

SURVEILLANCE REPORT



Surveillance of antimicrobial consumption in Europe

2010

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Surveillance of antimicrobial consumption in Europe

2010



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Errata

The following corrections were made on 7 March 2013:

The zero values were amended to indicate values <0 in tables 3.2, 3.5, 4.3, 4.4, 5.1 and 6.1

The following corrections were made on 5 September 2014:

Page 40. For indicator J01CE_%, the range from 0.2% to 31.1% was corrected to <0.1% to 31.1%; for indicator J01CR_%, the range from <0.3% to 7.1% was corrected to <0.1% to 40.9%; for indicator J01MA_% the range from <3.1% to 13.1% was corrected to 2.5% to 13.3%.

Page 42. p0 values were corrected for J01F, J01CE_%, J01CR_%, J01MA_%, J01_B/N and the p100 value for J01C.

Page 45. 'The proportion of consumption of tetracyclines (ATC groupJ01A) ... to 11.7% (the Netherlands)' was corrected to read 'The proportion of consumption of tetracyclines (ATC groupJ01A) ...to 11.7% (Sweden)'.

A number of other changes were made to correct minor typographical errors.

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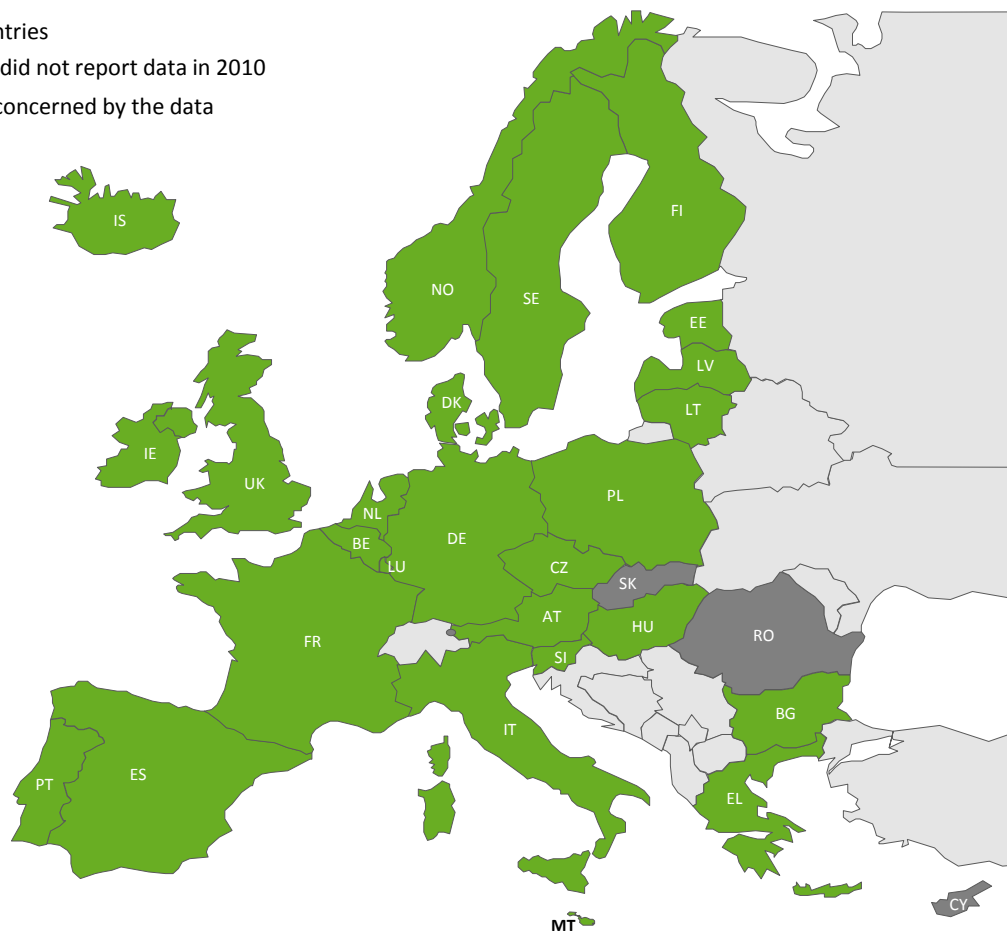
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Abbreviations

AB	Antibiotic
AMR	Antimicrobial resistance
ARPEC	Antibiotic Resistance and Prescribing in European Children Project
ATC classification	Anatomical therapeutic chemical classification
DDD	Defined Daily Dose
EARS-Net	European Antimicrobial Resistance Surveillance Network
ECDC	European Centre for Disease Prevention and Control
EEA	European economic area
ESAC-Net	European Surveillance of Antimicrobial Consumption Network
ESAC project	European Surveillance of Antimicrobial Consumption Project
ESVAC	European Surveillance of Veterinary Antimicrobial Consumption
EU	European Union
Eurostat	Statistical office of the European Union
HAI-Net	Healthcare-Associated Infections Surveillance Network
HC	Hospital care
TC	Total care
WHO	World Health Organization

EU/EEA countries participating in ESAC-Net, 2010

- Reporting countries
- Countries that did not report data in 2010
- Countries not concerned by the data



AT	Austria	EL	Greece	LT	Lithuania	RO	Romania
BE	Belgium	ES	Spain	LU	Luxembourg	SE	Sweden
BG	Bulgaria	FI	Finland	LV	Latvia	SI	Slovenia
CY	Cyprus	FR	France	MT	Malta	SK	Slovakia
CZ	Czech Republic	HU	Hungary	NL	Netherlands	UK	United Kingdom
DE	Germany	IE	Ireland	NO	Norway		
DK	Denmark	IS	Iceland	PL	Poland		
EE	Estonia	IT	Italy	PT	Portugal		

National institutions/organisations participating in ESAC-Net

Country	National institutes/organisations	website
Austria	Ministry of Health	www.bmg.gv.at
Belgium	Public Health, Food Chain Safety and Environment Scientific Institute of Public Health University of Antwerp (Laboratory of Medical Microbiology)	www.health.belgium.be www.wiv-isp.be www.ua.ac.be
Bulgaria	National Center of Infectious and Parasitic Diseases Alexander University Hospital, Medical University	www.ncipd.org
Cyprus	Directorate of Medical and Public Health Services Pharmaceutical Services	www.moh.gov.cy
Czech Republic	Charles University, Faculty of pharmacy	www.faf.cuni.cz
Germany	Robert Koch Institute Wissenschaftliches Institut der AOK (WIdO)	www.rki.de www.wido.de
Denmark	Statens Serum Institut	www.ssi.dk
Estonia	Health Board State Agency of Medicines	www.ravimiamet.ee
Finland	National Institute for Health and Welfare	www.thl.fi
France	National Institute for Public Health Surveillance Agency for the Safety of Health Products	www.invs.sante.fr http://afssaps-tst.afssaps.fr/html/index.htm
Greece	Hellenic Center for Disease Control and Prevention National Organization for Medicines National and Kapodistrian University of Athens, Medical School	www.keelpno.gr www.eof.gr http://en.uoa.gr
Hungary	National Center for Epidemiology University of Science of Szeged	www.oek.hu www.u-szeged.hu
Ireland	Health Protection Surveillance Centre	www.hpsc.ie
Iceland	Centre of Health Security and Communicable Disease Control	http://www.landlaeknir.is/ http://www.lyfjastofnun.is/
Italy	Ministry of Health National Institute of Health Italian Medicines Agency	www.salute.gov.it www.simi.iss.it www.agenziafarmaco.gov.it
Lithuania	Institute of Hygiene	
Luxembourg	Ministry of Health	www.ms.public.lu/fr/index.html

Country	National institutes/organisations	website
Latvia	The Centre for Disease Prevention and Control (CDPC) of Latvia State Agency of Medicines of Latvia Pauls Stradins Clinical University Hospital	http://www.spkc.gov.lv www.vza.gov.lv www.stradini.lv
Malta	National Antibiotic Committee	www.nacmalta.info/ https://ehealth.gov.mt/healthportal/others/regulatory_councils/national_antibiotic_committee/introduction.aspx
Netherlands	National Institute for Public Health and the Environment Dutch working group on antibiotic policy	www.rivm.nl www.swab.nl
Norway	Norwegian Institute of Public Health	www.fhi.no
Poland	Ministry of Health National Institute of Public Health National Medicines Institute	www.mz.gov.pl www.pzh.gov.pl www.il.waw.pl
Portugal	National Authority of Medicines and Health Products	www.infarmed.pt
Romania	National Institute of Public Health National Institute of Research and Development for Microbiology and Immunology "Cantacuzino"	www.cantacuzino.ro
Slovenia	National Institute of Public Health University Medical Centre Ljubljana	http://www.ivz.si/ www.4.kclj.si
Slovakia	Comenius University	www.uniba.sk
Spain	National Centres of Microbiology and Epidemiology Spanish Agency of Medicines and Medical Devices (AEMPS) University Hospital Son Espases University Hospital of Bellvitge	www.aemps.gob.es www.hospitalsonespases.es/ www.bellvitgehospital.cat
Sweden	Swedish Institute for Communicable Disease Control	www.smi.se
United Kingdom	Health Protection Agency Health Protection Scotland Public Health Agency University of Dundee University Hospital of South Manchester Welsh Antimicrobial Research Programme The British Society for Antimicrobial Chemotherapy	www.hpa.org.uk www.hps.scot.nhs.uk www.dundee.ac.uk www.uhsm.nhs.uk www.wales.nhs.uk www.bsac.org.uk

Summary

This is the first annual report of the European Surveillance of Antimicrobial Consumption Network (ESAC-Net) published by ECDC. The report is based on antimicrobial consumption data from the community (primary care sector) and the hospital sector reported to ECDC for the year 2010 by 24 EU Member States and two EEA non-EU countries (Iceland and Norway).

Key findings

In 2010, consumption of antibacterials for systemic use (anatomical therapeutic chemical (ATC) group J01) in the community, i.e. outside hospitals, was reported by 26 countries and varied by a factor of 3.5 between the highest (39.4 Defined Daily Doses (DDD) per 1 000 inhabitants and per day in Greece) and the lowest consumption (11.1 DDD per 1 000 inhabitants and per day in Estonia). The median consumption was 18.3 DDD per 1 000 inhabitants and per day. The most commonly used J01 subgroups were the combinations of penicillins including beta-lactamase inhibitors (ATC group J01CR) and penicillins with extended-spectrum (ATC group J01CA), followed by macrolides (ATC group J01FA) and tetracyclines (ATC group J01AA). No increase in the median consumption of antibacterials for systemic use in Europe was observed in 2010 compared to the surveillance period of the ESAC project (2001–2009). Fifteen (58%) participating countries reported a decrease in or a stable rate of consumption, while 11 (42%) countries reported an increase. The largest increase in the community was seen in the United Kingdom with 18.6 DDD per 1 000 inhabitants and per day in 2010, compared to 17.3 DDD per 1 000 inhabitants and per day reported for 2009. Lithuania reported a decrease in consumption from 19.7 DDD per 1 000 inhabitants and per day in 2009 to 12.7 DDD per 1 000 inhabitants and per day in 2010.

In 2010, 22 countries reported data on consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community. Consumption varied by a factor of 11.4 between the highest (3.3 DDD per 1 000 inhabitants and per day in Belgium) and the lowest consumption (0.29 DDD per 1 000 inhabitants and per day in Slovenia). Terbinafine, ketoconazole, fluconazole and itraconazole accounted for 98.9% of the total antimycotic and antifungal consumption in the community in all countries. Terbinafine consumption accounted for more than 50% of the total systemic antimycotic and antifungal consumption in 16 (72%) countries.

In 2010, two of the 12 quality indicators from the former ESAC project used to express consumption data of antibacterials for systemic use (ATC group J01) in the community [3, 4] showed a distinctive variation between European countries as described below:

- Consumption of beta-lactamase-sensitive penicillins (ATC group J01CE) expressed as a percentage of the total consumption of antibacterials for systemic use (ATC group J01), varied from <0.1% in Italy and 0.2% in Portugal to 31.1% in Denmark and 23.3% in Norway.
- The ratio of the consumption of broad-spectrum penicillins, cephalosporins and macrolides to that of narrow-spectrum penicillins, cephalosporins and macrolides, varied from 0.2 in Sweden and Norway to 180.2 in Malta.

In the hospital sector, consumption of antibacterials for systemic use (ATC group J01) in the 18 countries that reported 2010 data varied from 1.1 DDD per 1 000 inhabitants and per day in the Netherlands, to 3.0 in Latvia. The most frequently used subgroup in the hospital sector was the penicillin group (ATC group J01C), followed by cephalosporins (ATC group J01D) and quinolones (ATC group J01M).

In 2010, 17 countries reported consumption data of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the hospital sector, ranging from 0.02 DDD per 1 000 inhabitants and per day in Lithuania to 0.2 DDD per 1 000 inhabitants and per day in Belgium. Overall, amphotericin B and fluconazole accounted for 77% of the total antimycotic and antifungal consumption in the hospital sector in these countries. Fluconazole consumption alone accounted for more than 50% of the total systemic antimycotic and antifungal consumption in 10 (59%) participating countries.

In 2010, data on total antiviral consumption (ATC group J05), jointly presented for both the community and the hospital sector, were available from 22 countries. Consumption varied by a factor of 19.5 between the highest consumption (3.7 DDD per 1 000 inhabitants and per day in Denmark) and the lowest (0.19 DDD per 1 000 inhabitants and per day in Lithuania). Based on indications for treatment with the ATC group J05 substances, as suggested by the former ESAC project [5], most antivirals reported were 'HIV/AIDS antivirals' followed by 'herpes antivirals'. Bulgaria showed a different pattern with the highest consumption of antivirals active against influenza.

In 2010, only Denmark and Slovenia provided data on consumption by age group. When expressed in DDD per 1 000 inhabitants and per day, consumption of antibacterials for systemic use (ATC group J01) in these two countries was the highest among elderly persons (aged 75 years or over) and the lowest among children (aged nine years or under). The reason for this is because DDD are defined for adults and are not adapted for measuring antimicrobial consumption in children. When expressed as the number of sold packages per 1 000 inhabitants and per day, consumption among children was at the same level as that of elderly people.

Conclusions

The results presented in this report document trends of antimicrobial consumption across Europe. The general increasing trend in consumption of antibacterials for systemic use (ATC group J01) observed in the community in previous years did not continue in 2010.

Identification of the determining factors and reasons behind the changes observed in the consumption of different groups of antimicrobials remains difficult without additional data on prescriptions or indications for prescription and consumption. Additional detailed information on national programmes and campaigns on the prudent use of antimicrobials is needed to draw conclusions about the factors that may have influenced the trends that have been identified. At the European level, this would provide data for interventions aimed at best practices for the use of antimicrobials.

Inter-country comparisons using the results presented in this report should be made with caution, as certain countries report their total consumption, i.e. both the community and the hospital sector, while most other countries report only data on the community consumption. In addition, reporting practices may vary from year to year even in the same country. Finally, there are differences in the sources of national data and in the availability of national registries of all antimicrobials available on the market in each country; the latter being a prerequisite for presenting comparable data on antimicrobial consumption.

The transfer of the ESAC project from the University of Antwerp to ECDC was successfully completed during 2011. ESAC-Net will continue to collect, analyse and report data from EU/EEA countries, both in the community and in the hospital sector, and provide independent reference information on antimicrobial consumption in Europe.

Background

The European Commission funded the European Surveillance of Antimicrobial Consumption (ESAC) project coordinated by the University of Antwerp, Belgium, from 2001 to 2007. Since May 2007, funding of the ESAC project has been provided by the European Centre for Disease Prevention and Control (ECDC). At its inception, the goal of the ESAC project was to collect comparable and reliable data on antimicrobial consumption in Europe from publicly available sources, and to assess the trends in human exposure to antimicrobials. The ESAC project conducted a continuous, comprehensive collection of antimicrobial consumption data from 1997 to 2009, including consumption data for systemic use of antibiotics, antimycotics/antifungals and antivirals from the community (primary care sector) as well as the hospital sector [1, 2].

In July 2011, the coordination of the ESAC project was transferred from the University of Antwerp to ECDC and the surveillance network was renamed the European Surveillance of Antimicrobial Consumption Network (ESAC-Net). A representative of each of the 27 EU Member States and the three EEA countries were eligible to become ESAC-Net participants as nominated Member State contact points. These contact points reported antimicrobial consumption data for 2010 to the European Surveillance System. The data were then validated and analysed at ECDC. The ATC classification system was used for the allocation of antimicrobials into the following groups: antibacterials for systemic use (ATC group J01), antimycotics for systemic use and antifungals for systemic use (ATC groups J02 & D01BA), and antivirals for systemic use (ATC group J05).

1 Introduction

The use and overuse of antimicrobials is the one of the main factors responsible for the development and spread of antimicrobial resistance. Antimicrobial resistance has become a serious threat to public health, notably because of the emergence and spread of highly-resistant bacteria, and because there are very few novel antimicrobial agents in the research and development pipeline. European countries increasingly implement, or plan to implement actions to control antimicrobial resistance in the community through rational use of antimicrobials, including awareness campaigns on the prudent use of antibiotics. Access to information on antimicrobial consumption in Europe, and in particular the consumption of antibacterials can be an important source for healthcare professionals and policy makers to monitor progress towards a more prudent use of antibiotics.

The report is based on antimicrobial consumption data from the community (primary care sector) and the hospital sector reported to ECDC for the year 2010 by 24 EU Member States and two EEA non-EU countries (Iceland and Norway).

It includes data for three major categories of antimicrobials:

- antibacterials for systemic use (ATC group J01)
- antimycotics for systemic use and antifungals for systemic use (ATC groups J02 & D01BA)
- antivirals for systemic use (ATC group J05).

The largest proportion of antimicrobial consumption in humans takes place in the community, i.e. outside of hospitals. In both sectors, in the community and in the hospital sector different kind patient groups are usually cared for by the healthcare systems. The typical patterns of antimicrobial consumption differ between the two sectors. That is why results of consumption of antimicrobials of the ATC groups J01, J02 & D01BA are presented separately for the community and for the hospital sector.

Unlike the consumption of antibacterials, antimycotics and antifungals for systemic use, consumption of antivirals for systemic use (ATC group J05) is reported for both sectors grouped together. In several countries, dispensing of certain antiviral classes is limited to the hospital sector or to the community only.

Two quantitative indicators are used to report antimicrobial consumption, the number of DDD per 1 000 inhabitants and per day and the number of packages per 1 000 inhabitants and per day.

The former ESAC project developed 12 quality indicators for antimicrobial consumption in the community based on consensus of European antimicrobial surveillance experts [4]. It was concluded that these indicators could be used to better describe antimicrobial consumption and to assess changes in national antibiotic prescribing patterns in Europe. The indicators report consumption expressed in DDD per 1 000 inhabitants and per day for ATC group J01; percentage of the total consumption of antibacterials for systemic use (ATC group J01) corresponding to various sub-groups; the ratio of the consumption of broad-spectrum; and narrow spectrum antibacterials and seasonal variations of the total consumption of antibacterials for systemic use. When comparing results of different countries for the 12 quality indicators low values of the indicators suggest better quality, with the best quality being within the first quartile (p0–p25). Values of indicators within the second quartile (i.e. $p25 < \text{values} \leq p50$) suggest better quality than values of indicators in the third quartile etc. Only for the indicator describing the percentage of the total consumption of antibacterials for systemic use (ATC group J01) corresponding to the sub-group of beta-lactamase sensitive penicillins it is evaluated in the opposite way, i.e. high values of the indicator suggest better quality with the best quality being within the fourth quartile (p75–p100) This report intends to provide ECDC stakeholders with the results of the quality indicators for 2010 consumption data.

European surveillance of antimicrobial consumption

The ESAC project (2001–2011)

Surveillance of antimicrobial consumption in the EU is carried out in accordance with Decision No 2119/98/EC¹ on reporting communicable diseases and special healthcare issues (i.e. antimicrobial resistance and healthcare-associated infections) to the EU community network.

The European Commission's Directorate-General for Health and Consumers, funded the European Surveillance of Antimicrobial Consumption (ESAC) project from 2001 to 2007, which was originally coordinated by the University of Antwerp in Belgium. During the period May 2007–June 2011, funding of the ESAC project was provided by a grant from the European Centre for Disease Prevention and Control (ECDC). At its inception, the goal of the ESAC project was to collect comparable and reliable data on antimicrobial consumption in Europe from publicly available sources, and to assess the trends in human exposure to antimicrobials. The network was set up so that the ESAC project management team collaborated directly with dedicated national representatives from the 35 countries which participated. Participation in ESAC was voluntary but the network comprised all EU Member States, Iceland, Norway, Switzerland Croatia, the former Yugoslav Republic of Macedonia, Turkey, Russia and Israel). The ESAC project conducted a continuous, comprehensive collection of antimicrobial consumption data from 1997 to 2009, including consumption data for systemic use of antibiotics, antimycotics/antifungals and antivirals from the community (primary care sector), as well as the hospital sector.

In 2006, the ESAC project was the subject of an external evaluation and was found eligible for transition to ECDC together with 13 other dedicated surveillance networks in the EU. In July 2011, coordination of the ESAC project was transferred from the University of Antwerp to ECDC. Surveillance of antimicrobial consumption was integrated into The European Surveillance System and the network became the European Surveillance of Antimicrobial Consumption Network (ESAC-Net).

The ESAC project included point prevalence surveys of antimicrobial use conducted in 2008 and 2009 in acute care hospitals and in nursing homes across EU countries. These point prevalence surveys are now included as part of the activities of the Healthcare-Associated Infections Surveillance Network (HAI-Net) at ECDC [6]. Data on the prevalence of antimicrobial use in patients from European acute care hospitals in 2011–2012 are provided through the ECDC-coordinated Europe-wide point prevalence survey of healthcare-associated infections and antimicrobial use. Data on the prevalence of antimicrobial use among residents of long-term care facilities are collected by the ECDC-funded project Healthcare-Associated Infections and Antimicrobial use in European Long-Term Care Facilities (HALT-2).

ESAC-Net (2011 onwards)

ESAC-Net is today a Europe-wide network of national surveillance systems that provides independent reference data on antimicrobial consumption in Europe, reported by 29 EU/EEA countries. It collects and analyses data from the community (primary care) and the hospital sector.

The objectives of ESAC-Net are:

- to provide continuous surveillance of antimicrobial consumption in the European Union
- to work towards comparable surveillance methods and analyse inter-country differences
- to provide regular feedback to participating Member States
- to provide public access to information on antimicrobial consumption via the ESAC-Net interactive database².

To maintain and facilitate data reporting, ECDC ensures:

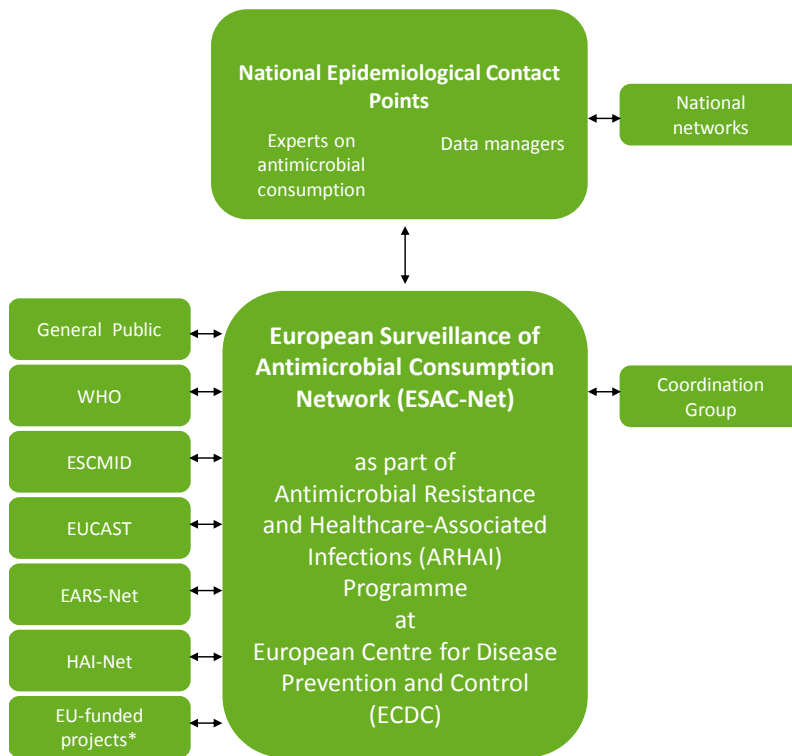
- Validation of community (primary care) and hospital sector data.
- Analysis of the trends in antimicrobial consumption overall and in the different ATC groups.
- Public access to information on antimicrobial consumption in Europe through an interactive database.
- Timely information and feedback to EU/EEA countries on indicators of antimicrobial consumption. These indicators provide a basis for monitoring the progress of EU/EEA countries towards prudent use of antimicrobials.

¹ Decision No 2119/98/EC of the European Parliament and of the Council of 24 September 1998 setting up a network for the epidemiological surveillance and control of communicable diseases in the Community. Official Journal L 268, 03/10/1998 p 1–7.

² www.ecdc.europa.eu/en/activities/surveillance/ESAC-Net/database

Figure 1.1 illustrates how the network is organised. Experts in antimicrobial consumption were nominated by each country to become network participants and they are supported by a coordination group. This group comprises of representatives from ESAC-Net participants and members of the management team and advisory board of the former ESAC project. There are also observers in the coordination group from other EU projects including the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) and the Antibiotic Resistance and Prescribing in European Children (ARPEC). This coordination group discusses technical, epidemiological and other scientific aspects of antimicrobial consumption surveillance and makes suggestions to ECDC in order to further develop the network and improve its effectiveness.

Figure 1.1. Organisation of ESAC-Net



* EU-funded projects on antimicrobial consumption, e.g. ARPEC and ESVAC.

2 Technical notes

2.1 Terminology and definitions

The term 'antimicrobial consumption' is used in this report whereas 'antimicrobial use' is applied to data from the point prevalence surveys in acute care hospitals, and in long-term-care facilities where data on the actual application of antimicrobials are retrieved from patient charts. These two projects are now part of ECDC's HAI-Net.

The term 'community' is used to designate the sector of mainly primary care (general practitioner, specialists) outside of hospitals. The terms 'ambulatory care' and 'outpatient sector' were not used to avoid potential misinterpretations as being patient care in hospitals or other healthcare facilities that did not require an overnight stay of the patient.

Antimicrobial consumption is expressed as a number of DDD per 1 000 inhabitants and per day. Complementary to this measurement unit, the number of packages per 1 000 inhabitants and per day is also used, provided that the country collects and reports data at the package level. Because the ATC/DDD system cannot take into account changes in package content, information on the sales of packages is deemed to improve the understanding and interpretation of differences in the levels and trends of consumption observed within countries and between countries.

Antimicrobials are grouped according to the anatomical therapeutic chemical (ATC) classification. The 2011 version of the ATC/DDD index from the WHO Collaborating Centre for Drug Statistics methodology (Oslo, Norway) was applied. The ATC/DDD index is available at www.whooc.no/atc_ddd_index and contains all valid ATC codes and corresponding DDD.

The three major categories of antimicrobial considered in this report (ATC groups J01, J02 & D01BA, J05) are referred to by their ATC codes rather than the name of the active ingredient.

Antibacterials for systemic use (ATC group J01) are often referred to by the public as 'antibiotics'. However, the term 'antibiotics' also includes topical antibacterials for which data are not collected by ESAC-Net.

In addition to the ATC classification, for some groups of antibiotics, i.e. macrolides and quinolones, and for antivirals, further sub-classifications that are not supported by the ATC classification were used (Annex 1). These sub-classifications were introduced by the ESAC project [5, 8, 9].

2.2 Data collection and reporting for 2010

Data on antimicrobial consumption were collected for the community (primary care sector) and for the hospital sector, and for some countries aggregated data for both sectors were combined (total care), according to the reporting protocol for 2010 data [7].

The ESAC-Net metadata [7] are, for most variables, based on the ESAC project core data. In November 2011, training was provided for the ESAC-Net participants on how to prepare, upload and approve their national consumption data. The call for 2010 surveillance data started in January 2012. ECDC accepted the last data upload on 16 May 2012, taking into consideration the technical changes that were introduced for this first upload of antimicrobial consumption data to the European Surveillance System and allowing for inclusion of data from all countries. After uploading, each country approves its own data and the results are made available from the ECDC website.

There are two options for reporting ESAC-Net data to ECDC:

- The preferred standard option, i.e. reporting of national antimicrobial consumption data at the medicinal product level and expressed as a number of packages sold. For this option, a valid national register of available antimicrobials is required (national registry data).
- A 'light' version, i.e. when national registry data are not available, reporting of aggregated numbers of DDD from national antimicrobial consumption data at the ATC substance level.

Additionally, ESAC-Net encouraged participants to report data on the above variables by age group, gender and type of prescriber, as well as to report quarterly rather than yearly data.

2.3 Data validation and analysis

The ESAC-Net data validation process consists of three steps:

- A quality check of the data was performed by the European Surveillance System using its in-built validation rules of the ESAC-Net metadata [7] during the uploading of the national data. Following the data upload, each country approved its own data.
- Following this, each ESAC-Net participating country checked the data for consistency by comparing figures displayed in the European Surveillance System online reports to national figures.
- ESAC-Net experts and data managers performed a final data validation. This final validation step included testing for outliers in terms of volume or patterns (e.g. comparison with the 2009 data from the ESAC project). When an inconsistency was detected, the European Surveillance System data managers or the network coordinator contacted the country in question for clarification, and where applicable, data were corrected and re-uploaded (last re-upload performed at the end of June 2012).

For the community data, two indicators are used to report antimicrobial consumption:

- the number of DDD per 1 000 inhabitants and per day;
- the number of packages per 1 000 inhabitants and per day.

For the hospital sector and for the few countries for which only total care data (combined reporting of antimicrobial consumption data from the community and the hospital sector) were available, one indicator is used to report antimicrobial consumption:

- the number of DDD per 1 000 inhabitants and per day.

Trends over time until 2010 were not assessed by applying statistical tests.

2.4 Data sources

In 2010, data were collated from 24 EU Member States and two EEA countries (Iceland and Norway). The data sources for ESAC-Net are national sales and reimbursement data, including information from national drug registries. Data are collected at the product level for antibacterials for systemic use (ATC group J01), antimycotics for systemic use (ATC group J02), antimycobacterials (ATC group J04), and antivirals for systemic use (ATC group J05). In addition, data on a few other antimicrobials outside of ATC group J are also collected.

Population data from Eurostat, or from national statistical reports, are used for the denominator. When consumption data do not cover the whole population, countries must provide data on the population covered by reported data on antimicrobials.

Table 2.1 provides an overview by country of the healthcare sectors from which the antimicrobial consumption data were provided: data type (origin of data), coverage of the population, and which of the four different categories of antimicrobials data were reported for. Twenty-four countries reported antimicrobial consumption data from the community. Eighteen of these countries separately uploaded data from the hospital sector. Greece and Iceland were only able to report data on both sectors combined (total care).

Data on antimicrobial consumption in the community (primary care sector), were obtained from the Ministry of Health or the national medicines agencies by half of the countries. About one third of the countries reported reimbursement data while the remaining countries reported sales data. Three countries reported both sales and reimbursement data. For most countries, the data coverage was reported as being 100%. Germany, Luxembourg, the Netherlands and Portugal reported data that covered 80–95% of the population. Most countries provided data on all antimicrobial categories under surveillance by ESAC-Net. Ireland, Poland, Spain and the United Kingdom only reported data of antibacterials for systemic use (ATC group J01).

In the hospital sector, half of the countries obtained antimicrobial consumption data from the Ministry of Health or national medicines agencies. Ireland, the Netherlands, Norway and Slovenia obtained the data from national hospital networks. Most countries reported sales data. Out of 18 countries, only Belgium reported reimbursement data and four countries reported both reimbursement and sales data. The data coverage was 100% with the exception of Ireland, Luxembourg and Portugal, which reported population coverage between 90 and 95%. All countries except for Ireland and the Netherlands, provided data on all categories under surveillance in ESAC-Net.

In 2010, 17 countries (65% of those reporting data for the community) chose the preferred standard option of uploading data to the European Surveillance System with complete national registry data to provide data to ESAC-Net for the community or for both healthcare sectors combined (total care, Greece and Iceland). Twelve countries (67% of those reporting data for the hospital sector) used this standard option to provide data for the hospital sector.

Compared with 2009 data, two countries had changed the type of data reported: Luxembourg reported sales data for the hospital sector for 2010 and Italy reported reimbursement data for the community for 2010. All other countries used not only the same data types, but also the same data providers for 2010 as for 2009. For 2010, Ireland, Latvia, Norway and Slovenia reported additional reimbursement data. Belgium, Italy, Lithuania and the Netherlands reported data from the hospital sector for 2010, which these countries had not been able to do for 2009.

Table 2.1 provides information on the data sources used for denominator data. Twenty-three countries used the total population or an extrapolation of this population to indicate the population covered by the consumption data. These countries did not need to provide national population data to ESAC-Net since the European Surveillance System automatically applies Eurostat population data for the calculations (done automatically by the European Surveillance System for 11 of the 23 countries). The remaining three countries, i.e. Czech Republic, Germany and Luxembourg, provided and applied the population covered by health insurance.

Comment

ESAC-Net aims for all network participants to use the ESAC-Net standard option for reporting antimicrobial consumption data (i.e. at the medicinal product level with a valid national register of available antimicrobials), thus ensuring a harmonised reporting of the consumption data in DDD by use of a standardised calculation procedure by the European Surveillance System. In addition, the standard option of ESAC-Net allows for a better validation and further analysis than the reporting of aggregated DDD ('light' option). For 2010 data, two thirds of the countries reporting community data, half of the countries reporting hospital sector data and the two countries reporting total care data, used this ESAC-Net standard option.

Analyses of antimicrobial consumption trends rely on countries consistently reporting data of the same type and provider. This is the case for most of the countries. However, Luxembourg reported sales data for the hospital sector in 2010 and Italy reported reimbursement data for the community in 2010, and trends in these countries and healthcare sectors should therefore be interpreted with caution. The availability, in four countries, of reimbursement data in addition to sales data allowed for additional quality checks of the data.

