

## SURVEILLANCE REPORT

# Antimicrobial consumption in the EU/EEA (ESAC-Net)

## Annual Epidemiological Report for 2023

### Key facts

- For 2023, 27 countries (25 European Union (EU) Member States and two European Economic Area (EEA) countries – Iceland and Norway) reported data on antimicrobial consumption.
- Antimicrobial consumption is expressed as the number of defined daily doses (DDD) per 1 000 inhabitants per day. The Anatomical Therapeutic Chemical (ATC) classification index with defined daily doses (ATC/DDD Index) 2024 was used for the analysis of 2023 data, and for historical data when possible.

### EU targets on antimicrobial consumption

- In 2023, the EU population-weighted mean total consumption (community and hospital sectors combined) of antibacterials for systemic use (ATC group J01) was 20.0 DDD per 1 000 inhabitants per day (country range 9.6–28.5). This was 1% higher than in 2019 (baseline year), and 4.1 DDD per 1 000 inhabitants per day higher than the 2030 target of 15.9 DDD per 1 000 inhabitants per day. For the EU overall, there was no statistically significant trend detected between 2019 (baseline year) and 2023.
- The EU population-weighted mean percentage of consumption of WHO 'Access' group antibiotics (see page 3) was 61.5% in 2023 (country range 41.7%–75.1%). This was 0.4 percentage points higher than 2019 (baseline year) and 3.5 percentage points below the 2030 target of  $\geq 65\%$ . For the EU overall, there was no statistically significant trend detected between 2019 (baseline year) and 2023.

### Community (primary care sector)

- In the community, the EU/EEA population-weighted mean consumption of antibacterials for systemic use (ATC group J01) was 18.3 DDD per 1 000 inhabitants per day (country range: 8.8–26.7) in 2023. There was no statistically significant trend between 2019 and 2023 for the EU/EEA overall.
- At EU/EEA level, the most consumed subgroup of antibiotics was penicillins (J01C) (47%), followed by macrolides, lincosamides and streptogramins (J01F) (17%), cephalosporins and other beta-lactams (J01D) (12%), tetracyclines (J01A) (9%), quinolones (J01M) (7%), other antibacterials (J01X) (5%), sulfonamides and trimethoprim (J01E) (3%), and other groups (J01B, J01G and J01R) (0.5%). A statistically significant decreasing trend was observed between 2019 and 2023 for 'Other groups (J01B, J01G, and J01R)'.
- The EU/EEA population-weighted mean ratio of consumption of mainly 'broad-spectrum' penicillins, cephalosporins, macrolides (except erythromycin) and fluoroquinolones to the consumption of narrow-spectrum penicillins, cephalosporins and erythromycin in the community was 5.5 (country range: 0.1–97.9). During 2019–2023, a statistically significant increasing trend was observed for this ratio in the EU/EEA overall.

### Hospital sector

- In the hospital sector, the EU/EEA population-weighted mean consumption of antibacterials for systemic use (ATC group J01) was 1.6 DDD per 1 000 inhabitants per day in 2023 (country range: 0.8–3.2). There was no statistically significant trend detected between 2019 and 2023 for EU/EEA overall.

- At EU/EEA level, the most commonly consumed subgroup of antibiotics was penicillins (J01C) (34%), followed by cephalosporins and other beta-lactams (J01D) (28%), other antibacterials (J01X) (12%), quinolones (J01M) (9%), macrolides, lincosamides and streptogramins (J01F) (8%), sulfonamides and trimethoprim (J01E) (4%), other groups (J01B, J01G, and J01R) (3%) and tetracyclines (J01A) (3%). A statistically significant decreasing trend was observed at EU/EEA level between 2019 and 2023 for quinolones (J01M) and for other groups (J01B, J01G, and J01R); and a statistically increasing trend was observed for other antibacterials (J01X), which was mainly due to an increase in the consumption of polymyxins (J01XB).
- In 2023, the proportion of mainly 'broad-spectrum' antibiotics (ATC groups J01XA, J01DD, J01DE, J01DF, J01DH, J01MA, J01XB, J01CR05, J01XX08, J01XX11, and J01XX09) consumed out of all hospital sector consumption of antibacterials for systemic use was 40.1% (country range 14.2%– 65.0%). During 2019–2023, there was no statistically significant trend detected for the EU/EEA overall.
- The EU population-weighted mean percentage of consumption of WHO 'Reserve' group antibiotics (see page 3) in the hospital sector was 5.4% (country range 0.7%–15.9%) in 2023. A statistically significant increasing trend was observed between 2019 and 2023 for the EU/EEA overall.

## Public health conclusions

- The poor progress towards the EU targets on antimicrobial consumption and the continued increase in the consumption of WHO 'Reserve' and 'broad-spectrum' antibiotics highlights the need to strengthen efforts to address unnecessary and inappropriate antimicrobial use at all levels of healthcare (i.e. community, hospital and long-term care sectors) in the EU/EEA.
- As emphasised in the Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01), national action plans should include key elements to promote prudent use of antimicrobials, including antimicrobial stewardship programmes with good diagnostic practices and infection prevention and control activities. The EU Council Recommendation also emphasises the importance of the timely availability of standardised data on antimicrobial consumption for benchmarking, and on antimicrobial resistance for clinical guidance.

## Methods

This report is based on data reported to the European Surveillance of Antimicrobial Consumption Network (ESAC-Net) for the period 2019 to 2023, retrieved from The European Surveillance System (TESSy), hosted by the European Centre for Disease Prevention and Control (ECDC), on 5 September 2024. TESSy is a system for the collection, storage, analysis and dissemination of data on communicable diseases, allowing for correction and re-uploading of historical data by the reporting countries. Therefore, the latest published reports supersede previous reports and reflect the most recently available data. For a detailed description of the methods used to produce this report, please refer to the 'Methods' chapter in the introduction to the ECDC Annual Epidemiological Report [1] and the latest ESAC-Net reporting protocol [2].

## The European Surveillance of Antimicrobial Consumption Network (ESAC-Net)

ESAC-Net is a European Union (EU)/European Economic Area (EEA)-wide network of national surveillance systems, providing European reference data on antimicrobial consumption (AMC). The network is coordinated by ECDC and covers all EU/EEA countries.

AMC refers to the volume of antimicrobials sold, dispensed or reimbursed within a setting, and does not reflect the actual use (e.g. ingestion, inhalation or injection) of antimicrobials. Consumption is measured through sales data (sales/distribution reports from pharmaceutical companies, wholesalers, pharmacies or market research companies) or reimbursement data (financial claims from legitimate beneficiaries, from prescribers or from dispensing pharmacies, including information from national drug registers). Data are reported for the community (primary care) and hospital sectors separately. The sector under which data are reported from nursing homes and other long-term care facilities for the elderly should be clearly specified. If it is not possible to differentiate between AMC in the community and hospital sectors, data can be reported as 'total care' (including both community and hospital sectors combined). However, this is not the preferred option for reporting and this option is only acceptable if the data cannot be subdivided by sector [2]. An overview of national data sources and healthcare sector coverage appears in Table 1.

To ensure standardisation and comparability, ESAC-Net uses the World Health Organization (WHO) Anatomical Therapeutic Chemical (ATC)/Defined Daily Dose (DDD) index to classify antimicrobial substances and measure AMC. For the collection of 2023 data, DDDs listed in the ATC/DDD Index for 2024 were used, and for historical data when possible [3]. For more information about the ATC/DDD methodology, please refer to the Guidelines for ATC classification and DDD assignment published by the WHO Collaborating Centre for Drug Statistics Methodology [4].

## Antimicrobial consumption indicators

ESAC-Net monitors several AMC indicators, providing standardised metrics enabling benchmarking and trend analyses. A subset of these is presented in this report, while more data are available from ECDC's online AMC database [5].

### Defined daily doses (DDD) per 1 000 inhabitants per day

The number of defined daily doses (DDD) per 1 000 inhabitants per day provides a rough estimate of the proportion of the population treated daily with antimicrobials. It is a technical unit for measurement of AMC, not necessarily the recommended dose for treatment. For the calculation of population-based rates of AMC for each country, the Eurostat population for each country and respective year was used [6], unless the country chose to report another denominator directly to ECDC.

