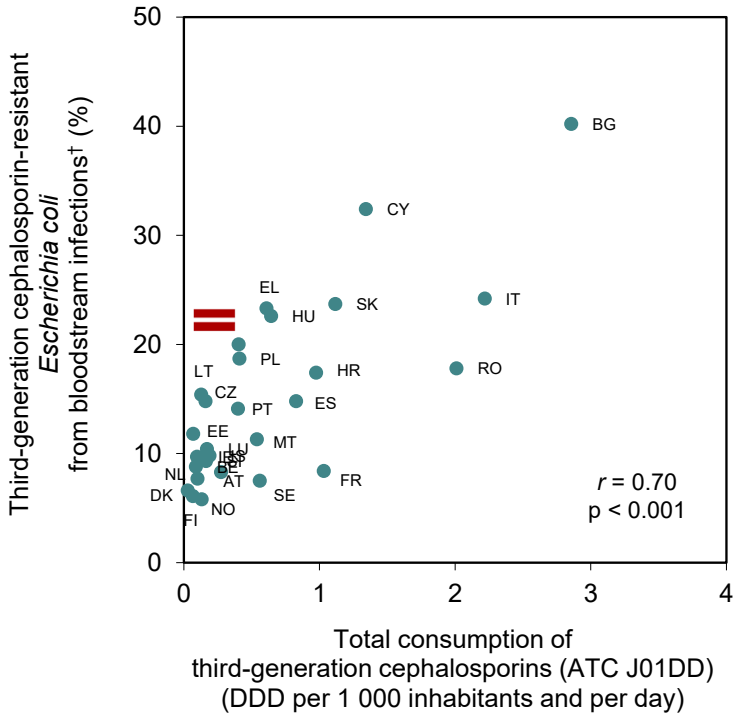
Only the 28 countries reporting data for both the community and the hospital sector were included.

* Agents included in this analysis: antibacterials for systemic use, neomycin, streptomycin, polymyxin B, kanamycin, vancomycin, colistin, rifamixin, fidaxomicin, rifamycin, rifampicin, rifabutin, metronidazole, tinidazole, ornidazole and secnidazole. Consumption of 'Unclassified' mainly consisted of benzathine phenoxymethylpenicillin, combinations of benzylpenicillin/procaine-benzylpenicillin/benzathine-benzylpenicillin and methenamine.

† EU refers to the population-weighted mean percentage based on reported data for 2022 from the included 26 EU Member States.

Relationships between antibiotic consumption and resistance, EU/EEA countries*, 2022





DDD, defined daily doses; *r*, Spearman's rank test

* Macrolide-resistant *S. pneumoniae*: excluding Cyprus and Malta that reported less than 20 *S. pneumoniae* isolates with antimicrobial susceptibility results; also excluding Germany because total consumption data were not available.
Third-generation cephalosporin-resistant *E. coli*: excluding Germany because total consumption data were not available.

† Each de-duplicated isolate from a blood sample (>99% data) or cerebrospinal fluid sample (<1% data) was considered a proxy for a bloodstream infection.

Source: EARS-Net and ESAC-Net; ECDC, 2023.

Target 3

Reduce by 15% the total incidence of bloodstream infections with meticillin-resistant *Staphylococcus aureus* (MRSA)

Number per 100 000 population

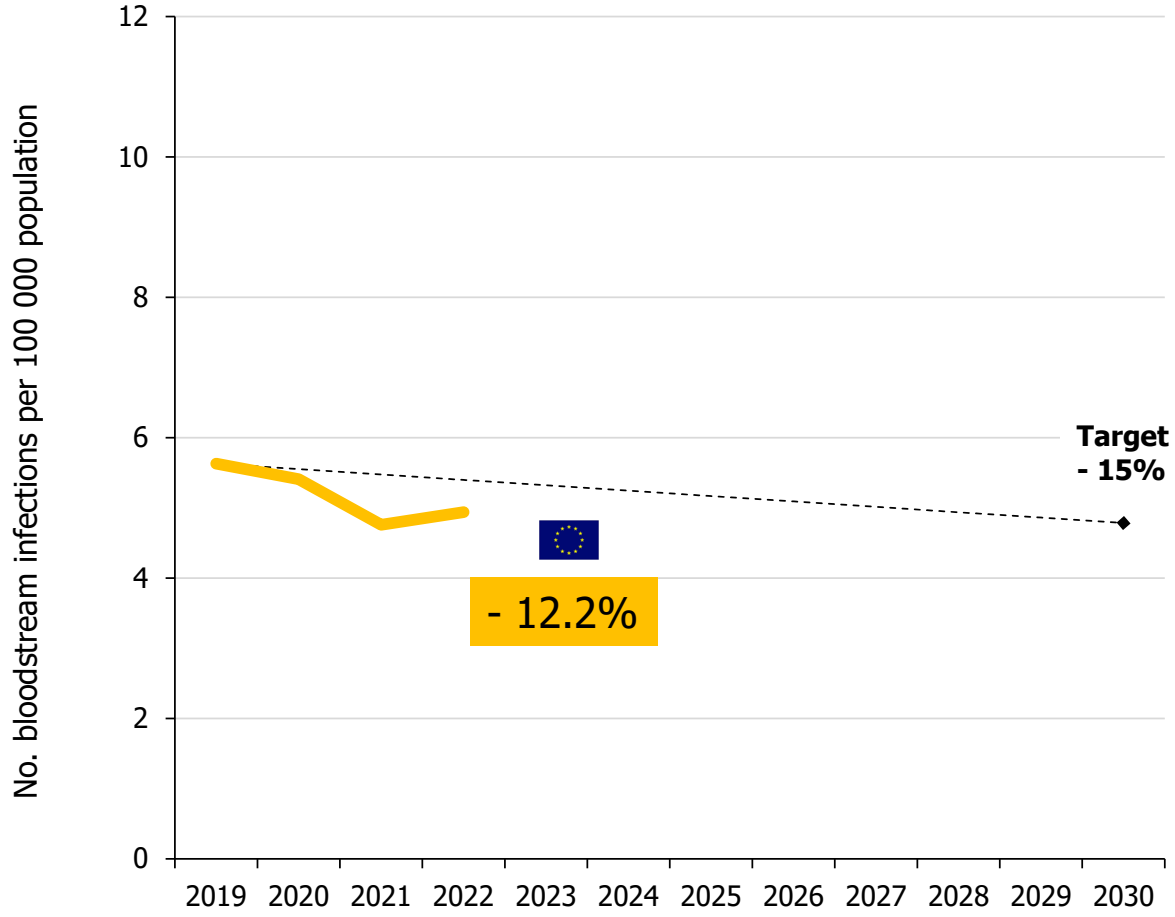
2019 baseline	5.6	-
2022	4.9	-12.2%
2030 TARGET	4.8	-15%