Reimbursement data do not include antimicrobials obtained without a prescription and thus give an underestimate of antimicrobial consumption in the community in those countries where over-the-counter dispensation of antimicrobials is known to occur [10]. Where appropriate, this limitation is mentioned in the footnotes of tables and figures in this report.

Table 2.1. Overview on data sources used for the surveillance of antimicrobial consumption by country, 2010

Country	Sector	Data provider	Data type	Data Coverage (%)	Antibacterials for systemic use (ATC group J01)*	Antimycotics and anti-fungals for systemic use (J01 & D01BA)	Drugs for treatment of tuberculosis (ATC group J04)	Antivirals for systemic use (ATC group J05)
Austria	C	Health Insurance Company	Reimbursement	100	Y	Y	Y	Y
Belgium	C	Health Insurance Company	Reimbursement	100	Y	Y	Y	Y
	HC	Health Insurance Company	Reimbursement	100	Y	Y	Y	Y
Bulgaria	C	Marketing Research Company	Sales	100	Y	Y	Y	Y
	HC	Marketing Research Company	Sales	100	Y	Y	Y	Y
Czech Republic	C	Health Insurance Company	Reimbursement	100	Y	Y	Y	Y
Denmark	C	Ministry of Health	Sales	100	Y	Y	Y	Y
	HC	Ministry of Health	Sales	100	Y	Y	Y	Y
Estonia	C	Medicines Agency	Sales	100	Y	Y	Y	Y
	HC	Medicines Agency	Sales	100	Y	Y	Y	Y
Finland	C	Medicines Agency	Sales	100	Y	Y	Y	Y
	HC	Medicines Agency	Sales	100	Y	Y	Y	Y
France	C	Medicines Agency	Sales	100	Y	Y	Y	Y
	HC	Medicines Agency	Sales	100	Y	Y	Y	Y
Germany	C	Health Insurance Company	Reimbursement	85	Y	Y	Y	Y
Greece	TC	Medicines Agency	Sales	100	Y	Y	Y	Y
Hungary	C	Marketing Research Company	Sales	100	Y	Y	Y	Y
	HC	Marketing Research Company	Sales	100	Y	Y	Y	Y
Iceland	TC	Medicines Agency	Sales	100	Y	Y	Y	Y
Ireland	C	Marketing Research Company	Sales	100	Y	N	N	N
	HC	Hospital network	Sales and reimbursement	90	Y	Y	N	N
Italy	C	Medicines Agency	Sales	100	Y	Y	Y	Y
	HC	Medicines Agency	Sales	100	Y	Y	Y	Y
Latvia	C	Medicines Agency	Sales and reimbursement	100	Y	Y	Y	Y
	HC	Medicines Agency	Sales and reimbursement	100	Y	Y	Y	Y
Lithuania	C	Medicines Agency	Sales	100	Y	Y	Y	Y
	HC	Medicines Agency	Sales	100	Y	Y	Y	Y
Luxembourg	C	Health Insurance Company	Reimbursement	95	Y	Y	Y	Y
	HC	Other	Sales	95	Y	Y	Y	Y
Malta	C	Ministry of Health	Sales	100	Y	Y	Y	Y
	HC	Ministry of Health	Sales	100	Y	Y	Y	Y
Netherlands	C	Community Pharmacists	Sales	92	Y	Y	Y	Y
	HC	Hospital network	Sales	100	Y	N	N	N
Norway	C	Other	Sales and reimbursement	100	Y	Y	Y	Y
	HC	Hospital network	Sales and reimbursement	100	Y	Y	Y	Y
Poland	C	Ministry of Health	Reimbursement	100	Y	N	N	N
Portugal	C	Ministry of Health	Sales	80	Y	Y	Y	Y
	HC	Ministry of Health	Sales	95	Y	Y	Y	Y
Slovenia	C	Other	Sales and reimbursement	100	Y	Y	Y	Y
	HC	Hospital network	Sales and reimbursement	100	Y	Y	Y	Y
Spain	C	Ministry of Health	Reimbursement	100	Y	N	N	N
Sweden	C	Other	Sales	100	Y	Y	Y	Y
	HC	Other	Sales	100	Y	Y	Y	Y
United Kingdom	C	Ministry of Health	Reimbursement	100	Y	N	N	N

C: community; HC: hospital care; TC: total care; Y: yes; N: no. *: oral and rectal nitroimidazole derivatives as antiprotozoals (ATC subgroup P01AB), oral vancomycin as intestinal anti-infective (ATC chemical substance A07AA09).

3. Consumption of antimicrobials for systemic use in the community

This chapter covers data on consumption of antibiotics (antibacterials) and of antimycotics and antifungals for systemic use in the community (i.e. outside hospitals).

3.1 Consumption of antibacterials for systemic use (ATC group J01)

3.1.1 Overall consumption of antibacterials for systemic use (ATC group J01)

Results

Twenty-six of 29 countries reported data on consumption of antibacterials for systemic use (ATC group J01) in the community for 2010. As in previous years, there were large inter-country variations in antibiotic consumption. These variations were observed both for the total consumption of antibacterials for systemic use (ATC group J01) and for all subgroups of antibacterials for systemic use, i.e. at ATC group level 3.

Results for Greece and Iceland, which reported total care data in 2010, are shown jointly with the consumption data for the community (primary care sector).

The total consumption of antibacterials for systemic use (ATC group J01) in the community ranged from 11.1 DDD per 1 000 inhabitants and per day (Estonia) to 39.4 DDD per 1 000 inhabitants and per day (Greece).

Figure 3.1 shows a north–south gradient with the lowest consumption (< 16.7 DDD per 1 000 inhabitants and per day) in the north of Europe, e.g., Scandinavian and Baltic countries, and the highest consumption (\geq 22.4 DDD per 1 000 inhabitants and per day) in the south of Europe, e.g. Greece, Italy and Portugal.

Consumption decreased in 15 (58%) countries between 2009 and 2010. However, the difference for Estonia and for Slovenia was very low (0.3 and 0.1 DDD per 1 000 inhabitants and per day, respectively). Since 1997, the number of reporting EU/EEA countries increased substantially from 14 countries in 1997 to 26 countries in 2010. Table 3.1 provides an overview, by country, for the period 1997 to 2010.

Consumption of six major subgroups of antibacterials for systemic use (ATC group J01) in the community in 2010 is presented in Table 3.1 and in Figure 3.1. Results for the subgroups are presented in detail in chapters 3.1.2 to 3.1.7.

Table 3.1. Consumption of antibacterials for systemic use (ATC group J01) in the community, EU/EEA countries, 1997–2010, expressed as DDD per 1 000 inhabitants and per day

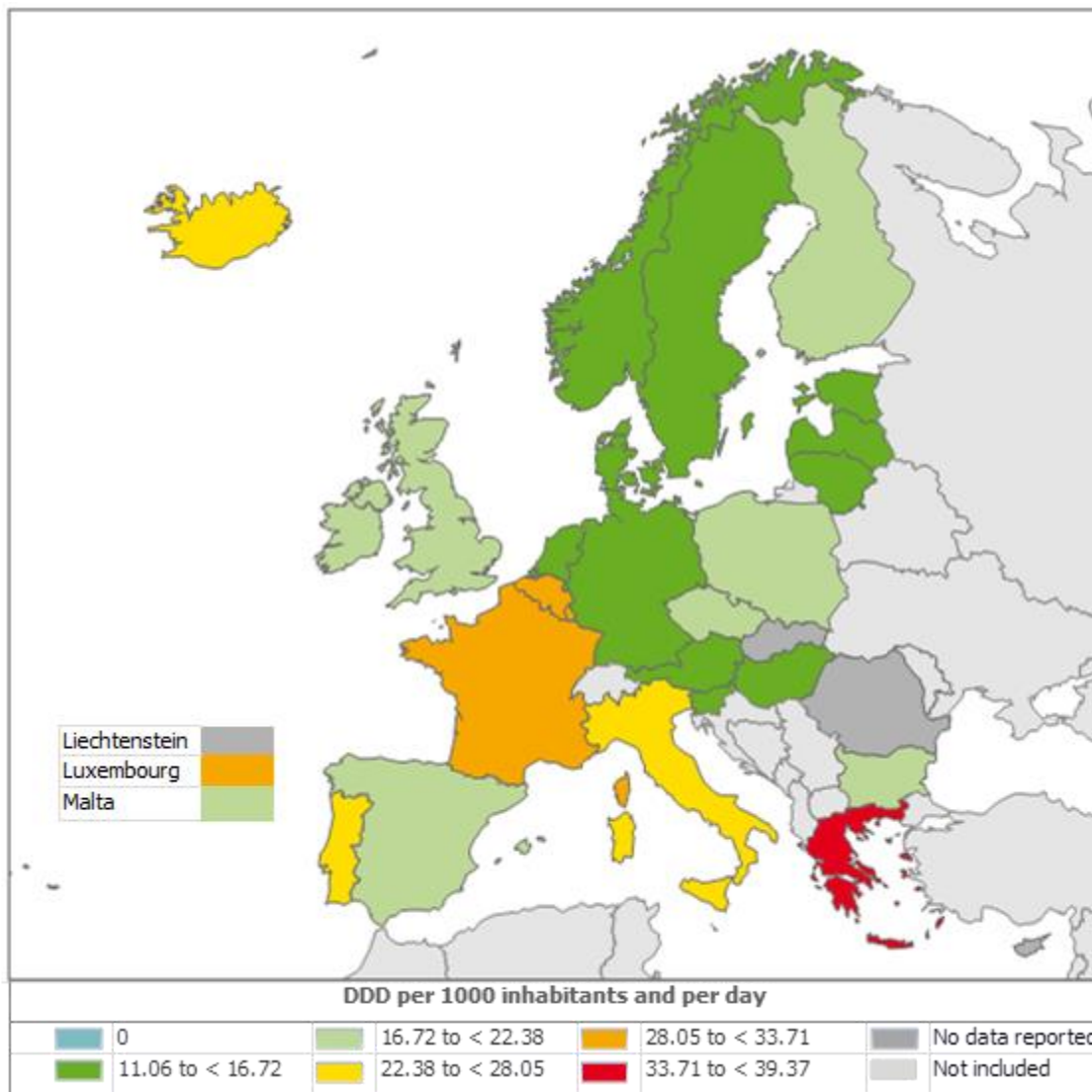
Country	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Austria		12.6	13.1	12.3	11.8	11.8	12.5	12.5	14.5	14.3	14.7	15.1	15.9	14.9
Belgium	25.4	26.4	26.2	25.3	23.7	23.8	23.8	22.7	24.3	24.2	25.4	27.7	27.5	28.4
Bulgaria			15.1*	20.2*	22.7*	17.3*	15.5*	16.4*	18.0*	18.1	19.8	20.6	18.6	18.2
Cyprus										31.9*	33.9*	32.8*	34.4*	
Czech Republic		18.2	18.6			17.1	16.7	15.8	17.3	15.9	16.8	17.4	18.4	17.9
Denmark	12.2	12.7	12.1	12.3	12.8	13.2	13.5	14.1	14.6	15.2	16.1	16.0	16.0	16.5
Estonia					14.4*	11.7	11.1	10.4	11.7	11.8	12.7	11.9	11.1	11.1
Finland	19.4	18.4	18.4	19.0	19.8	17.9	18.7	17.2	18.1	17.4	18.3	17.9	18.0	18.5
France	33.1	33.6	34.1	33.2	33.2	32.2	28.9	27.0	28.9	27.9	28.6	28.0	29.6	28.2
Germany	13.0	13.3	13.6	13.6	12.8	12.7	13.9	13.0	14.6	13.6	14.5	14.5	14.9	14.5
Greece	25.1	24.9	28.5	29.4	29.6	30.6	31.3	33.0*	34.7*	41.0*	43.2*	45.2*	38.6	39.4*
Hungary		18.3	23.5	18.5	18.6	17.1	19.1	18.2	19.5	17.2	15.5	15.2	16.0	15.7
Iceland	22.2*	23.1*	21.7*	20.5*	20.0*	20.6*	20.3*	21.4*	23.2*	20.0	19.3	20.6	19.5	23.1*
Ireland		16.5	18.0	17.6	18.7	18.7	20.1	20.2	20.5	21.2	23.0	22.4	20.8	20.3
Italy			24.5	24.0	25.5	24.3	25.6	24.8	26.2	26.7	27.6	28.5	28.7	27.4
Latvia						11.0		11.8	12.3	12.0	12.1	11.0	10.5	11.1
Lithuania										22.7*	24.1*	25.1*	19.7*	12.7
Luxembourg ^(a)	27.2	26.9	28.2	27.1	27.6	27.5	28.6	24.9	26.3	25.1	27.2	27.0	28.2	28.6
Malta											17.9	20.8	21.6	21.3
Netherlands	10.1	9.9	10.0	9.8	9.9	9.8	9.8	9.7	10.5	10.8	11.0	11.2	11.4	11.2
Norway		15.3			15.6	15.7	15.6	15.7	16.8	14.8	15.5	15.5	15.2	15.8
Poland		20.7	22.2	22.6	24.8	21.4		19.1	19.6		22.2	20.7	23.6	21.0
Portugal	23.1	23.3	25.2	24.9	24.5	26.5	25.1	23.8	24.5	22.7	22.1	22.6	22.9	22.4
Romania ^(b)													10.2	
Slovakia			25.7	27.6	29.1	26.7	27.6	22.5	25.1	22.5	24.8	23.4	23.8	
Slovenia	17.5	19.3	19.8	18.0	17.4	16.3	17.0	16.7	16.3	14.7	16.0	15.0	14.4	14.4
Spain ^(b)	21.3	20.6	20.0	19.0	18.0	18.0	18.9	18.5	19.3	18.7	19.9	19.7	19.7	20.3
Sweden	14.6	15.5	15.8	15.5	15.8	15.2	14.7	14.5	14.9	15.3	15.5	14.6	13.9	14.2
United Kingdom	17.0	16.2	14.8	14.3	14.8	14.8	15.1	15.0	15.4	15.3	16.5	16.9	17.3	18.6
Minimum	10.1	9.9	10.0	9.8	9.9	9.8	9.8	9.7	10.5	10.8	11.0	11.0	10.2	11.1
Median	20.4	18.4	20.0	19.0	18.7	17.3	18.7	17.2	18.1	17.8	18.8	20.1	18.6	18.3
Maximum	33.1	33.6	34.1	33.2	33.2	32.2	31.3	33.0	34.7	41.0	43.2	45.2	38.6	39.4

*Total care data; i.e. including the hospital sector.

^(a)Luxembourg updated all years with insured population data.

^(b)Romania and Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Figure 3.1. Consumption of antibacterials for systemic use (ATC group J01) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day



Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community. Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Other antibiotics, including amphenicols (ATC group J01B), aminoglycosides (ATC group J01G), combinations (ATC group J01R) and other antibacterials (ATC group J01X) are presented together in Figure 3.2 and Table 3.2 as 'other'. In 2010, consumption in these four ATC groups in the community varied from 0.02 DDD per 1 000 inhabitants and per day (Slovenia) to 3.3 DDD per 1 000 inhabitants and per day (Greece), with other antibacterials (ATC group J01X) being the most consumed. Nitrofurantoin (J01XE01) and nifurtoinol (J01XE02) accounted for 92% of the consumption of ATC group J01X in Belgium. The Nordic countries showed the highest levels of methenamine (J01XX05) consumption, varying from 1.3 (Sweden) and 1.6 (Finland) to 2.8 (Norway) DDD per 1 000 inhabitants and per day.

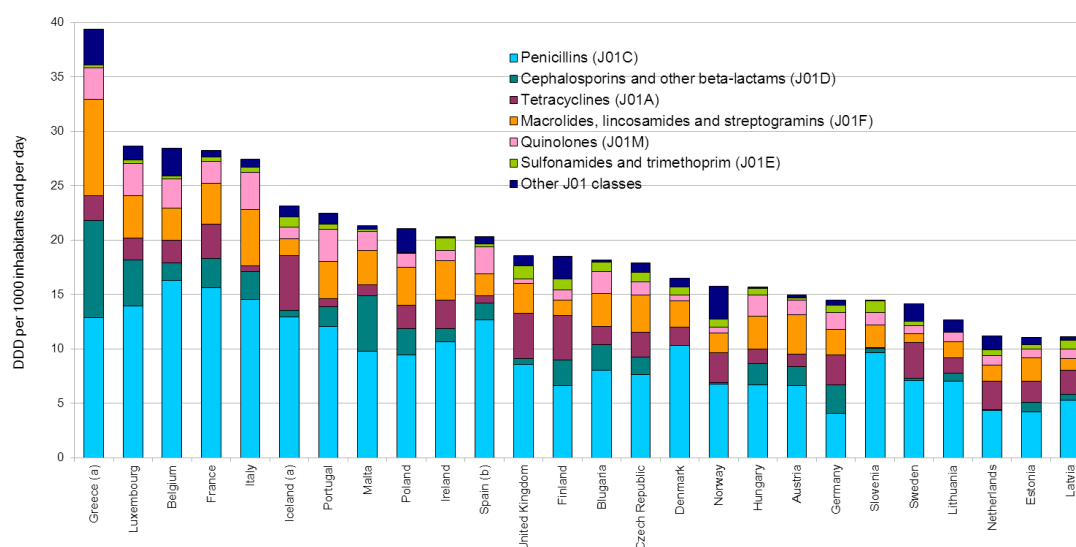
Table 3.2. Consumption of antibacterials for systemic use (ATC group J01) at ATC group level 3 in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day

Country	Tetracyclines (J01A)	Beta-lactams, penicillins (J01C)	Other beta-lactam antibacterials (J01D)	Sulfonamides and trimethoprim (J01E)	Macrolides, lincosamides and streptogramins (J01F)	Quinolones (J01M)	Other (J01B, J01G, J01R and J01X)	Total (ATC group J01)
Austria	1.2	6.6	1.7	0.2	3.6	1.4	0.3	14.9
Belgium	2.1	16.3	1.6	0.3	2.9	2.7	2.6	28.4
Bulgaria	1.7	8.0	2.3	0.9	3.0	2.0	0.2	18.2
Czech Republic	2.3	7.6	1.6	0.9	3.5	1.2	0.9	17.9
Denmark	1.7	10.3	<0.1	0.8	2.4	0.5	0.8	16.5
Estonia	1.9	4.2	0.9	0.4	2.2	0.8	0.7	11.1
Finland	4.1	6.6	2.3	1.0	1.5	0.9	2.1	18.5
France	3.2	15.6	2.7	0.4	3.8	2.0	0.6	28.2
Germany	2.7	4.1	2.6	0.7	2.3	1.5	0.5	14.5
Greece (a)	2.3	12.9	8.9	0.3	8.8	2.9	3.3	39.4
Hungary	1.4	6.7	1.9	0.6	3.0	2.0	0.1	15.7
Iceland (a)	5.1	12.9	0.6	0.9	1.6	1.0	1.0	23.1
Ireland	2.6	10.7	1.2	1.1	3.7	0.9	0.2	20.3
Italy	0.5	14.6	2.6	0.4	5.1	3.4	0.8	27.4
Latvia	2.2	5.3	0.5	0.8	1.1	0.9	0.3	11.1
Lithuania	1.4	7.0	0.8	<0.1	1.5	0.8	1.2	12.7
Luxembourg	2.0	14.0	4.2	0.3	3.9	2.9	1.3	28.6
Malta	1.0	9.8	5.0	0.2	3.1	1.8	0.4	21.3
Netherlands	2.7	4.4	<0.1	0.6	1.4	0.9	1.3	11.2
Norway	2.8	6.8	0.1	0.7	1.8	0.5	3.1	15.8
Poland	2.1	9.4	2.4	0.1	3.5	1.2	2.2	21.0
Portugal	0.7	12.1	1.8	0.5	3.4	3.0	1.0	22.4
Slovenia	<0.1	9.7	0.4	1.1	2.1	1.1	<0.1	14.4
Spain (b)	0.7	12.6	1.6	0.3	2.0	2.5	0.7	20.3
Sweden	3.3	7.1	0.2	0.4	0.7	0.8	1.7	14.2
United Kingdom	4.1	8.6	0.5	1.2	2.7	0.5	0.9	18.6

(a) Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

(b) Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Figure 3.2. Consumption of antibacterials for systemic use (ATC group J01) at ATC group level 3 in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day



(a) Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

(b) Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

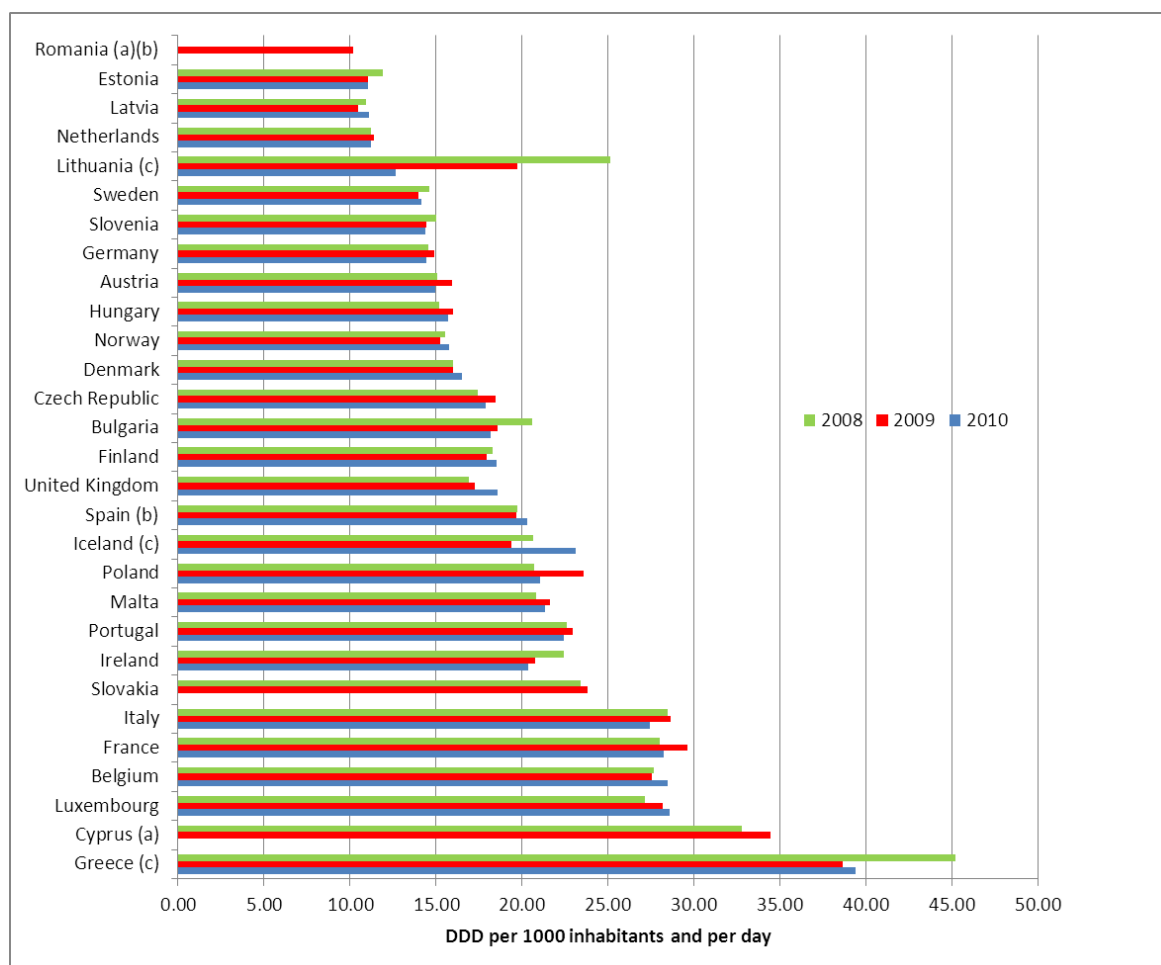
Trends

Trends in the consumption of antibacterials for systemic use (ATC group J01) in the community from 2008 to 2010 are presented in Figure 3.3. Between 2009 and 2010 the median consumption for the 26 EU/EEA countries that reported data for both years decreased by 0.3 DDD per 1 000 inhabitants and per day.

Three countries (Austria, Lithuania and Poland) showed a decrease of consumption of antibacterials for systemic use (ATC group J01) of more than 5% between 2009 and 2010. Additionally, five countries (Bulgaria, Estonia, Ireland, Lithuania and Slovenia) showed a continuous decrease between 2008 and 2010. In particular, Lithuania reported a nearly 50% decrease from 25.1 DDD per 1 000 inhabitants and per day in 2008 to 12.7 in 2010.

Three countries (Iceland, Latvia and the United Kingdom) showed an increase of consumption of antibacterials for systemic use (ATC group J01) of more than 5% between 2009 and 2010, two countries (Luxembourg and the United Kingdom) showed a continuous increase between 2008 and 2010.

Figure 3.3. Trends of consumption of antibacterials for systemic use (ATC group J01) in the community, EU/EEA countries, 2008–2010, expressed as DDD per 1 000 inhabitants and per day.



(a) Cyprus and Slovakia reported data only for 2008 and 2009; Romania only for 2009.

(b) Romania and Spain reported reimbursement data, i.e. not including over-the-counter sales without a prescription and other non-reimbursed courses.

(c) Greece (2008, 2010), Iceland (2010) and Lithuania (2008, 2009) provided only total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

Discussion

In 2010, the median consumption of antibacterials for systemic use (ATC group J01) was at the same level as in 2009, whereas a trend of a general decrease had been observed from 1999 to 2004 followed by a gradual increase from 2004 to 2008 [1].

One country (Lithuania) reported a substantial decrease of consumption of antibacterials for systemic use (ATC group J01), with the following possible explanations: a decrease in the number of small local pharmacies, a more strict control of antimicrobial dispensing due to the economic crisis, and removal of reimbursement of antibiotics for adults.

For 2010, only Greece reported total care data including both consumption in the community and the hospital sector, making comparison with data from 2009 difficult. Making the assumption that consumption in the hospital sector in Greece in 2010 was similar to that reported for 2009, this would mean a 5–7% decrease of consumption in the community between 2009 and 2010. A possible explanation for this assumed decrease was reported by Greece as being the introduction in 2010 of an obligatory electronic prescription system, which may have limited the dispensation of antibiotics without a prescription by pharmacies as well as allowed authorities to evaluate prescribers. This decrease will need follow-up and needs to be confirmed with 2011 data.

There were other short-term decreases or increases of consumption of antibacterials for systemic use (ATC group J01) in EU/EEA countries. More information is provided in the comments of the country sheets (see Annex 2).

3.1.2 Tetracyclines (ATC group J01A)

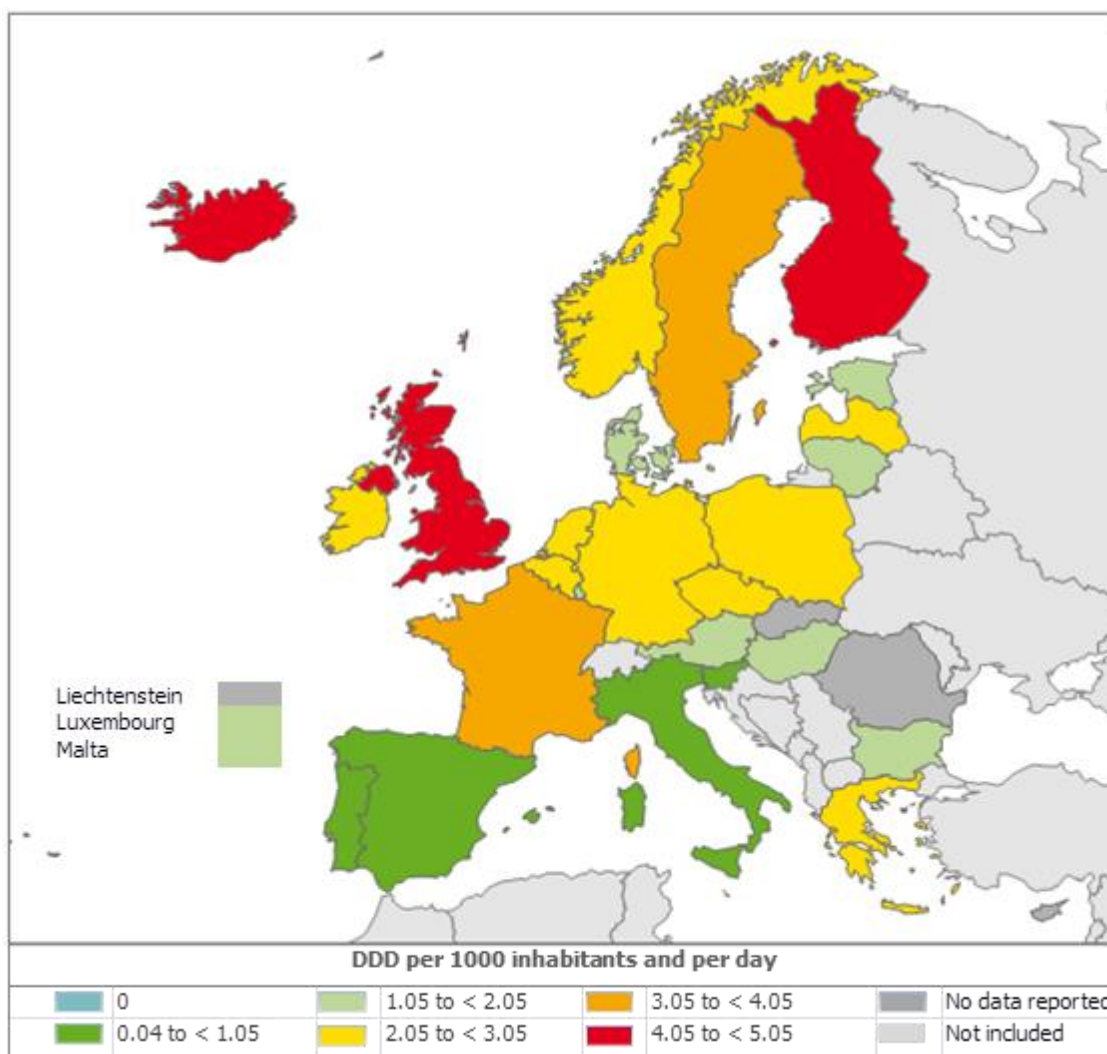
Results

In 2010, consumption of tetracyclines (ATC group J01A) in the community ranged from 0.04 DDD per 1 000 inhabitants and per day (Slovenia) to 5.1 DDD per 1 000 inhabitants and per day (Iceland), with a median of 2.1 DDD per 1 000 inhabitants and per day (Table 3.2). Tetracycline consumption was generally lower in southern Europe than in northern and western Europe (Figure 3.4). Tetracycline consumption as a proportion of the total consumption of ATC group J01 ranged from less than 0.3% (Slovenia) to 23.7% (the Netherlands).

The most consumed of all tetracyclines in the community in 2010 was doxycycline which, on average, accounted for 74.9% of consumption of this group, followed by lymecycline, minocycline and tetracycline. This pattern is similar to that observed for 2009.

Likewise in 2009, some countries showed different patterns of consumption of the various tetracyclines. In 2010, lymecycline was the most frequently consumed of all tetracyclines in the United Kingdom, representing 34.4% of consumption of this group.

Figure 3.4. Consumption of tetracyclines (ATC group J01A) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



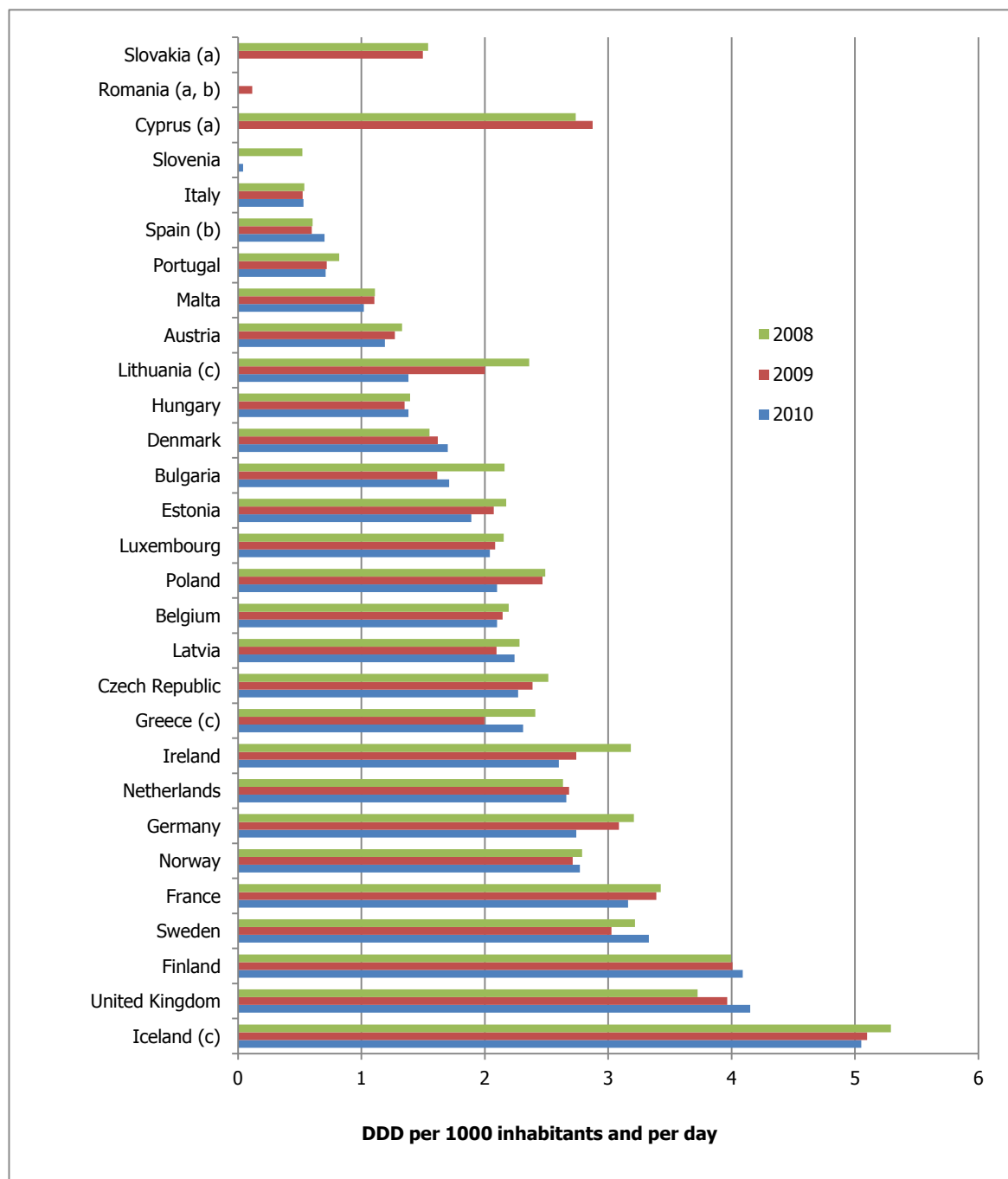
Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community. Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Trends

Figure 3.5 shows the consumption of tetracyclines (ATC J01A) in the community per country between 2008 and 2010. During this period, consumption continuously decreased in 12 of the 26 countries reporting for the full three-year period, while a continuous increase could be noted in three countries (Denmark, Finland and the United Kingdom).