**Total consumption (community and hospital sectors combined) of antibacterials for systemic use (ATC group J01) expressed as DDD per 1 000 inhabitants per day**, is the primary ESAC-Net indicator. This indicator has been selected as the primary harmonised outcome indicator by an expert group convened by ECDC, the European Food Safety Authority (EFSA) and the European Medicines Agency (EMA) [7]. It also is the main indicator recommended by the Council to set up an EU target for AMC [8] (see section 'EU targets on antimicrobial consumption'). In addition, this report also presents data measured as DDD per 1 000 inhabitants per day for several antimicrobial subgroups and separately for the community and the hospital sector. Additional data are available from ECDC's online AMC database [5].

### ECDC/EFSA/EMA secondary indicators

The ECDC/EFSA/EMA secondary indicators aim to describe the distributions of antibacterials for systemic use (ATC J01) mainly according to their spectrum of activity (e.g. broad- versus narrow-spectrum) and separately for the community and the hospital sector [7].

**The secondary indicator for the community sector** is the ratio of consumption of mainly 'broad-spectrum' penicillins, 'broad-spectrum' cephalosporins, macrolides (except erythromycin) and fluoroquinolones (ATC groups J01(CR+DC+DD+(FA- FA01)+MA)) to the consumption of narrow-spectrum penicillins, narrow-spectrum cephalosporins and erythromycin (ATC groups J01(CA+CE+CF+DB+FA01)).

**The secondary indicator for the hospital sector** is the proportion of glycopeptides (ATC group J01XA), third- and fourth-generation cephalosporins (J01DD and J01DE), monobactams (J01DF), carbapenems (J01DH), fluoroquinolones (J01MA), polymyxins (J01XB), piperacillin and enzyme inhibitor (J01CR05), linezolid (J01XX08), tedizolid (J01XX11), and daptomycin (J01XX09) out of total hospital consumption of antibacterials for systemic use.

### World Health Organization (WHO) Access, Watch and Reserve (AWaRe) classification of antimicrobials

The WHO Access, Watch and Reserve (AWaRe) classification of antimicrobials is a tool to evaluate and monitor antibiotic use and support antibiotic stewardship efforts, emphasising the importance of prudent use of antibiotics. 'Access' antibiotics are mostly first- and second-line therapies that offer the best therapeutic value, while minimising the potential for antimicrobial resistance (AMR). 'Watch' antibiotics have a broad spectrum of activity and stewardship efforts that should limit empiric use of these antibiotics 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. The analysis is based on the latest classification, published in 2023 [9].

This report presents data on the percentage of '**Access**' group antimicrobials consumed out of total AWARe consumption (community and hospital sectors combined) of antibacterials for systemic use (ATC group J01), as well as the percentage of '**Reserve**' group antimicrobials out of hospital sector AWARe consumption of antibacterials for systemic use (ATC group J01). More data, presented according to the AWARe classification, are available from ECDC's online AMC database [5].

### Population-weighted mean consumption rates

All EU mean and EU/EEA mean AMC rates presented in this report are population-weighted. Population-weighted mean AMC rates were calculated by multiplying the AMC rate for each country with the corresponding Eurostat population and dividing the product by the total population of all participating countries. Annual population data were retrieved from the Eurostat online database on 8 July 2024 [6].

EU and EU/EEA population-weighted means are used for assessing trends across multiple countries over time. Therefore, the countries included in the calculation of the EU and EU/EEA population-weighted means (and hence the population under surveillance) are consistent across all years in the tables with trend analyses. As a result, the EU/EEA population-weighted means presented in this report might differ slightly from the 'Crude EU/EEA mean' shown in ECDC's online AMC Dashboard (which includes all reporting countries for each year).

## Missing data

Where national data was missing in the 2019–2023 time series on total consumption of antibacterials for systemic use expressed as DDD per 1 000 inhabitants per day, imputations were used to allow for the inclusion of all current EU Member States in the trend analysis. Missing hospital sector data from Germany for 2019–2022 were imputed by using the overall EU/EEA community-to-hospital sector ratio. For Cyprus and Sweden, the missing data points for 2023 were replaced with the country's data points for 2022.

While imputation of the German 2019–2022 data was only performed for the total consumption of antibacterials for systemic use, the 2023 imputations for Cyprus and Sweden were used throughout this report.

## Trend analyses

To assess the statistical significance of trends, a linear regression model was applied to the five-year time series using STATA/SE 16.0. To describe the trends, the terms 'increase' or 'decrease' were only used if the p-value for the regression coefficient was statistically significant ( $p \leq 0.05$ ).

For national data, trend analyses were only performed for countries reporting data for all years during the period 2019–2023, and when there were no major changes to their national surveillance frameworks.

## EU targets on antimicrobial consumption

In 2023, the Council of the European Union adopted a Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01), which invites EU Member States to take appropriate national measures to reduce AMC. This reduction is measured as two concrete AMC targets set at EU level, with corresponding individual recommended targets for each Member State based on the national situation [8].

The first EU AMC target is to reduce the population-weighted total consumption of antibiotics in humans, measured as DDD per 1 000 inhabitants per day in the community and hospital sectors combined, by 20% by 2030 compared with 2019 (baseline year) (i.e. from 19.9 DDD per 1 000 inhabitants per day in 2019 to 15.9 DDD per 1 000 inhabitants per day in 2030). To help reach the EU target, recommended Member State reductions in AMC range from 3% to 27% during the period 2019 to 2030, depending on their total consumption for the baseline year (see Table 2 for details).

The second EU AMC target is to have at least 65% of AWaRe group consumption coming from the 'Access' group by 2030 [9]. All individual Member States are recommended to reach the same target, as set at EU level (i.e. at least 65% of total consumption being from the 'Access' group of antibiotics). The EU target is more ambitious than the global target of at least 60% of 'Access' group consumption, as defined by WHO in their 13th General Programme of Work 2019–2023 [10].

# Results

## Data availability

Twenty-five EU Member States and two EEA countries (Iceland and Norway) reported AMC data for 2023 to ESAC-Net. Cyprus and Sweden were unable to provide data for 2023, and data from Liechtenstein are still unavailable to ESAC-Net. AMC data were mainly based on sales of antimicrobials, or were a combination of sales and reimbursement data. Reimbursement data were more commonly used to report community consumption than hospital sector consumption (seven countries versus three countries) (Table 1). AMC data from long-term care facilities (LTCFs) were mainly reported as community sector data, or partly with community data and partly with hospital sector data. Italy reported all LTCF consumption with the hospital sector data. These differences affect comparability of sector-specific data between countries. Furthermore, not all countries included LTCF data when reporting to ESAC-Net; Ireland reported incomplete LTCF data, and the Netherlands did not report any LTCF data at all (Table 1). This results in an underestimation of total AMC in these countries and affects the general comparability of AMC with other countries.

**Table 1. ESAC-Net antimicrobial consumption data sources and inclusion of data from long-term care facilities (LTCF), EU/EEA countries, 2023**

Country	Community sector data source	Hospital sector data source	LTCF inclusion
Austria	R	S	Yes (C/H)
Belgium	R	R	Yes (C)
Bulgaria	S	S	Yes (C)
Croatia	R	S	Yes (C)
Cyprus	ND	ND	ND
Czechia	R	S	Yes (C/H)
Denmark	S	S	Yes (C)
Estonia	S	S	Yes (C/H)
Finland*	S	S	Yes (C/H)
France	S	S	Yes (C/H)
Germany	R	Other	Yes (C)
Greece	S/R	S	Yes (C/H)
Hungary	S	S	Yes (C)
Iceland	S	S	Yes (C)
Ireland	S	S	Partly (C)
Italy	S/R	R	Yes (H)
Latvia	S	S	Yes (C)
Lithuania	S	S	Yes (C/H)
Luxembourg	R	S	Yes (C)
Malta	S	S	Yes (C)
Netherlands	S	S	No
Norway	S/R	S/R	Yes (C/H)
Poland	S	S	Yes (C)
Portugal**	R	S/R	Yes (C)
Romania	S	R	Yes (C)
Slovakia	S	S	Yes (C)
Slovenia	S/R	S/R	Yes (C)
Spain	S/R	S/R	Yes (C)
Sweden	ND	ND	ND

LTCF: Long-term care facility, S= sales data, R= reimbursement data, C= LTCF data included with community sector data, H= LTCF data included with hospital sector data, C/H = LTCF data partly reported with community data and partly with hospital sector data ND= no data.

\* Finland included consumption in remote primary centres and nursing homes in hospital data.

\*\* Portugal's hospital sector data only refers to antimicrobials consumed in public hospitals on the mainland.