Reduce by 6% the total incidence of bloodstream infections with meticillin-resistant *Staphylococcus aureus* (MRSA)

Number per 100 000 population

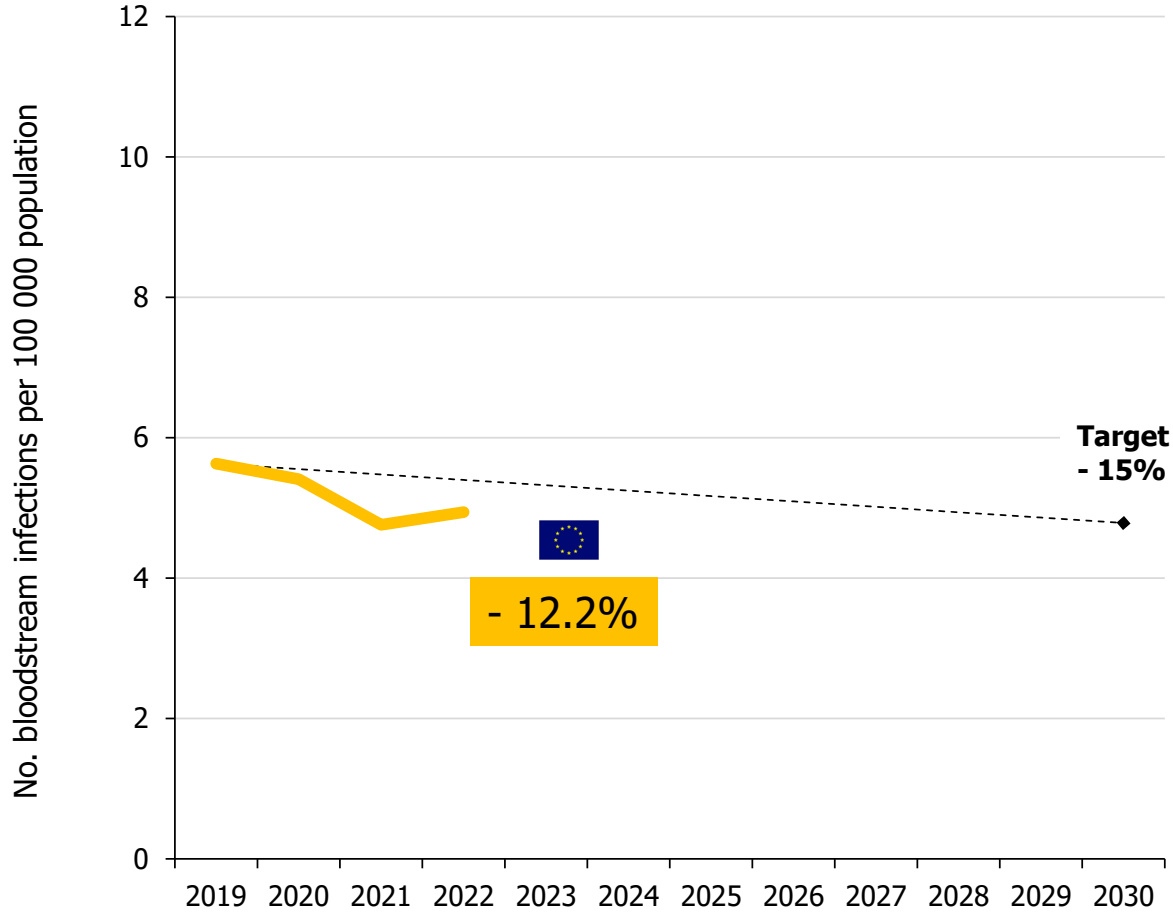
2019 baseline	1.9	-
2022	2.2	+14.8%
2030 TARGET	1.8	-6%

Estimated incidence* of bloodstream infections with meticillin-resistant *Staphylococcus aureus* (MRSA)†, EU and EU/EEA countries, 2019-2022



Source: EARS-Net, ECDC, 2023.