As shown in Figure 3.6, the median consumption of tetracyclines in the community (2.0 DDD per 1 000 inhabitants and per day) and the corresponding interquartile ranges of consumption in the participating countries did not differ between 2010 and 2009.

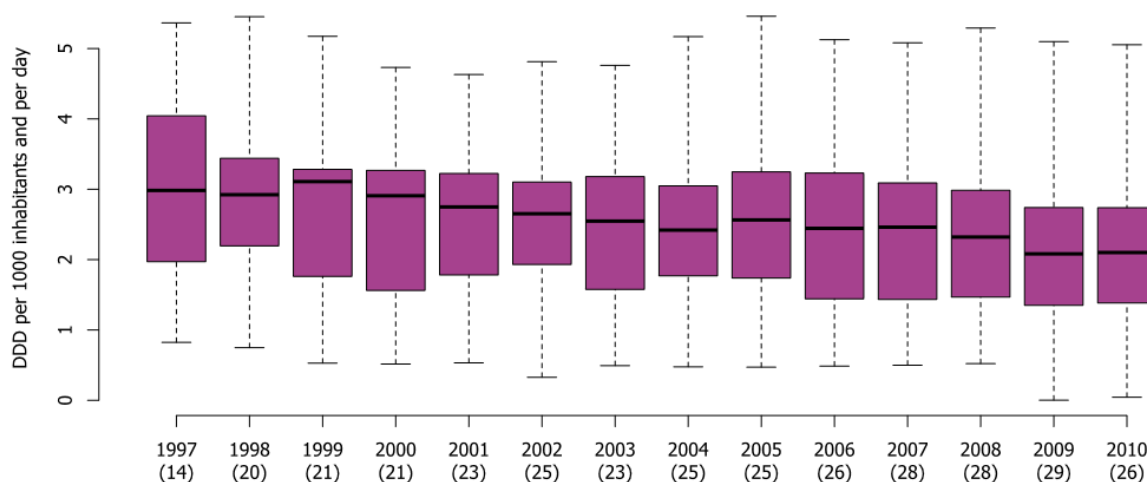
Figure 3.5. Trends of consumption of tetracyclines (ATC group J01A) in the community, EU/EEA countries, 2008-2010, expressed as DDD per 1 000 inhabitants and per day.



^(a)Cyprus and Slovakia reported data only for 2008 and 2009; Romania only for 2009; ^(b) Romania and Spain: reimbursement data, i.e. not including over-the-counter sales without a prescription and other non-reimbursed courses, ^(c)Greece (2008, 2010), Iceland (2010) and Lithuania (2008–2009) provided only total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

Doxycycline consumption represented less than 50% of the total consumption of tetracyclines only in Belgium, Denmark, Ireland, Sweden and the United Kingdom in 2009, and only in Belgium, Denmark and the United Kingdom in 2010. For all other countries, doxycycline consumption represented more than 50% of the total consumption of tetracyclines.

Figure 3.6. Trends and inter-country variations of consumption of tetracyclines (ATC group J01A) in the community, EU/EEA countries, 1997–2010, expressed as DDD per 1 000 inhabitants and per day.



Boxes indicate the lower and the upper quartiles. The bold lines indicate the medians. Whiskers indicate the minimum and maximum values. For 1997–2009, only data from ESAC participating countries that also participated in ESAC-Net in 2010 are included. The number of participating countries is shown in parentheses.

Discussion

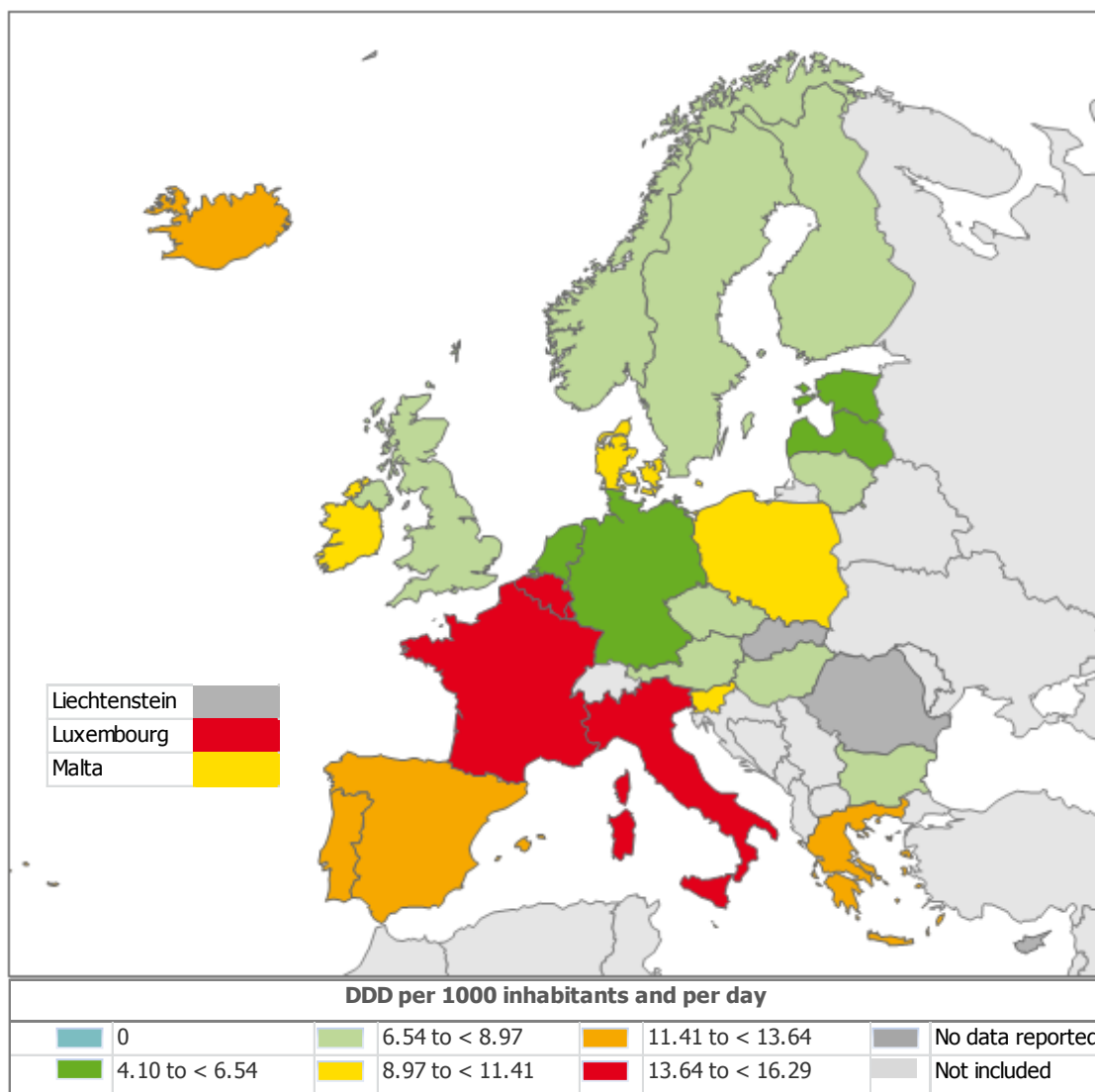
The ESAC project reported a significant decrease of consumption of tetracyclines (J01A) in the community during 1997–2009 [11]. Although the relative consumption of doxycycline within this group increased between 2009 and 2010, the median consumption of tetracyclines in the 26 reporting EU/EEA countries did not increase in 2010 compared to 2009.

3.1.3. Beta-lactams, penicillins (ATC group J01C)

Results

In all countries, penicillins (ATC subgroup J01C) were the antibiotics with the highest consumption in the community. In 2010, consumption of penicillins ranged from 4.1 DDD per 1 000 inhabitants and per day (Germany) to 16.3 DDD per 1 000 inhabitants and per day (Belgium) (Figure 3.2). The median consumption was 8.9 DDD per 1 000 inhabitants and per day among the countries reporting data for 2010. In ten out of 26 countries, penicillins contributed to 50% or more of the total consumption of antibacterials for systemic use (ATC group J01) in the community, with Slovenia having the highest percentage (67% of the total antimicrobial consumption in the community) and Germany the lowest percentage (28%).

Figure 3.7. Consumption of beta-lactams, penicillins (ATC group J01C) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community. Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

As shown in Figure 3.8, the main subgroups of penicillins were penicillins with extended spectrum (ATC group J01CA) and combinations of penicillins, incl. beta-lactamase inhibitors (ATC group J01CR). In 2010, consumption of penicillins with extended spectrum (ATC group J01CA) ranged from 1.1 (Malta) to 8.5 (France) DDD per 1 000 inhabitants and per day. Consumption of combinations of penicillins, incl. beta-lactamase inhibitors (ATC group J01CR) ranged from 0.2 (Sweden) to 9.7 (Italy) DDD per 1 000 inhabitants and per day.

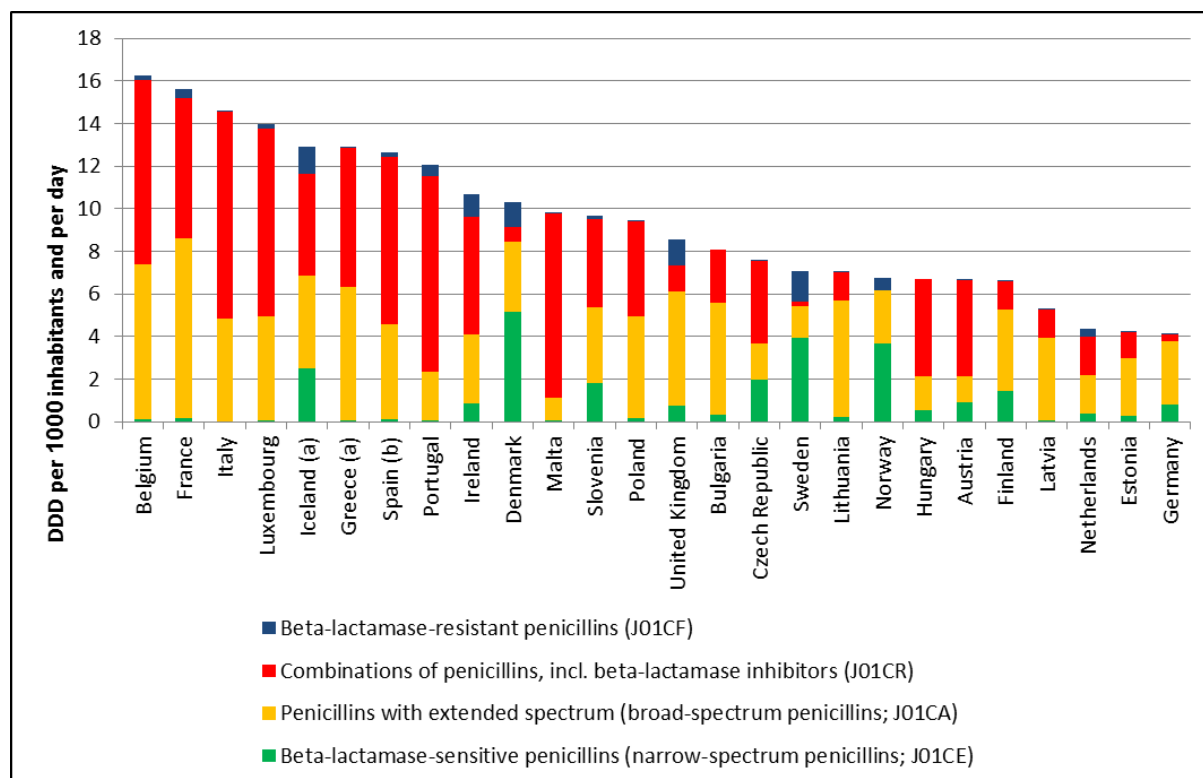
As in 2009, the two most frequently consumed penicillins were amoxicillin (J01CA04) and amoxicillin with enzyme inhibitor (J01CR02). Consumption of amoxicillin (J01CA04, i.e. without enzyme inhibitor) ranged from 0.9 (Sweden)

to 8.5 (France) DDD per 1 000 inhabitants and per day. Consumption of amoxicillin with enzyme inhibitor (J01CR02) ranged from <0.01 (Norway) to 9.7 (Italy) DDD per 1 000 inhabitants and per day.

Consumption of phenoxymethylpenicillin (J01CE02), the main beta-lactamase sensitive penicillin, in only three countries (Denmark, Norway and Sweden) represented 51.6% of the total consumption of this antibiotic in the 26 EU/EEA countries reporting data to ESAC-Net in 2010.

The proportion of combinations of penicillins, incl. beta-lactamase inhibitors (ATC group J01CR) among all beta-lactams, penicillins (ATC group J01C) ranged from <0.01% (Norway) to 88.1% (Malta).

Figure 3.8. Consumption of broad- and narrow-spectrum penicillins in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



^(a) Greece and Iceland provided total care data, i.e. including the hospital sector.

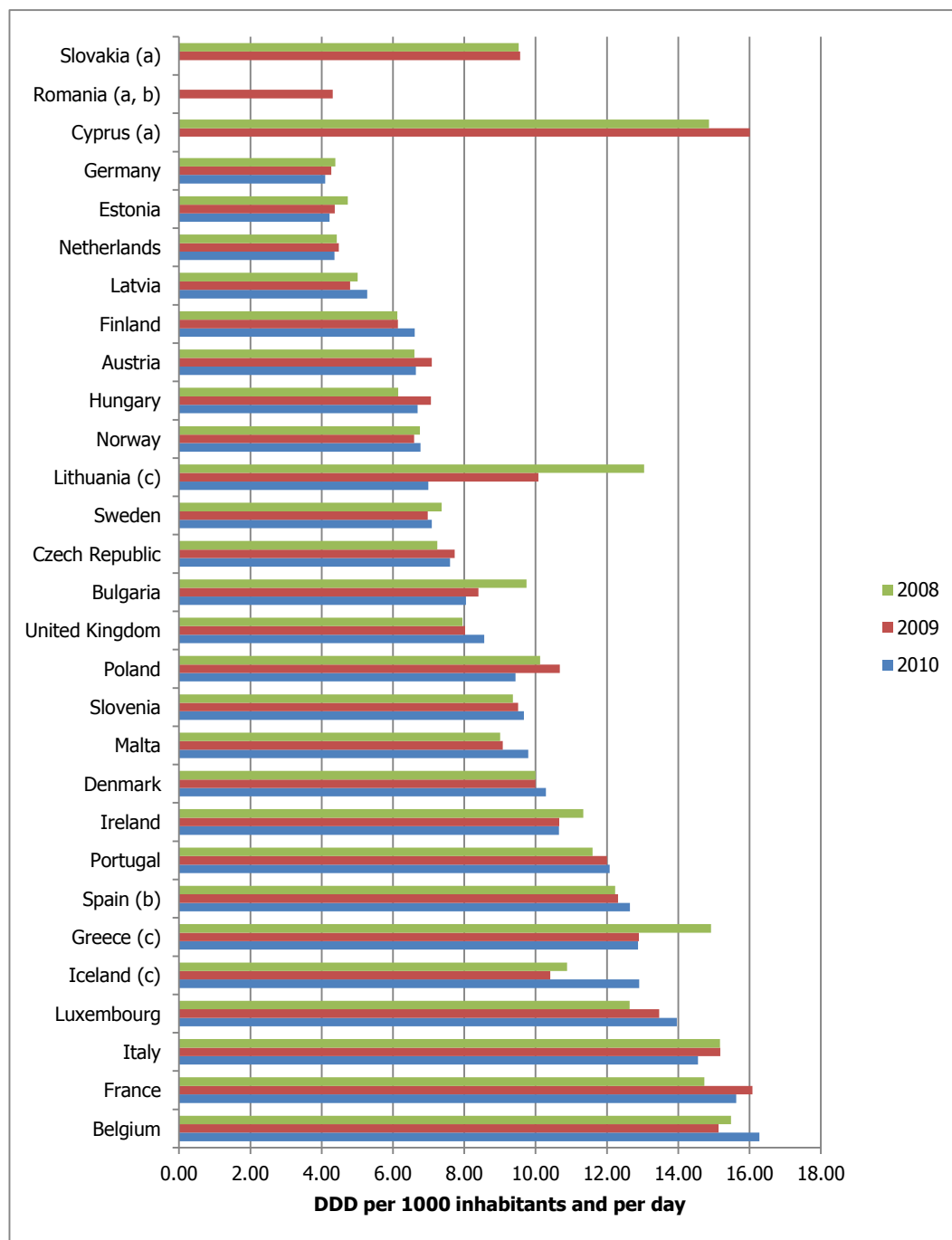
^(b) Spain provided reimbursement data, i.e. not including consumption without a prescription and other non-reimbursed courses.

Trends

Among countries reporting data for 2008–2010, consumption of penicillins (J01C) continuously increased in eight countries (Denmark, Finland, Luxembourg, Malta, Portugal, Slovenia, Spain and the United Kingdom) and continuously decreased in five countries (Bulgaria, Estonia, Germany, Greece and Lithuania) (Figure 3.9).

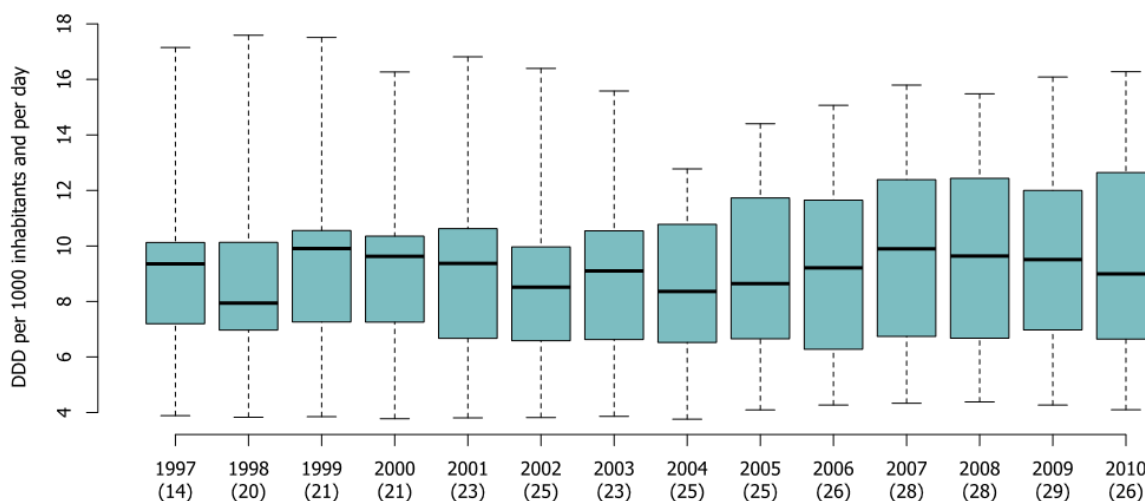
As shown in Figure 3.10, the median consumption of beta-lactams, penicillins (ATC group J01C) decreased from 9.5 DDD per 1 000 inhabitants and per day in 2009 to 8.4 DDD per 1 000 inhabitants and per day in 2010.

Figure 3.9. Trends of consumption of beta-lactams, penicillins (ATC group J01C) in the community, EU/EEA countries, 2008–2010, expressed as DDD per 1 000 inhabitants and per day.



^(a) Cyprus and Slovakia reported data only for 2008 and 2009; Romania only for 2009; ^(b) Romania and Spain: reimbursement data, i.e. not including over-the-counter sales without a prescription and other non-reimbursed courses, ^(c) Greece (2008, 2010), Iceland (2010) and Lithuania (2008–2009) provided only total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

Figure 3.10. Trends and inter-country variations of consumption of beta-lactams, penicillins (ATC group J01C) in the community, EU/EEA countries, 1997-2010, expressed as DDD per 1 000 inhabitants and per day.



Boxes indicate the lower and the upper quartiles. The bold lines indicate the medians. Whiskers indicate the minimum and maximum values. For 1997–2009, only data from ESAC participating countries that also participated in ESAC-Net in 2010 are included. The number of participating countries is shown in parentheses.

Discussion

Penicillins (ATC group J01C) are the most frequently prescribed and consumed antibacterials for systemic use in the community. The percentage of total consumption of antibacterials for systemic use (ATC group J01) corresponding to penicillins (ATC group J01C) has been suggested as a quality indicator for antibiotic consumption in the community (Table 3.6).

Phenoxymethylpenicillin (ATC J01CE02) is the most commonly consumed penicillin in Scandinavian countries, where it is used as a first-line drug among the penicillins, whereas in other countries amoxicillin (J01CA04) and amoxicillin with enzyme inhibitor (J01CR02) are the most commonly consumed penicillins.

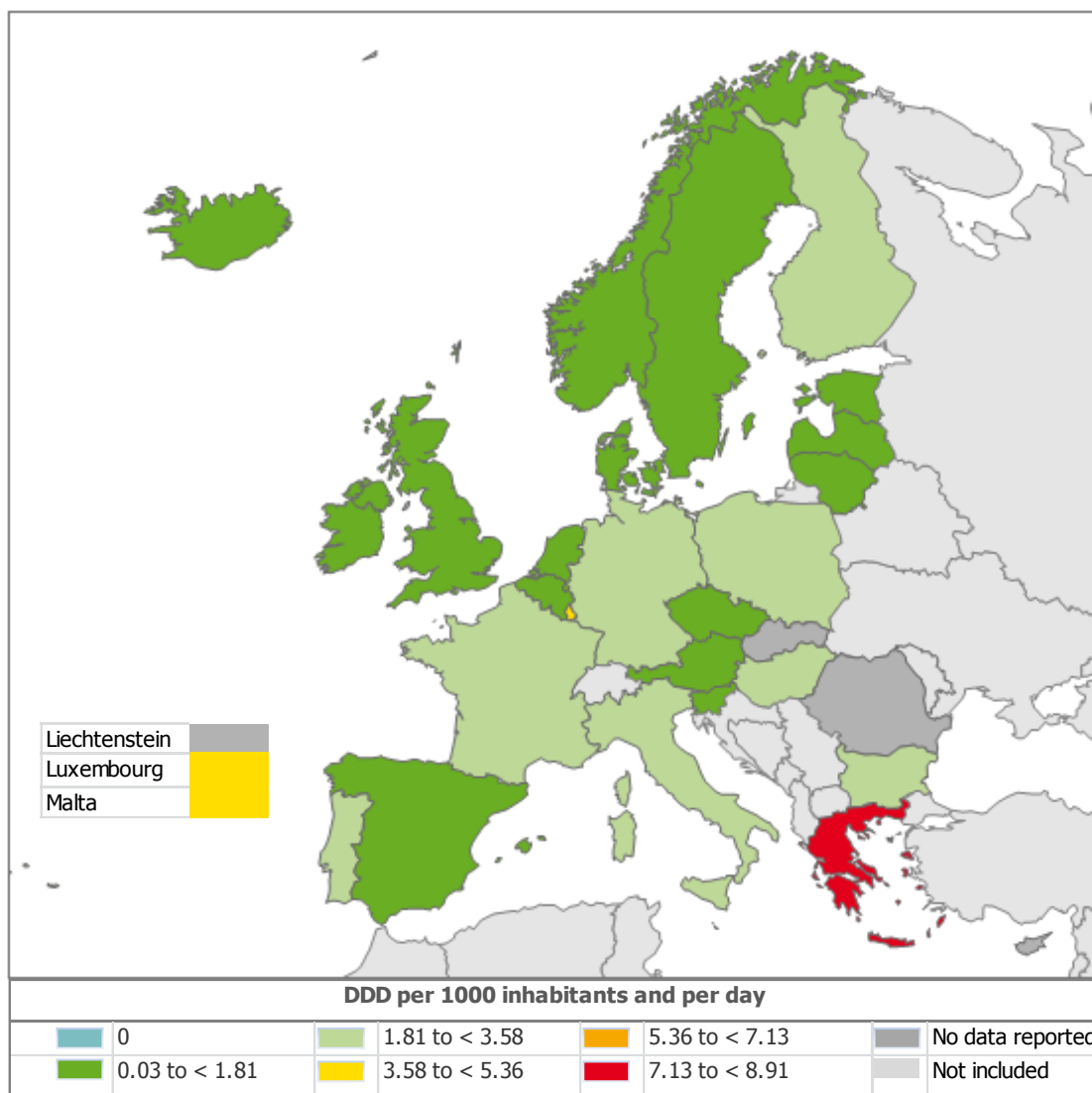
The ESAC project reported a significant increase in the consumption of penicillins (ATC group J01C) during 1997-2009 [12]. Data from 2010, however, show a 12% decrease of the median consumption of penicillins compared to 2009 (Figure 3.10).

3.1.4. Other beta-lactam antibacterials (ATC group J01D)

Results

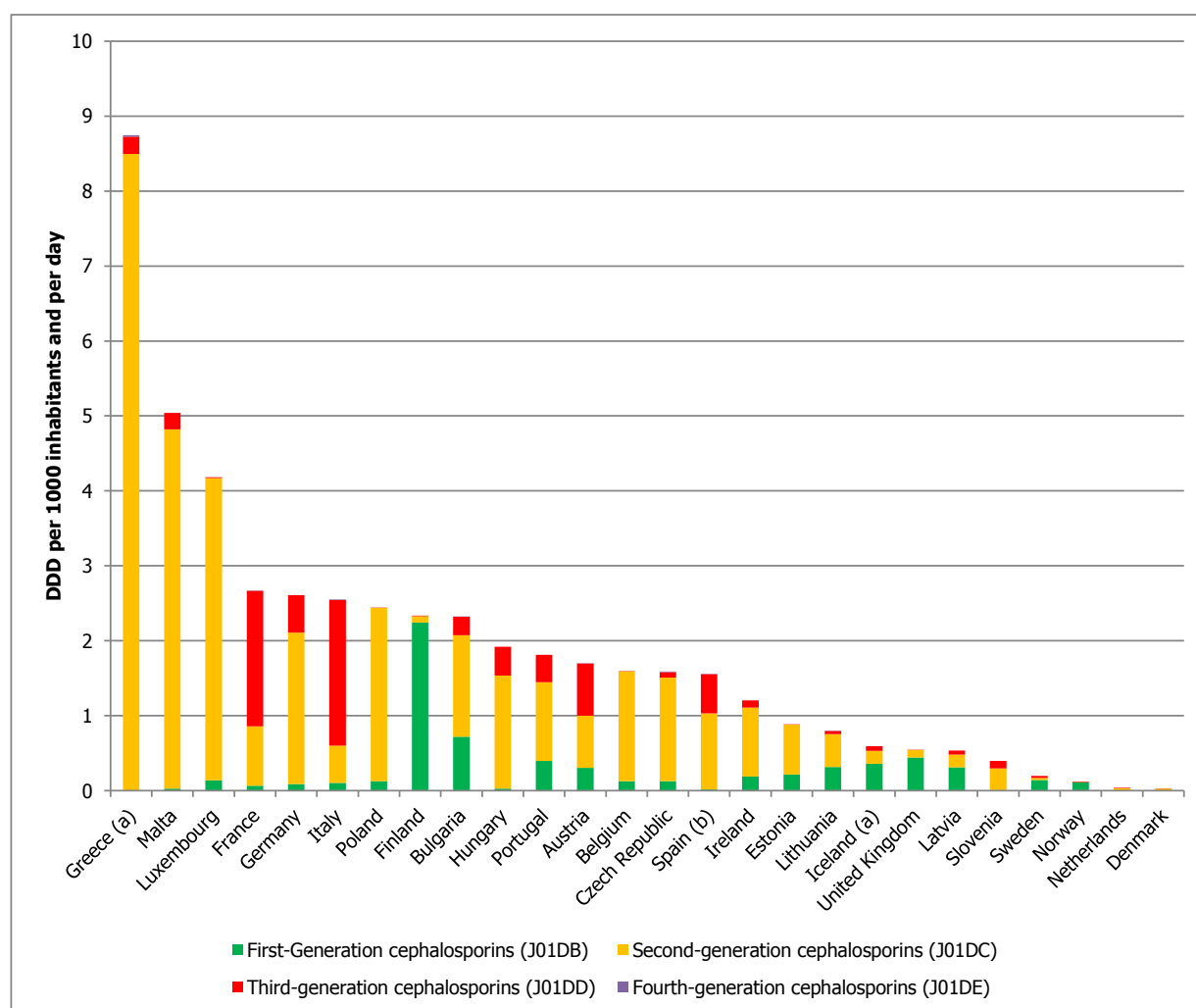
As shown in Figure 3.13 and Table 3.2, in 2010 the consumption of other beta-lactam antibacterials (ATC group J01D), which includes cephalosporins, ranged from 0.03 DDD per 1 000 inhabitants and per day (Denmark) to 8.9 DDD per 1 000 inhabitants and per day (Greece) with a median of 1.6 DDD per 1 000 inhabitants and per day. All reporting countries except Greece, Luxembourg and Malta reported a consumption of less than 3.6 DDD per 1 000 inhabitants and per day (Figure 3.11). The proportion of consumption of cephalosporins (ATC groups J01DB-DE & J01DI) out of the total consumption of antibacterials for systemic use (ATC group J01) ranged from 0.2% (Denmark) to 22.6% (Greece).

Figure 3.11. Consumption of other beta-lactam antibacterials (ATC group J01D) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community. Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Figure 3.12. Consumption of first-, second-, third- and fourth-generation cephalosporins (ATC groups J01DB-DE) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



^(a) Greece and Iceland provided total care data, i.e. including the hospital sector.

^(b) Spain provided reimbursement data, i.e. not including consumption without a prescription and other non-reimbursed courses.

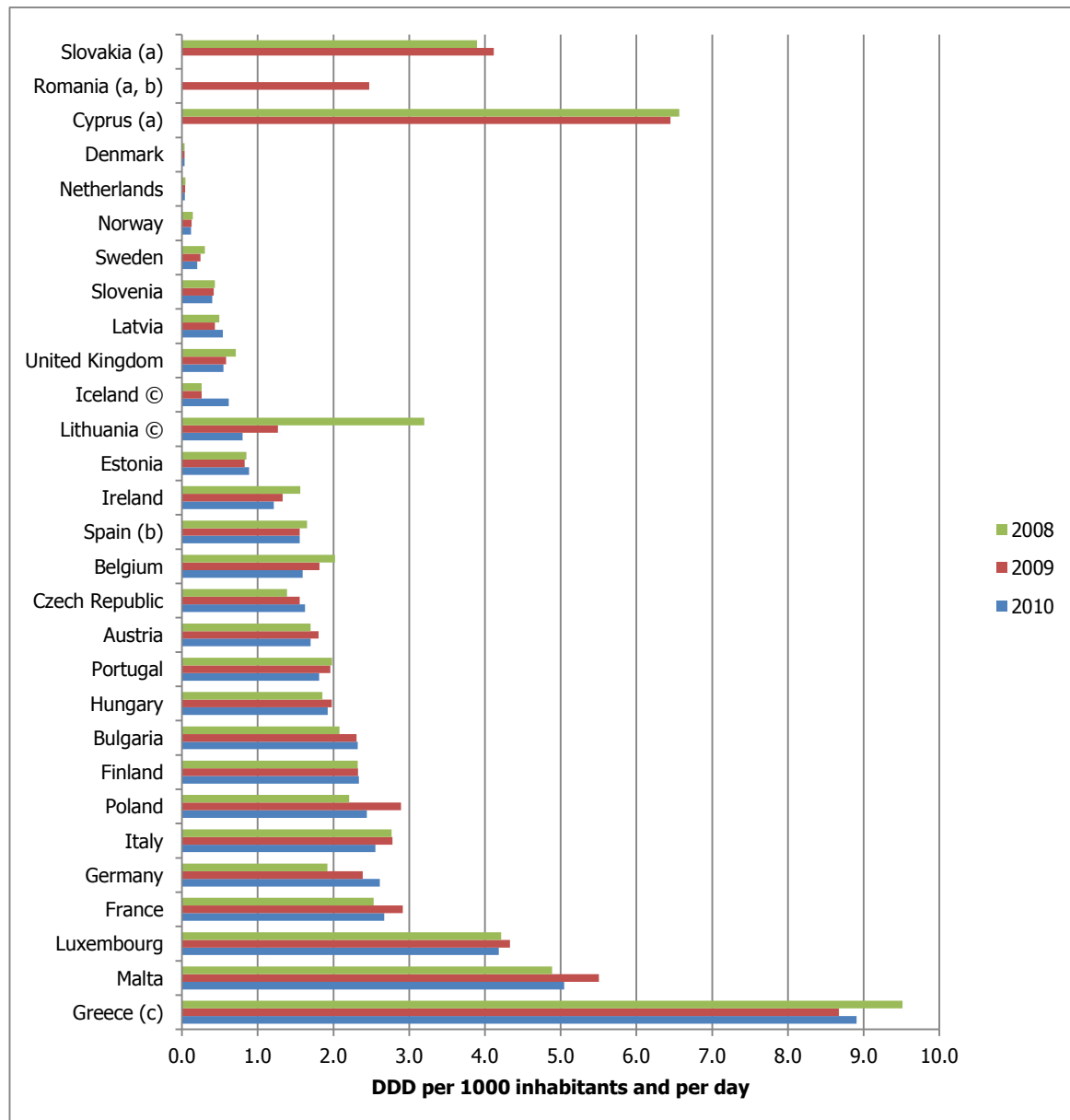
In 2010, the consumption of other cephalosporins (ATC group J01DI) was reported as zero consumption from EU/EEA countries.