## Progress towards the EU targets on antimicrobial consumption

### Total consumption (community and hospital sectors combined) of antibacterials for systemic use (ATC group J01)

In 2023, the EU population-weighted mean total consumption (community and hospital sectors combined) of antibacterials for systemic use (ATC group J01) was 20.0 DDD per 1 000 inhabitants per day, which was 1% higher than in 2019 (baseline year). For the EU overall, there was no statistically significant trend detected between 2019 and 2023 (Table 2).

At country-level, total AMC in 2023 ranged from 9.6 DDD per 1 000 inhabitants per day in the Netherlands to 28.5 in Greece. One country (Bulgaria) showed a significantly increasing trend between 2019 and 2023, while no country had a significant decreasing trend during the period. Of the countries reporting data for 2023, only one (Finland) had already reached its individual 2030 target. Among the 24 EU Member States providing data for all years during 2019–2023, a majority (14 countries) had a higher consumption in 2023 than in 2019 (Table 2).

### Percentage of WHO 'Access' group antibiotics consumed out of total consumption (community and hospital sectors combined)

The EU population-weighted mean percentage of 'Access' group antibiotics consumed was 61.5% in 2023, which was 0.4 percentage points higher than in 2019 (baseline year) and 3.5 percentage points below the 2030 target of > 65%. For the EU overall, there was no statistically significant trend detected between 2019 and 2023 (Table 3).

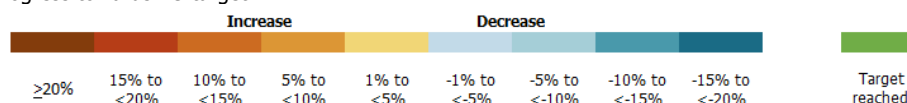
At country-level, the percentage ranged between 41.7% (Slovakia) and 82.1% (Iceland). Four countries (Denmark, Estonia, Ireland and Latvia) had significant increasing trends between 2019 and 2023. Of the 24 countries reporting data for 2023, eight had already reached the 2030 target of > 65%, however all these countries were already at the target in 2019 (baseline year). Among the 24 Member States providing data for all years during the period 2019–2023, a majority (16 countries) had a higher percentage of consumption for 'Access' group antibiotics in 2023 than in 2019 (Table 3).



**Table 2. Total consumption (community and hospital sectors combined) of antibacterials for systemic use (ATC group J01), EU/EEA countries, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**

Country	2019	2020	2021	2022	2023	Trend 2019–2023	Progress towards 2030 target*			
							Change (%) 2019-2023	Recommended reduction (%) 2019-2030	2023	Target 2030
Austria	11.6	8.8	8.8	10.5	11.3		-3%	-3%	11.3	11.2
Belgium	21.4	16.7	17.4	20.5	20.6		-3%	-18%	20.6	17.5
Bulgaria	20.7	22.7	24.4	25.7	26.3		+27%	-18%	26.3	17.0
Croatia	18.8	15.7	18.2	20.2	21.2		+13%	-9%	21.2	17.1
Cyprus	30.1	28.9	25.0	33.5		N/A	N/A	-27%	N/A	22.0
Czechia	16.9	13.4	13.7	17.1	18.1		+7%	-9%	18.1	15.4
Denmark	15.3	14.3	14.4	15.2	16.2		+6%	-9%	16.2	13.9
Estonia	11.8	10.5	10.1	12.4	12.7		+8%	-3%	12.7	11.4
Finland	14.7	11.9	11.3	12.5	12.9		-12%	-9%	12.9	13.3
France	25.1	20.3	21.5	24.3	24.1		-4%	-27%	24.1	18.3
Germany					13.3		N/A	N/A	13.3	11.5
Greece <sup>a</sup>	34.1	28.1	23.5	32.9	28.5		N/A	-16%	28.5	24.9
Hungary	14.4	11.2	11.9	14.4	14.2		-2%	-9%	14.2	13.1
Iceland	19.3	16.5	16.8	18.6	18.5		-4%	N/A	18.5	N/A
Ireland	22.8	18.6	17.8	23.1	22.4		-2%	-27%	22.4	16.6
Italy	21.7	18.4	17.5	21.9	23.1		+6%	-18%	23.1	17.8
Latvia	13.9	11.9	11.6	14.9	14.9		+7%	-9%	14.9	12.6
Lithuania	16.3	14.2	14.1	18.5	18.7		+15%	-9%	18.7	14.6
Luxembourg <sup>a</sup>	21.1	16.1	15.9	19.1	20.2		N/A	-4%	20.2	17.3
Malta	20.7	16.6	15.8	24.0	22.9		+11%	-18%	22.9	17.0
Netherlands	9.5	8.5	8.3	9.1	9.6		+1%	-3%	9.6	9.2
Norway	14.9	13.9	14.0	15.3	15.5		+4%	N/A	15.5	N/A
Poland	23.6	18.5	20.2	23.6	23.2		-2%	-27%	23.2	17.3
Portugal	19.3	15.2	15.3	18.8	19.7		+2%	-9%	19.7	17.6
Romania	25.8	25.2	25.7	27.6	27.4		+6%	-27%	27.4	18.8
Slovakia	19.3	14.4	16.0	20.8	20.1		+4%	-9%	20.1	17.6
Slovenia	13.0	10.2	10.2	12.4	13.4		+3%	-9%	13.4	11.8
Spain	24.9	19.7	20.0	23.2	24.1		-3%	-27%	24.1	18.2
Sweden	11.8	10.3	10.1	11.2			N/A	-3%	N/A	11.4
<b>EU/EEA**</b>	<b>19.8</b>	<b>16.4</b>	<b>16.4</b>	<b>19.3</b>	<b>19.9</b>		<b>+1%</b>	<b>N/A</b>	<b>19.9</b>	<b>N/A</b>
<b>EU***</b>	<b>19.9</b>	<b>16.4</b>	<b>16.4</b>	<b>19.4</b>	<b>20.0</b>		<b>+1%</b>	<b>-20%</b>	<b>20.0</b>	<b>15.9</b>

Progress towards EU target:



\* As per the Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01) [8].

\*\* EU/EEA mean refers to the population-weighted mean consumption, based on data from all 27 current EU Member States and two EEA countries (Iceland and Norway). Imputations have been included as described in the 'Methods' section.

\*\*\* EU mean refers to the population-weighted mean consumption based on data from all 27 current EU Member States. Imputations have been included as described in the 'Methods' section.

Total care data (community and hospital sectors combined) not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable.

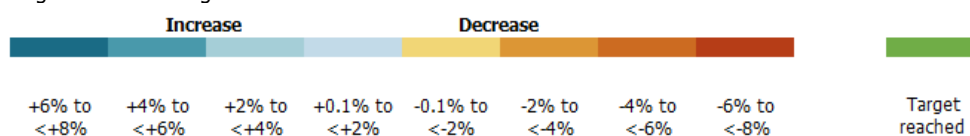
Trend analyses were not performed because of missing data, changes in the type of data or change in data process.

a) Greece and Luxembourg changed their data collection process during the period, which could have an impact on comparability with previous years.

**Table 3. Percentage (%) of WHO 'Access' group antibiotics consumed out of total AWaRe consumption (community and hospital sectors combined), EU/EEA countries, 2019–2023**