Estimated incidence* of bloodstream infections with meticillin-resistant *Staphylococcus aureus* (MRSA)†, EU and EU/EEA countries, 2019-2022



Change 2019–2022

Target achieved		Progress		Regress	
Austria	- 30.4 %	Italy	- 12.9 %	Croatia	+ 99.4 %
Belgium	- 51.5 %	Latvia	+ 14.8 %	Cyprus	+ 113 %
Bulgaria	- 40.3 %	Liechtenstein	N/A‡	Finland	+ 7.8 %
Czechia	- 29.7 %	Lithuania	+ 27.3 %	Greece	+ 8.2 %
Denmark	- 25.9 %	Luxembourg	- 18.7 %	Hungary	+ 19.7 %
Estonia	- 18.6 %	Malta	+ 15.8 %	Iceland	- 45.8 %
France	- 47.0 %	Netherlands	+ 31.7 %	Slovenia	+ 12.9 %
Germany	- 35.1 %	Norway	+ 15.5 %	Spain	+ 9.7 %
Ireland	- 14.5 %	Poland	- 8.2 %	Sweden	+ 17.8 %
		Portugal	- 22.6 %		
		Romania	+ 48.0 %		
		Slovakia	- 31.8 %		

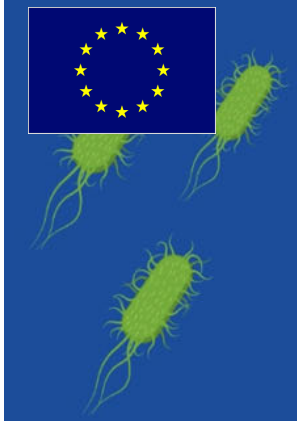
* Incidence was estimated using the EARS-Net data reported to EpiPulse. Each de-duplicated isolate from a blood sample (>99% data) or cerebrospinal fluid sample (<1% data) was considered a proxy for a bloodstream infection.

† MRSA is based on antimicrobial susceptibility testing (AST) results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

‡ N/A, not applicable: Liechtenstein only reported data in 2022.

Source: EARS-Net, ECDC, 2023.

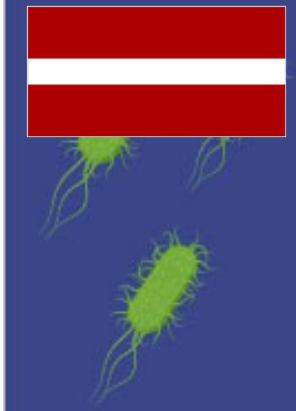
Target 4



Reduce by 10% the total incidence of bloodstream infections with third-generation cephalosporin-resistant *Escherichia coli*

Number per 100 000 population

2019 baseline	10.4	-
2022	8.7	-16.8%
2030 TARGET	9.4	-10%

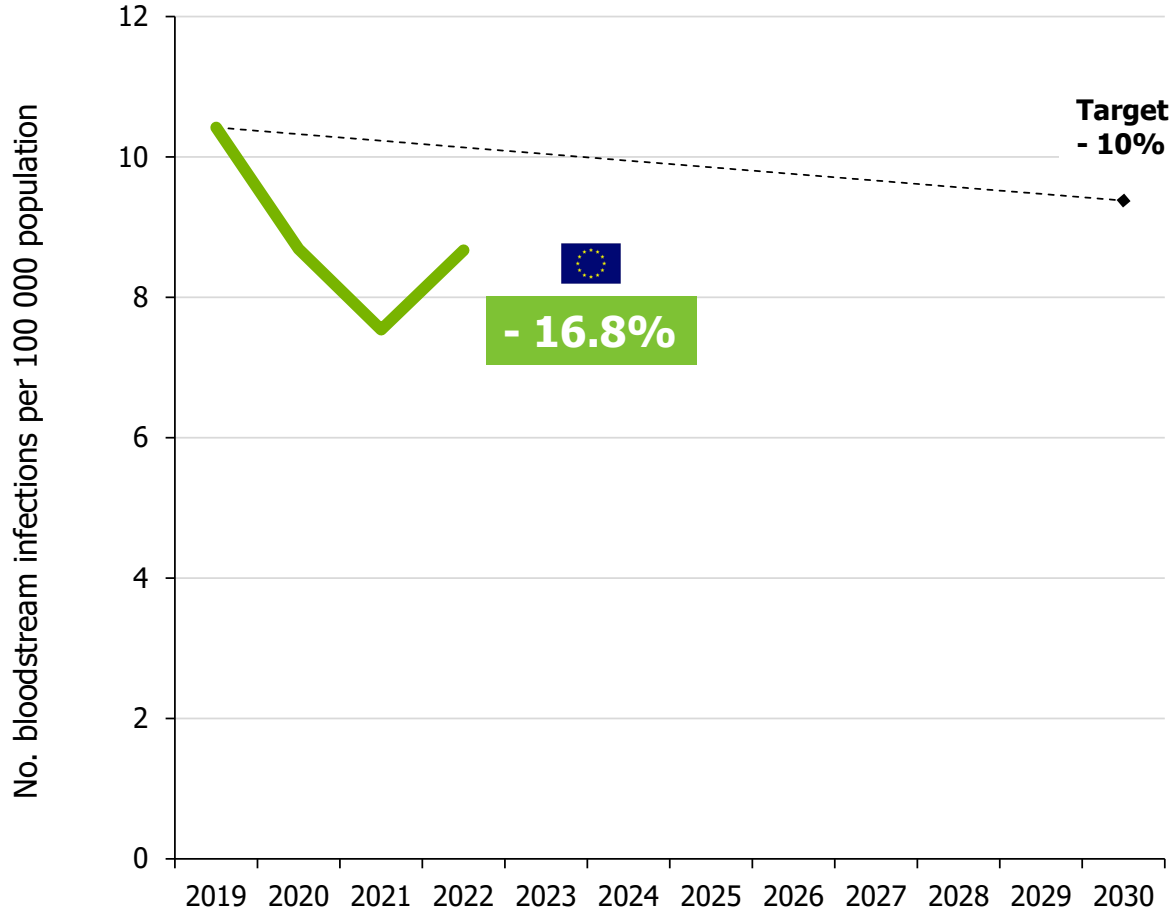


Maintain at baseline level the total incidence of bloodstream infections with third-generation cephalosporin-resistant *Escherichia coli*