In 2010, the median proportion of first-generation cephalosporins (ATC group J01DB) among cephalosporins was 13.7% in the community. Consumption of first-generation cephalosporins ranged from 0.004 (Greece) to 2.2 (Finland) DDD per 1 000 inhabitants and per day.

As shown in Figure 3.12, second-generation cephalosporins (ATC group J01DC) were the most frequently consumed subgroup of cephalosporins. In 2010, consumption of second-generation cephalosporins ranged from 0.02 (Denmark) to 8.5 (Greece) DDD per 1 000 inhabitants and per day.

In 2010, the consumption of third-generation cephalosporins (ATC group J01DD) ranged from 1.8 (France) to 1.9 (Italy). In these two countries third-generation cephalosporins represented more than two thirds of cephalosporins.

Figure 3.13. Trends of consumption of other beta-lactam antibacterials (ATC group J01D) in the community, EU/EEA countries, 2008–2010, expressed as DDD per 1 000 inhabitants and per day.

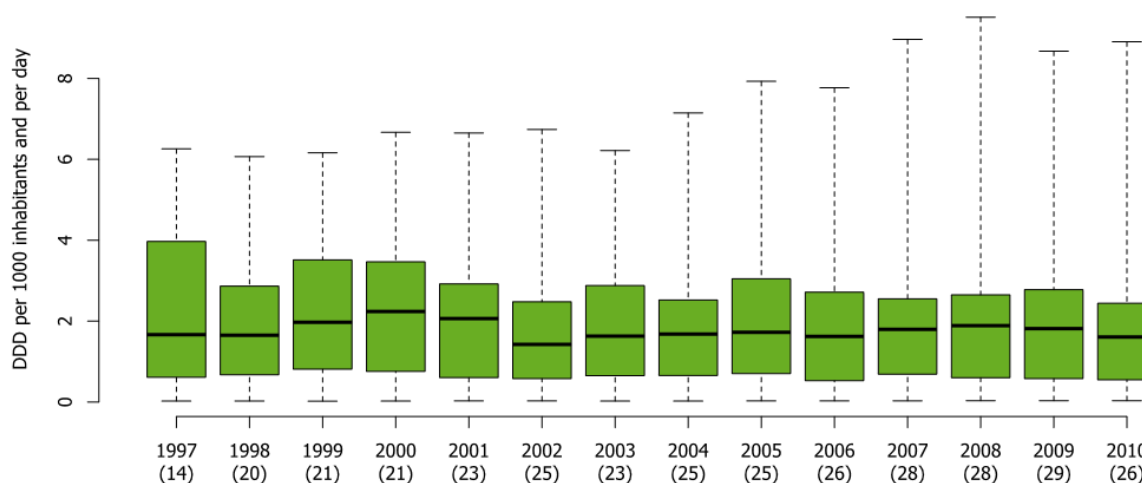


^(a)Cyprus and Slovakia reported data only for 2008 and 2009; Romania only for 2009; ^(b)Romania and Spain: reimbursement data, i.e. not including over-the-counter sales without a prescription and other non-reimbursed courses, ^(c)Greece (2008, 2010), Iceland (2010) and Lithuania (2008–2009) provided only total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

Trends

Among countries reporting data for the full period 2008–2010, community consumption of other beta-lactam antibacterials (J01D) decreased continuously in eleven out of 26 countries (Figure 3.13). During the same period, a continuous increase was observed in four countries (Bulgaria, Czech Republic, Finland and Germany).

Figure 3.14. Trends and inter-country variations of consumption of other beta-lactam antibacterials (ATC group J01D) in the community, EU/EEA countries, 1997–2010, expressed as DDD per 1 000 inhabitants and per day.



Boxes indicate the lower and the upper quartiles. The bold lines indicate the medians. Whiskers indicate the minimum and maximum values. For 1997–2009, only data from ESAC participating countries that also participated in ESAC-Net in 2010 are included. The number of participating countries is shown in parentheses.

As shown Figure 3.14, the median consumption of other beta-lactam antibacterials (ATC group J01D) decreased from 1.8 DDD per 1 000 inhabitants and per day in 2009 to 1.6 DDD per 1 000 inhabitants and per day in 2010.

Discussion

The percentage of total consumption of antibacterials for systemic use (ATC group J01) corresponding to third- plus fourth-generation cephalosporins (ATC groups J01DD & J01DE) has been suggested as a quality indicator for antibiotic consumption in the community (Table 3.6). Results from the former ESAC project suggest that variations in the consumption of second- and third-generation cephalosporins between countries and over time could be an indication of inappropriate use [13].

As for penicillins, the highest consumption of other beta-lactam antibacterials (ATC J01D) was reported from Greece. A possible bias could be that Greece reported total consumption data, including data from the hospital sector.

The ESAC project reported a significant increase in the consumption of other beta-lactam antibacterials (ATC group J01D) during 1997–2009 [13]. In 2010, data from ESAC-Net showed a small decrease as compared to 2009 (Figure 3.14), which cannot so far be interpreted.

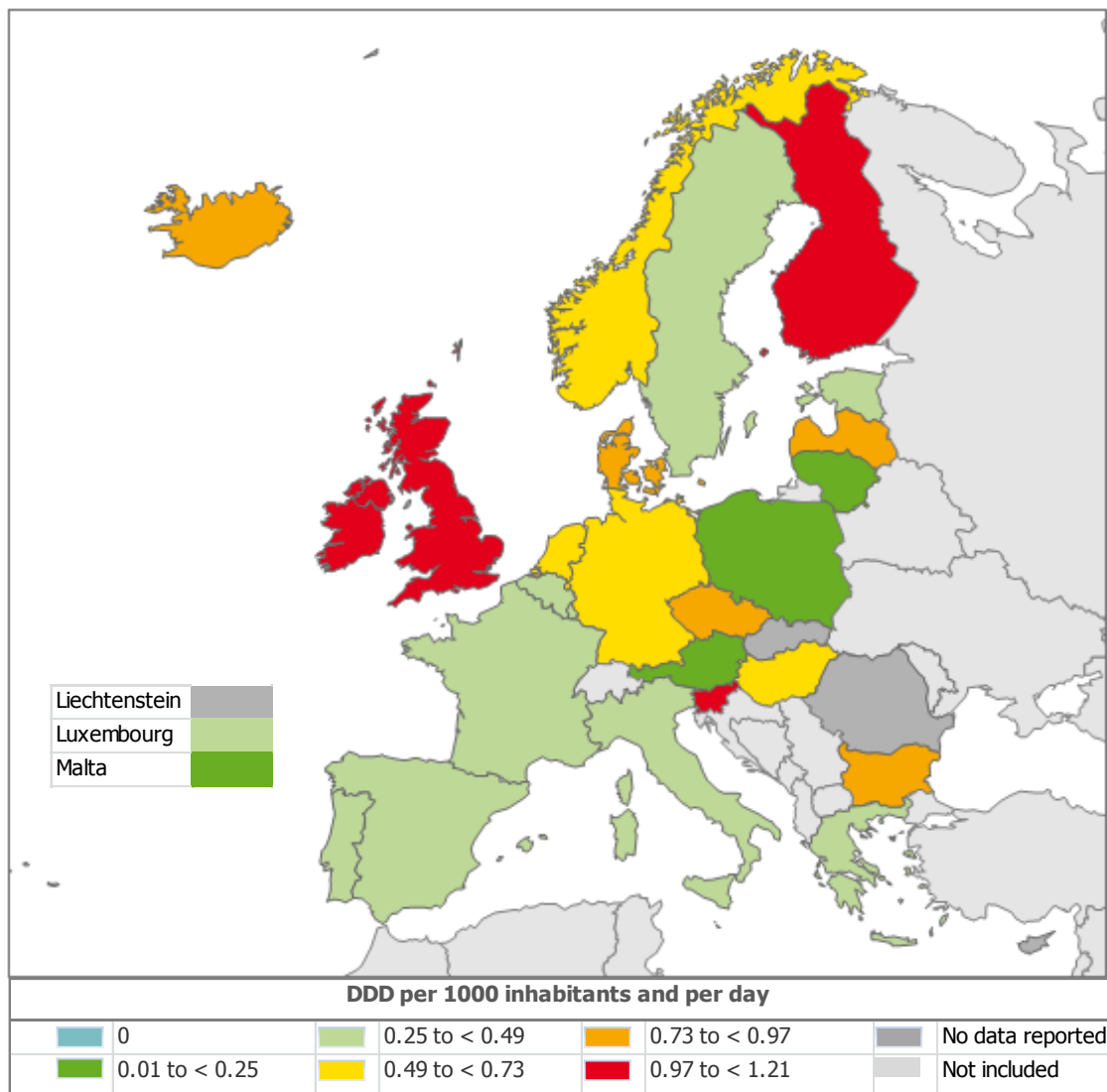
3.1.5. Sulfonamides and trimethoprim (ATC group J01E)

Results

In 2010, consumption of sulfonamides and trimethoprim ranged from 0.01 DDD per 1 000 inhabitants and per day (Lithuania) to 1.2 DDD per 1 000 inhabitants and per day (United Kingdom) (Figure 3.15), with a median consumption of 0.51 DDD per 1 000 inhabitants and per day. The proportion of sulfonamides and trimethoprim consumption out of the total consumption of antibacterials for systemic use (ATC group J01) ranged from 0.07% (Lithuania) to 7.3% (Spain).

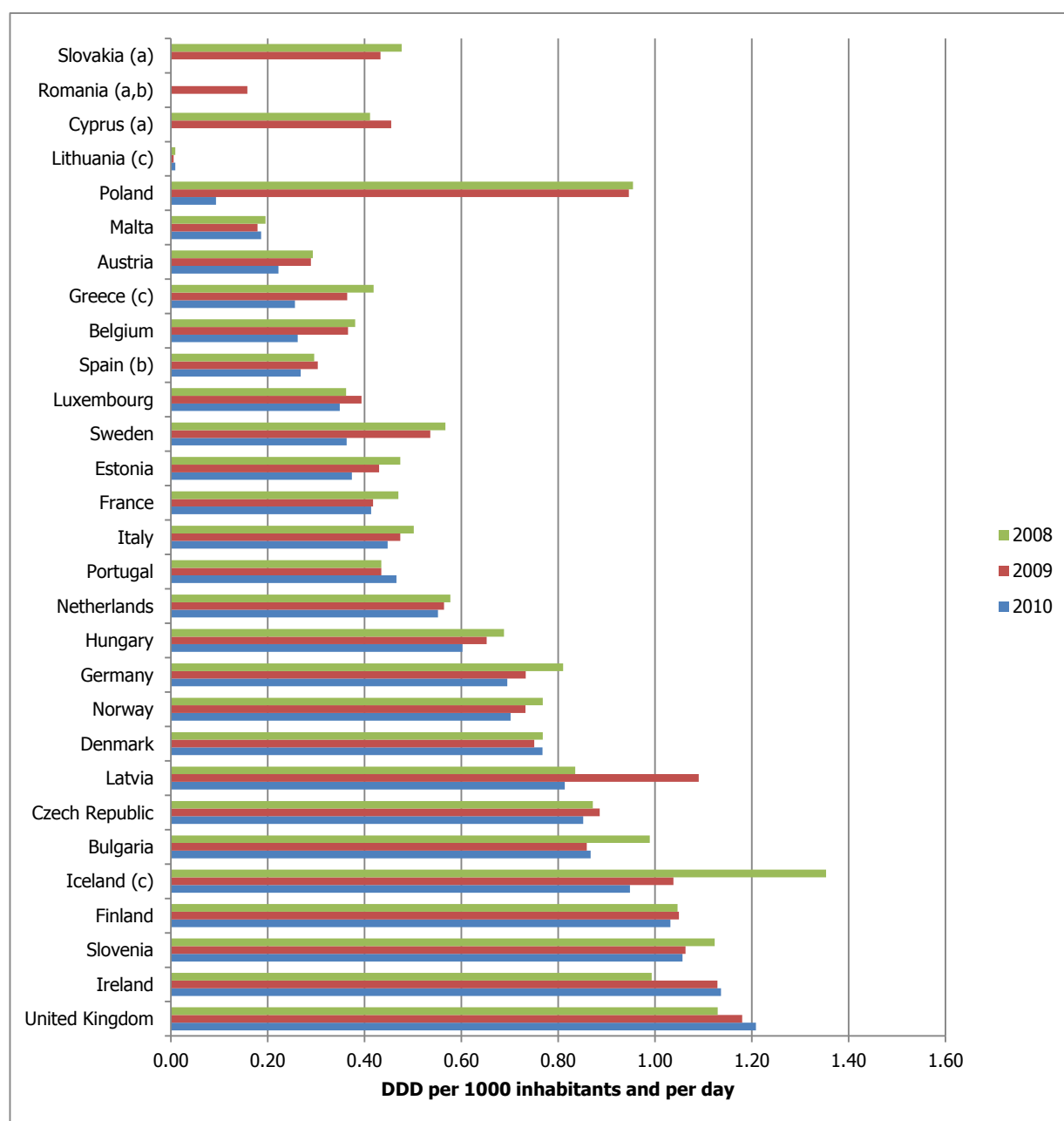
In 2010, the most consumed agents from ATC group J01E in the community were trimethoprim (J01EA01) alone and the combination of sulfamethoxazole and trimethoprim (J01EE01), which together represented 97% of the consumption of this group. However, in Finland and in the United Kingdom, consumption in the ATC group J01E was almost reported as trimethoprim (J01EA01) with 1.03 and 1.2 DDD per 1 000 inhabitants and per day.

Figure 3.15. Consumption of sulfonamides and trimethoprim (ATC group J01E) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community. Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Figure 3.16. Trends of consumption of sulfonamides and trimethoprim (ATC group J01E) in the community, EU/EEA countries, 2008–2010, expressed as DDD per 1 000 inhabitants and per day.



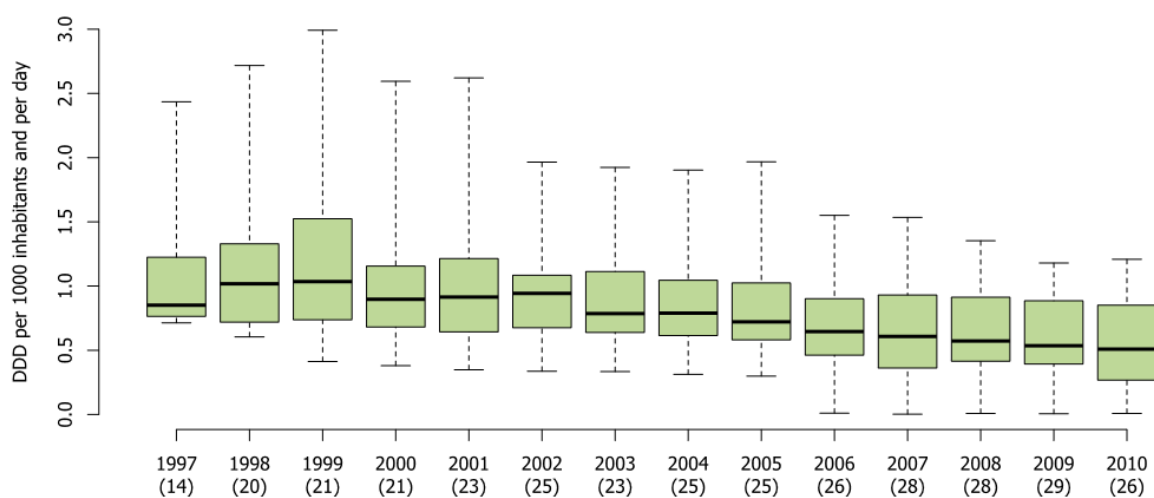
^(a)Cyprus and Slovakia reported data only for 2008 and 2009; Romania only for 2009; ^(b)Romania and Spain: reimbursement data, i.e. not including over-the-counter sales without a prescription and other non-reimbursed courses, ^(c)Greece (2008, 2010), Iceland (2010) and Lithuania (2008–2009) provided only total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

Trends

Figure 3.16 shows the consumption of sulfonamides and trimethoprim (ATC group J01E) in the community between 2008 and 2010 per country. For the 26 countries reporting for all years during this period, consumption continuously decreased in a majority (14) of the reporting countries, while a continuous increase was observed in two countries (Ireland and the United Kingdom).

As shown in Figure 3.17, the median consumption of sulfonamides and trimethoprim (ATC group J01E) in EU/EEA countries slowly decreased from 2004 and was 0.50 DDD per 1 000 inhabitants and per day in 2010.

Figure 3.17. Trends and inter-country variations of consumption of sulfonamides and trimethoprim (ATC group J01E) in the community, EU/EEA countries, 1997–2010, expressed as DDD per 1 000 inhabitants and per day.



Boxes indicate the lower and the upper quartiles. The bold lines indicate the medians. Whiskers indicate the minimum and maximum values. For 1997–2009, only data from ESAC participating countries that also participated in ESAC-Net in 2010 are included. The number of participating countries is shown in parentheses.

Discussion

The consumption of sulfonamides and trimethoprim (ATC group J01E) showed a decreasing trend in most EU/EEA countries and is dominated by one substance, i.e. trimethoprim, used alone (ATC J01EA01) or in a combination with sulfamethoxazole (ATC J01EE01).

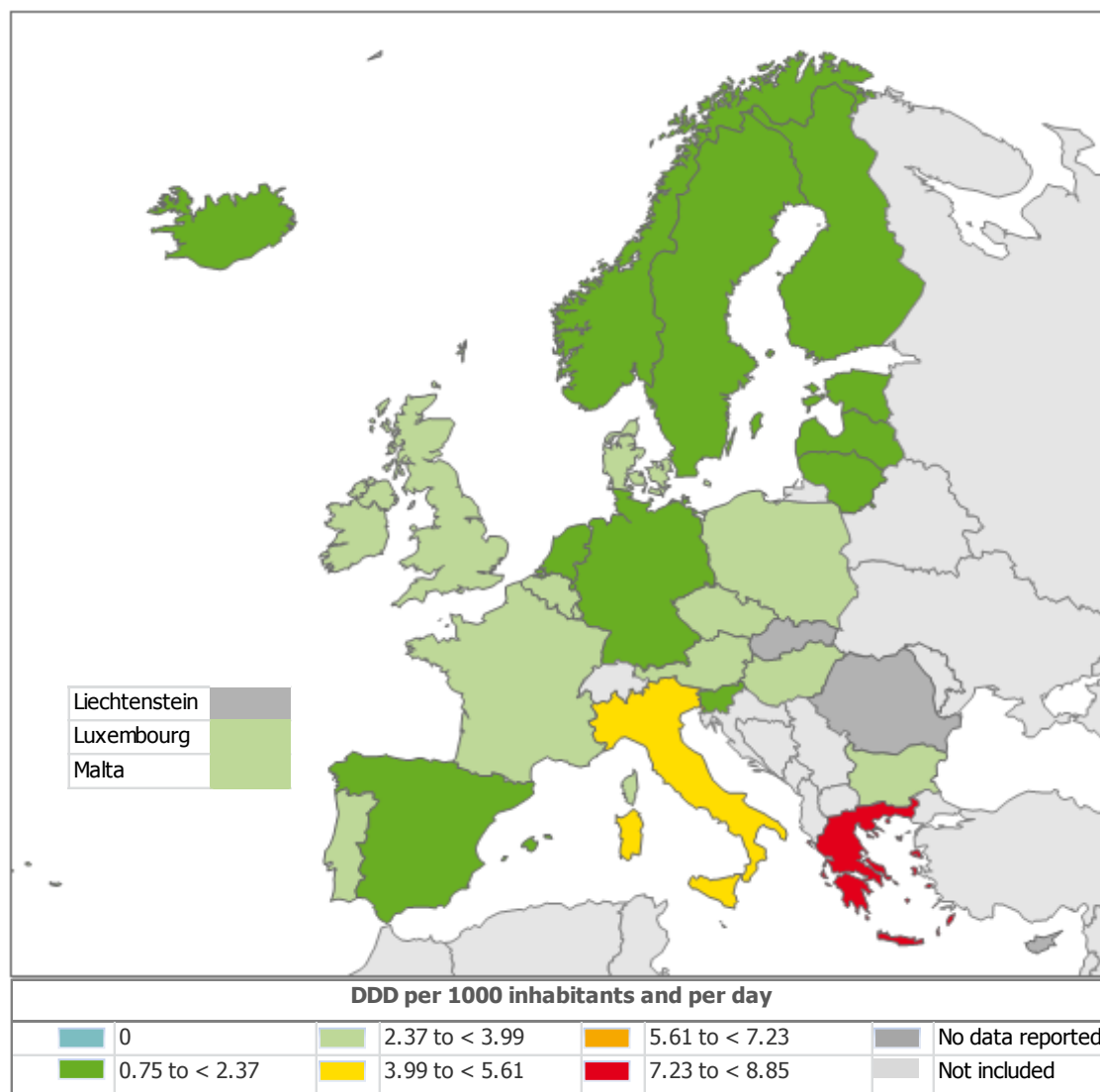
3.1.6. Macrolides, lincosamides and streptogramins (ATC group J01F)

Results

Macrolides, lincosamides and streptogramins (ATC group J01F), was the second most commonly used ATC subgroup in 13 of the reporting countries. In 2010, consumption ranged from 0.7 DDD per 1 000 inhabitants and per day (Sweden) to 8.8 DDD per 1 000 inhabitants and per day (Greece). Greece and Italy were the only countries that reported a consumption of macrolides, lincosamides and streptogramins (ATC group J01F) higher than 4.0 DDD per 1 000 inhabitants and per day in 2010 (Figure 3.19).

The proportion of consumption of macrolides, lincosamides and streptogramins (ATC group J01F) out of the total consumption of antibacterials for systemic use (ATC group J01 group) ranged from 5.3% (Sweden) to 22.4% (Greece).

Figure 3.18. Consumption of macrolides, lincosamides and streptogramins (ATC group J01F) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community. Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Table 3.3. Consumption of short-, intermediate- and long-acting macrolides for systemic use in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.

Country	Short-acting macrolides	Intermediate-acting macrolides	Long-acting macrolides	Total
Austria	0.01	2.21	0.63	2.85
Belgium	0.10	1.68	0.84	2.62
Bulgaria	0.00	1.57	0.91	2.49
Czech Republic	0.12	2.36	0.77	3.25
Denmark	0.56	1.40	0.39	2.34
Estonia	0.01	1.70	0.35	2.06
Finland	0.08	0.59	0.55	1.23
France	0.20	1.92	0.51	2.63
Germany	0.24	1.33	0.51	2.09
Greece ^(a)	0.11	7.30	1.14	8.55
Hungary	0.05	1.50	0.88	2.42
Iceland ^(a)	0.42	0.31	0.66	1.40
Ireland	0.63	2.70	0.30	3.63
Italy	0.23	3.33	1.52	5.08
Latvia	0.16	0.57	0.24	0.97
Lithuania	0.07	1.08	0.30	1.44
Luxembourg	0.40	2.14	0.92	3.46
Malta	0.29	2.12	0.57	2.97
Netherlands	0.09	0.67	0.54	1.31
Norway	0.85	0.32	0.38	1.55
Poland	0.20	1.64	1.06	2.89
Portugal	0.11	1.88	1.39	3.37
Slovenia	0.12	0.70	1.07	1.89
Spain ^(b)	0.14	0.75	0.99	1.88
Sweden	0.31	0.06	0.06	0.43
United Kingdom	1.39	1.12	0.19	2.71

A classification of macrolides is used as described by the ESAC project [9] according to the mean plasma elimination (Annex 1).

^(a)Greece and Iceland provided total care data, i.e. including the hospital sector.

^(b)Spain provided reimbursement data, i.e. not including consumption without a prescription and other non-reimbursed courses.

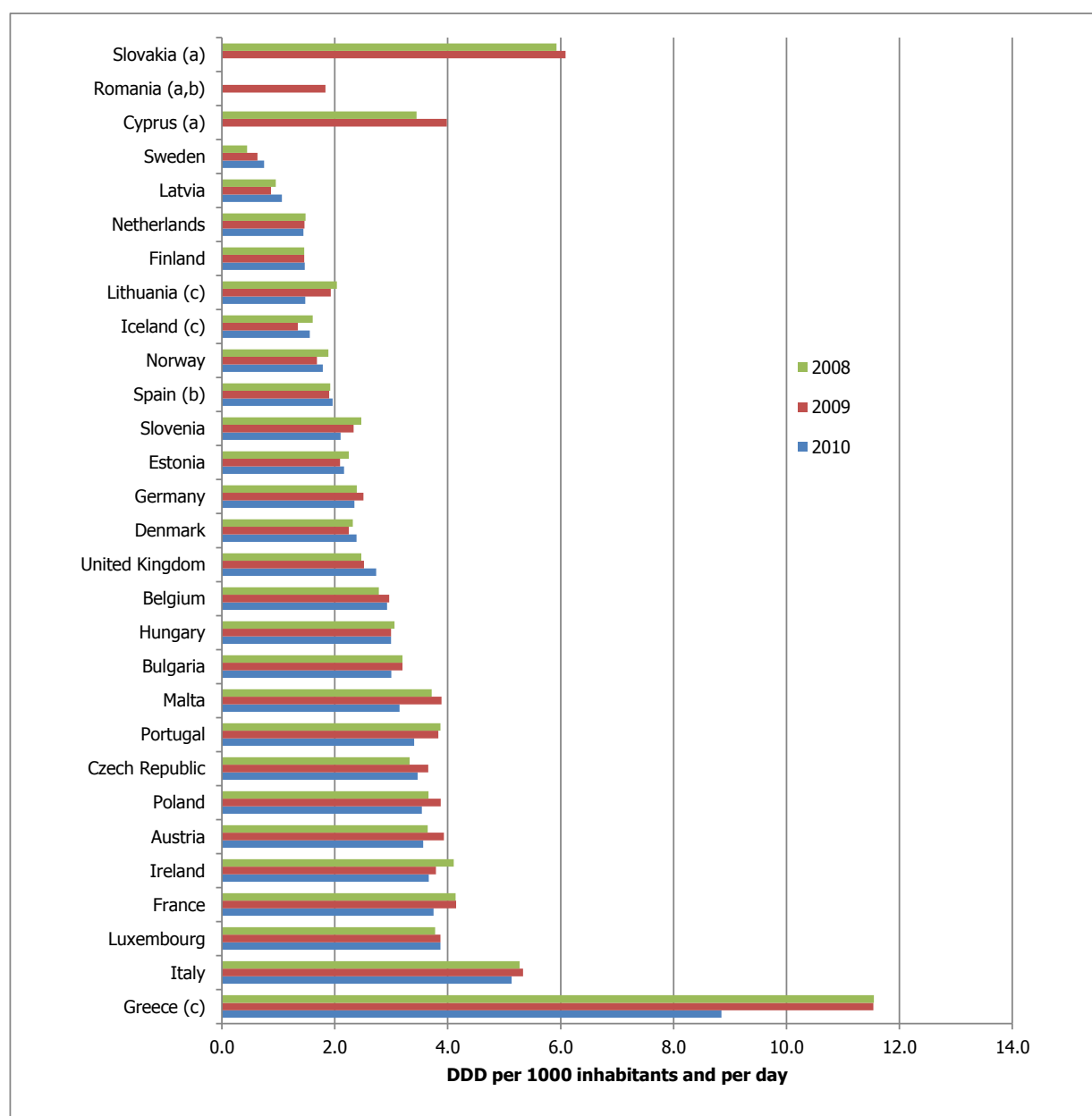
In 2010, the overall consumption of macrolides (ATC group J01FA) varied by a factor of 20 from 0.43 DDD per 1 000 inhabitants and per day (Sweden) to 8.6 DDD per 1 000 inhabitants and per day (Greece) (Table 3.3).

Among short-acting macrolides, erythromycin (ATC J01FA01) was the most consumed substance in the United Kingdom, where it accounted for 51% of the total consumption of macrolides (ATC group J01FA).

Intermediate-acting macrolides, mostly clarithromycin (ATC J01FA09) accounted for 62% of the total consumption of macrolides (ATC group J01FA) with a consumption ranging from 0.06 DDD per 1 000 inhabitants and per day (Sweden) to 7.3 DDD per 1 000 inhabitants and per day (Greece).

The consumption of long-acting macrolides, mostly azithromycin (J01FA10), ranged from 0.06 DDD per 1 000 inhabitants and per day (Sweden) to 1.14 DDD per 1 000 inhabitants and per day (Greece).

Figure 3.19. Trends of consumption of macrolides, lincosamides and streptogramins (ATC group J01F) in the community, EU/EEA countries, 2008-2010, expressed as DDD per 1 000 inhabitants and per day.



^(a)Cyprus and Slovakia reported data only for 2008 and 2009; Romania only for 2009; ^(b)Romania and Spain: reimbursement data, i.e. not including over-the-counter sales without a prescription and other non-reimbursed courses, ^(c)Greece (2008, 2010), Iceland (2010) and Lithuania (2008-2009) provided only total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

Trends

Temporal trends in the consumption of macrolides, lincosamides and streptogramins (ATC group J01F) are presented in Figure 3.19. Six countries (Bulgaria, Greece, Ireland, Lithuania Portugal, Slovenia) showed a continuous decrease of more than 5% between 2008 and 2010, while three other countries (Latvia, Sweden and the United Kingdom) showed continuous increase of more than 5% during the same period.

The median consumption of macrolides, lincosamides and streptogramins (ATC group J01F) decreased from 3.9 DDD per 1 000 inhabitants and per day in 2009 to 2.8 DDD per 1 000 inhabitants and per day in 2010.

Discussion

Macrolides (ATC group J01FA), in particular intermediate-acting substances, were the most often consumed antibiotics among the group comprising macrolides, lincosamides and streptogramins (ATC group J01F) in all countries, with the exception of Sweden where lincosamides were predominantly used.

A significant increase over time of consumption of macrolides and lincosamides and of the ratio long-acting/intermediate-acting macrolide consumption (compositional data analysis for ESAC project data from 1997–2009) has previously been reported by the former ESAC project for the period 1997–2009 [9]. This report, however, shows that the median consumption of macrolides, lincosamides and streptogramins (ATC group J01F) decreased between 2009 and 2010.

The large inter-country variation in the consumption of macrolides may indicate inappropriate use in some of the reporting countries.

3.1.7. Quinolone antibacterials (ATC group J01M)

Results

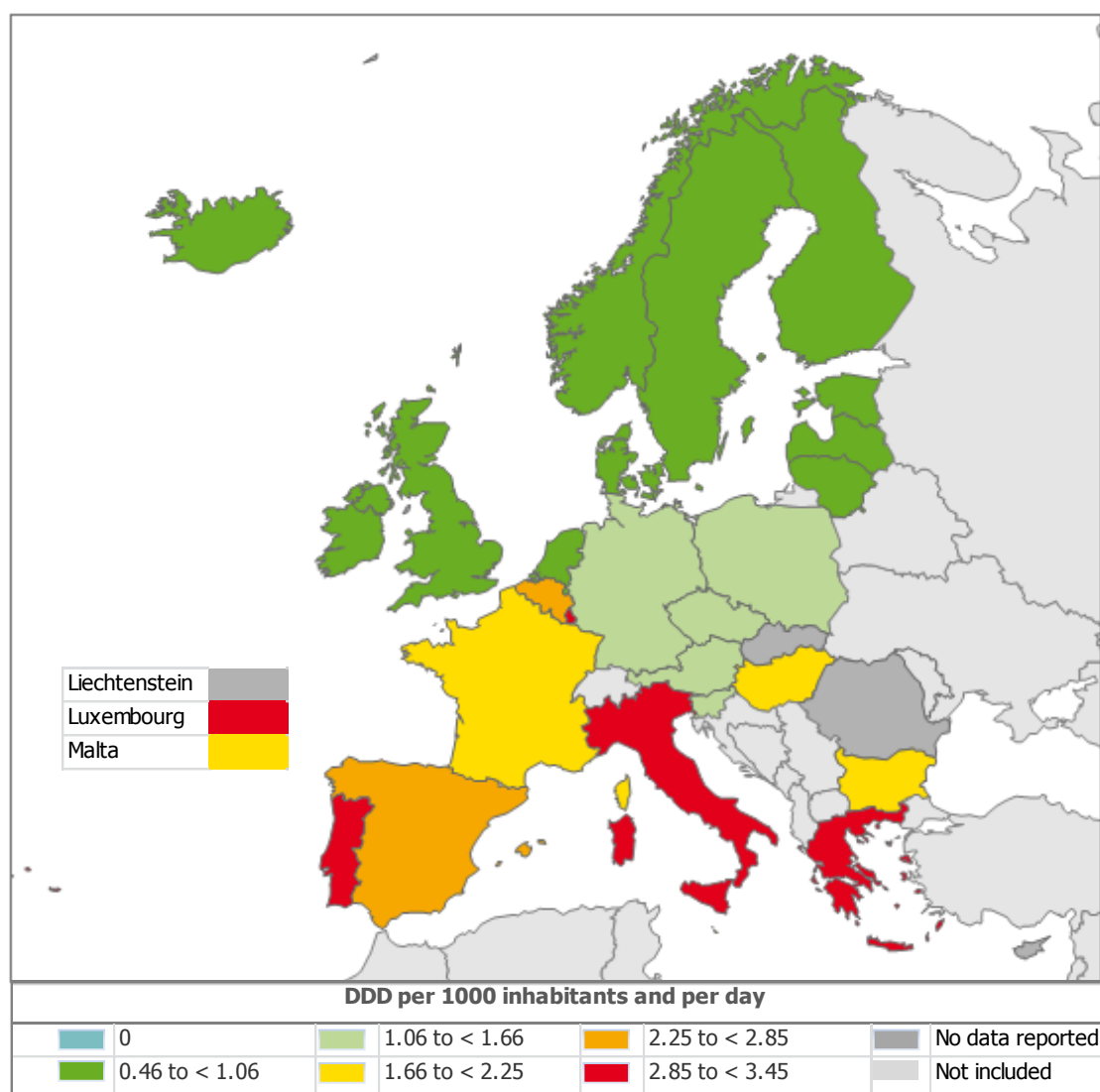
Community consumption of quinolone antibacterials (ATC group J01M) showed a gradient from Northern to Southern Europe (Figure 3.20). In 2010, consumption varied by a factor of 7.5 ranging from 0.46 DDD per 1 000 inhabitants and per day (United Kingdom) to 3.5 DDD (Italy), with a median consumption of 1.2 DDD per 1 000 inhabitants and per day. The proportion of consumption of quinolone antibacterials (ATC group J01M) out of the total consumption of antibacterials for systemic use (ATC group J01) ranged from 2.5% (United Kingdom) to 13.3% (Portugal).