Country	2019	2020	2021	2022	2023	Trend 2019–2023	Progress towards the 2030 target of ≥65% Access group *	
							Change 2019-2023 (percentage points)	Increase needed 2019-2030 to reach target (percentage points)
Austria	58.1	60.9	59.9	59.5	61.6		+3.4	+6.9
Belgium	67.9	67.3	68.4	69.4	68.9		+1.0	None
Bulgaria	45.1	40.5	38.3	40.7	42.0		-3.1	+19.9
Croatia	62.7	61.4	60.2	60.1	60.7		-2.0	+2.3
Cyprus	48.9	44.3	48.3	55.4		N/A	N/A	+16.1
Czechia	60.2	61.9	61.4	58.9	60.6		+0.4	+4.8
Denmark	78.4	79.0	79.3	80.1	80.1		+1.7	None
Estonia	61.3	61.1	63.7	64.0	64.2		+2.9	+3.7
Finland	73.2	70.3	70.4	72.3	74.0		+0.8	None
France	72.0	70.5	72.4	71.3	72.7		+0.7	None
Germany					60.1	N/A	N/A	N/A
Greece <sup>a</sup>	46.8	48.6	51.9	42.6	42.0	N/A	-4.8	+18.2
Hungary	50.5	51.0	49.2	49.1	50.3		-0.2	+14.5
Iceland	82.9	83.0	83.3	83.7	82.1		-0.8	N/A
Ireland	70.3	70.8	73.7	74.0	75.1		+4.9	None
Italy	48.9	47.2	47.8	47.2	50.8		+1.9	+16.1
Latvia	68.6	69.4	71.2	70.8	71.6		+3.0	None
Lithuania	68.3	67.6	70.5	70.7	66.6		-1.7	None
Luxembourg <sup>a</sup>	59.5	60.2	60.6	60.8	61.7	N/A	+2.2	+5.5
Malta	49.9	54.7	58.0	55.0	56.0		+6.1	+15.1
Netherlands	71.2	70.1	70.2	71.0	71.8		+0.6	None
Norway	64.1	58.8	58.8	62.0	61.4		-2.7	N/A
Poland	60.4	62.9	60.9	56.7	60.4		+0.1	+4.6
Portugal	61.4	61.6	61.6	61.0	62.5		+1.1	+3.6
Romania	52.8	49.9	49.0	50.3	51.2		-1.6	+12.2
Slovakia	42.4	43.6	40.2	37.7	41.7		-0.7	+22.6
Slovenia	62.1	63.3	64.0	61.7	62.4		+0.3	+2.9
Spain	63.0	62.0	62.3	61.2	61.8		-1.2	+2.0
Sweden	71.0	68.0	67.6	69.0		N/A	N/A	None
<b>EU/EEA**</b>	<b>61.2</b>	<b>60.4</b>	<b>60.7</b>	<b>59.8</b>	<b>61.5</b>		<b>+0.4</b>	<b>N/A</b>
<b>EU***</b>	<b>61.1</b>	<b>60.4</b>	<b>60.8</b>	<b>59.8</b>	<b>61.5</b>		<b>+0.4</b>	<b>+3.9</b>

Progress towards target:



\* As per the Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01) [8].

\*\* EU/EEA mean refers to the population-weighted mean consumption based on data from the 26 EU Member States reporting data for at least four years during the period 2019 to 2023 and two EEA countries (Iceland and Norway). Imputations have been included as described in the 'Methods' section.

\*\*\* EU mean refers to the population-weighted mean consumption based on data from the 26 EU Member States reporting data for at least four years during the period 2019 to 2023. Imputations were applied, as detailed in the 'Methods' chapter.

Total care data (community and hospital sectors combined) not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable.

Trend analyses were not performed because of missing data, changes in the type of data or change in data process. Progress towards EU AMC target not shown for EEA countries.

a) Greece and Luxembourg changed their data collection process during the period, which could have an impact on comparability with previous years.



## Community consumption of antibacterials for systemic use (ATC group J01)

The EU/EEA population-weighted mean consumption of antibacterials for systemic use in the community (i.e. outside of the hospital sector) was 18.3 DDD per 1 000 inhabitants per day in 2023. At country level, community consumption ranged from 8.8 DDD per 1 000 inhabitants per day in the Netherlands to 26.7 in Greece. There was no statistically significant trend detected for the EU/EEA overall between 2019 and 2023. At country level, a statistically significant increasing trend was observed for one country (Bulgaria) during the same period (Table 4).

The community consumption of major sub-groups of antibacterials for systemic use (ATC group J01) during 2019 and 2023 is presented in Figure 1. At EU/EEA level in 2023, the most commonly consumed subgroup of antibiotics in 2023 was penicillins (J01C) (47%), followed by macrolides, lincosamides and streptogramins (J01F) (17%), cephalosporins and other beta-lactams (J01D) (12%), tetracyclines (J01A) (9%), quinolones (J01M) (7%), other antibacterials (J01X) (5%), sulfonamides and trimethoprim (J01E) (3%) and 'minor groups combined' (J01B, J01G and J01R) (0.5%). Between 2019 and 2023, a statistically significant decreasing trend was observed for 'minor groups combined' (J01B, J01G, and J01R). Country-level antibacterial subgroups distributions are available in the AMC dashboard [5].

The ratios of consumption of mainly 'broad-spectrum' (ATC groups J01(CR+DC+DD+(FA-FA01)+MA)) to 'narrow-spectrum' (ATC groups J01(CA+CE+CF+DB+FA01)) antibiotics in the community sector are presented in Table 5. In 2023, the EU/EEA population-weighted mean ratio was 5.5, ranging from 0.1 in Norway to 97.9 in Hungary. During the period 2019–2023, a statistically significant increasing trend was observed for the EU/EEA overall and for six individual countries (Austria, Bulgaria, Italy, Latvia, Lithuania and Slovakia), and a statistically significant decreasing trend was observed for two countries (Iceland and Ireland).

**Figure 1. Community consumption of antibacterials for systemic use (ATC group J01) by subgroup (ATC level 3), EU/EEA population-weighted mean\*, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**



\*EU/EEA refers to the population-weighted mean consumption, based on reported or imputed community sector data, as described in the 'Methods' section.

**Table 4. Community consumption of antibacterials for systemic use (ATC group J01), EU and EEA countries, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**

Country	2019	2020	2021	2022	2023	Trend 2019–2023
Austria	9.8	7.1	7.2	8.8	9.5	
Belgium	19.8	15.3	16.0	19.0	19.1	
Bulgaria	19.1	20.7	22.4	24.2	24.6	↑
Croatia	16.9	14.0	16.2	18.2	19.1	
Cyprus						N/A
Czechia			11.5	13.9	15.0	N/A
Denmark	13.4	12.5	12.6	13.3	14.3	
Estonia	10.2	8.8	8.7	10.8	11.2	
Finland	12.6	10.0	9.4	10.5	11.1	
France	23.3	18.7	19.9	22.6	22.3	
Germany	11.4	8.9	8.1	10.0	11.7	
Greece <sup>a</sup>	32.4	26.4	21.8	31.2	26.7	N/A
Hungary	13.3	10.0	10.8	13.4	13.1	
Iceland	18.0	15.4	15.7	17.5	17.4	
Ireland	21.0	17.1	16.3	21.5	20.7	
Italy	19.8	16.5	16.0	20.0	21.2	
Latvia	12.0	10.0	10.2	13.4	13.3	
Lithuania	14.0	11.9	12.1	16.2	16.3	
Luxembourg <sup>a</sup>	19.8	14.8	14.6	17.6	18.7	N/A
Malta	18.7	14.4	14.1	21.7	20.9	
Netherlands	8.7	7.8	7.6	8.3	8.8	
Norway	13.6	12.8	12.8	14.0	14.2	
Poland	22.2	17.1	18.8	22.3	21.8	
Portugal	17.9	13.7	13.7	17.1	18.0	
Romania	24.0	23.7	24.3	26.2	25.8	
Slovakia	18.0	13.2	14.5	19.7	19.0	
Slovenia	11.5	8.8	8.7	11.0	11.9	
Spain	23.3	18.2	18.5	21.7	22.5	
Sweden	10.3	8.9	8.7	9.6		N/A
<b>EU/EEA*</b>	<b>18.3</b>	<b>15.0</b>	<b>15.1</b>	<b>17.9</b>	<b>18.3</b>	




















\* EU/EEA mean refers to the population-weighted mean consumption based on data from the 25 EU Member States and two EEA countries (Iceland and Norway) reporting community sector data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

Community data not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable. Trend analyses were not performed because of missing data, changes in the type of data or change in data process.

a) Greece and Luxembourg changed their data collection process during the period, which could have an impact on comparability with previous years.