Number per 100 000 population

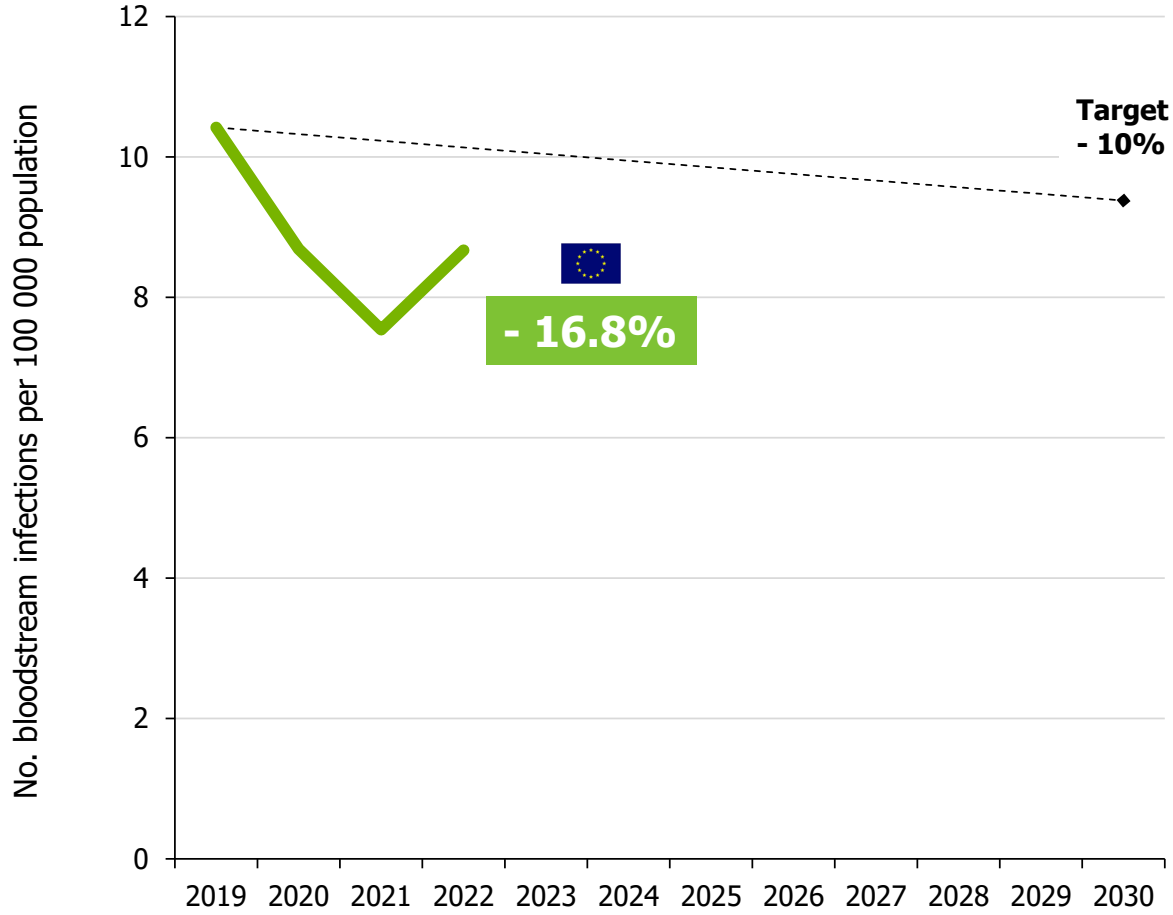
2019 baseline	5.0	-
2022	5.7	+14.1%
2030 TARGET	5.0	-

Estimated incidence* of bloodstream infections with third-generation cephalosporin-resistant *Escherichia coli*, EU and EU/EEA countries, 2019-2022



Source: EARS-Net, ECDC, 2023.

Estimated incidence* of bloodstream infections with third-generation cephalosporin-resistant *Escherichia coli*, EU and EU/EEA countries, 2019-2022



Change 2019–2022

Target achieved	Progress	Regress

Austria	- 26.5 %	Italy	- 24.7 %
Belgium	- 38.9 %	Latvia	+ 14.1 %
Bulgaria	- 27.7 %	Liechtenstein	N/A†
Croatia	- 7.1 %	Lithuania	+ 28.1 %
Cyprus	+ 73.6 %	Luxembourg	- 24.1 %
Czechia	- 4.7 %	Malta	- 39.6 %
Denmark	- 9.1 %	Netherlands	- 5.4 %
Estonia	+ 11.8 %	Norway	- 15.0 %
Finland	- 28.0 %	Poland	- 6.1 %
France	- 53.4 %	Portugal	- 24.8 %
Germany	- 17.2 %	Romania	+ 70.3 %
Greece	+ 54.7 %	Slovakia	- 6.4 %
Hungary	+ 17.5 %	Slovenia	- 3.1 %
Iceland	+ 21.2 %	Spain	+ 29.5 %
Ireland	- 25.3 %	Sweden	- 7.7 %

* Incidence was estimated using the EARS-Net data reported to EpiPulse. Each de-duplicated isolate from a blood sample (>99% data) or cerebrospinal fluid sample (<1% data) was considered a proxy for a bloodstream infection.