In 2010, consumption of first-generation quinolones ranged from 0.02 DDD per 1 000 inhabitants and per day (United Kingdom) to 0.57 DDD per 1 000 inhabitants and per day (France)

In 2010, second-generation quinolones were on average three times more often consumed than first- and third-generation quinolones. Ciprofloxacin (J01MA01) accounted for 73% of the consumption of second-generation quinolones in all countries. The lowest consumption of ciprofloxacin was reported from the United Kingdom and the highest from Greece with 0.39 and 1.8 DDD per 1 000 inhabitants and per day, respectively.

The proportion of consumption of third-generation quinolones out of the total consumption of quinolone antibacterials (ATC J01M) varied from 1.3% in the United Kingdom to 32.8% in Belgium.

Figure 3.20. Consumption of quinolone antibacterials (ATC group J01M) in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



Greece and Iceland provided total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community. Spain provided reimbursement data, i.e. not including consumption of antibiotics obtained without a prescription and other non-reimbursed courses.

Table 3.4. Consumption of first-, second- and third-generation quinolones for systemic use in the in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.

Country	First-generation quinolones	Second-generation quinolones	Third-generation quinolones	Total
Austria	0.15	0.92	0.28	1.36
Belgium	0.24	1.57	0.88	2.69
Bulgaria	0.31	1.60	0.08	1.99
Czech Republic	0.54	0.68	< 0.01	1.22
Denmark	-	0.50	0.01	0.51
Estonia	0.26	0.55	< 0.01	0.81
Finland	0.11	0.72	0.06	0.88
France	0.57	1.30	0.13	2.00
Germany	0.09	1.27	0.14	1.51
Greece ^(a)	0.43	2.09	0.37	2.89
Hungary	0.40	1.50	0.07	1.97
Iceland ^(a)	-	1.02	< 0.01	1.02
Ireland	< 0.01	0.85	0.05	0.91
Italy	0.33	2.72	0.40	3.45
Latvia	0.22	0.64	< 0.01	0.86
Lithuania	0.25	0.57	0.01	0.83
Luxembourg	0.25	2.14	0.55	2.94
Malta	0.28	1.39	0.11	1.79
Netherlands	0.21	0.62	0.04	0.87
Norway	-	0.54	< 0.01	0.54
Poland	0.48	0.75	< 0.01	1.23
Portugal	0.21	2.26	0.50	2.97
Slovenia	0.30	0.71	0.10	1.10
Spain ^(b)	0.32	1.89	0.33	2.54
Sweden	0.04	0.73	0.01	0.77
United Kingdom	0.02	0.44	0.01	0.46

A classification of quinolone antibacterials into three generations is used based on their chemical structure and antimicrobial activity as described from the ESAC project in [8] (Annex 1).

^(a) Greece and Iceland provided total care data, i.e. including the hospital sector.

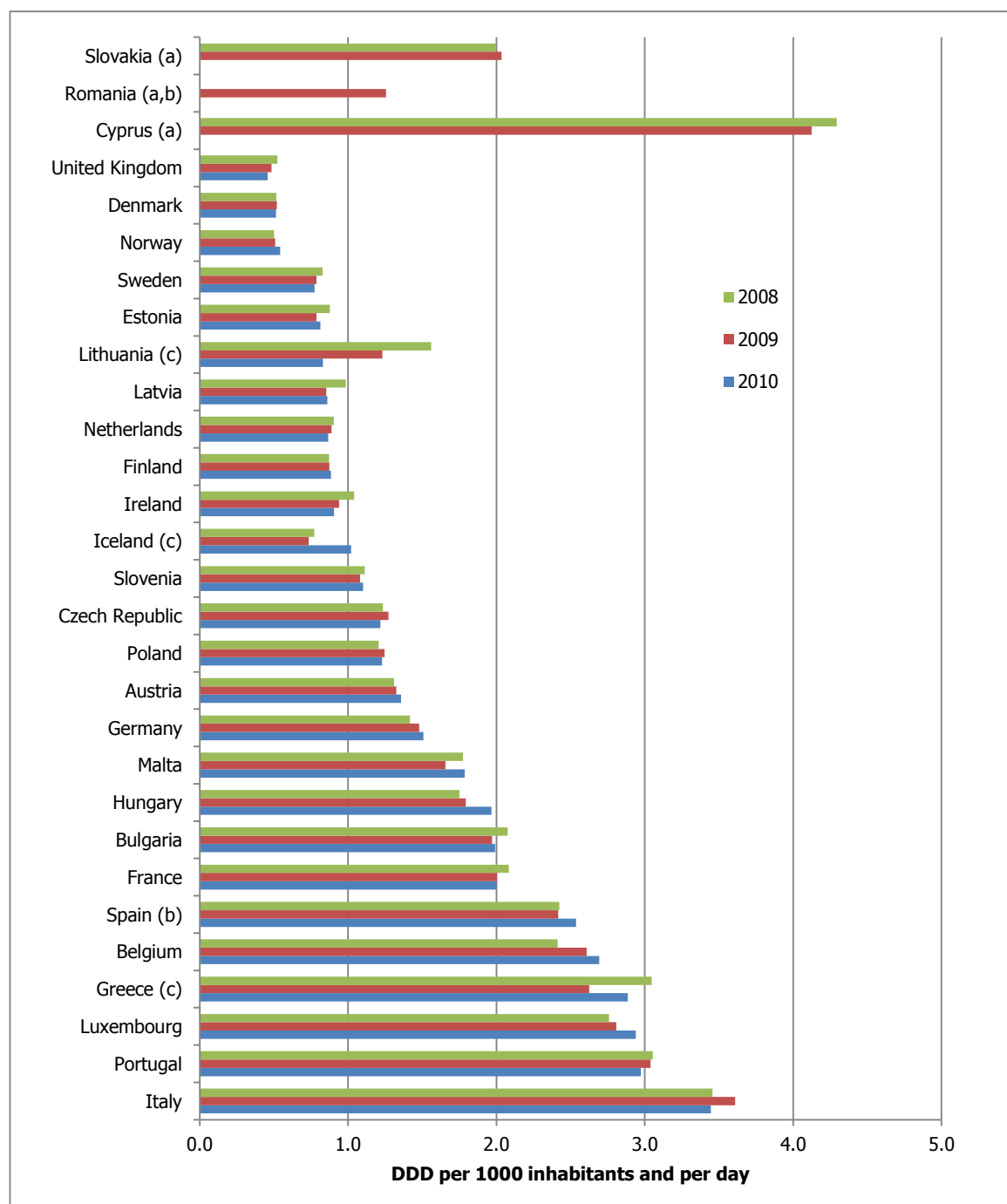
^(b) Spain provided reimbursement data, i.e. not including consumption without a prescription and other non-reimbursed courses.

Trends

Temporal trends in the consumption of quinolone antibacterials (ATC group J01M) from 2008 to 2010 are presented in Figure 3.21. Seven countries (Estonia, Greece, Ireland, Latvia, Lithuania, Sweden, United Kingdom) showed a decrease of more than 5% between 2008 and 2010, while six other countries (Belgium, Germany, Hungary, Iceland, Luxembourg, Norway) showed an increase of more than 5% during the same period.

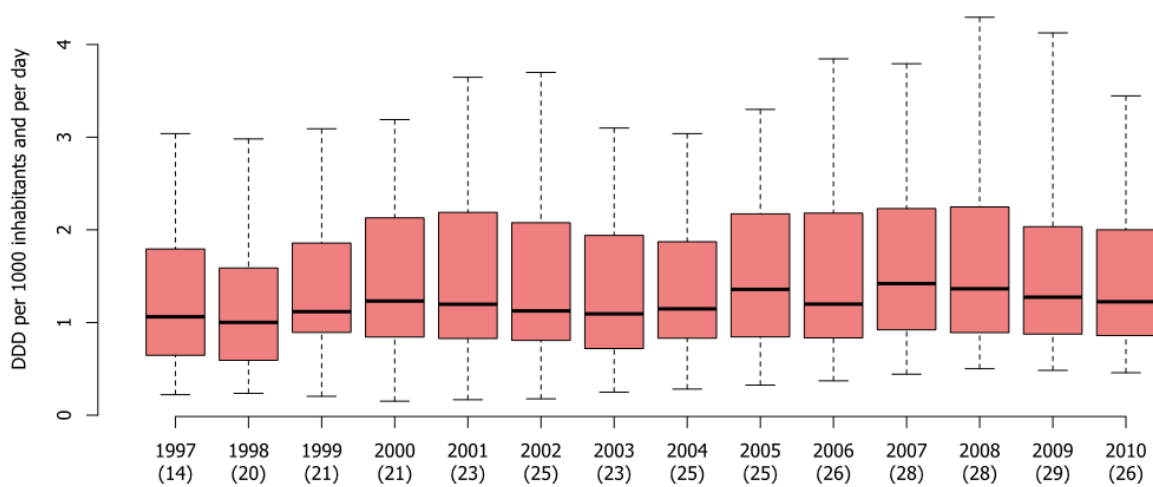
As shown in Figure 3.22, the median consumption of quinolone antibacterials (ATC group J01M) increased from 1.1 DDD per 1 000 inhabitants and per day in 1997 to 1.4 DDD per 1 000 inhabitants and per day in 2007 and has since slowly decreased to reach 1.2 DDD per 1 000 inhabitants and per day in 2010.

Figure 3.21. Trends of consumption of quinolone antibacterials (ATC group J01M) in the community, EU/EEA countries, 2008–2010, expressed as DDD per 1 000 inhabitants and per day.



^(a)Cyprus and Slovakia reported data only for 2008 and 2009; Romania only for 2009; ^(b)Romania and Spain: reimbursement data, i.e. not including over-the-counter sales without a prescription and other non-reimbursed courses, ^(c)Greece (2008, 2010), Iceland (2010) and Lithuania (2008-2009) provided only total care data, i.e. including the hospital sector. On average, 90% of total care data correspond to consumption in the community.

Figure 3.22. Trends and inter-country variations of consumption of quinolone antibacterials (ATC group J01M) in the community, EU/EEA countries, 1997–2010, expressed as DDD per 1 000 inhabitants and per day.



Boxes indicate the lower and the upper quartiles. The bold lines indicate the medians. Whiskers indicate the minimum and maximum values. For 1997–2009, only data from ESAC participating countries that also participated in ESAC-Net in 2010 are included. The number of participating countries is shown in parentheses.

Discussion

Fluoroquinolones, mostly ciprofloxacin (J01MA01), represented almost the entire consumption of quinolone antibacterials (ATC group J01M).

The total quinolone consumption in the community together with its seasonal variation increased significantly between 1997 and 2009 [8]. During the same period, the ratio of third-generation/second-generation quinolones also increased. This report, however, shows that the median consumption of quinolone antibacterials (ATC group J01M) seem to have slowly but regularly decreased between 2007 and 2010 (Figure 3.22).

The large inter-country variation in the consumption of quinolones antibacterials (ATC J01M) may indicate potentially inappropriate use in some of the reporting countries. Quinolone consumption is included in two proposed quality indicators for antibiotic consumption in the community (Table 3.6).

3.2. Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

Results

In 2010, 22 countries reported data on consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (Table 3.5).

The consumption varied by a factor of 7.2 ranging from 0.45 DDD per 1 000 inhabitants and per day (Lithuania) to 3.25 DDD per 1 000 inhabitants and per day (Belgium).

In 2010, terbinafine (D01BA02), ketoconazole (J02AB02), fluconazole (J02AC02), and itraconazole (J02AC02) represented 98.9% of the total consumption of antimycotics and antifungals for systemic use (ATC groups J02&D01BA) in the community in all countries.

Terbinafine (D01BA02) consumption alone represented more than 50% of the total consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in 17 (77%) of the reporting countries. The proportion of terbinafine consumption ranged from 15.3% (Luxembourg) to 86.7% (Norway).

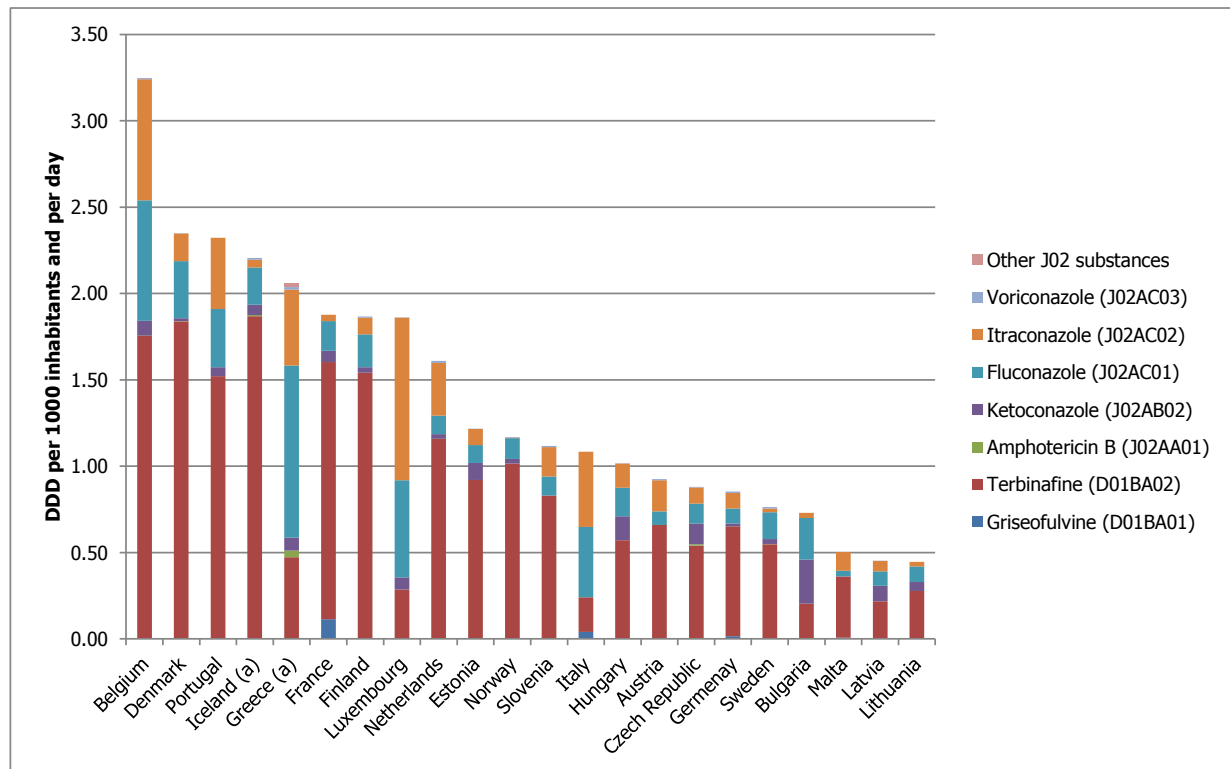
In the Netherlands and in Denmark, the total consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) was 1.5- and 2.1-fold higher than the median total consumption of all countries (1.1 DDD per 1 000 inhabitants and per day).

Table 3.5. Consumption of antifungals (ATC group D01BA) and antimycotics (ATC group J02) for systemic use in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.

Country	D01BA01 (Griseofulvine)	D01BA02 (Terbinafine)	J02AA01 (Amphotericin B)	J02AB02 (Ketoconazole)	J02AC01(Fluconazole)	J02AC02 (Itraconazole)	J02AC03 (Voriconazole)	Other J02 sub- stances	Total J02 & D01BA
Austria	-	0.66	<0.01	-	0.08	0.18	0.01	<0.01	0.92
Belgium	-	1.76	<0.01	0.09	0.70	0.70	0.01	<0.01	3.25
Bulgaria	-	0.20	-	0.25	0.24	0.03	-	-	0.73
Czech Republic	-	0.54	0.01	0.12	0.12	0.09	<0.01	<0.01	0.88
Denmark	-	1.84	<0.01	0.02	0.33	0.16	<0.01	-	2.35
Estonia	<0.01	0.92	-	0.10	0.10	0.09	<0.01	-	1.22
Finland	-	1.54	-	0.03	0.19	0.10	0.01	<0.01	1.87
France	0.11	1.49	-	0.07	0.17	0.04	-	<0.01	1.88
Germany	0.02	0.64	<0.01	0.02	0.09	0.09	0.01	<0.01	0.86
Greece ^(a)	-	0.47	0.04	0.08	1.00	0.44	0.02	0.02	2.07
Hungary	-	0.57	-	0.14	0.17	0.14	<0.01	-	1.02
Iceland ^(a)	-	1.87	0.01	0.06	0.22	0.04	0.01	<0.01	2.21
Italy	0.04	0.20	-	-	0.41	0.44	-	-	1.08
Latvia	-	0.22	-	0.09	0.08	0.06	<0.01	-	0.45
Lithuania	-	0.28	-	0.05	0.09	0.03	-	<0.01	0.45
Luxembourg	-	0.29	-	0.07	0.56	0.94	<0.01	-	1.86
Malta	0.01	0.35	-	<0.01	0.03	0.11	-	-	0.50
Netherlands	<0.01	1.16	<0.01	0.03	0.11	0.31	0.01	<0.01	1.61
Norway	<0.01	1.02	-	0.03	0.12	<0.01	<0.01	<0.01	1.17
Portugal	-	1.52	-	0.05	0.34	0.41	-	-	2.32
Slovenia	-	0.83	-	-	0.11	0.17	0.01	<0.01	0.29
Sweden	<0.01	0.55	<0.01	0.03	0.15	0.02	0.01	<0.01	0.77

^(a) Iceland and Greece provided only total care data, i.e. including the hospital sector.

Figure 3.23. Consumption of antifungals (ATC group D01BA) and antimycotics (ATC group J02) for systemic use in the community, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.



(a): Greece and Iceland provided total care data, i.e. including the hospital sector.

Discussion

Of all 14 substances under surveillance (12 antimycotics of ATC group J02 and two antifungals of ATC group D01BA), four substances dominated the consumption patterns as in previous years.

Seasonal variations of the consumption of antifungals and antimycotics for systemic use have previously been described [14]. Such variations were not analysed for this report. Similar to antibacterials for systemic use (antibiotics), the fact that five countries (Austria, Belgium, the Czech Republic, Germany and Portugal) reported reimbursement data may have resulted in underreporting as data on antifungals and antimycotics obtained without prescription or that were not reimbursed because of prices below a reimbursement limit are not included in reimbursement databases [10, 14].

Nevertheless, ESAC-Net data and historical data from the ESAC project are publicly available, standardised and validated European reference data on consumption of antifungals and antimycotics for systemic use (ATC groups J02 & D01BA). These data can be used for the monitoring and evaluation of policies for appropriate prescribing of antimycotics and antifungals for systemic use [14].

3.3. Quality indicators for consumption of antibacterials for systemic use (ATC group J01) in the community

Background

In 2007, the ESAC project published 12 consensus quality indicators for antimicrobial consumption in the community in Europe based on ESAC project data from 1997–2003. It was concluded that these indicators could be used to better describe antimicrobial consumption and to assess changes in national antibiotic prescribing patterns in Europe, and that work towards improvement of indicator values could have an impact on reducing antimicrobial resistance, patient health benefit, cost-effectiveness and information for public health policy makers [4].

Results

The values for 2010 of the proposed quality indicators for the 26 reporting countries are presented in Table 3.6. In addition, the minimum value (p0), 25th percentile (p25), median (p50), 75th percentile (p75) and maximum value (p100) are displayed at the bottom of the table. For all quality indicators except J01EC_%, low values of the indicator suggest better quality with the best quality being within the first quartile (p0–p25). For the indicator J01CE_%, high values of the indicator suggest better quality with the best quality being within the fourth quartile (p75–p100).

The first five indicators (displayed as J01, J01C, J01D, J01F and J01M) report consumption expressed in DDD per 1 000 inhabitants and per day for ATC group J01 and four subgroups, (i.e. J01C, J01D, J01F and J01M). The values correspond to the results presented in Chapter 3 (Tables 3.1. and 3.2).

The Netherlands reported values within the first quartile for all five indicators. Latvia, Lithuania and Sweden reported values within the first quartile for ATC group J01 and for three other indicators. France, Italy, Luxembourg and Greece reported values within the fourth quartile (p75-p100) for all five indicators.

The next four indicators (displayed as J01CE_%, J01CR_%, J01DD+DE_% and J01MA_%) report on the percentage of the total consumption of antibacterials for systemic use (ATC group J01) corresponding to various sub-groups: beta-lactamase sensitive penicillins (ATC group J01CE), combination of penicillins incl. beta-lactamase inhibitors (ATC group J01CR), third- and fourth-generation cephalosporins (ATC groups J01DD and J01DE), and fluoroquinolones (ATC group J01MA).

- Four countries (Denmark, Finland, Norway and Sweden) reported values within the quartiles suggesting the best quality for all four indicators.
- Three countries (Hungary, Italy and Spain) reported values within the quartiles suggesting the lowest quality for all four indicators
- Indicator J01CE_% (relative consumption of beta-lactamase sensitive penicillins ranged from <0.1% to 31.1%). The Czech Republic, Denmark, Finland, Iceland, Poland, Slovenia and Sweden reported values within the fourth quartile, suggesting a better quality than all other quartiles.
- Indicator J01CR_% (relative consumption of combination of penicillins incl. beta-lactamase inhibitors) ranged from <0.1% to 40.9%. Denmark, Estonia, Finland, Germany, Norway, Sweden and the United Kingdom showed values within the first quartile suggesting a better quality than all other quartiles.
- Indicator J01DD+DE_% (relative consumption of third- and fourth-generation cephalosporins) ranged from <0.1% to 7.1%. Belgium, Denmark, Estonia, Finland, Norway, Poland, Sweden and United Kingdom showed values within the first quartile, suggesting a better quality than all other quartiles.
- Indicator J01MA_% (relative consumption of fluoroquinolones) ranged from 2.5% to 13.3%. Denmark, Finland, Iceland, Ireland, Norway, Sweden and United Kingdom showed values within the first quartile suggesting a better quality than all other quartiles.

The tenth quality indicator (displayed as J01_B/N) reports on the ratio of the consumption of broad-spectrum penicillins, cephalosporins and macrolides to the consumption of narrow-spectrum penicillins, cephalosporins and macrolides.

The indicator values ranged from 0.17% in Sweden to 180.2% in Malta.

The last two quality indicators (displayed as J01_SV and J01M_SV) report on seasonal variations of the total consumption of antibacterials for systemic use (ATC group J01) and of consumption of quinolone antibacterials (J01M). As these indicators are calculated based on winter quarters and summer quarters starting in July 2009 and ending in June 2010, they could only be calculated for the 12 countries that provided quarterly data for this time period.

- Indicator values for the seasonality of total consumption of antibacterials for systemic use (ATC group J01) ranged from 10.9% (Ireland) to 41.5% (Hungary).
- The indicator values for seasonality of the consumption of quinolone antibacterials (J01M) ranged from 0.6% (Ireland) to 81.9% (Iceland).

Discussion

Data for Greece and Iceland, which reported only total care data, i.e. including hospital sector data, were included in Table 3.6 because the largest proportion of consumption of antibacterials for systemic use (ATC group J01) is reported from the community. However, quality indicators from these two countries should be interpreted with caution because certain antibiotics, e.g. broad-spectrum antibiotics, represent a larger proportion of total consumption in the hospital sector than in the community.

Interpretation of ranking of the countries should be done with caution, as the indicators are not independent, e.g. an increase in the consumption of macrolides, lincosamides and streptogramins (ATC group J01F) will probably result in an increase of the ratio of broad- to narrow-spectrum penicillins, cephalosporins and macrolides. For countries where changes in the ranking suggest quality improvement, this could just reflect a relative change compared to other countries, e.g. that quality decreased in all countries but less in that specific country [3]. Finally, it should be emphasised that these indicators cannot by themselves indicate quality of antimicrobial use unless they are utilised with corresponding clinical data.

Table 3.6. ESAC quality indicators for consumption data of antibacterials for systemic use (ATC group J01) from the community, EU/EEA countries, 2010

Country	Consumption (DDD per 1000 inhabitants and per day)					Relative consumption (%)				Broad/narrow J01_B/ N	Seasonal variation	
	J01 ^(a)	J01C	J01D	J01F	J01M	J01CE_ % [‡]	J01CR_ %	J01DD+DE_ %	J01MA_ %		J01_SV	J01M_S V
Austria	14.94	6.64	1.70	3.56	1.36	6.1	30.2	4.7	9.1	7.68	29.0	14.2
Belgium	28.44	16.28	1.59	2.92	2.69	0.3	30.4	<0.1	9.5	49.72	-	-
Bulgaria	18.18	8.05	2.32	3.00	1.99	1.8	13.6	1.4	11.0	6.79	-	-
Czech Republic	17.89	7.60	1.62	3.47	1.22	11.1	21.7	0.5	6.8	4.15	16.4	2.8
Denmark	16.51	10.29	0.03	2.38	0.51	31.1	4.1	<0.1	3.1	0.44	12.6	5.6
Estonia	11.06	4.22	0.88	2.16	0.81	2.3	11.4	<0.1	7.4	8.77	28.2	4.1
Finland	18.50	6.61	2.33	1.47	0.88	7.7	7.4	<0.1	4.8	0.76	-	-
France	28.23	15.62	2.67	3.75	2.00	0.5	23.4	6.4	6.9	42.98	-	-
Germany	14.46	4.10	2.61	2.35	1.51	5.6	2.2	3.5	10.4	4.32	31.8	23.8
Greece ^(b)	39.37	12.87	8.91	8.85	2.89	0.2	16.7	0.6	7.3	148.41	-	-
Hungary	15.67	6.69	1.92	3.00	1.97	3.4	29.3	2.5	12.4	15.85	41.5	21.4
Iceland ^(b)	23.13	12.90	0.62	1.56	1.02	10.8	20.7	0.3	4.4	1.87	12.9	81.9
Ireland	20.32	10.65	1.21	3.66	0.91	4.3	27.0	0.5	4.5	5.65	10.9	0.6
Italy	27.43	14.55	2.55	5.13	3.45	<0.1	35.4	7.1	12.1	110.60	-	-
Latvia	11.11	5.27	0.54	1.06	0.86	0.4	12.1	0.5	7.4	5.32	-	-
Lithuania	12.68	6.99	0.80	1.48	0.83	1.8	10.2	0.3	6.0	5.33	-	-
Luxembourg	28.60	13.96	4.18	3.87	2.94	0.3	30.9	<0.1	10.3	35.17	31.3	20.6
Malta	21.34	9.80	5.04	3.15	1.79	0.2	40.4	1.0	8.4	180.15	-	-
Netherlands	11.21	4.36	0.04	1.45	0.87	3.3	16.1	<0.1	7.6	6.79	-	-
Norway	15.77	6.77	0.12	1.79	0.54	23.3	<0.1	<0.1	3.4	0.20	-	-
Poland	21.03	9.43	2.44	3.54	1.23	0.7	21.3	<0.1	5.8	37.07	-	-
Portugal	22.44	12.08	1.81	3.41	2.97	0.2	40.9	1.6	13.3	28.32	18.0	6.6
Slovenia	14.39	9.67	0.40	2.10	1.10	12.7	28.8	0.7	7.6	3.58	17.6	3.7
Spain	20.31	12.64	1.56	1.96	2.54	0.4	38.7	2.6	12.3	61.37	-	-
Sweden	14.15	7.09	0.20	0.75	0.77	27.8	1.7	0.2	5.5	0.17	-	-
United Kingdom	18.58	8.56	0.55	2.73	0.46	4.1	6.4	<0.1	2.5	1.02	14.1	5.2
p0	11.06	4.10	0.03	0.75	0.51	<0.1	<0.1	<0.1	2.5	0.17	10.9	0.6
p25	14.46	6.69	0.62	1.79	0.87	0.4	11.9	0.04	5.8	4.15	14.7	3.9
p50	18.34	9.00	1.61	2.83	1.22	3.3	21.3	0.46	7.4	6.79	17.8	6.1
p75	22.17	12.50	2.41	4.45	2.00	7.7	29.3	1.56	10.1	36.60	29.0	20.8
p100	39.37	16.28	8.91	8.85	3.45	31.1	40.9	7.11	13.3	180.15	41.5	81.9

^(a) Denominator for relative consumption; ^(b) Country provided only to total care data; ‡ Indicators within the fourth quartile (i.e. values > percentile 75 (p75) suggest better quality than indicator values within the third quartile (i.e. p50 < values ≤ p75) and so on.

Quality indicators

Indicators on consumption of antibacterials for systemic use (ATC group J01) and at ATC group level 3

J01	J01_DID***	Consumption of antibacterials for systemic use (J01) expressed in DDD per 1000 inhabitants and per day
J01C	J01C_DID	Consumption of penicillins (J01C) expressed in DDD per 1000 inhabitants and per day
J01D	J01D_DID	Consumption of cephalosporins (J01D) expressed in DDD per 1000 inhabitants and per day
J01F	J01F_DID	Consumption of macrolides, lincosamides and streptogramins (J01F) expressed in DDD per 1000 inhabitants and per day
J01M	J01M_DID	Consumption of quinolones (J01M) expressed in DDD per 1000 inhabitants and per day

Indicators on the relative consumption of antibacterials for systemic use (ATC group 3)Relative consumption

J01CE_%	J01CE_%	Consumption of beta-lactamase sensitive penicillins (J01CE) expressed as percentage of the total consumption of antibacterials for systemic use (J01)
J01CR_%	J01CR_%	Consumption of combination of penicillins, including beta-lactamase inhibitor (J01CR) expressed as percentage of the total consumption of antibacterials for systemic use (J01)
J01DD+DE	J01DD+DE_%	Consumption of third- and fourth- generation cephalosporins (J01(DD+DE)) expressed as percentage of the total consumption of antibacterials for systemic use (J01)
J01MA_%	J01MA_%	Consumption of fluoroquinolones (J01MA) expressed as percentage of the total consumption of antibacterials for systemic use (J01)

Indicators on the ratio of broad and narrow spectrum antibacterials

J01_B/N	J01_B/N	Ratio of the consumption of broad-spectrum (J01(CR+DC+DD+(F-FA01))) to the consumption of narrow-spectrum penicillins, cephalosporins and macrolides (J01(CE+DB+FA01))
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Indicators on seasonal variation of antibacterials for systemic consumption (ATC group J01, subgroup J01M)

J01_SV	J01_SV	Seasonal variation of the total antibiotic consumption (J01) of a year period starting in July and ending the next calendar year in June, expressed as percentage: [(DDD (winter quarters)/DDD (summer quarters)-1] x 100
J01M_SV	J01M_SV	Seasonal variation of quinolone consumption (J01M) -" -

*** This column displays the **original labels** of the quality indicators as described in the article "European Surveillance of Antimicrobial Consumption (ESAC): quality indicators for outpatient antibiotic use in Europe" published in Qual Saf Health Care 2007;16:440-445.

4. Consumption of antimicrobials for systemic use in the hospital sector

4.1. Distribution of total antimicrobial consumption between community and the hospital sector

Results

The distribution by percentage of the total consumption between the two sectors (community and hospital sector) is provided for the three main ATC groups under surveillance in ESAC-Net: antibacterials for systemic use (ATC group J01), antimycotics and antifungals for systemic use (ATC groups J02 & D01BA), and antivirals for systemic use (ATC group J05) (Table 4.1). Data are available from 18 countries, which reported for both sectors.

For antibacterials for systemic use (ATC group J01), a median 92% of total consumption was reported by the countries as being from the community. This percentage varied from 76% (Finland) to 94% Portugal.

Two countries (Latvia and Finland) reported more than 20% of the total consumption as being from the hospital sector. Thirteen (72%) countries reported less or equal to 10% of the total consumption as being from the hospital sector.

Table 4.1. Distribution of consumption of antimicrobials for systemic use (ATC groups J01, J02 & D01BA, and J05) both in the community and in the hospital care sector, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.

Country	Antibacterials for systemic use (J01)				Antimycotics/antifungals for systemic use (J02&D01BA)				Antivirals for systemic use (J05)			
	Community		Hospital sector		Community		Hospital sector		Community		Hospital sector	
	DDD per 1000 inhabitants and per day	%	DDD per 1000 inhabitants and per day	%	DDD per 1000 inhabitants and per day	%	DDD per 1000 inhabitants and per day	%	DDD per 1000 inhabitants and per day	%	DDD per 1000 inhabitants and per day	%
Belgium	28.4	93	2.0	7	3.25	96	0.13	4	0.89	81	0.21	19
Bulgaria	18.2	93	1.5	7	0.73	96	0.03	4	0.74	91	0.07	9
Denmark	16.5	90	1.8	10	2.35	92	0.20	8	0.26	26	0.73	74
Estonia	11.1	86	1.8	14	1.22	96	0.05	4	0.23	12	1.63	88
Finland	18.5	87	2.8	13	1.87	94	0.12	6	0.28	46	0.34	54
France	28.2	93	2.2	7	1.88	94	0.11	6	2.70	73	1.01	27
Hungary	15.7	92	1.3	8	1.02	96	0.04	4	0.42	85	0.08	15
Ireland	20.3	92	1.8	8	-	-	0.09	-	-	-	-	-
Italy	27.4	93	2.1	7	1.08	90	0.13	10	0.28	14	1.71	86
Latvia	11.1	79	3.0	21	0.45	89	0.05	11	0.54	99	0.01	1
Lithuania	12.7	84	2.4	16	0.45	96	0.02	4	0.14	8	0.05	92
Luxembourg	28.6	93	2.1	7	1.86	93	0.15	7	0.60	31	1.35	69
Malta	21.3	92	2.0	8	0.50	80	0.12	20	0.09	36	0.17	64
Netherlands	11.2	91	1.1	9	1.61	-	-	-	1.83	-	-	-
Norway	15.8	92	1.4	8	1.17	95	0.06	5	1.07	98	0.02	2
Portugal	22.4	94	1.4	6	2.32	97	0.07	3	0.19	6	2.95	94
Slovenia	14.4	89	1.7	11	0.29	76	0.09	24	0.36	96	0.01	4
Sweden	14.2	90	1.5	10	0.77	92	0.07	8	0.99	96	0.04	4
Median	17.0	92	1.8	8	1.17	94	0.09	6	0.42	73	0.19	27

For antimycotics and antifungals for systemic use (ATC group J02 & D01BA), a median 94% of total consumption was reported as being from the community, ranging from 76% (Slovenia) to 97% (Portugal). Two countries (Malta and Slovenia) reported more than 20% of the total consumption as being from the hospital sector. Thirteen (82%) countries reported less or equal to 10% of the total consumption as being from the hospital sector.