**Table 5. Ratio of consumption (DDD per 1 000 inhabitants per day) of broad-spectrum penicillins, cephalosporins, macrolides (except erythromycin) and fluoroquinolones to consumption of narrow-spectrum penicillins, cephalosporins and erythromycin in the community, EU/EEA countries, 2019–2023**

Country	2019	2020	2021	2022	2023	Trend 2019–2023
Austria	3.6	3.5	3.7	3.9	4.1	 ↑
Belgium	1.9	2.1	1.9	1.7	1.7	 ↓
Bulgaria	4.5	4.9	5.6	5.8	8.7	 ↑
Croatia	4.5	5.7	6.4	5.3	6.2	 ↑
Cyprus						N/A
Czechia			5.0	4.3	4.1	N/A
Denmark	0.3	0.3	0.3	0.3	0.3	 ↓
Estonia	3.0	3.3	3.3	3.3	3.1	 ↓
Finland	0.3	0.3	0.3	0.3	0.3	 ↓
France	0.9	1.1	1.0	1.0	0.9	 ↓
Germany	1.5	1.6	1.6	1.5	1.8	 ↑
Greece <sup>a</sup>	5.1	4.4	4.3	6.6	6.8	N/A
Hungary	13.6	15.2	20.7	24.7	97.9	 ↑
Iceland	0.5	0.5	0.5	0.4	0.4	↓
Ireland	1.2	1.0	0.9	0.9	0.8	↓
Italy	7.5	8.1	8.3	9.4	9.5	↑
Latvia	1.9	2.2	2.6	2.5	2.7	↑
Lithuania	1.1	1.2	1.6	1.5	2.4	↑
Luxembourg <sup>a</sup>	3.2	3.2	3.1	3.0	2.6	N/A
Malta	20.1	19.1	18.5	24.5	20.8	 ↓
Netherlands	1.4	1.6	1.5	1.4	1.4	 ↓
Norway	0.1	0.1	0.1	0.1	0.1	 ↓
Poland	3.0	3.3	3.5	3.1	2.9	 ↓
Portugal	5.0	5.8	5.8	5.6	5.4	 ↓
Romania	4.1	4.7	5.3	4.3	5.1	 ↑
Slovakia	8.3	9.3	12.5	14.1	12.9	↑
Slovenia	1.5	2.1	2.3	1.6	1.5	 ↓
Spain	2.3	2.5	2.5	2.4	2.2	 ↓
Sweden	0.2	0.2	0.2	0.2		N/A
<b>EU/EEA*</b>	<b>3.2</b>	<b>3.4</b>	<b>3.7</b>	<b>3.8</b>	<b>5.5</b>	 ↑

\* EU/EEA mean refers to the population-weighted mean consumption based on data from 25 current EU Member States and two EEA countries (Iceland and Norway) reporting community sector data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

 Community data not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable. Trend analyses were not performed because of missing data, changes in the type of data or change in data process.

a) Greece and Luxembourg changed their data collection process during the period, which could have an impact on comparability with previous years.

## Hospital sector consumption of antibacterials for systemic use (ATC group J01)

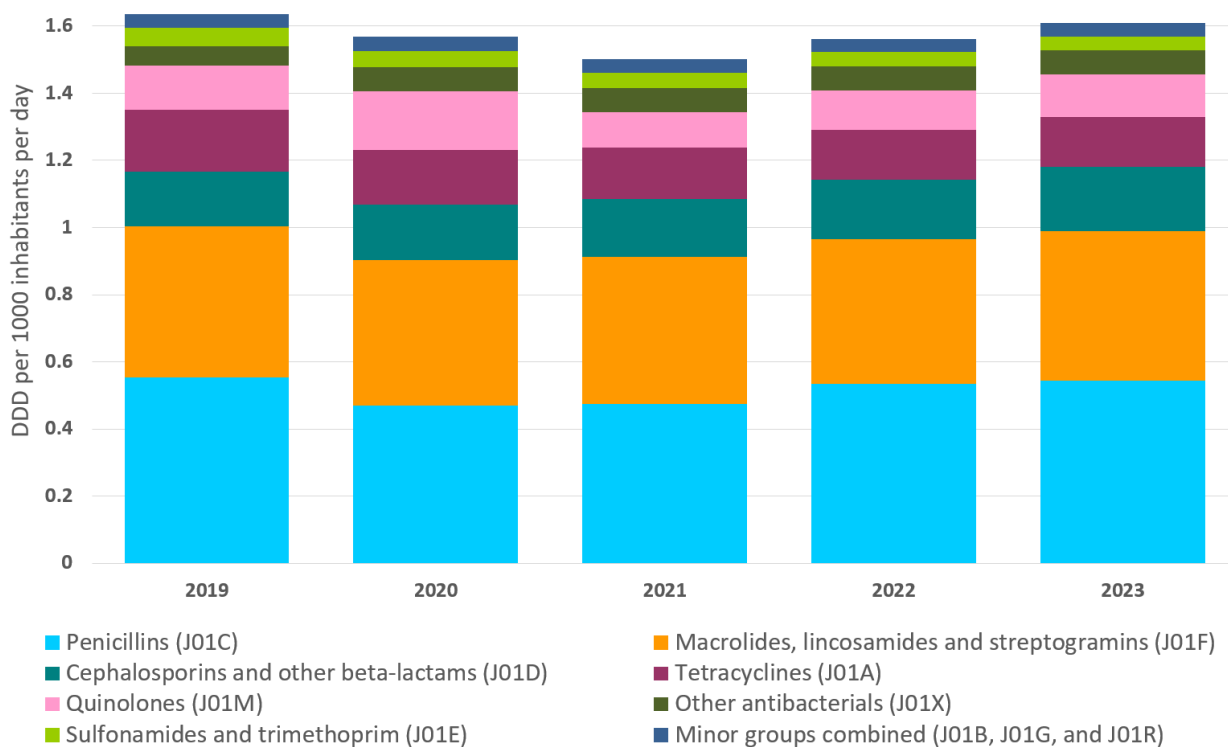
**The EU/EEA population-weighted mean consumption of antibacterials for systemic use in the hospital sector** was 1.61 DDD per 1 000 inhabitants per day in 2023. At country level, hospital sector consumption ranged from 0.77 DDD per 1 000 inhabitants per day in the Netherlands to 3.17 in Czechia. There was no statistically significant trend detected for the EU/EEA overall between 2019 and 2023. At country level, a statistically significant increasing trend between 2019 and 2023 was observed for one country (Portugal) (Table 6).

**The hospital sector consumption of major sub-groups of antibacterials for systemic use (ATC group J01)** during 2019–2023 is presented in Figure 2. At EU/EEA level, the most commonly consumed subgroup in 2023 was penicillins (J01C) (34%), followed by cephalosporins and other beta-lactams (J01D) (28%), other antibacterials (J01X) (12%), quinolones (J01M) (9%), macrolides, lincosamides and streptogramins (J01F) (8%), sulfonamides and trimethoprim (J01E) (4%), ‘minor groups combined’ (J01B, J01G, and J01R) (3%) and tetracyclines (J01A) (3%). Between 2019 and 2023, a statistically significant decreasing trend was observed at EU/EEA level for quinolones (J01M) and for ‘minor groups combined’ (J01B, J01G, and J01R). A statistically increasing trend was observed for other antibacterials (J01X), which was mainly due to an increase in the consumption of polymyxins (J01XB). Country-level antibacterial subgroups distributions are available in the AMC dashboard [5].

**The proportions of mainly ‘broad-spectrum’ antibiotics (ATC groups J01XA, J01DD, J01DE, J01DF, J01DH, J01MA, J01XB, J01CR05, J01XX08, J01XX11, and J01XX09) out of all hospital sector consumption of antibacterials for systemic use** are presented in Table 7. In 2023, the EU/EEA population-weighted mean proportion was 40.1%, ranging from 14.2% in Czechia to 65.0% in Bulgaria. During 2019–2023, there was no statistically significant trend detected for the EU/EEA overall, however, two individual countries (Iceland and Spain) had increasing trends for this indicator. No country showed a statistically significant decreasing trend during the period.

**The percentage of WHO ‘Reserve’ antibiotics consumed out of hospital sector AWaRe consumption** is presented in Table 8. In 2023, the EU/EEA population-weighted mean proportion was 5.40%, ranging from 0.65% in Finland to 15.90% in Greece. During 2019–2023, a statistically significant increasing trend was observed for the EU/EEA overall, as well as for nine individual EU/EEA countries (Bulgaria, Croatia, France, Greece, Hungary, Italy, Norway, Poland and Spain). No country showed a statistically significantly decreasing trend during the period.

**Figure 2. Hospital sector consumption of antibacterials for systemic use (ATC group J01) by subgroup (ATC level 3), EU/EEA population-weighted mean\*, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**



\*EU/EEA refers to the population-weighted mean consumption, based on reported or imputed hospital sector data, as described in the 'Methods' section.