† N/A, not applicable. Liechtenstein only reported data in 2022.

Source: EARS-Net, ECDC, 2023.

Target 5

Reduce by 5% the total incidence of bloodstream infections with carbapenem-resistant *Klebsiella pneumoniae*

Number per 100 000 population

2019 baseline	2.2	-
2022	3.3	+49.7%
2030 TARGET	2.1	-5%

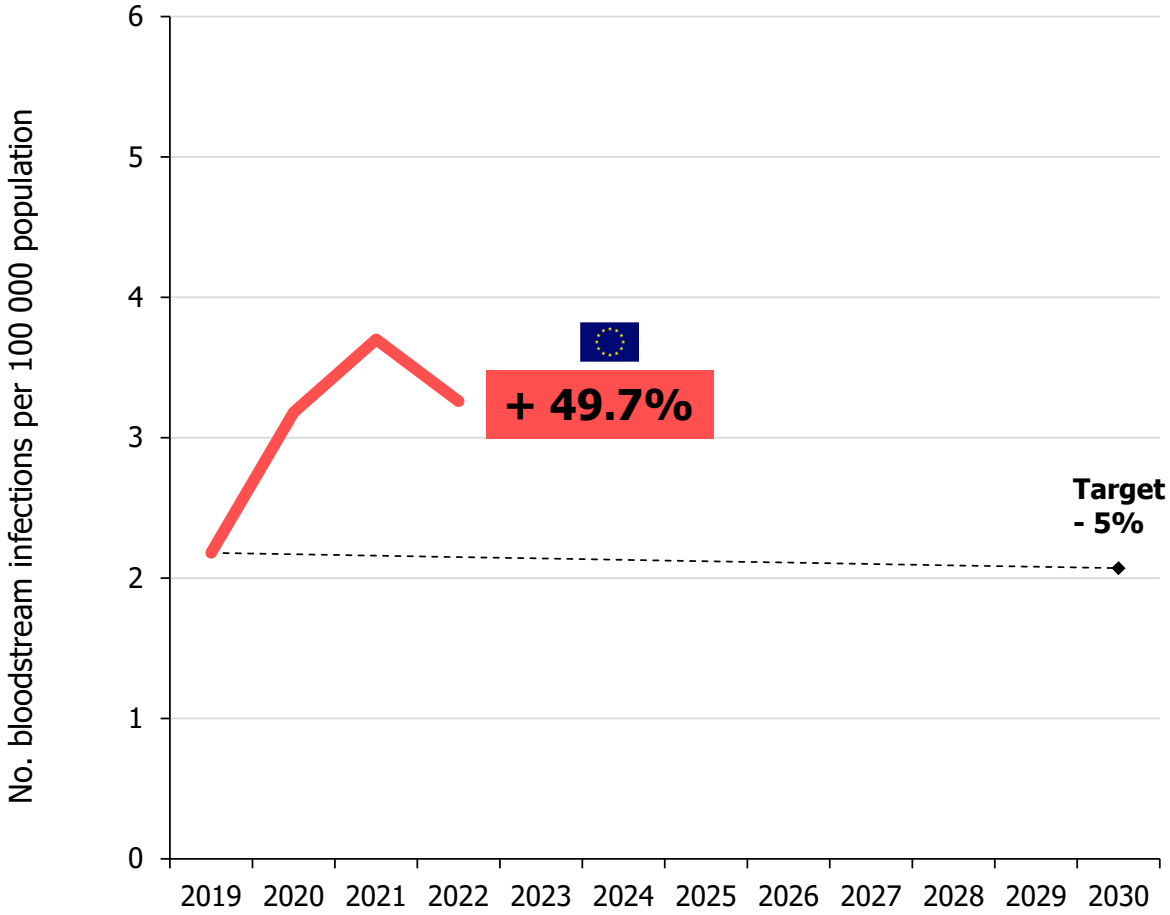
Maintain at baseline level the total incidence of bloodstream infections with carbapenem-resistant *Klebsiella pneumoniae*