For antivirals for systemic use (ATC group J05), a median of 73% of total consumption was reported as being from the community, ranging from 6% (Portugal) to 99% (Latvia). Eight (50%) countries reported more or equal to 50% of the total consumption as being from the hospital sector.

Discussion

In 2010, the distribution of total consumption of antimicrobials from ATC groups J01 and J02 & D01BA showed a rather uniform pattern with the largest proportion of consumption being reported from the community. The low proportion of consumption in the community in Finland can be explained by the fact conversely to the other EU/EEA countries that Finland reported remote primary health care centres and nursing homes consumption in the hospital sector, thus overestimating hospital consumption.

In contrast, considerable inter-country variation was observed for the distribution of the total consumption of antivirals for systemic use (ATC group J05) between the community and the hospital sector. In some countries, dispensing of certain antiviral agents is limited to the hospital sector or to the community only. As a consequence, data are presented separately for each sector for only ATC groups J01 and J02 & D01BA. For antivirals for systemic use (ATC group J05), data are presented for both sectors grouped.

4.2. Consumption of antibacterials for systemic use (ATC group J01)

Results

For 2010, 18 countries reported data on consumption of antibacterials for systemic use (ATC group J01) in the hospital sector.

The consumption of antibacterials for systemic use (ATC group J01) in the hospital sector varied from 1.06 (the Netherlands) to 3.0 DDD per 1 000 inhabitants and per day (Latvia) with a median of 1.8 DDD per 1 000 inhabitants and per day.

Table 4.1 provides an overview of the total consumption of antibacterials for systemic use (ATC group J01) in the community, reported per country during the period 1997 to 2010. The number of reporting countries has increased from 10 countries in 1997 to 18 countries in 2010.

Table 4.2. Consumption of antibacterials for systemic use (ATC group J01) in the hospital care sector, EU/EEA countries, 1997-2010, expressed as DDD per 1 000 inhabitants and per day.

Country	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Belgium	2.0	2.0	2.2	2.2	2.2	2.2	2.3	2.1	1.9		1.9	1.7		2.0
Bulgaria										1.4	1.4	1.5	1.6	1.5
Denmark	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.7	1.8	1.8	1.8	1.8
Estonia						8.6	2.4	2.3	2.5	2.1	1.9	2.0	1.6	1.8
Finland ^(a)	3.5	3.7	3.7	3.8	3.9	3.9	3.6	3.4	3.5	3.4	3.2	3.2	3.2	2.8
France	3.3	3.0	3.1	3.2	2.9		2.8	2.5	2.6	2.3	2.2	2.2	2.2	2.2
Greece	2.1	2.1	2.2	2.3	2.2	2.2	2.3						3.3	
Hungary					1.2	1.3	1.5	1.3	1.4	1.4	1.2	1.2	1.3	1.3
Iceland										0.6				
Ireland								0.7	0.7	1.9	2.1	1.6	1.4	1.8
Italy									0.2		1.5	2.3		2.1
Latvia						6.2		4.7	3.9	3.2	3.5	2.8	2.2	3.0
Lithuania														2.4
Luxembourg	2.0	1.9	2.2	2.2	2.1	2.4	2.4	2.0	2.1	2.1	2.2	2.2		2.1
Malta	1.6	2.5	2.6	2.4	1.9	1.7	2.0	1.8	1.4	1.7	1.3	1.4	1.4	2.0
Netherlands	0.6	0.6	0.7	0.6	0.6	0.7								1.1
Norway		1.1			1.1	1.3	1.4	1.3	1.3	1.5	1.5	1.7	1.5	1.4
Poland		3.0	3.4	2.4	2.4	1.7								
Portugal ^(b)													1.4	1.4
Romania													2.6	
Slovakia			1.3	1.2	1.4	1.5	1.4	1.6	1.9	1.7	1.9	1.8	1.9	
Slovenia	0.5	1.6	1.7	1.8	1.7	1.8	1.8	1.6	1.7	1.7	1.7	1.7	1.8	1.7
Sweden	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.3	1.5	1.5	1.5

^(a) Finland: data include consumption in remote primary health care centres and nursing homes.

^(b) Portugal: data correspond to public hospitals only.

Table 4.3 and Figure 4.1 present the consumption of antibacterials for systemic use (ATC group J01) in the hospital sector, as a total and by sub-groups.

The proportion of consumption of tetracyclines (ATC group J01A) out of the total consumption of antibacterials for systemic use (ATC J01) ranged from 0.6% (Luxembourg) to 11.7% (Sweden).

The proportion of consumption of penicillins (ATC group J01C) ranged from 9.0% (Finland) to 51.7% (Belgium). Three out of 18 countries had a proportion \geq 50% (France, Belgium and Sweden).

The proportion of consumption of cephalosporins and other beta-lactams (ATC group J01D) was highest in Finland (66.6%), and lowest in Ireland (9.3%).

The proportion of consumption of sulfonamides and trimethoprim ranged from 0.6% (Bulgaria) to 6.2% (Malta).

The proportion of consumption of macrolides, lincosamides and streptogramins (ATC group J0F) ranged from 2.6% (Finland) to 14.5% (Malta)

The proportion of the consumption of quinolone antibacterials (ATC group J0M) ranged from 5.8% (Finland) to 20.9% (Hungary).

Trends

Temporal trends in the consumption of antibacterials for systemic use (ATC group J01) in the hospital sector from 2008 to 2010 are presented in Figure 4.2. Between 2009 and 2010, consumption decreased in Finland (more than 5% decrease), Bulgaria, Norway and Slovenia, whereas it increased in eight countries (Latvia, France, Hungary, Malta, Estonia, Ireland, Portugal and Sweden) during the same period. During 2008–2010, only Norway showed a continuous decreasing consumption in the hospital sector.

The median consumption of antibacterials for systemic use (ATC group J01) increased from 1.7 DDD per 1 000 inhabitants and per day in 2009 to 1.8 DDD per 1 000 inhabitants and per day in 2010 (Figure 4.3).

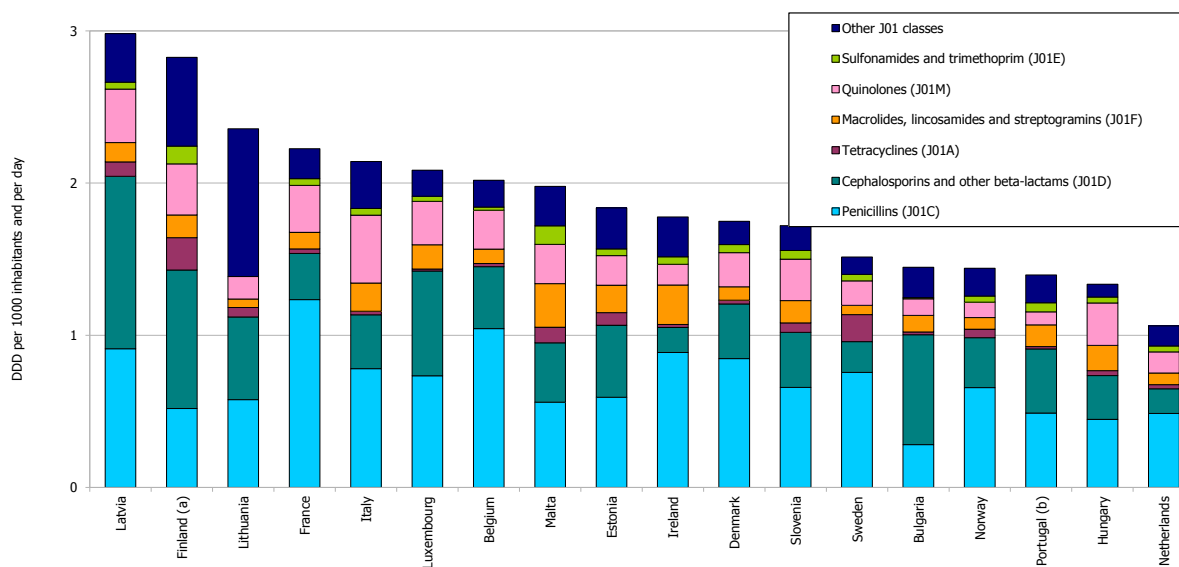
Table 4.3. Consumption of antibacterials for systemic use (ATC group J01) by ATC group level 3 in the hospital sector, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.

Country	Tetracyclines (J01A)	Beta-lactams, penicillins (J01C)	Other Beta-lactam antibacterials (J01D)	Sulfonamides and trimethoprim (J01E)	Macrolides, lincosamides and streptogramins (J01F)	Quinolones antibacterials (J01M)	Other (J01B, J01G, J01R and J01X)	Total (ATC group J01)
Belgium	0.02	1.04	0.41	0.02	0.09	0.25	0.18	2.0
Bulgaria	0.02	0.28	0.72	0.01	0.11	0.11	0.20	1.4
Denmark	0.03	0.85	0.36	0.05	0.09	0.23	0.15	1.7
Estonia	0.08	0.59	0.47	0.04	0.18	0.19	0.27	1.8
Finland ^(a)	0.21	0.52	0.91	0.12	0.15	0.34	0.58	2.8
France	0.03	1.23	0.30	0.04	0.11	0.31	0.20	2.2
Hungary	0.03	0.45	0.29	0.04	0.17	0.28	0.08	1.3
Ireland	0.02	0.89	0.17	0.05	0.26	0.14	0.26	1.8
Italy	0.02	0.78	0.35	0.04	0.18	0.45	0.31	2.1
Latvia	0.09	0.91	1.13	0.05	0.13	0.35	0.32	3.0
Lithuania	0.06	0.58	0.54	<0.01	0.06	0.15	0.97	2.4
Luxembourg	0.01	0.73	0.69	0.03	0.16	0.29	0.17	2.1
Malta	0.10	0.56	0.39	0.12	0.29	0.26	0.26	2.0
Netherlands	0.03	0.49	0.16	0.04	0.08	0.14	0.13	1.1
Norway	0.06	0.66	0.33	0.04	0.08	0.10	0.18	1.4
Portugal ^(b)	0.02	0.49	0.42	0.06	0.14	0.09	0.18	1.4
Slovenia	0.06	0.66	0.36	0.06	0.15	0.27	0.16	1.7
Sweden	0.18	0.76	0.20	0.04	0.06	0.16	0.11	1.5

^(a)Finland: data include consumption in remote primary health care centres and nursing homes.

^(b)Portugal: data correspond to public hospitals only.

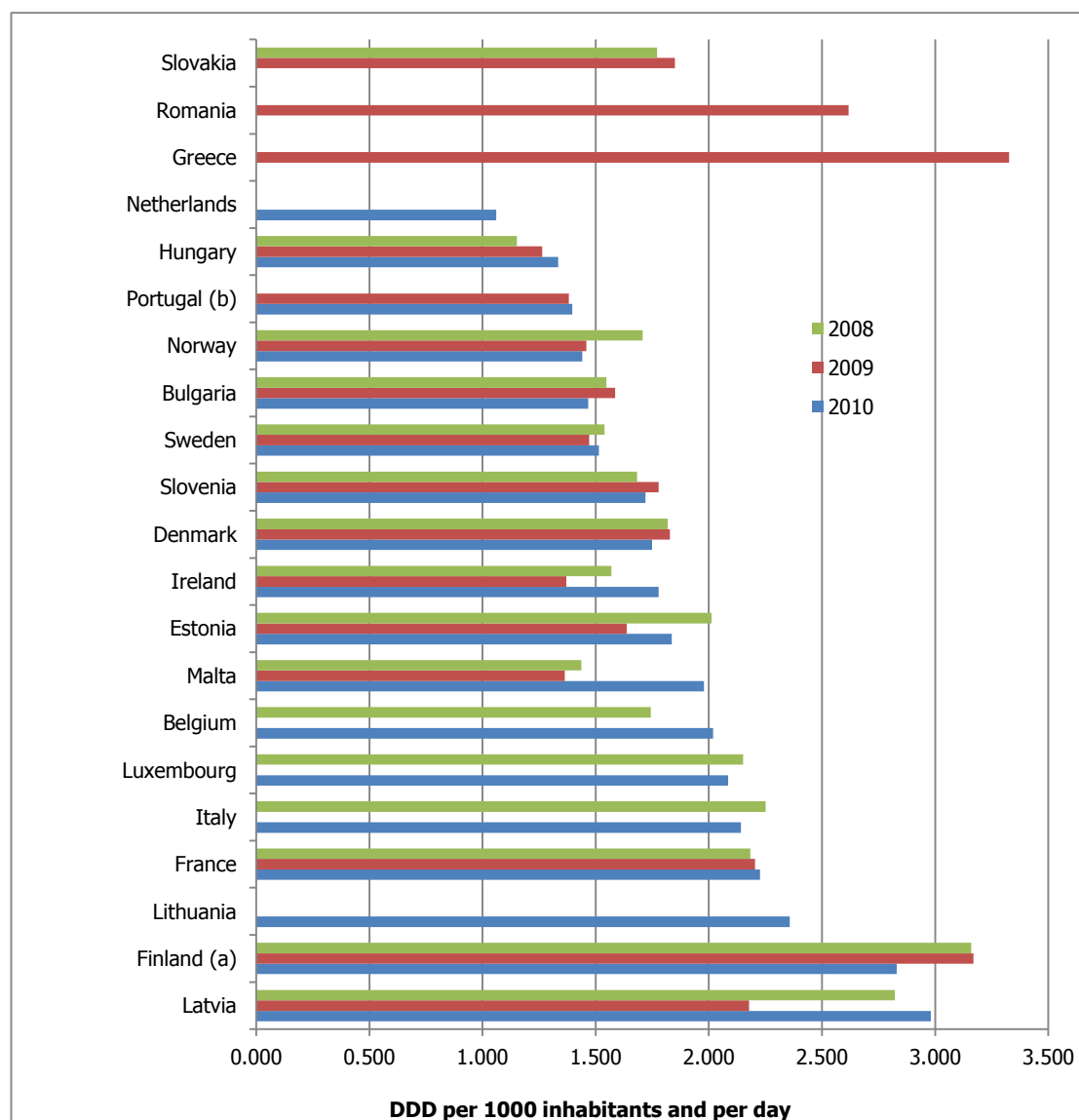
Figure 4.1. Consumption of antibacterials for systemic use (ATC group J01) in the hospital sector in EU/EEA countries, 2010, at group level 3, expressed as DDD per 1 000 inhabitants and per day.



^(a)Finland: data include consumption in remote primary health care centres and nursing homes.

^(b)Portugal: data correspond to public hospitals only.

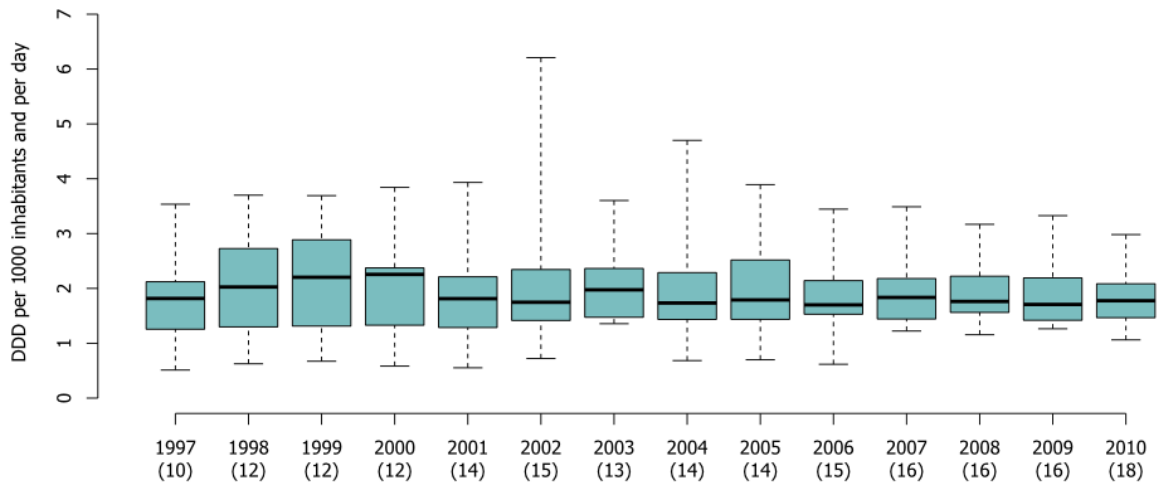
Figure 4.2. Trends of consumption of antibacterials for systemic use (ATC group J01) in the hospital sector in EU/EEA countries, 2008-2010, expressed as DDD per 1 000 inhabitants and per day.



^(a)Finland: data include consumption in remote primary health care centres and nursing homes.

^(b)Portugal: data correspond to public hospitals only.

Figure 4.3. Trends and inter-country variations of consumption of antibacterials for systemic use (ATC group J01) in the hospital sector, EU/EEA countries, 1997–2010, expressed as DDD per 1 000 inhabitants and per day.



Boxes indicate the lower and the upper quartiles. The bold lines indicate the medians. Whiskers indicate the minimum and maximum values. For 1997–2009, only data from ESAC participating countries that also participated in ESAC-Net in 2010 are included. The number of participating countries is shown in parentheses.

Discussion

In 2010, there were no major changes in the patterns of consumption of antibacterials for systemic use (ATC group J01) in the hospital sector compared with 2009. In contrast to consumption in the community (primary care), consumption in the hospital sector does not show a clear geographical gradient and the median consumption has remained at about the same level since 2001. The distribution of the consumption of antibacterials for systemic use (ATC group J01) between sub-groups did not change in 2010 compared to 2009. Compared with 2009, consumptions of penicillins (ATC group J01C) and of other beta-lactam antibacterials (ATC group J01D, includes cephalosporins) represented one third of the total consumption in the ATC group J01.

In Finland, data from the hospital sector include consumption in remote primary health care centres and nursing homes, which results in a higher consumption rate compared to most other countries (Tables 4.2 and 4.3, and Figures 4.1 and 4.2).

4.3. Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

Results

In 2010, 17 countries reported data on consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the hospital sector (Table 4.4). The Netherlands reported on the consumption of antibacterials for systemic use (ATC group J01), but not on antimycotics or antifungals.

The median consumption was 0.09 DDD per 1 000 inhabitants and per day. Consumption varied by a factor of 10 from 0.02 DDD per 1 000 inhabitants and per day (Lithuania) to 0.2 DDD per 1 000 inhabitants and per day (Denmark).

In 2010, amphotericin B (J02AA01) and fluconazole (J02A02) represented 77.3% of the total consumption of antimycotics and antifungals for systemic use in the hospital sector in the reporting countries. The proportion of the total represented by fluconazole consumption varied from 33% (Lithuania) to 95% (Latvia). Fluconazole represented more than 50% of the total consumption in 10 (59%) reporting countries.

For Malta, no consumption was reported for ATC group D01BA as terbinafine is not on the Government Hospital Formulary List.

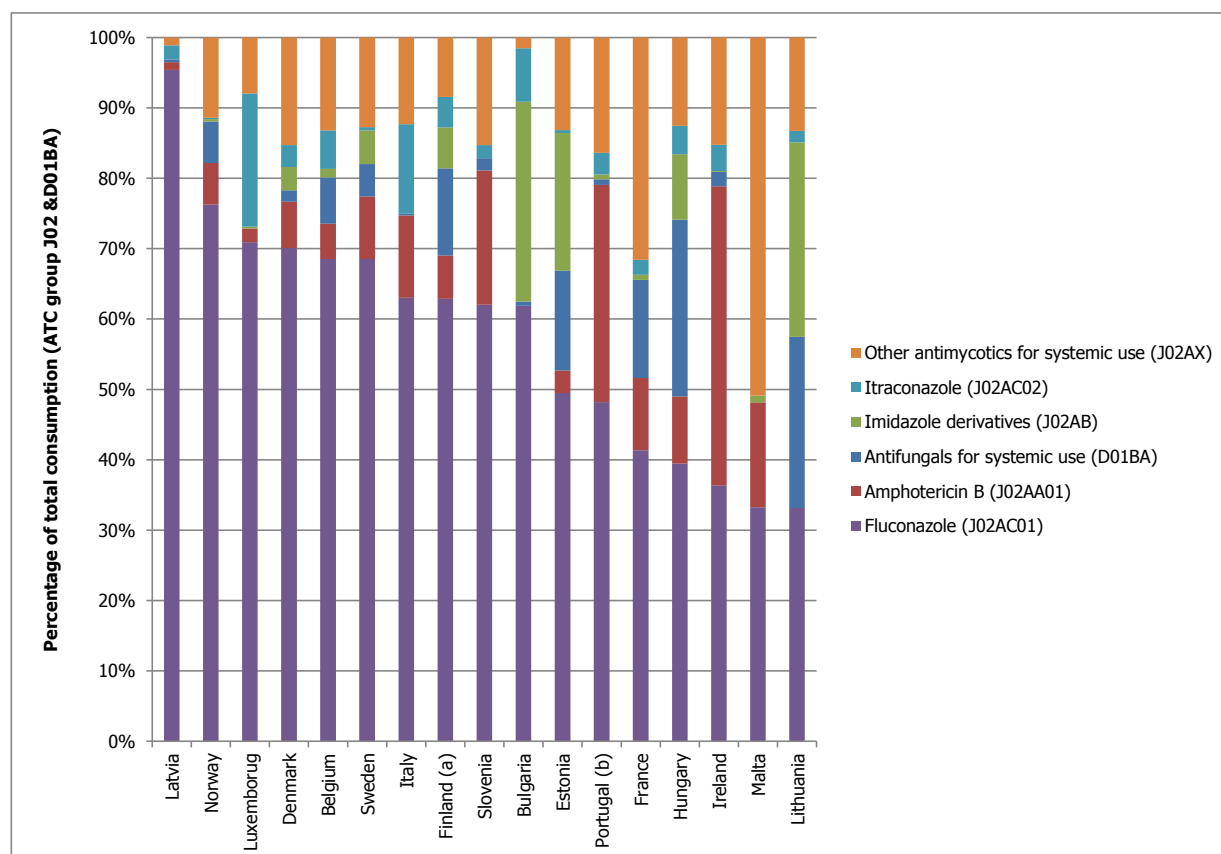
Table 4.4. Consumption of antifungals (ATC group D01BA) and antimycotics (ATC group J02) for systemic use in the hospital sector, EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.

Country	Antifungals for systemic use (D01BA)	Amphotericin B (J02AA01)	J02AB Imidazole derivatives (J02AB)	Fluconazole (J02AC01)	Itraconazole (J02AC02)	Other antimycotics for systemic use	Total (J02 & D01BA)
Belgium	0.009	0.007	0.002	0.089	0.007	0.017	0.130
Bulgaria	<0.001	-	0.009	0.020	0.003	0.001	0.033
Denmark	0.003	0.013	0.007	0.142	0.006	0.031	0.202
Estonia	0.007	0.002	0.010	0.025	<0.001	0.007	0.050
Finland ^(a)	0.015	0.008	0.007	0.077	0.005	0.010	0.122
France	0.015	0.011	0.001	0.045	0.002	0.035	0.109
Hungary	0.010	0.004	0.004	0.016	0.002	0.005	0.039
Ireland	0.002	0.040	<0.001	0.034	0.004	0.014	0.093
Italy	<0.001	0.015	-	0.080	0.016	0.016	0.127
Latvia	<0.001	0.001	-	0.052	0.001	0.001	0.054
Lithuania	0.004	-	0.005	0.006	<0.001	0.002	0.018
Luxembourg	<0.001	0.003	<0.001	0.103	0.028	0.012	0.146
Malta	-	0.018	0.001	0.041	-	0.063	0.124
Norway	0.003	0.003	<0.001	0.043	<0.001	0.006	0.056
Portugal ^(b)	0.001	0.023	0.001	0.036	0.002	0.012	0.075
Slovenia	0.002	0.018	-	0.057	0.002	0.014	0.092
Sweden	0.003	0.006	0.003	0.045	<0.001	0.008	0.065

^(a) Finland: data include consumption in remote primary health care centres and nursing homes.

^(b) Portugal: data correspond to public hospitals only.

Figure 4.4. Relative consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the hospital sector, EU/EEA countries, 2010.



^(a)Finland: data include consumption in remote primary health care centres and nursing homes.

^(b)Portugal: data correspond to public hospitals only.

Discussion

This is the first time that consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the hospital sector is reported in a surveillance report. From all 14 substances under surveillance (12 antimycotics of the ATC group J02 and one antifungal of ATC group D01BA), fluconazole (J02A02) showed the highest consumption in all countries.

5. Consumption of antivirals for systemic use (ATC group J05) in both the community and the hospital sector

Results

Twenty-two countries reported data to ESAC-Net on antivirals for systemic use (ATC group J05). The data are presented together for the community and the hospital sector (Table 5.1 and Figure 5.1). Austria, the Czech Republic, Germany and the Netherlands reported consumption data on antivirals from only the community.

Total consumption of antivirals for systemic use (ATC group J05) showed an almost 20-fold difference from 0.19 DDD per 1 000 inhabitants and per day (Lithuania) to 3.7 DDD per 1 000 inhabitants and per day (France).

The median consumption in the reporting countries was the highest (0.28 DDD per 1 000 inhabitants and per day) for nucleosides and nucleotides excluding reverse transcriptase inhibitors (ATC group J05AB). Protease inhibitors (ATC group J05AE), nucleoside and nucleotide reverse transcriptase inhibitors (ATC group J05AF) (each with 0.27 DDD per 1 000 inhabitants and per day) were the next most used groups. For these three ATC groups (J05AB, J05AE, J05AF), France reported the highest consumption of all reporting countries with 0.67, 0.82 and 0.51 DDD per 1 000 inhabitants and per day, respectively. The lowest consumption of ATC groups J05AB and J05AE was reported by Malta (0.02 and 0.10 DDD per 1 000 inhabitants and per day, respectively), and from Slovenia for ATC group J05AF (0.02 DDD per 1 000 inhabitants and per day).

Figure 5.1 shows the distribution of total consumption of antivirals for systemic use (ATC group J05) into seven categories based on their main indication: 'HIV/AIDS antivirals', 'HIV/hepatitis B antivirals', 'hepatitis C antivirals', 'herpes antivirals', 'influenza antivirals' and one group for remaining substances (Annex 1).

The relative consumption of 'HIV/AIDS antivirals' out of the total antiviral consumption ranged from 8.6% (Bulgaria) to 73% (Norway). Total consumption of 'HIV/AIDS antivirals' represented 55.6% of the total European consumption of antivirals for systemic use (ATC group J05).

Greece reported the highest proportion of consumption of the group 'HIV/hepatitis B antivirals' (32.5%) and of the group 'hepatitis B antivirals' (28.9%). The proportion of the consumption of 'Hepatitis C antivirals' out of the total consumption of antivirals for systemic use (ATC group J05) ranged from 2.3% (Denmark) to 41.7% (Lithuania). For the group 'herpes antivirals', the proportion of total consumption of antivirals for systemic use (ATC group J05) ranged from 5.5% (Estonia) to 54% (Iceland).

In 2009, the year of the A7H1N1 pandemic, the ESAC project reported a median consumption of oseltamivir (J05AH02) of 0.10 DDD per 1 000 inhabitants and per day (maximum reported by Norway with 0.98 DDD per 1 000 inhabitants and per day). One year earlier, in 2008, the ESAC project reported a median consumption of oseltamivir of 0.001 DDD per 1 000 inhabitants and per day (maximum reported by Finland with 0.36 DDD per 1 000 inhabitants and per day). For 2010, i.e. the year following the A7H1N1 pandemic, ESAC-Net reports a median consumption of oseltamivir of 0.003 DDD per 1 000 inhabitants and per day, a similar level to the level reported by the ESAC project in 2008 before the pandemic. In 2010, the highest oseltamivir consumption was 0.38 DDD per 1 000 inhabitants and per day in Bulgaria, which represented half of the total consumption of antivirals for systemic use (ATC J05) in that country.

Table 5.1. Total consumption of antivirals for systemic use (ATC group J05) in both sectors (community and hospital care sector), EU/EEA countries, 2010, expressed as DDD per 1 000 inhabitants and per day.

Country	Nucleosides and nucleotides excl. reverse transcriptase inhibitors (J05AB)	Protease inhibitors (J05AE)	Nucleoside and nucleotide reverse transcriptase inhibitors (J05AF)	Non-nucleoside reverse transcriptase inhibitors (J05AG)	Neuraminidase inhibitors (J05AH)	Antivirals for treatment of HIV infections, combinations (J05AR)	Other antivirals (J05AC + J05AD + J05AX)	Total (J05)
Austria ^(a)	0.39	0.19	0.20	0.11	0.01	<0.01	0.04	0.92
Belgium	0.13	0.42	0.25	0.25	<0.01	<0.01	0.05	1.11
Bulgaria	0.08	0.05	0.06	0.01	0.60	<0.01	<0.01	0.81
Czech Republic ^(a)	0.16	0.04	0.16	0.02	<0.01	<0.01	0.01	0.37
Denmark	0.35	0.27	0.13	0.21	<0.01	<0.01	0.04	1.00
Estonia	0.24	0.53	0.52	0.51	0.06	<0.01	<0.01	1.86
Finland	0.35	0.10	0.06	0.08	0.01	-	0.03	0.62
France	0.67	0.82	0.51	0.37	<0.01	1.13	0.21	3.71
Germany ^(a)	0.25	0.27	0.27	0.14	<0.01	0.44	0.06	1.42
Greece	0.31	0.18	1.03	0.06	<0.01	<0.01	0.04	1.62
Hungary	0.20	0.02	0.05	0.02	0.01	0.03	0.17	0.50
Iceland	0.39	0.14	0.05	0.04	<0.01	<0.01	<0.01	0.63
Italy	0.46	0.54	0.67	0.21	0.01	<0.01	0.10	2.00
Latvia	0.24	0.07	0.08	0.14	<0.01	<0.01	<0.01	0.54
Lithuania	0.14	<0.01	0.03	0.01	0.01	<0.01	<0.01	0.19
Luxembourg	0.38	0.34	0.31	0.17	<0.01	0.68	0.09	1.95
Malta	0.10	0.02	0.07	0.07	0.01	-	<0.01	0.26
Netherlands ^(a)	0.23	0.29	0.29	0.29	-	0.68	0.05	1.83
Norway	0.21	0.26	0.08	0.09	0.01	0.41	0.02	1.09
Portugal	0.37	0.98	0.93	0.76	<0.01	<0.01	0.10	3.14
Slovenia	0.21	0.09	0.02	0.04	<0.01	<0.01	0.01	0.38
Sweden	0.40	0.27	0.14	0.14	<0.01	<0.01	0.07	1.03

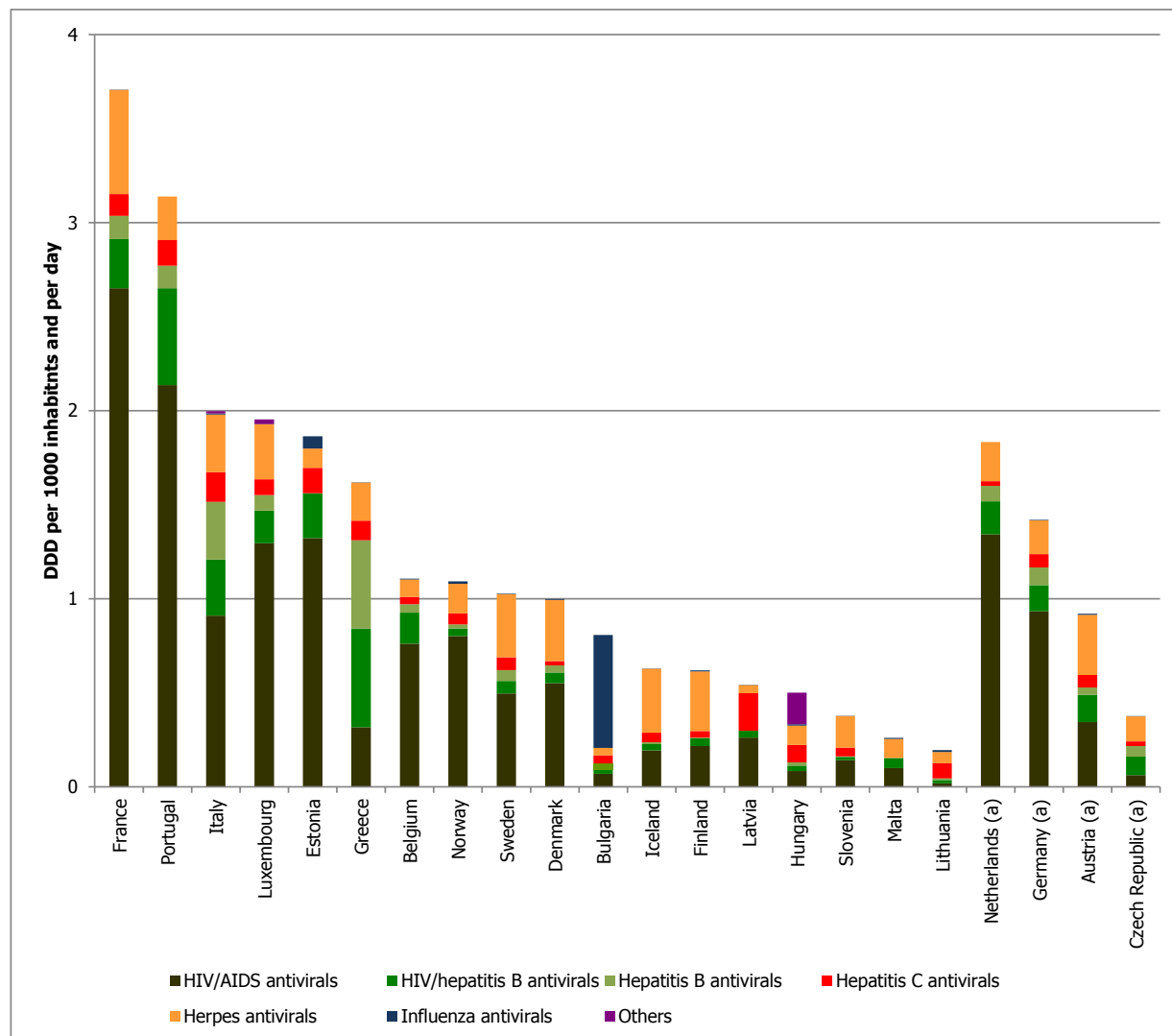
^(a)Countries reported only consumption data from the community

Discussion

In contrast to the consumption of antibacterials for systemic use (ATC group J01) and of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA), for which results are presented separately for each of the two healthcare sectors, consumption of antivirals for systemic use (ATC group J05) are presented for both sectors grouped together. A comparison of European consumption of antivirals for systemic use (ATC group J05) within one single sector would be less useful as the patterns of the distribution of total consumption of antivirals differ considerably between countries (Table 4.1). In some countries, dispensing of certain antiviral classes is limited to the hospital sector or to the community only. The actual total consumption of antivirals for systemic use (ATC group J05) in Austria, the Czech Republic, Germany and the Netherlands is underestimated since data on consumption in the hospital sector were not reported.