**Table 6. Hospital sector consumption of antibacterials for systemic use (ATC group J01), EU/EEA countries, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**

Country	2019	2020	2021	2022	2023	Trend 2019–2023
Austria	1.82	1.67	1.63	1.69	1.78	
Belgium	1.59	1.41	1.43	1.48	1.48	
Bulgaria	1.63	1.98	2.08	1.49	1.66	
Croatia	1.85	1.61	1.93	1.98	2.08	
Cyprus						N/A
Czechia			2.21	3.15	3.17	N/A
Denmark	1.86	1.75	1.80	1.83	1.91	
Estonia	1.54	1.65	1.41	1.61	1.54	
Finland	2.10	1.94	1.84	1.98	1.84	
France	1.74	1.64	1.69	1.75	1.72	
Germany					1.65	N/A
Greece	1.68	1.74	1.77	1.73	1.80	
Hungary	1.16	1.21	1.12	1.04	1.07	
Iceland	1.33	1.11	1.02	1.13	1.15	
Ireland	1.77	1.47	1.49	1.67	1.77	
Italy	1.89	1.92	1.54	1.80	1.90	
Latvia	1.88	1.92	1.48	1.51	1.57	
Lithuania	2.30	2.31	1.95	2.33	2.41	
Luxembourg <sup>a</sup>	1.38	1.27	1.28	1.41	1.50	N/A
Malta	1.99	2.17	1.68	2.26	2.03	
Netherlands	0.80	0.76	0.70	0.75	0.77	
Norway	1.30	1.16	1.14	1.24	1.26	
Poland	1.42	1.36	1.37	1.30	1.39	
Portugal	1.40	1.45	1.54	1.72	1.72	↑
Romania	1.73	1.43	1.38	1.39	1.54	
Slovakia	1.38	1.27	1.43	1.13	1.10	
Slovenia	1.50	1.32	1.42	1.48	1.49	
Spain	1.63	1.56	1.49	1.52	1.59	
Sweden	1.47	1.42	1.40	1.56		N/A
<b>EU/EEA*</b>	<b>1.63</b>	<b>1.57</b>	<b>1.50</b>	<b>1.56</b>	<b>1.61</b>	

\* EU/EEA mean refers to the population-weighted mean consumption based on data from 24 current EU Member States and two EEA countries (Iceland and Norway) reporting hospital sector data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

Hospital data not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable.

Trend analyses were not performed because of missing data, changes in the type of data or change in data process.

a) Luxembourg changed its data collection process during the period, which could have an impact on comparability with previous years.

**Table 7. Percentage (%) of glycopeptides, third- and fourth-generation cephalosporins, monobactams, carbapenems, fluoroquinolones, polymyxins, piperacillin and enzyme inhibitor, linezolid, tedizolid and daptomycin out of total hospital sector consumption (DDD per 1 000 inhabitants per day) of antibacterials for systemic use, EU/EEA countries, 2019–2023**

Country	2019	2020	2021	2022	2023	Trend 2019–2023
Austria	34.0	34.8	36.5	35.3	35.1	
Belgium	29.8	31.4	31.2	30.5	29.7	
Bulgaria	58.5	62.6	71.1	67.5	65.0	
Croatia	33.5	36.8	39.5	38.9	39.3	
Cyprus						N/A
Czechia			23.5	15.9	14.2	N/A
Denmark	23.9	24.7	24.3	22.7	22.6	
Estonia	21.7	24.6	24.8	23.2	23.7	
Finland	18.1	21.4	19.5	18.6	19.2	
France	30.1	32.4	33.4	36.3	32.1	
Germany					39.6	N/A
Greece	50.8	50.8	59.8	57.9	57.8	
Hungary	36.3	40.8	42.4	39.7	42.1	
Iceland	17.0	18.7	21.3	29.3	30.3	↑
Ireland	28.1	30.3	31.1	30.3	30.9	
Italy	44.5	42.8	44.4	46.2	44.6	
Latvia	40.8	36.9	41.9	40.6	42.0	
Lithuania	23.4	24.8	22.0	17.6	18.4	
Luxembourg <sup>a</sup>	35.1	37.9	37.5	35.1	35.8	N/A
Malta	37.0	38.6	41.2	39.2	42.4	
Netherlands	24.3	26.8	28.7	27.4	26.8	
Norway	19.4	19.5	21.7	21.8	20.9	
Poland	29.2	34.3	44.1	37.9	39.8	
Portugal	42.6	43.3	44.2	42.6	43.7	
Romania	55.4	55.1	64.8	61.5	60.1	
Slovakia	32.3	35.1	38.6	33.7	36.7	
Slovenia	30.7	31.3	32.2	31.2	30.0	
Spain	45.7	47.9	50.3	50.2	51.0	↑
Sweden	27.9	28.6	30.4	30.0		N/A
<b>EU/EEA*</b>	<b>36.8</b>	<b>38.4</b>	<b>41.5</b>	<b>40.9</b>	<b>40.1</b>	

\* EU/EEA mean refers to the population-weighted mean consumption based on data from 24 current EU Member States and two EEA countries (Iceland and Norway) reporting hospital sector data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

Hospital data not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable. Trend analyses were not performed because of missing data, changes in the type of data or a change in the data process.

a) Luxembourg changed its data collection process during the period, which could have an impact on comparability with previous years.

**Table 8. Percentage (%) of WHO 'Reserve' group antibiotics consumed out of hospital sector AWaRe consumption, EU/EEA countries, 2019–2023**

Country	2019	2020	2021	2022	2023	Trend 2019–2023
Austria	4.39	5.19	6.00	5.65	5.58	
Belgium	0.92	0.99	0.96	0.95	0.91	
Bulgaria	0.32	0.58	0.66	0.83	1.00	↑
Croatia	1.77	2.41	3.42	3.66	3.38	↑
Cyprus						N/A
Czechia			1.77	1.14	1.26	N/A
Denmark	0.79	0.75	0.73	0.77	0.75	
Estonia	1.32	1.09	1.26	1.33	1.18	
Finland	0.55	0.55	0.60	0.56	0.65	
France	2.75	3.40	3.60	4.10	5.28	↑
Germany					3.09	N/A
Greece	11.19	12.00	15.46	15.09	15.90	↑
Hungary	0.52	0.67	1.06	0.99	1.04	↑
Iceland	0.45	0.70	0.76	0.81	2.32	
Ireland	2.83	3.60	3.40	3.28	3.74	
Italy	3.86	4.23	5.43	7.06	6.85	↑
Latvia	0.67	0.55	1.08	0.68	1.52	
Lithuania	2.91	4.06	1.05	0.97	1.27	
Luxembourg <sup>a</sup>	2.33	2.82	2.76	3.20	3.19	N/A
Malta	0.57	0.67	1.15	0.96	0.92	
Netherlands	0.45	0.42	0.49	0.47	0.68	
Norway	0.51	0.54	0.58	0.64	0.80	↑
Poland	1.02	1.29	1.61	1.91	2.13	↑
Portugal	4.62	5.05	5.12	4.80	5.03	
Romania	1.62	2.47	3.42	3.39	3.27	
Slovakia	1.53	1.76	2.86	2.16	4.64	
Slovenia	0.89	1.16	2.12	1.80	1.58	
Spain	9.42	10.77	11.64	12.31	13.05	↑
Sweden	0.76	0.78	0.96	0.90		N/A
<b>EU/EEA*</b>	<b>3.42</b>	<b>3.96</b>	<b>4.55</b>	<b>4.99</b>	<b>5.40</b>	↑

\* EU/EEA mean refers to the population-weighted mean consumption based on data from 24 current EU Member States and two EEA countries (Iceland and Norway) reporting data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

 Hospital data not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable. Trend analyses were not performed because of missing data, changes in the type of data or change in data process.

a) Luxembourg changed its data collection process during the period, which could have an impact on comparability with previous years.

## Consumption of antimicrobials from ATC groups other than J01

For consumption of antimicrobials from ATC groups other than J01, there were larger differences between countries and over time in terms of data completeness, data sources and types of healthcare facility included. Thus, caution should be exercised when interpreting AMC rates, especially when comparing countries.

### Total consumption (community and hospital sector) of antimycotics and antifungals for systemic use (ATC groups J02 & D01B)

The EU/EEA population-weighted mean total consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01B) was 1.16 DDD per 1 000 inhabitants per day in 2023. At country level, total consumption ranged from 0.55 DDD per 1 000 inhabitants per day in Spain to 3.47 in Iceland (Table 9).

In 2024, the DDD of parenteral amphotericin B (ATC J02AA01) was altered to take formulation-specific dosing recommendations into account [3]. Thus, the previous DDD of 35 mg now only refers to the conventional formulation while, for the lipid formulation, a new DDD of 210 mg was assigned. To take this new DDD into account, formulation-specific data are necessary at product level and ESAC-Net only started to collect such data in 2023. Work is ongoing to update historical data, but remains incomplete. This could have an impact on comparability across the years in countries with a large proportion of amphotericin B (J02AA01) as part of the consumption of antimycotics for systemic use (ATC group J02). Hence, trend analyses were not performed for antimycotics and antifungals.