Number per 100 000 population

*For baseline 0.00 it was not possible to calculate percentage of increase

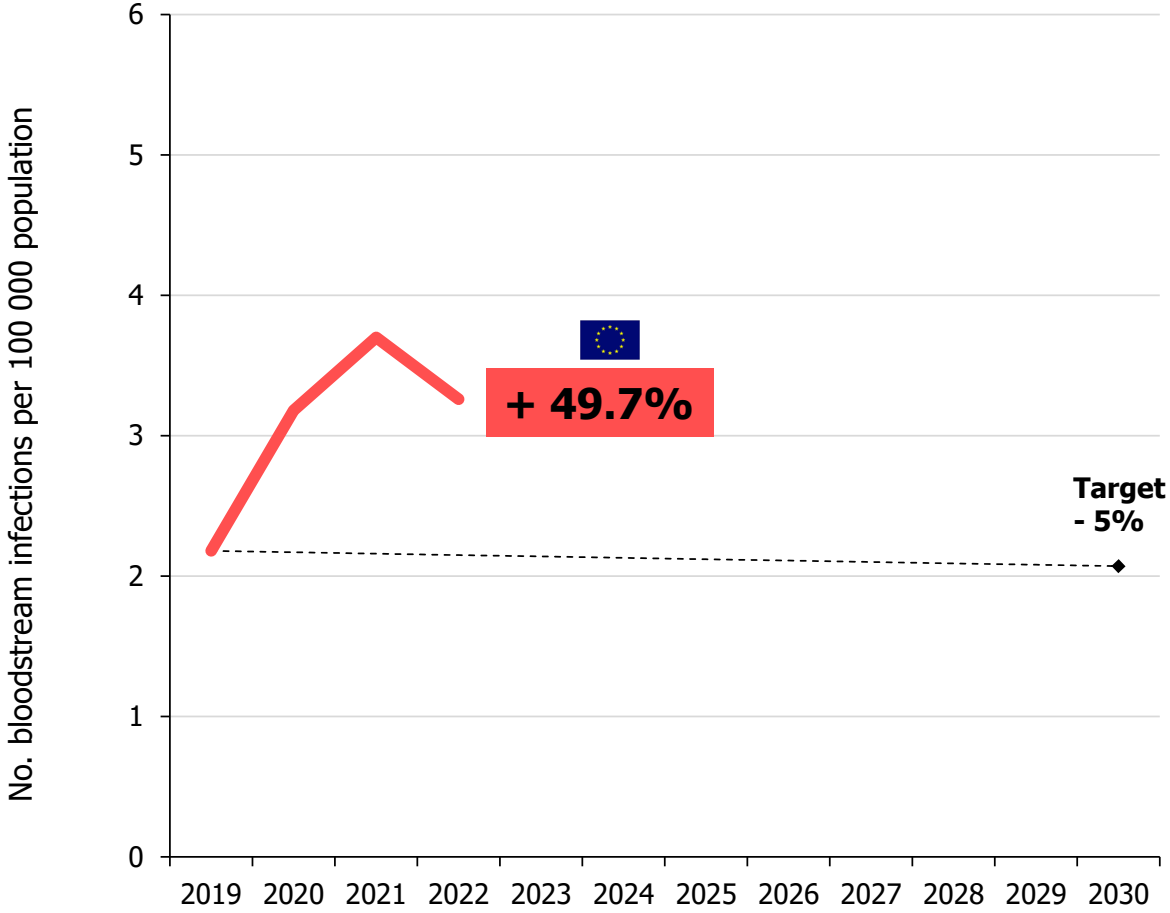
2019 baseline	0.00	-
2022	0.47	NA *
2030 TARGET	0.00	-

Estimated incidence* of bloodstream infections with carbapenem-resistant *Klebsiella pneumoniae*, EU and EU/EEA countries, 2019-2022



Source: EARS-Net, ECDC, 2023.

Estimated incidence* of bloodstream infections with carbapenem-resistant *Klebsiella pneumoniae*, EU and EU/EEA countries, 2019-2022



Change 2019–2022

Target achieved	Progress	Regress

Austria	- 32.2 %	Italy	- 7.8 %
Belgium	- 8.5 %	Latvia	N/A†
Bulgaria	+ 74.9 %	Liechtenstein	N/A†
Croatia	+ 111 %	Lithuania	- 80.1 %
Cyprus	+ 278 %	Luxembourg	+ 92.2 %
Czechia	+ 156 %	Malta	- 43.2 %
Denmark	+ 48.3 %	Netherlands	+ 85.9 %
Estonia	N/A†	Norway	- 1.8 %
Finland	- 100 %	Poland	+ 140 %
France	- 42.5 %	Portugal	+ 2.7 %
Germany	+ 20.7 %	Romania	+ 269 %
Greece	+ 38.0 %	Slovakia	+ 257 %
Hungary	+ 530 %	Slovenia	+ 591 %
Iceland	N/A†	Spain	+ 42.6 %
Ireland	- 40.0 %	Sweden	+ 71.6 %

* Incidence was estimated using the EARS-Net data reported to EpiPulse.
Each de-duplicated isolate from a blood sample (>99% data) or cerebrospinal fluid sample (<1% data) was considered a proxy for a bloodstream infection.

† N/A, not applicable.
Estonia: incidence increased from 0 in 2019 to 0.23 cases per 100 000 pop. in 2022;
Iceland: incidence was 0 in 2020-2022;
Latvia: incidence increased from 0 in 2019 to 0.47 cases per 100 000 pop. in 2022;
Liechtenstein: only reported data in 2022.

Source: EARS-Net, ECDC, 2023.

Main actions to prevent and control antimicrobial resistance (AMR)

Prudent use of antimicrobial agents
i.e., only when needed, correct dose, correct dose intervals, correct duration

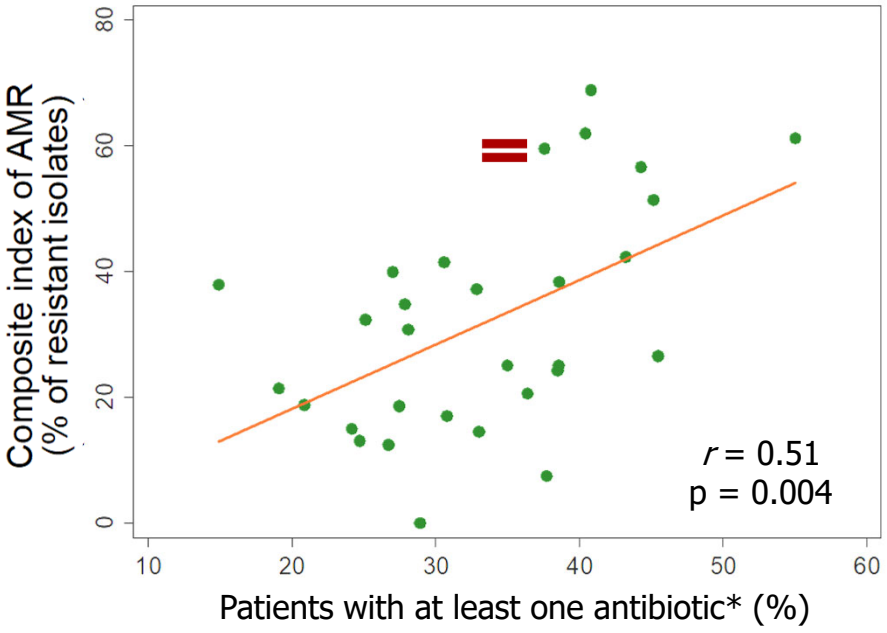
Infection prevention and control
i.e., hand hygiene, screening for carriage, isolation of patients, environmental cleaning, etc.