Within the ATC groups of antimicrobials for systemic use (ATC groups J01, J02 & D01BA, and J05), antivirals for systemic use (ATC group J05) showed the highest variation between countries. As shown for antibacterials for systemic use (ATC group J01), future data analysis may highlight certain socioeconomic or structural determinants that may explain these variations. Following a suggestion from the ESAC project [5] to allocate the actual 57 unique substances from the ATC classification into seven groups according to their main indication, this proposed classification was adopted to allow a more clinical relevant description of the consumption of antivirals for systemic use (Annex 1). The group 'HIV/AIDS antivirals' represented more than half of the total European consumption of antivirals for systemic use (ATC J05) and therefore consumption of this group is a major determinant of inter-country variation. Because antivirals are often used for the treatment of long-lasting infections similar to chronic diseases, data on consumption of antivirals may be interpreted differently from data on consumption of antibacterials (antibiotics). The large inter-country variation of total consumption of antivirals may reflect the burden of viral infections rather than overuse or misuse as this may be the case for antibacterials. For example, the ESAC project, using data from 2008, showed a strong correlation between consumption of 'HIV/AIDS antivirals' and the number of HIV/AIDS patients [5].

Figure 5.1. Total consumption of antivirals for systemic use (ATC group J05) from both sectors (community and hospital care sector), EU/EEA countries, grouped into categories of their main indication (adopted from [5] (see annex1), 2010, expressed as DDD per 1 000 inhabitants and per day.



^(a)Countries reported only consumption data from the community

6. Analysis of antimicrobial consumption data as packages and by age group

6.1. Number of packages for antibacterials for systemic use per 1 000 inhabitants and per day (ATC group J01, oral administration)

Results

In 2010, 12 countries (Belgium, Bulgaria, Denmark, Estonia, Finland, France, Italy, Latvia, Lithuania, Portugal, Slovenia and Sweden) provided data on the number of packages consumed for both the community and the hospital sector. For each healthcare sector, Table 6.1 shows the average numbers of DDD per package and per route of administration for antibacterials for systemic use (ATC group J01), antimycotics and antifungals for systemic use (ATC groups J02 & D01BA), and antivirals for systemic use (ATC group J05).

In 2010, the average number of DDD per package for all three groups of antimicrobials was higher in the community (7.2 to 12.5 DDD per package) than in the hospital sector (0.5 to 4.6 DDD per package). In the community and in the hospital sector, the number of DDD per package was lower for antimicrobials administered parenterally rather than orally, with the exception of antivirals for systemic use (ATC J05) in the community.

Table 6.1. Average (mean) DDD per package of antimicrobial (ATC groups J01, J02 & D01BA, and J05) for countries*, which reported data from both sectors (community and hospital care sector), 2010.

ATC group	Route of administration	Community DDD per package (Mean)	Hospital sector DDD per package (Mean)
ATC group J01	oral	7.2	4.6
	parenteral	0.5	0.9
ATC group J02 and D01BA	oral	8.4	2.8
	parenteral	1.7	1.8
ATC group J05	oral	8.9	2.7
	parenteral	12.5	0.5

*Belgium, Bulgaria, Denmark, Estonia, Finland, France, Italy, Latvia, Lithuania, Portugal, Slovenia and Sweden

The total consumption of antibacterials for systemic use (ATC group J01, oral administration) in the community ranged from 1.2 packages per 1 000 inhabitants and per day (Sweden) to 4.8 packages per 1 000 inhabitants and per day (France). On average, 2.4 packages of antibacterials for systemic use (ATC group J01) were consumed per 1 000 inhabitants and per day.

When considering major ATC groups, consumption ranged from 0.11 packages of sulfonamides and trimethoprim (ATC group J01E) per 1 000 inhabitants and per day to 1.1 packages of penicillins (ATC group J01C) per 1 000 inhabitants and per day.

Table 6.2. Consumption of packages of antibacterials for systemic use (ATC group J01, oral administration) in the community, EU/EEA countries, 2010, expressed as packages per 1 000 inhabitants and per day.

Country	Tetracyclines (J01A)	Beta-lactams, penicillins (J01C)	Other Beta-lactam antibacterials (J01D)	Sulfonamides and trimethoprim (J01E)	Macrolides, lincosamides and streptogramins (J01F)	Quinolones antibacterials (J01M)	Other (J01B, J01G, J01R and J01X)	Total (ATC group J01)
Austria	0.09	0.73	0.31	0.03	0.60	0.24	0.04	2.05
Belgium	0.14	1.28	0.12	0.05	0.39	0.32	0.22	2.51
Bulgaria	0.24	0.83	0.44	0.24	0.57	0.35	0.10	2.77
Czech Republic	0.18	0.64	0.21	0.17	0.48	0.18	0.07	1.93
Denmark	0.07	1.19	0.00	0.13	0.29	0.07	0.04	1.79
Estonia	0.21	0.65	0.17	0.07	0.35	0.15	0.20	1.79
Finland	0.23	0.86	0.43	0.09	0.26	0.13	0.08	2.08
France	0.18	2.25	0.92	0.09	0.74	0.41	0.24	4.82
Greece ^(a)	0.38	0.71	1.24	0.09	1.15	0.47	0.08	4.13
Iceland ^(a)	0.27	1.35	0.08	0.15	0.26	0.14	0.06	2.31
Ireland	0.22	1.24	0.25	0.04	0.43	0.14	0.00	2.32
Italy	0.07	1.49	0.43	0.06	0.69	0.80	0.23	3.77
Latvia	0.21	0.61	0.11	0.16	0.20	0.17	0.05	1.50
Lithuania	0.15	0.85	0.13	<0.01	0.26	0.18	0.14	1.71
Luxembourg	0.14	1.27	0.34	0.07	0.61	0.39	0.11	2.93
Portugal	0.05	1.05	0.20	0.08	0.49	0.36	0.11	2.34
Slovenia	0.00	1.22	0.06	0.22	0.37	0.19	<0.01	2.06
Spain	0.04	1.06	0.18	0.03	0.33	0.31	0.18	2.13
Sweden	0.15	0.66	0.04	0.06	0.09	0.09	0.09	1.19
Mean number	0.16	1.05	0.30	0.10	0.45	0.27	0.11	2.43

^(a)Greece and Iceland provided total care data, i.e. including the hospital sector.

Discussion

Antimicrobial consumption expressed in DDD per 1 000 inhabitants and per day cannot be directly extrapolated to a number of prescriptions per patient. However, the ESAC project used the number of consumed packages as a proxy for the number of prescription or treatments.

In this report, the number of DDD per package was analysed to validate packages as a proxy for prescription. The average number of DDD per package was calculated for the three main ATC groups under surveillance: antibacterials for systemic use (ATC group J01), antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) and antivirals for systemic use (ATC group J05) and stratified by routes of administration and healthcare sectors.

In the hospital sector, the number of DDD per package ranged from 0.5 to 4.6. It is not likely that a package covers the full length of one treatment or prescription for a patient. In the community, it was assumed that treatments with antivirals for systemic use (ATC group J05) and with antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) were less frequently used for short treatment for acute infections than for treatments of chronic diseases.

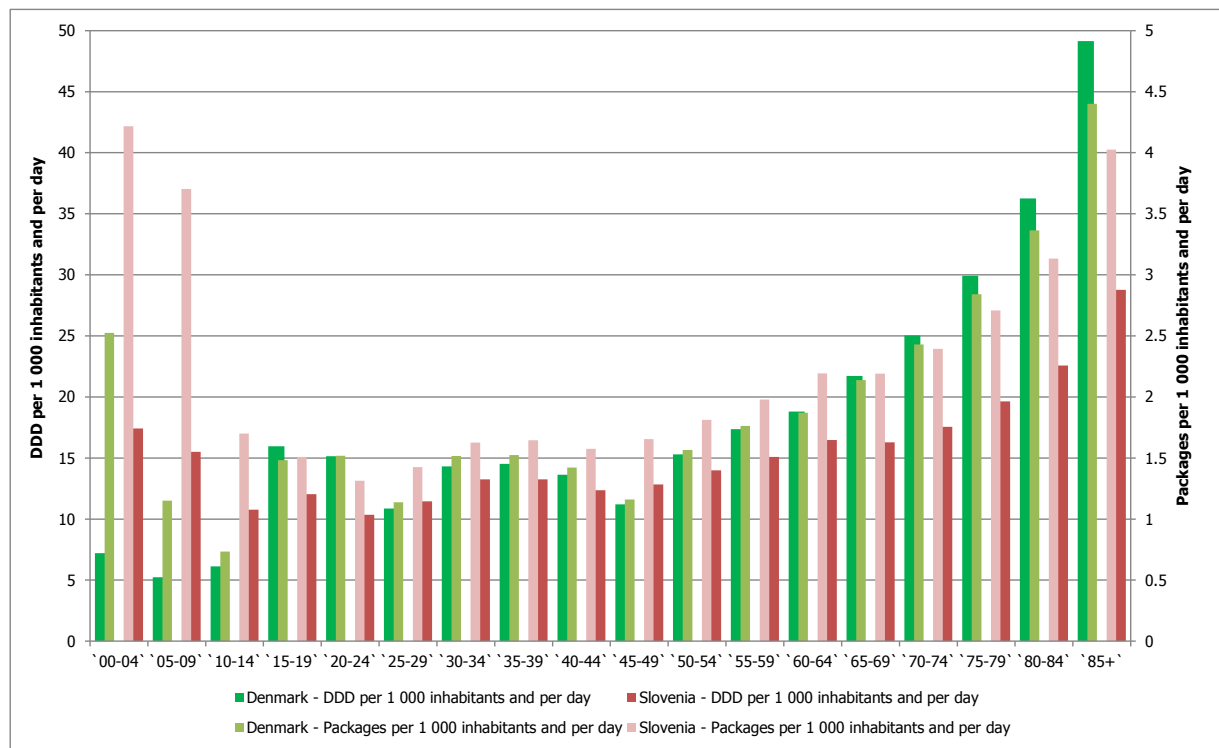
Based on the registry data delivered, some countries reported a package size of one single unit, as antimicrobial dispensing was counted as the number of single units, whereas others reported package sizes of more than 100 units in the hospitals. Additionally, some countries reported a package size of a single unit for the parenteral route of administration in both sectors.

This means that, unlike for the community, the number of packages may not represent a good surrogate for prescriptions for these ATC groups in the hospital sector and parenteral drugs.

Antibacterials for systemic use (ATC group J01) are often used to treat acute infections. In 2010, on average 2.4 packages antibacterials for systemic use (ATC group J01) per 1 000 per inhabitants and per day were consumed in the 12 countries that reported data on packages. Would further information be available on the average duration of treatments and the actual used daily doses, the number of prescriptions and treatments could be extrapolated from these data on the number of packages per 1 000 inhabitants and per day.

6.2. Consumption of antibacterials for systemic use (ATC group J01, oral administration) by age group

Figure 6.1. Consumption of antibacterials for systemic use (ATC group J01, oral administration) in the community by age group, Denmark and Slovenia, 2010, expressed as DDD per 1 000 inhabitants and per day and in packages per 1 000 inhabitants and per day.



Results

In 2010, only two countries, Denmark and Slovenia, provided community consumption data subdivided by age groups. Figure 6.1 shows the consumption of antibacterials for systemic use (ATC group J01, oral administration) by age groups. In both countries, consumption in packages per 1 000 inhabitants and per day and in DDD per 1 000 inhabitants and per day increased in parallel with increasing age groups among the elderly.

In Denmark, consumption of antibacterials for systemic use (ATC group J01, oral administration) was the highest for the age group >85 years. In this age group, consumption was one third higher than in the age group 80–84 years (49.1 vs. 36.3 DDD per 1 000 inhabitants and per day). Consumption in the age group 74–79 years was twice as high as that in adults from age groups 20–54 years (29.9 vs. 13.6 DDD per 1 000 inhabitants and per day). In Slovenia, consumption of antibacterials for systemic use (ATC group J01, oral administration) was twice as high in the age group >85 years compared to the age group 55–59 years (28.7 vs. 15.1 DDD per 1 000 inhabitants and per day).

In contrast to the findings in the elderly, consumption of antibacterials for systemic use (ATC group J01, oral administration) expressed in DDD per 1 000 inhabitants and per day in young Danish children (age groups 0–4 and 5–9 years) was around 50% lower than in teenagers and adults (age groups 10–59 years). Young Slovenian children in the age groups 0–4 and 5–9 years had a consumption around 25% higher compared to Slovenian teenager and adults (age groups 10–59 years).

Consumption of antibacterials for systemic use (ATC group J01, oral administration) expressed as a number of packages, showed a disproportional increase of consumption in the very young age groups (age groups 0–4 years and 5–9 years) for both Denmark and Slovenia. For the age groups 10–54 years, the average number of DDD per package was 9.7 in Denmark and 7.7 in Slovenia. In the age group 0–4 years, this ratio was 3.3 and 1.9 times lower, i.e. 2.9 in Denmark and 4.1 in Slovenia.

Discussion

In 2010, only two of 26 countries reporting on antimicrobial consumption provided data subdivided by age groups. The results are therefore presented in this report as an example and the results may not reflect the situation in all other countries. The observation of a higher consumption in small children and the elderly, however, confirms what was previously reported by the ESAC project.

Although only two countries reported data, in young children, the discrepancy between the reported consumptions when expressed as a number of packages per 1 000 inhabitants and per day or as a number of DDD per 1 000 inhabitants and per day, may indicate the need for developing specific measurement of units for antimicrobial consumption in children.

In the future, consumption data subdivided by age groups may be reported from more European countries, which may allow identification of specific age groups that consume high proportions of certain antimicrobial sub-groups and provide detailed information for campaigns or interventions aimed at a more prudent use of antimicrobials in these sub-groups of population.

7. General discussion and perspectives

The former ESAC project was included in the list of 14 dedicated surveillance networks to be transferred to ECDC. Since 1 July 2011 and following its transition, the network is coordinated at ECDC and was renamed ESAC-Net. The present report of antimicrobial consumption surveillance data from 2010 is the first report of ESAC-Net following this transition.

In line with the goals of the former ESAC project, the scope of ESAC-Net is to encourage all network participants to report national antimicrobial consumption data at the medicinal product level by providing national registry data and the number of packages for each product. This standard version, in contrast to the 'light' option, is the preferred format for reporting data to ESAC-Net as it offers better opportunities for internal data validation and additional material for further analyses. For instance, the national registries include information from participating countries on the number of individual products available on the market, which has been shown to be associated with the level of consumption [15]. In 2010, two thirds of the reporting countries used the preferred format for reporting data on antimicrobial consumption in the community.

Quality of antimicrobial consumption data also depends on the type of data available for a specific sector. For ESAC-Net, countries provide sales or/and reimbursement data that have both advantages and drawbacks. The major drawback of reimbursement data is that they cannot record antimicrobials dispensed without a prescription and non-reimbursed prescribed antimicrobials [10]. For this reason, countries that report reimbursement data and are known as having a substantial proportion of antimicrobials being dispensed without a prescription are indicated as such in the tables and figures in this report. Even though it could represent a potential bias, ESAC-Net will continue the joint analysis of sales and reimbursement data. A change of data provider and/or type of data could introduce bias in the consumption rates reported by ESAC-Net. However, the number of countries each year that change data provider and/or types of data is small. There were two changes in 2010: Luxembourg reported sales data for the hospital sector, and Italy reported reimbursement data for the community.

In 2010, consumption of antibacterials for systemic use (ATC group J01) in the community in Europe varied considerably and showed a north-to-south gradient. A gradual increase in the median overall consumption in the community has been reported by the ESAC project between 2004 and 2008. For 2010, ESAC-Net data did not show evidence of an overall increase of the median consumption of antibacterials for systemic use (ATC group J01) in the community. Additional data would be required to identify the possible reason for temporal changes observed over the 13 years of surveillance of antimicrobial consumption conducted by the ESAC project and continued by ESAC-Net. Such data would include prescriptions, indications or information on national interventions for a more prudent use of antimicrobials. Without such additional data, it remains difficult to explain the changes observed in the consumption of different groups of antimicrobials over time.

The former ESAC project developed and published 12 quality indicators for antimicrobial consumption in the community based on consensus of European antimicrobial surveillance experts [4]. Data on these quality indicators are reported by ESAC-Net but, as stated in the report summary, comparisons between countries should be done with caution. Nevertheless, these indicators could be used by healthcare professionals and policy makers to monitor progress towards a more prudent use of antibiotics in the community.

European countries increasingly implement, or plan to implement, actions to control antimicrobial resistance in the community through rational use of antimicrobials, including awareness campaigns on the prudent use of antibiotics. Data from the ESAC project [1, 2] have been instrumental for the evaluation of such campaigns and this first surveillance report of ESAC-Net intends to provide similar data for 2010.

Unlike the consumption of antibacterials for systemic use (ATC group J01) and of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA), for which results are presented separately for the community and for the hospital sector, consumption of antivirals for systemic use (ATC group J05) was reported for both sectors grouped together. While the distribution of consumption of antimicrobials of the ATC groups J01 and J02 & D01BA shows that the largest proportion of consumption takes place in the community, the largest consumption of antivirals may take place in the community or in the hospital sector depending on the country. In several countries, dispensing of certain antiviral classes is limited to the hospital sector or to the community only. To some extent, surveillance of antiviral consumption implies an essential difference compared to the consumption of antibiotics, as antivirals are often used for the treatment of long-lasting infections similar to chronic diseases. In 2010, antiviral consumption showed the highest inter-country variation of all three main antimicrobial groups under surveillance, and may reflect the burden of viral diseases rather than targets for improving practices and a more prudent use of antiviral agents.

The type of healthcare settings that are included in the hospital sector differ across European countries. For example and since the beginning of the ESAC project, data from Finland, the country with the second highest consumption of antibacterials for systemic use (ATC group J01) in the hospital sector in 2010, include data from nursing homes and from remote primary healthcare centres. For this reason, antimicrobial consumption from the hospital sector in Finland cannot be compared with other countries.

One main driver for the selection and spread of multidrug-resistant bacteria responsible for healthcare-associated infections such as carbapenemase-producing *Enterobacteriaceae* is the use of antimicrobials in patients admitted to hospitals. For the time being, ESAC-Net employs the same measurement of unit (DDD per 1 000 inhabitants and per day) for both the community and the hospital sector. Reporting of antimicrobial consumption data from the hospital sector could still be improved and represent the next challenge for this type of surveillance. In the future, there may be options to develop and agree on measurement of units specifically for the hospital sector and report hospital-based consumption data. Availability of antimicrobial consumption data at the hospital level in EU/EEA countries would allow for linking antimicrobial consumption data from ESAC-Net with antimicrobial resistance data from the European Antimicrobial Resistance Surveillance Network (EARS-Net). A prerequisite for this type of analysis, however, would be the harmonisation of hospital codes and denominator data between ESAC-Net and EARS-Net.

At this stage, data collected by the ESAC project and by ECDC on drugs for treatment of tuberculosis (ATC group J04A), oral and rectal nitroimidazole derivatives as antiprotozoals use (ATC group P01AB), and oral vancomycin used as a non-absorbable intra-intestinal anti-infective (ATC A07AA09) require further investigation in terms of validity and quality of the data before they are published.

Antimicrobial consumption in humans is presented in this ESAC-Net report. Data on the sales of veterinary antimicrobial agents used in animals are produced by the European Surveillance of Veterinary Antimicrobial Consumption (ESVAC) project [16]. Both consumption of antimicrobials in humans and in animals is associated with the development and spread of antimicrobial resistance. In the future, inter-agency work should aim at integrating data on antimicrobial consumption and on antimicrobial resistance in humans and in animals in a single European report.

ECDC aims to provide public access to the ESAC-Net database at the 4th level of the ATC classification, including the latest data following their publication in an annual report, via an interactive database on the ECDC website.

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Annex 1. Further sub-classification of macrolides, quinolones and antivirals

Classification of macrolides into short-, intermediate- and long acting macrolides*

<u>short-acting</u>		<u>intermediate-acting</u>		<u>long-acting</u>	
ATC code	Substance	ATC code	Substance	ATC code	Substance
J01FA01	erythromycin	J01FA06	roxithromycin	J01FA10	azithromycin
J01FA02	spiramycin	J01FA07	josamycin	J01FA13	dirithromycin
J01FA03	midecamycin	J01FA09	clarithromycin		
J01FA05	oleandomycin	J01FA14	flurithromycin		
J01FA08	troleandomycin	J01FA15	telithromycin		
J01FA11	miocamycin				
J01FA12	rokitamycin				

*Macrolides subdivided into short-acting (half life < 4h), intermediate-acting (half life 4-24h) and long acting (half-life >24h) macrolides. Adopted from [8]

Classification of quinolones into three generations*

<u>first generation</u>		<u>second generation</u>		<u>third generation</u>	
J01MB01	rosoxacin	J01MA01	ofloxacin	J01MA05	temafloxacin
J01MB02	nalidixic acid	J01MA02	ciprofloxacin	J01MA13	trovafloxacin
J01MB03	piromidic acid	J01MA03	pefloxacin	J01MA14	moxifloxacin
J01MB04	pipemidic acid	J01MA04	enoxacin	J01MA15	gemifloxacin
J01MB05	oxolinic acid	J01MA07	lomefloxacin	J01MA16	gatifloxacin
J01MB06	cinoxacin	J01MA08	fleroxacin	J01MA17	prulifloxacin
J01MB07	flumequine	J01MA09	sparfloxacin	J01MA18	pazufloxacin
J01MA06	norfloxacin	J01MA10	rufloxacin	J01MA19	garenoxacin
		J01MA11	grepafloxacin		
		J01MA12	levofloxacin		

* Classification of quinolones is based on their chemical structure and antimicrobial activity. Adopted from [7]

Classification of antivirals into seven groups based on their main indication*

substances used for the treatment of influenza: 'influenza antivirals'

J05AC02	rimantadine	J05AH01	zanamivir	J05AH02	oseltamivir
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substances used for the treatment of hepatitis C: 'hepatitis C antivirals'

J05AB04	ribavirin
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substances used for the treatment of herpetic infections: 'herpes antivirals'

J05AC03	tromantadine	J05AB03	vidarabine	J05AB12	cidofovir
J05AD01	foscarnet	J05AB06	ganciclovir	J05AB13	peniclovir
J05AB01	aciclovir	J05AB09	famciclovir	J05AB14	valganciclovir
J05AB02	idoxuridine	J05AB11	valaciclovir	J05AB15	brivudine

substances used for the treatment of HIV/AIDS: 'HIV/AIDS antivirals'

J05AE01	saquinavir	J05AF01	zidovudine	J05AR01	zidovudine and lamivudine
J05AE02	indinavir	J05AF02	didanosine	J05AR02	lamivudine and abacavir
J05AE03	ritonavir	J05AF03	zalcitabine	J05AR03	tenofovir disoproxil and emtricitabine
J05AE04	nelfinavir	J05AF04	stavudine	J05AR04	zidovudine, lamivudine and abacavir
J05AE05	amprenavir	J05AF06	abacavir	J05AR05	zidovudine, lamivudine and nevirapine
J05AE06	lopinavir	J05AG01	nevirapine	J05AR06	emtricitabine, tenofovir disoproxil and efavirenz
J05AE07	fosamprenavir	J05AG02	delavirdine	J05AX07	enfuvirtide
J05AE08	atazanavir	J05AG03	efavirenz	J05AX08	raltegravir
J05AE09	tipranavir	J05AG04	etravirine	J05AX09	maraviroc
J05AE10	darunavir				

substances used for the treatment of hepatitis B: 'hepatitis B antivirals'

J05AF08	adefovir dipivoxil	J05AF11	telbivudine
J05AF10	entecavir	J05AF12	clevidine

substances used for both HIV and hepatitis B treatment: 'HIV/hepatitis B antivirals'

J05AF05	lamivudine	J05AF07	tenofovir disoproxil	J05AF09	emtricitabine
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other antivirals'

J05AA01	metisazone	J05AX01	moroxydine	J05AX05	inosine pranobex
J05AD02	fosfonet	J05AX02	lysozyme	J05AX06	pleconaril

* Adopted from [4]

This classification is not part of the WHO Collaborating Centre for Drug Statistics methodology

Annex 2. Country summary sheets

These country summary sheets provide specific information on antimicrobial consumption for each of the reporting countries. The country summary sheets were produced by the the European Surveillance System database at the time of the publication of the report. They are also available via the public ESAC-Net interactive database at the ECDC homepage (www.ecdc.europa.eu/en/activities/surveillance/ESAC-Net/database). Member States can at any time retroactively re-upload data to the European Surveillance System, e.g. for correction purposes. Therefore it is possible that slight differences between the results shown in the report and in the country summary sheets can occur.

Data source

- Antimicrobial consumption data: Type of healthcare sector for which data are reported: community (primary care sector), hospital sector, and/or total care.
Type of consumption data: sales data or reimbursement data from health insurance systems.
The coverage (in percentage) of the data: representativeness of the data reported.
Source of the consumption data: public or private.
- Population data: For comparison reasons, consumption data are reported in numbers of DDDs per 1 000 inhabitants and per day. ESAC uses the Eurostat population data, except when this population is not relevant, e.g. when using health insurance data.

Antibiotics for systemic use

Data on consumption of antibacterials ('antibiotics') for systemic use (ATC group J01) are presented, split into seven major sub-groups based on the ATC classification.

- The table presents the data expressed in DDD per 1 000 inhabitants per day for each of the healthcare sectors for which data are reported.
- For each healthcare sector (where data are reported):
 - a pie chart presents the distribution of the relative consumption of the seven antibiotic classes; and
 - a bar chart presents the trends of consumption of the seven classes from 1997 to 2010.

Antimycotics and antifungals for systemic use

Data on consumption of the major antimycotics and antifungals for systemic use (ATC group J02& D01BA) are presented.

- The table presents the data expressed in DDD per 1 000 inhabitants per day for each of the healthcare sectors for which data are reported.
- A figure presenting the distribution of the relative consumption of each of the major antimycotics for systemic use for each of the healthcare sectors for which data are reported.

Member State comments

To facilitate interpretation, a fourth section with a comment is sometimes included. This comment originates from the general comments provided by the National Networks on antimicrobial use and consumption in their country, to which ECDC added technical comments about the presentation of the data where necessary.



Antimicrobial consumption in Austria, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	100%	Health Insurance Company	8 375 290	Eurostat

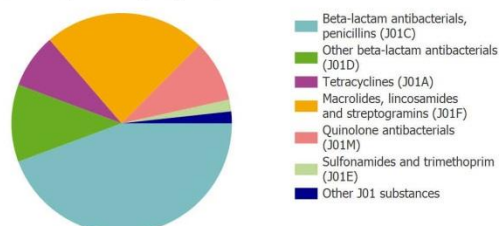
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

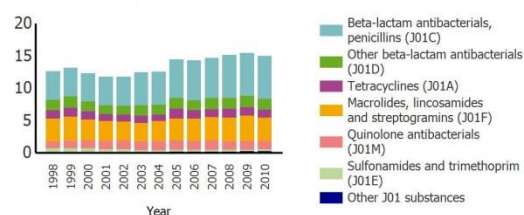
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	6.64	-
Other beta-lactam antibacterials (J01D)	1.70	-
Tetracyclines (J01A)	1.19	-
Macrolides, lincosamides and streptogramins (J01F)	3.56	-
Quinolone antibacterials (J01M)	1.36	-
Sulfonamides and trimethoprim (J01E)	0.26	-
Other J01 substances	0.26	-
Total	14.98	-

Distribution of the consumption in the community (primary care sector) of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day





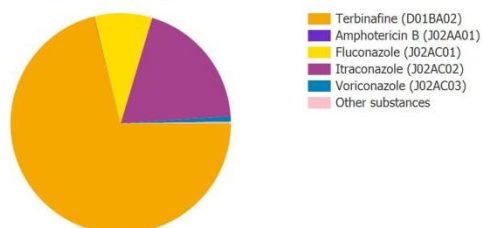
Antimicrobial consumption in Austria, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

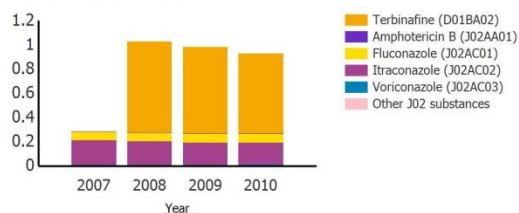
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.66	-
Amphotericin B (J02AA01)	<0.01	-
Ketoconazole (J02AB02)	0.00	-
Fluconazole (J02AC01)	0.08	-
Itraconazole (J02AC02)	0.18	-
Voriconazole (J02AC03)	<0.01	-
Other substances	<0.01	-
Total	0.93	-

Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in Belgium, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	100%	Health Insurance Company	10 839 905	Eurostat
Hospital sector	Reimbursement	100%	Health Insurance Company	10 839 905	Eurostat

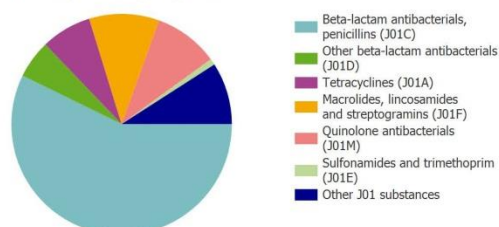
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

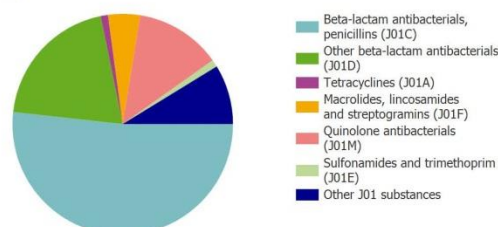
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	16.28	1.04
Other beta-lactam antibacterials (J01D)	1.59	0.40
Tetracyclines (J01A)	2.10	0.02
Macrolides, lincosamides and streptogramins (J01F)	2.92	0.09
Quinolone antibacterials (J01M)	2.69	0.25
Sulfonamides and trimethoprim (J01E)	0.26	0.02
Other J01 substances	2.58	0.18
Total	28.44	2.02

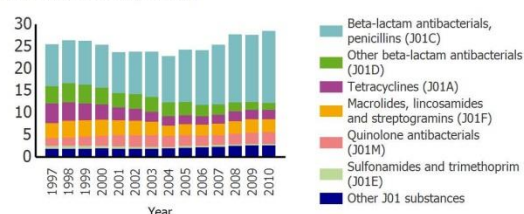
Distribution of the consumption in the community (primary care sector) of ATC group J01



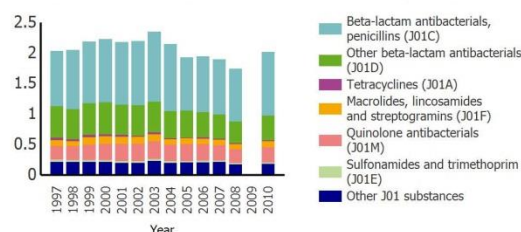
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





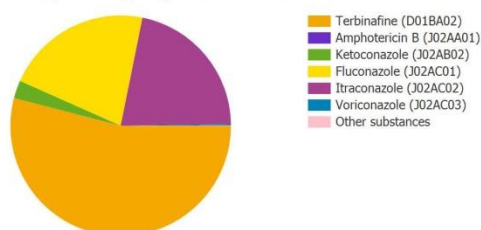
Antimicrobial consumption in Belgium, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

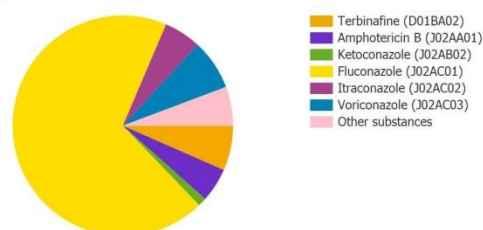
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	1.76	<0.01
Amphotericin B (J02AA01)	<0.01	<0.01
Ketoconazole (J02AB02)	0.09	<0.01
Fluconazole (J02AC01)	0.70	0.09
Itraconazole (J02AC02)	0.70	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	<0.01	<0.01
Total	3.25	0.13

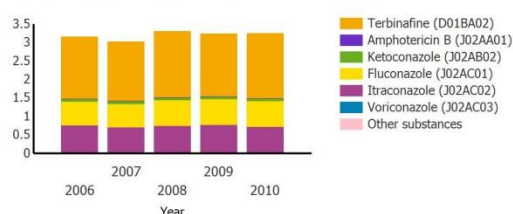
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



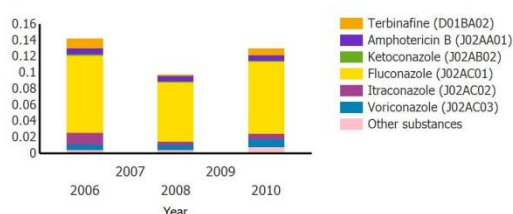
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

In Belgium, antimicrobials for systemic use in human medicine are prescription-only medicines and sold by pharmacies. Data on Belgian consumption are reimbursement data provided by the National Institute for Health and Disability Insurance RIZIV/INAMI. In 2008, the population coverage has been extended to all self-employed workers, reaching approximately 98% of the total population. According to the 2010 ESAC-Net recommendations and in order to use the EUROSTAT population data as denominators, the Belgian 2010 reimbursement data have been extrapolated to 100% prior to being delivered to TESSy. Comparisons across the time and with other countries should therefore be done with caution, taking these variations into account. These extensions of coverage partially explain the global rise in consumption that is observed in Belgium. An additional explanation relies on the number of DDD per package that has been constantly increasing in our country; this is particularly the case for penicillins (J01C), the subgroup showing the largest increase in consumption since 2008. The use of macrolides, lincosamides and streptogramins (MLS; J01F), quinolones (J01M) and other antibacterials (J01X) also increased, while tetracycline (J01A) and cephalosporin (J01D) use are decreasing. Belgian antibiotic guides for ambulatory care were released by the Belgian Antibiotic Policy Coordination Committee (BAPCOC) in 2006 and 2008 to encourage rational antibiotic use. A new edition will be released before the 2012-2013 Winter. Since 2000, several national campaigns, projects and surveillances aim at promoting a prudent use of antibiotics in human and veterinary medicines, and since the European Antibiotic Awareness Day in 2008, a public campaign focusing on antibiotic use in children is being organised each winter. Overall antimycotic and antifungal use (J02, D01B) shows little variation. Belgium remains (one of) the highest consumer(s) in Europe. Most used substances remain terbinafine (53%), itraconazole (23%) and fluconazole (21%). Further research is necessary to explore plausible motivations and mechanisms of such a high consumption.