### Total consumption (community and hospital sector) of antimycobacterials for treatment of tuberculosis (ATC group J04A)

The EU/EEA population-weighted mean total consumption of antimycobacterials for treatment of tuberculosis (ATC group J04A) was 0.2 DDD per 1 000 inhabitants per day in 2023. At country level, total consumption ranged from 0.11 DDD per 1 000 inhabitants per day in Poland to 0.89 in Romania. There was no statistically significant trend detected for the EU/EEA overall between 2019 and 2023. At country level, a statistically significant increasing trend was detected for one country (Slovenia) between 2019 and 2023 (Table 10).


### Total consumption (community and hospital sector) of antivirals for systemic use (ATC group J05)

The EU/EEA population-weighted mean total consumption of antivirals for systemic use (ATC group J05) was 5.1 DDD per 1 000 inhabitants per day in 2023. At country level, total consumption ranged from 0.3 DDD per 1 000 inhabitants per day in Spain to 15.1 in Italy. Between 2019 and 2023, a statistically significant increasing trend was detected for the EU/EEA overall, as well as for six individual countries (Croatia, Finland, Iceland, Luxembourg, Norway and Spain) (Table 11).

**Table 9. Total consumption (community and hospital sector combined) of antimycotics and antifungals for systemic use (ATC groups J02 & D01B) EU/EEA countries, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**

Country	2019	2020	2021	2022	2023
Austria	0.84	0.74	0.80	0.81	0.83
Belgium	3.06	2.77	3.05	3.17	3.36
Bulgaria	0.83	0.78	0.85	0.89	0.99
Croatia	0.51	0.43	0.49	0.55	0.62
Cyprus	3.05	3.35	3.76	3.61	
Czechia	0.77	0.65	0.76	0.80	0.81
Denmark	1.13	1.58	1.62	1.61	1.62
Estonia	1.59	1.45	1.39	1.41	1.47
Finland	1.96	1.79	1.84	1.87	2.10
France	1.52	1.40	1.39	1.43	1.36
Germany					0.87
Greece	2.21	1.67	1.71	1.82	1.63
Hungary	1.10	0.96	0.91	1.02	1.07
Iceland	3.15	3.09	3.28	3.20	3.47
Ireland					1.45
Italy	0.93	0.86	0.86	0.84	0.85
Latvia	0.85	0.81	0.86	0.88	1.04
Lithuania	0.77	0.69	0.73	0.76	0.88
Luxembourg <sup>a</sup>	1.52	1.28	1.28	1.29	1.40
Malta	0.59	1.18	0.62	0.68	0.85
Netherlands					
Norway	1.41	1.45	1.52	1.50	1.65
Poland	1.17	0.91	0.94	1.09	1.18
Portugal	2.08	1.68	1.83	1.98	2.01
Romania	0.88	0.73	0.82	0.90	0.94
Slovakia	0.84	0.76	0.82	0.79	0.83
Slovenia	0.98	0.76	0.86	0.84	0.94
Spain	0.46	0.37	0.44	0.50	0.55
Sweden	0.86	0.79	0.81		
<b>EU/EEA*</b>	<b>1.17</b>	<b>1.04</b>	<b>1.08</b>	<b>1.13</b>	<b>1.16</b>

\* EU/EEA mean refers to the population-weighted mean consumption based on data from 23 current EU Member States and two EEA countries (Iceland and Norway) reporting data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

 Data not reported.

a) Luxembourg changed its data collection process during the period, which could have an impact on comparability with previous years.



**Table 10. Total consumption (community and hospital sector combined) of antimycobacterials for treatment of tuberculosis (ATC group J04A), EU/EEA countries, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**

Country	2019	2020	2021	2022	2023	Trend 2019–2023
Austria	0.16	0.15	0.15	0.14	0.15	
Belgium	0.24	0.21	0.19	0.19	0.20	
Bulgaria	0.33	0.16	0.09	0.39	0.25	
Croatia	0.16	0.13	0.12	0.11	0.14	
Cyprus	0.18	0.15	0.19	0.00		N/A
Czechia	0.15	0.13	0.12	0.14	0.14	
Denmark	0.16	0.13	0.12	0.12	0.12	
Estonia	0.09	0.26	0.05	0.29	0.15	
Finland	0.16	0.16	0.13	0.14	0.14	
France	0.31	0.27	0.24	0.26	0.26	
Germany					0.21	N/A
Greece	0.23	0.25	0.17	0.21	0.23	
Hungary	0.16	0.13	0.10	0.13	0.14	
Iceland	0.31	0.20	0.20	0.17	0.25	
Ireland						N/A
Italy	0.11	0.11	0.09	0.10	0.21	
Latvia	0.26	0.25	0.15	0.25	0.20	
Lithuania	0.57	0.48	0.31	0.49	0.46	
Luxembourg <sup>a</sup>	0.27	0.27	0.28	0.31	0.40	N/A
Malta	0.13	0.13	0.07	0.09	0.12	
Netherlands						N/A
Norway	0.13	0.13	0.11	0.12	0.13	
Poland	0.13	0.13	0.17	0.10	0.11	
Portugal	0.18	0.17	0.16	0.15	0.17	
Romania	0.92	0.71	0.60	0.75	0.89	
Slovakia	0.18	0.17	0.16	0.16	0.18	
Slovenia	0.05	0.10	0.10	0.11	0.14	↑
Spain	0.13	0.12	0.12	0.12	0.15	
Sweden	0.23	0.20	0.19			N/A
<b>EU/EEA*</b>	<b>0.23</b>	<b>0.20</b>	<b>0.18</b>	<b>0.20</b>	<b>0.23</b>	

\* EU/EEA mean refers to the population-weighted mean consumption based on data from 23 current EU Member States and two EEA countries (Iceland and Norway) reporting data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

Data not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable. Trend analyses were not performed because of missing data, changes in the type of data or change in data process.

a) Luxembourg changed its data collection process during the period, which could have an impact on comparability with previous years.

**Table 11. Total consumption (community and hospital sector combined) of antivirals for systemic use (ATC groups J05) EU/EEA countries, 2019–2023 (expressed as DDD per 1 000 inhabitants per day)**

Country	2019	2020	2021	2022	2023	Trend 2019–2023
Austria	1.84	1.81	1.72	2.03	1.71	
Belgium	2.25	2.19	2.22	2.36	2.50	
Bulgaria	2.06	2.84	1.82	2.56	3.21	
Croatia	0.87	0.86	0.92	0.99	1.02	
Cyprus	1.98	2.36	2.55	2.24		↑ N/A
Czechia	0.96	1.40	1.82	1.47	1.50	
Denmark	2.93	2.90	2.91	2.95	3.12	
Estonia	6.76	6.38	7.08	7.59	6.54	
Finland	1.71	1.68	1.75	2.03	2.31	
France	4.28	4.25	4.20	4.45	4.84	
Germany						N/A
Greece	3.36	3.30	2.95	3.29	4.62	
Hungary	0.95	0.97	1.35	1.23	1.11	
Iceland	2.27	2.24	2.38	2.62	3.00	
Ireland						N/A
Italy	2.00	2.00	1.46	11.19	15.08	
Latvia	3.52	3.16	2.90	3.15	3.24	
Lithuania	1.73	1.60	1.32	1.85	2.44	
Luxembourg <sup>a</sup>	2.69	2.89	2.91	3.22	3.56	N/A
Malta	0.84	0.61	0.57	0.77	0.90	
Netherlands						N/A
Norway	1.90	1.93	1.95	2.05	2.17	
Poland	2.85	3.73	2.93	3.87	4.20	
Portugal	6.74	7.71	7.84	7.96	7.76	
Romania	2.82	3.18	2.71	2.86	3.07	
Slovakia	0.88	1.09	2.66	2.95	1.44	
Slovenia	0.60	1.04	1.03	1.13	1.21	
Spain	0.25	0.26	0.28	0.31	0.33	
Sweden	2.01	2.03	2.06			↑ N/A
<b>EU/EEA*</b>	<b>2.46</b>	<b>2.63</b>	<b>2.44</b>	<b>4.31</b>	<b>5.12</b>	

\* EU/EEA mean refers to the population-weighted mean consumption based on data from 23 current EU Member States and two EEA countries (Iceland and Norway) reporting data for at least four years during the period 2019 to 2023. Imputations have been included as described in the 'Methods' section.