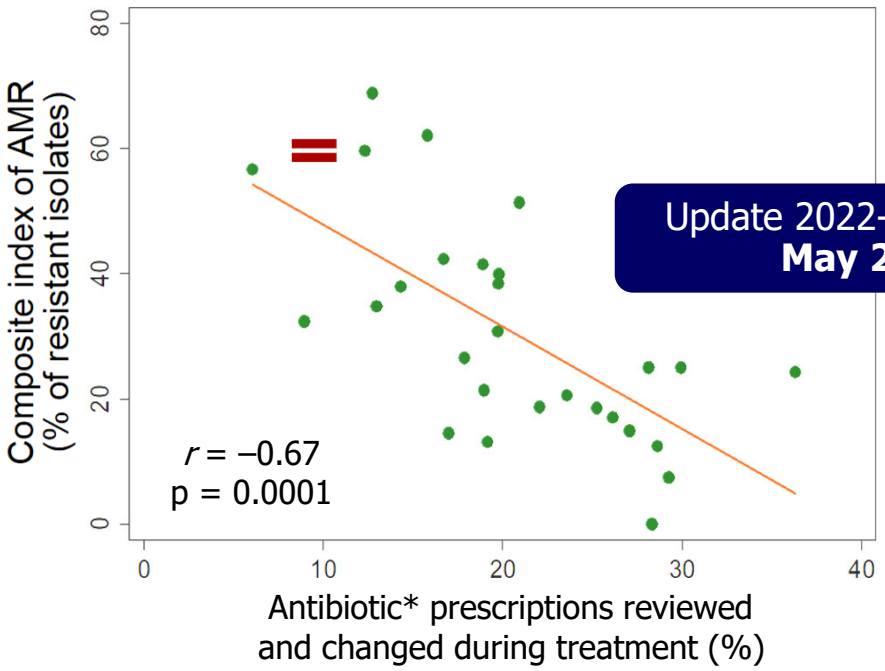
New antimicrobial agents
i.e., with a novel mechanism of action

Other actions:
- vaccination
- surveillance & monitoring
- new diagnostic tests
- research and development

Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals, 2016-2017

Countries with a higher prevalence of antibiotic use have a higher composite index of AMR, but countries with more frequent review and change of antibiotic prescriptions have a lower composite index of AMR