Data not reported.

The symbols ↑ and ↓ indicate a statistically significant increasing and decreasing trend. N/A = Not applicable. Trend analyses were not performed because of missing data, changes in the type of data or change in data process.

a) Luxembourg changed its data collection process during the period, which could have an impact on comparability with previous years.

## Discussion

Ensuring prudent use of antimicrobials is fundamental for an effective response to the emergence and spread of antimicrobial resistance (AMR) [8]. The importance of AMC surveillance data to guide and evaluate interventions targeting prudent use of antibiotics is highlighted at both EU [8] and global levels [11,12]. The latest AMC data from ESAC-Net, presented in this report and through the online ECDC AMC database [5], highlight opportunities for significant reductions in AMC and improvements in AMC surveillance, calling for intensified efforts at EU and country levels.

### Poor progress towards the EU targets on AMC

The Council Recommendation on stepping up EU actions against antimicrobial resistance in a One Health approach (2023/C 220/01) [8] sets EU targets of a 20% reduction in total antibiotic consumption in humans between 2019 and 2030 and at least 65% of all antibiotics consumed in humans being from the WHO 'Access' group by 2030. After the temporary reduction in total AMC in 2020 and 2021, the first years of COVID-19 pandemic [13], the rate has now returned to slightly above the baseline level of 2019. No decreasing trends between 2019 and 2023 could be detected at EU level overall, or for any individual EU Member State. The poor progress towards the EU target on total AMC means that the initial need, assuming a linear reduction trend, for an average annual reduction of 0.36 DDD per 1 000 inhabitants per day over 11 years, has now increased to 0.59 over seven years. In addition, there has been limited progress towards the second EU target of  $\geq 65\%$  of total AMC being from the 'Access' group antibiotics, and no increase in the number of EU Member States reaching this target since 2019.

At national level, many Member States still have a long way to go to reach their individual country-specific targets. Although all individual national targets contribute to reaching the common EU-level goal, they put the greatest burden of reduction on Member States with the highest AMC. National interventions therefore need to be context-specific and adapted to local conditions and challenges. In addition to the EU targets on AMC, establishment of additional national goals for infection prevention and control, antimicrobial stewardship and prescription practices could be helpful to monitor and evaluate interventions to improve antimicrobial use in EU/EEA countries.

### Continued increased consumption of WHO 'Reserve', broad-spectrum and last-line antimicrobials, in both the community and hospital sectors

The increases in the ratio of mainly 'broad-spectrum' to 'narrow-spectrum' antibiotics in the community sector and the percentage of WHO 'Reserve' group consumption in the hospital sector highlighted in previous years [14] continued in 2023. This indicates an ongoing shift towards consumption of antibiotics with a broader spectrum of activity, as well as 'last-resort' antibiotics for the treatment of confirmed or suspected infections due to multidrug-resistant organisms.

While it is possible that this increase could partly be attributed to an increased need to appropriately treat infections caused by bacteria with resistance to first- and second-line antibiotics, it could also indicate a need to review the indications for the use of these antibiotics in many EU/EEA countries. This is supported by the results of the latest ECDC point prevalence survey (PPS) of healthcare-associated infections and antimicrobial use in European acute care hospitals 2022–2023, showing large inter-country variation and sometimes extensive use of broad-spectrum antibiotics in EU/EEA hospitals. Recommendations from the ECDC PPS include reducing inappropriate antimicrobial use by targeting the use of broad-spectrum antimicrobials, the switch from intravenous to oral administration, increasing post-prescription review of antimicrobial treatments, and ensuring dedicated skilled personnel and time for antimicrobial stewardship consultancy [15]. In addition, availability and use of rapid diagnostic tests and ensuring rapid testing for clinical AMR can reduce inappropriate use of last-line antibiotics [16]. Several of these recommendations could also be applied in the community and long-term care facility sectors.

### Challenges in AMC surveillance capacity in the EU/EEA

The latest Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01) recommends that Member States close existing surveillance gaps and ensure completeness of human AMC data at all levels, including community, hospitals and long-term care facilities [8]. Within ESAC-Net, the number of countries able to report data separately for the community and the hospital sector has increased over the last five years, but issues regarding comparability and data availability remain.

Collection of AMC data is a complex process, including the integration of data from diverse sources and sectors. The types of healthcare facilities included in the community and hospital sectors differ across EU/EEA countries and therefore caution should be exercised when interpreting AMC rates, especially when making comparisons between countries. Sector attribution of long-term care facility data differed across countries, and in some instances long-term care facility data were incomplete or not reported at all. In addition, differences in pharmaceutical distribution systems could have an impact on AMC data when specific antimicrobial agents are excluded from reimbursement, distributed, imported or exported outside of the system covered by surveillance, or subject to stockpiling. These challenges are particularly noticeable for antimicrobials from ATC groups other than J01 (i.e. antimycotics and antifungals for systemic use (J02 and D01B), antimycobacterial for treatment of tuberculosis (J04A) and antivirals for systemic use (J05)).

Several countries are currently revising their AMC surveillance systems, including making changes to data collection processes and legal frameworks. While this will eventually lead to strengthened AMC surveillance in the EU/EEA, it will temporarily challenge data availability, as well as comparability of trends.

## **A need to strengthen efforts to address unnecessary and inappropriate antimicrobial use in the EU/EEA**

The poor progress towards the EU targets on AMC and the continued proportional increase in the consumption of WHO 'Reserve' and 'broad-spectrum' antibiotics highlights the need to strengthen efforts to address unnecessary and inappropriate antimicrobial use at all levels of healthcare (i.e. community, hospital and long-term care sectors) in the EU/EEA. As emphasised in the Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach, national strategies should include key elements to promote prudent use of antimicrobials, including antimicrobial stewardship programmes, integrated into infection prevention and control activities. The Council Recommendation also highlights the importance of timely availability of standardised data on AMC for benchmarking, and on AMR for clinical guidance [8].

Strengthening antimicrobial stewardship programmes is one of the most cost-effective means for promoting appropriate antimicrobial use, reducing unnecessary AMC and limiting the harmful effects of AMR. In so doing, these programmes could also yield substantial health and economic gains in the EU/EEA [17, 18]. However, there is considerable variability in the implementation of antimicrobial stewardship programmes in the EU/EEA, with consistent reports on shortcomings across countries [18]. In addition, improving the knowledge and changing the attitudes and behaviour of the public, patients and healthcare staff is essential if we are to establish and ensure the prudent use of antimicrobials, both in terms of expectations, normative pressures and adherence to treatment guidelines [16]. Some examples of educational material targeting both prescribers and the public can be found on the European Antibiotic Awareness Day website [19] and in ECDC's Directory of online resources for prevention and control of antimicrobial resistance and healthcare-associated infections [20].

The EU Guidelines for the prudent use of antimicrobials in human health emphasise the fact that, although the ultimate responsibility for the policies and structures necessary to ensure the prudent use of antimicrobials lies with the national, regional and local governments, collaboration with other organisations (including regulators and those responsible for delivering healthcare and professional education) is essential. These initiatives need to scale up in the context of increasing AMR [21] and healthcare systems still recovering from the COVID-19 pandemic [22], placing high demands on the availability of strong policy support and adequate funding mechanisms. While the importance of optimising antimicrobial usage practices through surveillance and stewardship activities is recognised in all national action plans on AMR in the EU, the level of implementation and funding mechanisms for these activities vary [23]. This highlights the importance of ensuring sustainable implementation arrangements in national action plans, as well as operational, monitoring and evaluation frameworks.

## Public health conclusions

The poor progress towards the EU targets on antimicrobial consumption and the continued increase in the consumption of WHO 'Reserve' and 'broad-spectrum' antibiotics highlights the need to strengthen efforts to address unnecessary and inappropriate antimicrobial use at all levels of healthcare (i.e. community, hospital and long-term care sectors) in the EU/EEA.

As emphasised in the Council Recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health approach (2023/C 220/01), national action plans should include key elements to promote prudent use of antimicrobials, including antimicrobial stewardship programmes integrated into good diagnostic practises and infection prevention and control activities. The EU Council Recommendation also highlights the importance of timely availability of standardised data on antimicrobial consumption for benchmarking, and on antimicrobial resistance for clinical guidance.



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