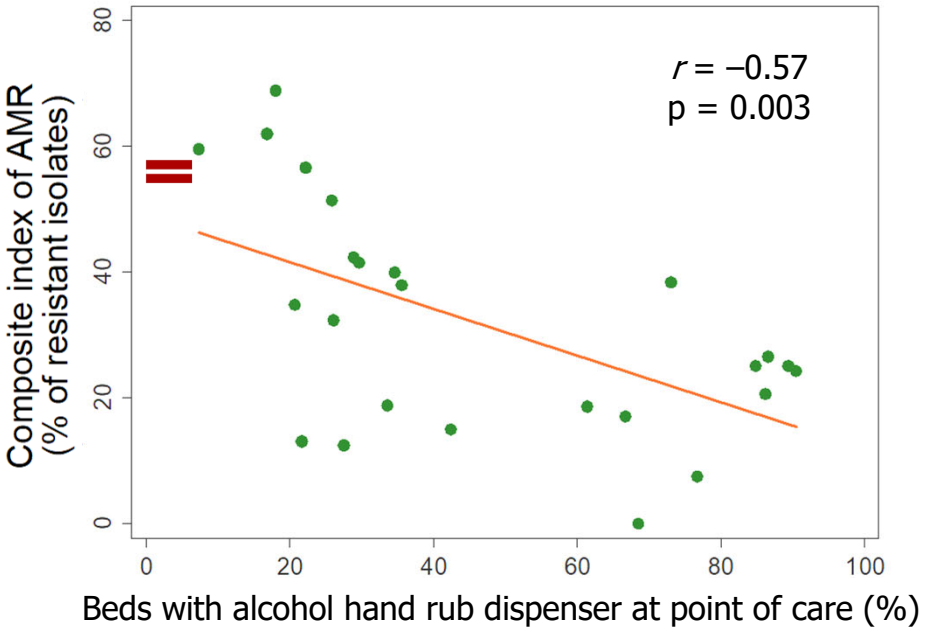
Update 2022-2023 data:
May 2024

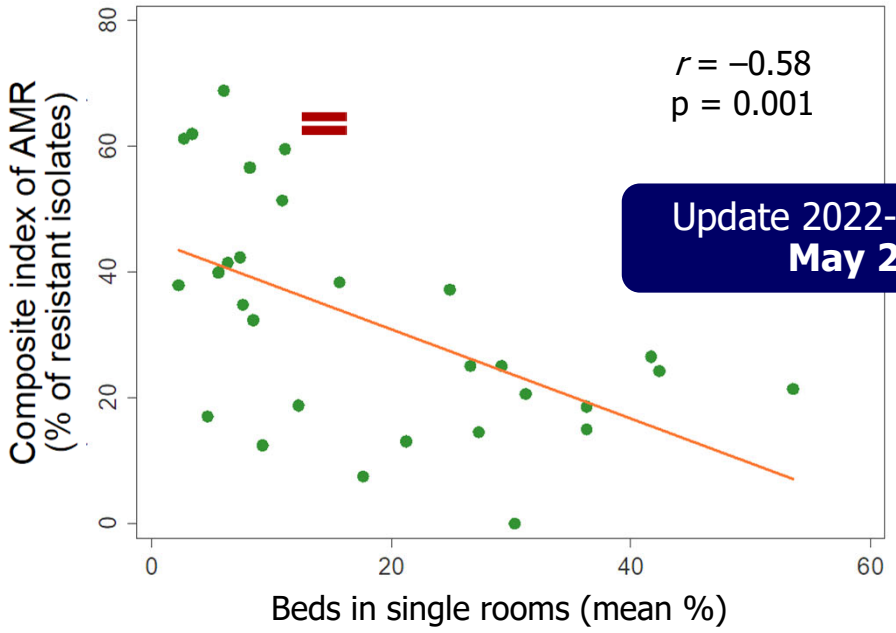
*Antibacterials for systemic use (ATC J01)

Source: OECD & ECDC. http://www.oecd.org/health/health-systems/AMR-Tackling-the-Burden-in-the-EU-OECD-ECDC-Briefing-Note-2019.pdf
ECDC. https://www.ecdc.europa.eu/en/publications-data/point-prevalence-survey-healthcare-associated-infections-and-antimicrobial-use-5

Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals, 2016-2017

Countries with more resources for infection prevention and control have a lower composite index of AMR





Update 2022-2023 data: **May 2024**

Additional preliminary result: Hospitals with at least 0.4 full-time equivalent (FTE) infection prevention and control (IPC) nurse for 250 beds (r = –0.35, p = 0.04)

Source: OECD & ECDC. http://www.oecd.org/health/health-systems/AMR-Tackling-the-Burden-in-the-EU-OECD-ECDC-Briefing-Note-2019.pdf
ECDC. https://www.ecdc.europa.eu/en/publications-data/point-prevalence-survey-healthcare-associated-infections-and-antimicrobial-use-5

Directory of online resources for prevention and control of antimicrobial resistance (AMR) and healthcare-associated infections (HAI)

Tools for public health

Prevention and control of infections by microorganism

- Containing unusual antimicrobial resistance
- Carbapenem-resistant Enterobacterales (CRE)
- Vancomycin-resistant enterococci (VR...
- Meticillin-resistant Staphylococcus aureus (MRSA)
- Clostridium difficile

Healthcare-associated infections

- Managing an outbreak
- Hand hygiene
- Surgical site infections
- Central line-related bloodstream infection (CLABSI)
- Catheter-associated urinary tract infection (CAUTI)
- Ventilator-associated pneumonia (VAP) and healthcare-associated pneumonia (HAP)
- Infections related to endoscopic procedures

Infection prevention and control in healthcare

- Organisation of infection prevention and control
- Infection prevention and control in primary care
- Infection prevention and control in dentistry

Prudent use of antibiotics

- Antimicrobial stewardship
- Peri-operative antimicrobial prophylaxis

Training

- Training courses on infection prevention and control (IPC)
- Training courses on antimicrobial stewardship
- Training courses on the prevention of antimicrobial resistance
- Learning courses on antibiotic resistance for the public

Strategies, action plans and European projects

- Strategies and action plans on antimicrobial resistance
- European projects on antimicrobial resistance and healthcare-associated infections

https://ecdc.europa.eu/en/publications-data/directory-online-resources-prevention-and-control-antimicrobial-resistance-amr

The new OECD report identifies 11 One Health "best buys" and 3 policy packages

OECD
BETTER POLICIES FOR BETTER LIVES

Embracing a One Health Framework to Fight Antimicrobial Resistance

Promote prudent use of antibiotics in humans

- Improve antibiotic stewardship
- Delayed antimicrobial prescription
- Financial incentives to encourage prudent use of antibiotics

Prevent the spread of resistant infections

- Improve hand hygiene practices
- Improve environmental hygiene practices in health facilities
- Increase the use of rapid diagnostic tests
- Improve vaccination coverage

Promote AMR awareness and understanding

- Increase information campaigns
- Improve the training of health professionals

'One-health' policies

- Improving hygiene on farms
- Improve food hygiene practices

Source: OECD. Embracing a One Health Framework to Fight Antimicrobial Resistance. 14 September 2023. http://oe.cd/amr-onehealth
OECD. Fighting antimicrobial resistance in the EU/EEA. Embracing a One Health approach. November 2023. http://oe.cd/amr-eaad2023

Everyone is responsible

Everyone is responsible and can make a difference in addressing this growing threat to human health: patients, doctors, nurses, pharmacists, veterinarians, farmers, policy makers.

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#EAAD
#AntimicrobialResistance

EUROPEAN ANTIBIOTIC AWARENESS DAY

A EUROPEAN HEALTH INITIATIVE

Thank you!

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EUROPEAN CENTRE FOR DISEASE PREVENTION AND CONTROL