Antimicrobial consumption in Bulgaria, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Marketing Research Company	7 364 570	National Statistics Agency
Hospital sector	Sales	100%	Marketing Research Company	7 364 570	National Statistics Agency

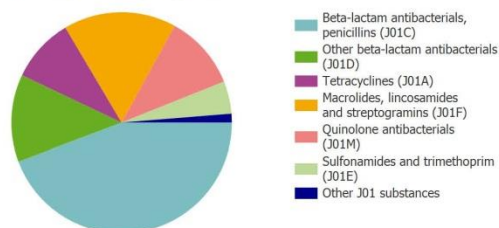
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

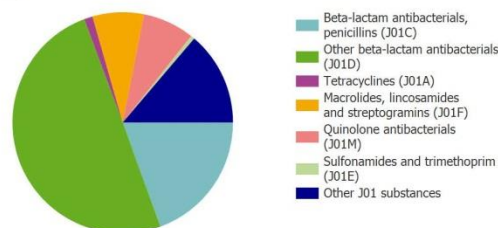
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	8.05	0.28
Other beta-lactam antibacterials (J01D)	2.32	0.72
Tetracyclines (J01A)	1.71	0.02
Macrolides, lincosamides and streptogramins (J01F)	3.00	0.11
Quinolone antibacterials (J01M)	1.99	0.11
Sulfonamides and trimethoprim (J01E)	0.87	<0.01
Other J01 substances	0.23	0.20
Total	18.18	1.45

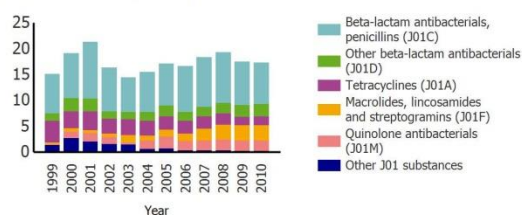
Distribution of the consumption in the community (primary care sector) of ATC group J01



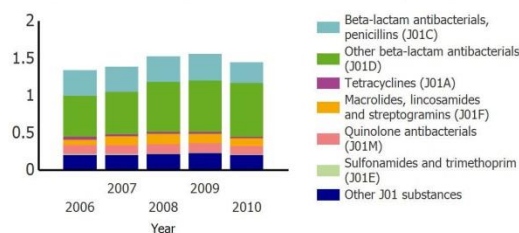
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





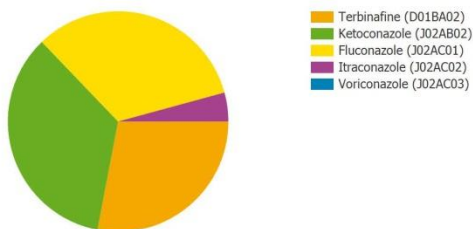
Antimicrobial consumption in Bulgaria, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

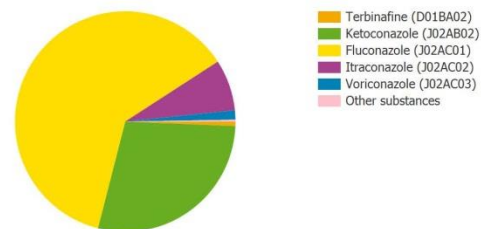
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.20	<0.01
Amphotericin B (J02AA01)	0.00	0.00
Ketoconazole (J02AB02)	0.25	<0.01
Fluconazole (J02AC01)	0.24	0.02
Itraconazole (J02AC02)	0.03	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	0.00	<0.01
Total	0.73	0.03

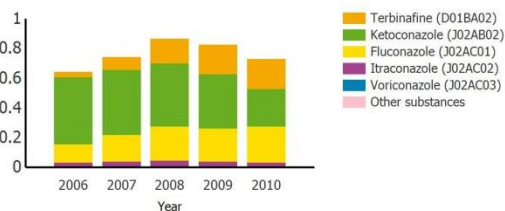
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



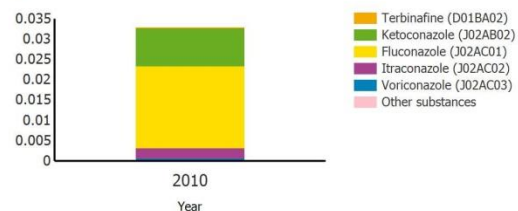
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

National Network: In Bulgaria, all antimicrobial agents for systemic use in humans are prescription-only medicines and sold by pharmacies. During the period 1999-2004 a data provider is the State Medicines Agency and antimicrobial consumption represented TC. From 2005 till now data on Bulgarian drug use are obtained from a Marketing Research Company and are collected separately for AC and HC. There is a continuous decrease in the consumption of antimicrobials for systemic use (ATC J01) in both-community sector and hospitals. Broad spectrum penicillins (ATC J01CA) and combinations of penicillins with b-lactamase inhibitors (ATC J01CR) are most frequently used in the AC when in the HC cephalosporins amount to nearly 50% of the antibiotic consumption. Overall antimycotic and antifungal use (ATC J02, D01B) is below 1 DDD/1000 inhabitants per day. Over the past five years the most used substances in both-AC and HC remain fluconazole and ketoconazole.



Antimicrobial consumption in Czech Republic, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	100%	Health Insurance Company	10 396 221	National Statistics Agency

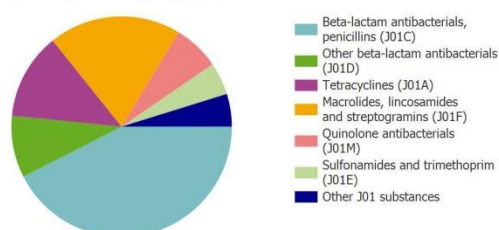
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

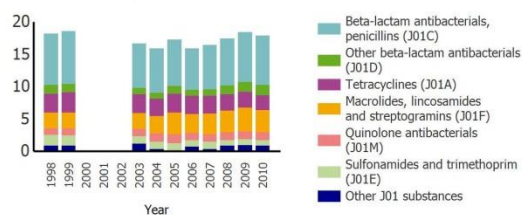
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	7.60	-
Other beta-lactam antibacterials (J01D)	1.62	-
Tetracyclines (J01A)	2.27	-
Macrolides, lincosamides and streptogramins (J01F)	3.47	-
Quinolone antibacterials (J01M)	1.22	-
Sulfonamides and trimethoprim (J01E)	0.85	-
Other J01 substances	0.86	-
Total	17.89	-

Distribution of the consumption in the community (primary care sector) of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day





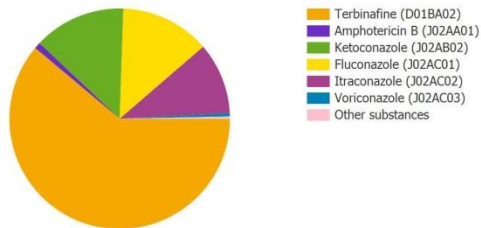
Antimicrobial consumption in Czech Republic, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

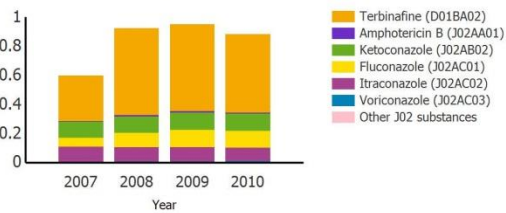
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.54	-
Amphotericin B (J02AA01)	<0.01	-
Ketoconazole (J02AB02)	0.12	-
Fluconazole (J02AC01)	0.12	-
Itraconazole (J02AC02)	0.09	-
Voriconazole (J02AC03)	<0.01	-
Other substances	<0.01	-
Total	0.88	-

Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in Denmark, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Ministry of Health	5 534 738	Eurostat
Hospital sector	Sales	100%	Ministry of Health	5 534 738	Eurostat

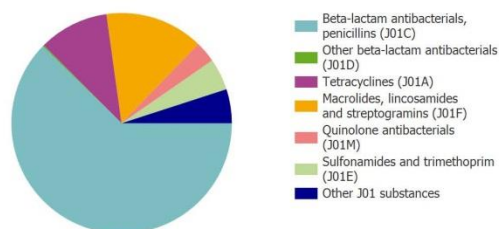
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

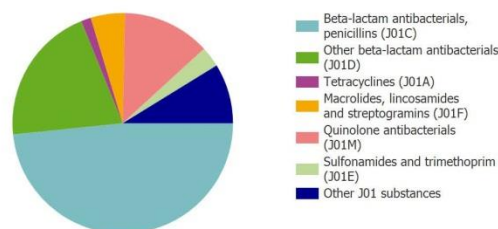
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	10.29	0.85
Other beta-lactam antibacterials (J01D)	0.03	0.36
Tetracyclines (J01A)	1.70	0.03
Macrolides, lincosamides and streptogramins (J01F)	2.38	0.09
Quinolone antibacterials (J01M)	0.51	0.23
Sulfonamides and trimethoprim (J01E)	0.77	0.05
Other J01 substances	0.82	0.15
Total	16.51	1.75

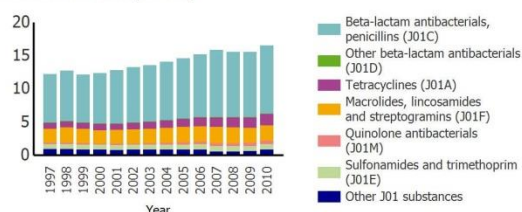
Distribution of the consumption in the community (primary care sector) of ATC group J01



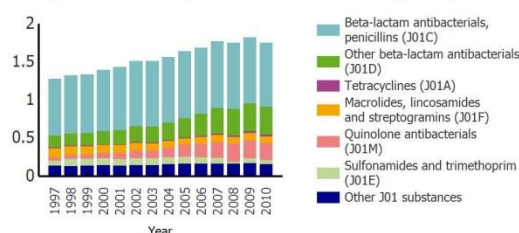
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





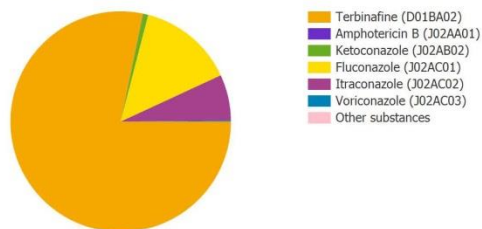
Antimicrobial consumption in Denmark, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

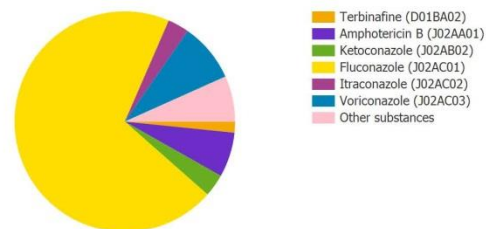
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	1.84	<0.01
Amphotericin B (J02AA01)	<0.01	0.01
Ketoconazole (J02AB02)	0.02	<0.01
Fluconazole (J02AC01)	0.33	0.14
Itraconazole (J02AC02)	0.16	<0.01
Voriconazole (J02AC03)	<0.01	0.02
Other substances	<0.01	0.01
Total	2.35	0.20

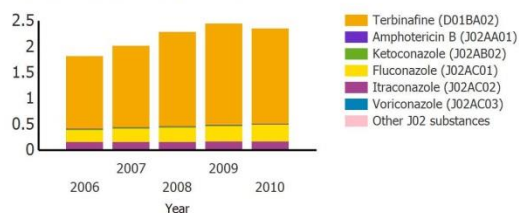
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



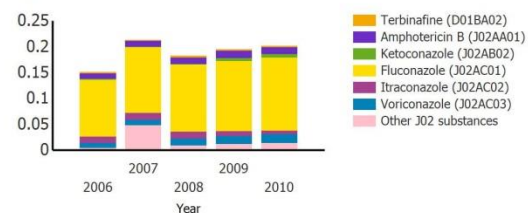
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

In Denmark, all antimicrobial agents for human use are prescription-only medicines and are sold by pharmacies in defined packages. Data on Danish antimicrobial consumption is obtained from the Danish Medicines Agency (DMA). In 2010, 90 % of the antimicrobial agents were prescribed in ambulatory care, whereas the remaining 10 % were used in the hospitals. The overall consumption increased by 5% (0.95 DDD) when comparing 2010 to 2009. This increase was noted in primary care only which showed the highest measured level of consumption since recordings began in 1995. The increase detected from 2009 to 2010 in primary healthcare is partially thought to reflect the occurrence of a *Mycoplasma pneumoniae* outbreak as well as changes in national treatment guidelines. In hospital care, the use of antimicrobial agents remained at the same level as in 2009. In both hospitals and ambulatory care, the use of broad-spectrum antimicrobial agents increased (e.g. tetracyclines; combinations of penicillins, incl. beta-lactamase inhibitors; cephalosporins; carbapenems and fluoroquinolones) while the use of older more traditional agents decreased (e.g. beta-lactamase sensitive penicillins; aminoglycosides and imidazole derivatives). Since 2001, the consumption of broad-spectrum antimicrobial agents has increased by 73% and 79% in primary and hospital care, respectively.



Antimicrobial consumption in Estonia, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Medicines Agency	1 340 127	Eurostat
Hospital sector	Sales	100%	Medicines Agency	1 340 127	Eurostat

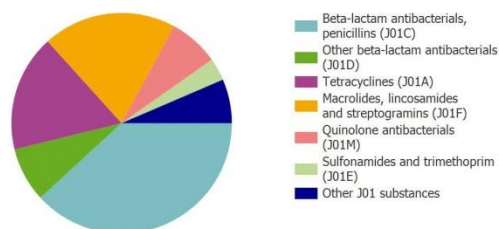
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

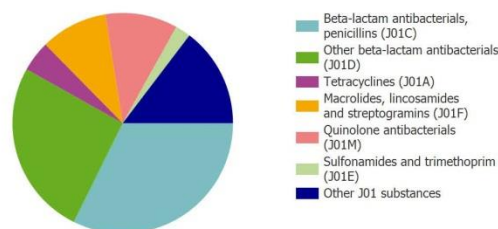
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	4.22	0.59
Other beta-lactam antibacterials (J01D)	0.88	0.47
Tetracyclines (J01A)	1.89	0.08
Macrolides, lincosamides and streptogramins (J01F)	2.16	0.18
Quinolone antibacterials (J01M)	0.81	0.19
Sulfonamides and trimethoprim (J01E)	0.37	0.04
Other J01 substances	0.71	0.27
Total	11.05	1.83

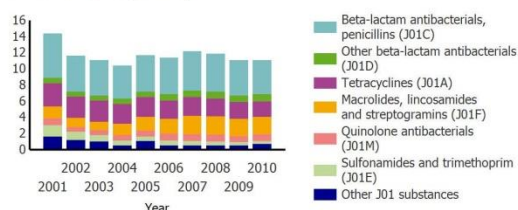
Distribution of the consumption in the community (primary care sector) of ATC group J01



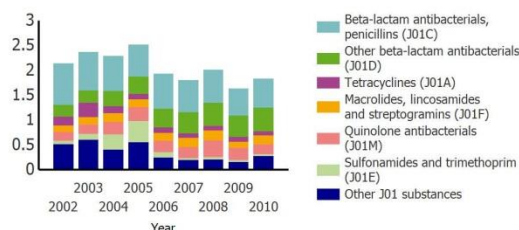
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





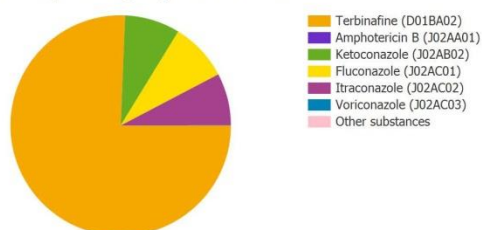
Antimicrobial consumption in Estonia, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

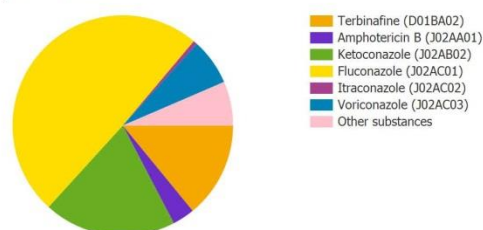
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.92	<0.01
Amphotericin B (J02AA01)	<0.01	<0.01
Ketoconazole (J02AB02)	0.10	<0.01
Fluconazole (J02AC01)	0.10	0.02
Itraconazole (J02AC02)	0.09	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	<0.01	<0.01
Total	1.21	0.05

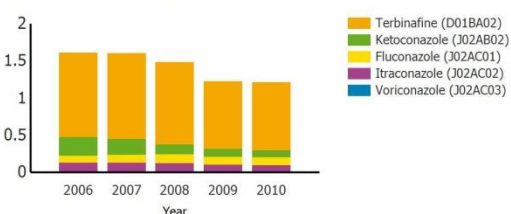
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



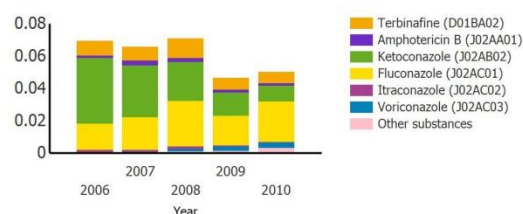
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

The use of antibiotics has been quite low and stable in Estonia over the past ten years if compared to the other European countries. The total consumption has remained practically on the same level, being almost 13 DDD/1000 inhabitants/day in 2009 and 2010. The use of antibiotics of all groups has remained approximately on the same level in 2010 compared to the previous year. Penicillins are the most commonly used antibiotics - both in ambulatory and hospital care. In ambulatory care the use of penicillins was almost 40% of total consumption in 2010. Mainly extended spectrum penicillins were used. Other more often used antibiotics were macrolides and lincosamides and tetracyclines. In hospitals the use of penicillins was 32% of total and cephalosporins were the antibiotics of second choice - about 26% of total use. In Estonia antibiotics are prescription-only medicines.



Antimicrobial consumption in Finland, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Medicines Agency	5 351 427	Eurostat
Hospital sector	Sales	100%	Medicines Agency	5 351 427	Eurostat

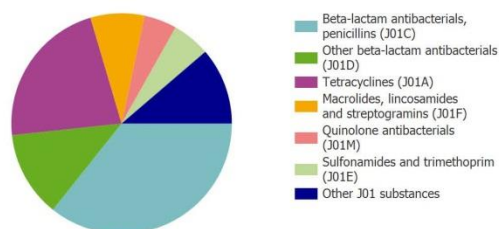
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

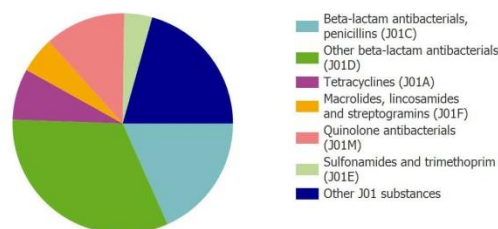
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	6.61	0.52
Other beta-lactam antibacterials (J01D)	2.33	0.91
Tetracyclines (J01A)	4.09	0.21
Macrolides, lincosamides and streptogramins (J01F)	1.47	0.15
Quinolone antibacterials (J01M)	0.88	0.34
Sulfonamides and trimethoprim (J01E)	1.03	0.12
Other J01 substances	2.09	0.59
Total	18.50	2.83

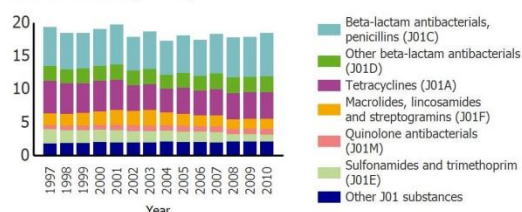
Distribution of the consumption in the community (primary care sector) of ATC group J01



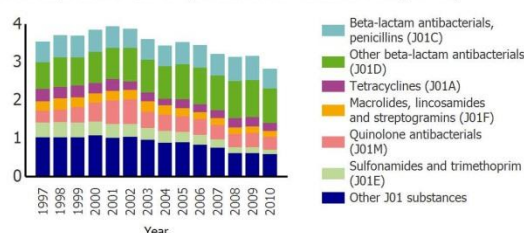
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





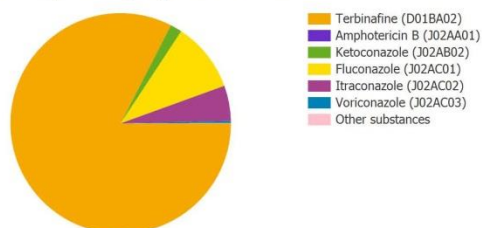
Antimicrobial consumption in Finland, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

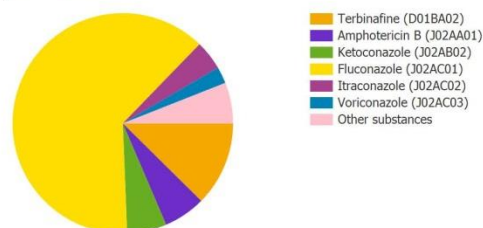
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	1.54	0.02
Amphotericin B (J02AA01)	<0.01	<0.01
Ketoconazole (J02AB02)	0.03	<0.01
Fluconazole (J02AC01)	0.19	0.08
Itraconazole (J02AC02)	0.10	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	<0.01	<0.01
Total	1.87	0.12

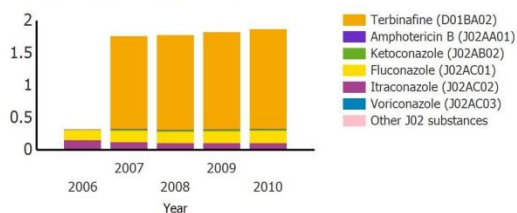
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



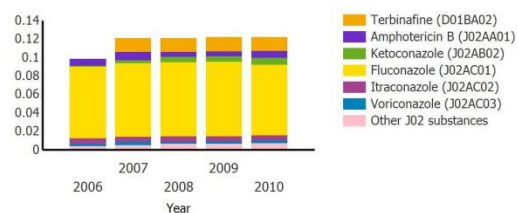
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Finland: hospital sector data include consumption in remote primary health care centres and nursing homes, thus overestimating hospital consumption and underestimating community consumption compared to the other countries that report data from this sources as community consumption.



Antimicrobial consumption in France, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Medicines Agency	64 848 000	National Statistics Agency
Hospital sector	Sales	100%	Medicines Agency	64 848 000	National Statistics Agency
Total care					National Statistics Agency

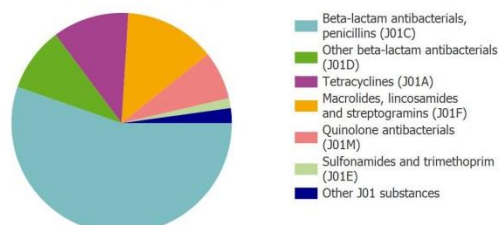
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

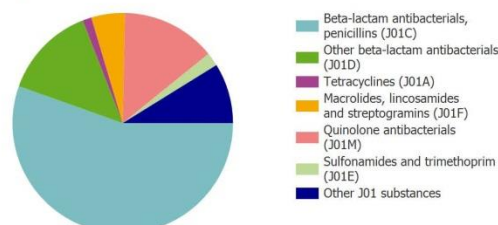
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	15.62	1.23
Other beta-lactam antibacterials (J01D)	2.67	0.30
Tetracyclines (J01A)	3.16	0.03
Macrolides, lincosamides and streptogramins (J01F)	3.75	0.11
Quinolone antibacterials (J01M)	2.00	0.31
Sulfonamides and trimethoprim (J01E)	0.41	0.04
Other J01 substances	0.62	0.20
Total	28.23	2.23

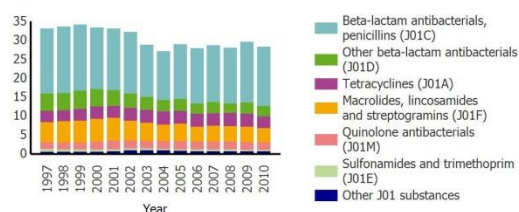
Distribution of the consumption in the community (primary care sector) of ATC group J01



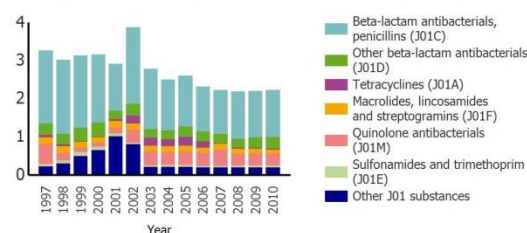
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





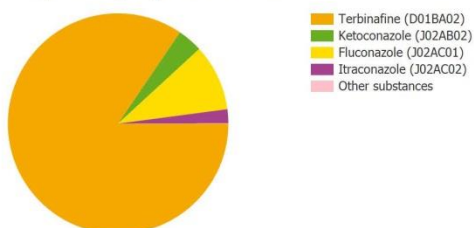
Antimicrobial consumption in France, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

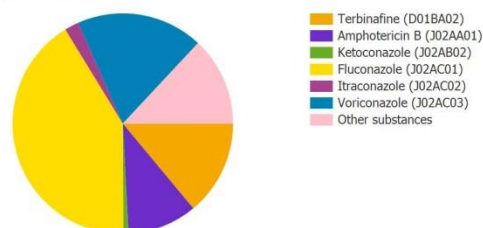
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	1.49	0.02
Amphotericin B (J02AA01)	0.00	0.01
Ketoconazole (J02AB02)	0.06	<0.01
Fluconazole (J02AC01)	0.17	0.05
Itraconazole (J02AC02)	0.04	<0.01
Voriconazole (J02AC03)	0.00	0.02
Other substances	<0.01	0.01
Total	1.76	0.11

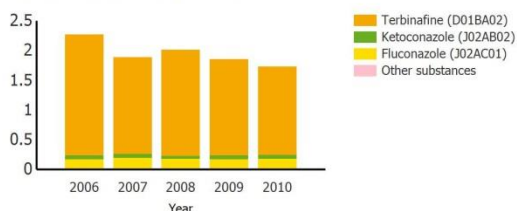
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



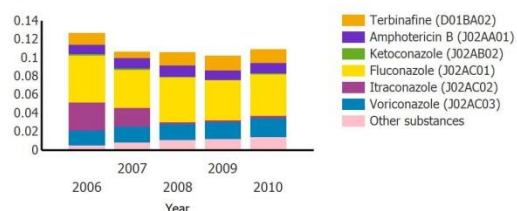
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

Overall, the 2010 results are in line with the trend previously observed. In ambulatory care, the antibiotic consumption decreased by 4.5% but this downward evolution can probably be partly ascribed to the noticeable drop in the incidence of winter pathologies. In hospital care, with the standard indicator (DID), the consumption levels off since 2006 but if we relate the consumption data to the number of hospitalisation days, we observe a slight increase from 2006. The distribution of the consumption in ambulatory care highlights the share of penicillins. Except for the "combination of penicillins", the use of all the other groups levelled off or decreased. In the hospital care, the share of penicillins stabilised whereas the relative use of quinolones and macrolides declined and the part of cephalosporins went up. The consumption of antimycotics for systemic use increased slightly in 2010. As to antivirals, the global consumption decreased, after an atypical year 2009 due to influenza A.



Antimicrobial consumption in Germany, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	85%	Health Insurance Company	69 767 395	Health Insurance Company

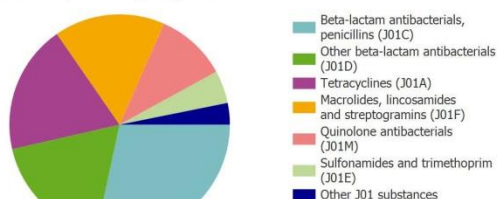
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

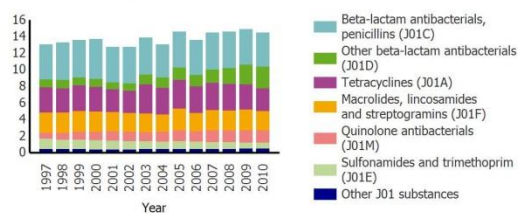
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	4.10	-
Other beta-lactam antibacterials (J01D)	2.61	-
Tetracyclines (J01A)	2.74	-
Macrolides, lincosamides and streptogramins (J01F)	2.35	-
Quinolone antibacterials (J01M)	1.51	-
Sulfonamides and trimethoprim (J01E)	0.69	-
Other J01 substances	0.46	-
Total	14.46	-

Distribution of the consumption in the community (primary care sector) of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day





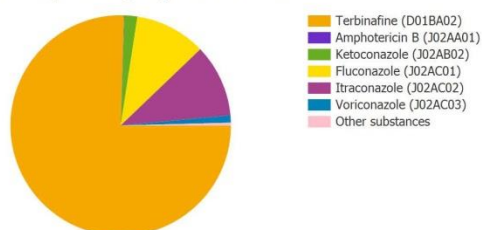
Antimicrobial consumption in Germany, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

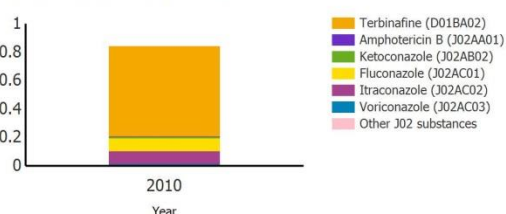
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.64	-
Amphotericin B (J02AA01)	<0.01	-
Ketoconazole (J02AB02)	0.02	-
Fluconazole (J02AC01)	0.09	-
Itraconazole (J02AC02)	0.09	-
Voriconazole (J02AC03)	<0.01	-
Other substances	<0.01	-
Total	0.84	-

Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

With the exception of slightly higher values in 2009, the overall antibiotic consumption in ambulatory care remained nearly constant since 2007. The transient increase in 2009 might be due to a higher rate of respiratory infections during the outbreak of pandemic influenza. Considering the time period from 2008 to 2010, the consumption of penicillins (J01C) decreased by 6.4%, while the use of other β -lactam antibacterials (J01D) showed an increase (36%). Within the group of penicillins, extended spectrum penicillins (J01CA) accounted for the major part (72%). Compared to other countries, penicillins represent a relatively low portion of the overall antibiotic consumption in Germany (28%). After a slight increase from 2008 to 2009 (5.0%), in 2010 the consumption of macrolides, lincosamides and streptogramins (J01F) dropped somewhat below the level observed in 2008. The consumption of tetracyclines (J01A) and sulfonamides and trimethoprim (J01E) continuously decreased from 2008 to 2010 by around 15% in both groups, while the consumption of quinolones (J01M) showed an increase of 6.3%.



Antimicrobial consumption in Greece, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Total care	Sales	100%	Medicines Agency	11 305 118	Eurostat

* Proportion of total country population under surveillance.

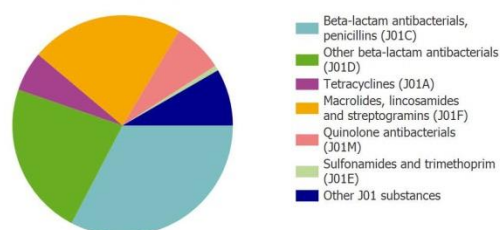
Antibacterials for systemic use (ATC group J01)

Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

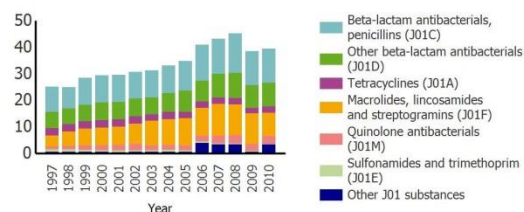
ATC group J01	Community (primary care sector)*	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	12.87	-
Other beta-lactam antibacterials (J01D)	8.91	-
Tetracyclines (J01A)	2.31	-
Macrolides, lincosamides and streptogramins (J01F)	8.85	-
Quinolone antibacterials (J01M)	2.89	-
Sulfonamides and trimethoprim (J01E)	0.29	-
Other J01 substances	3.29	-
Total	39.40	-

* Country provided only total care data.

Distribution of the consumption in the community (primary care sector) of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in Greece, 2010

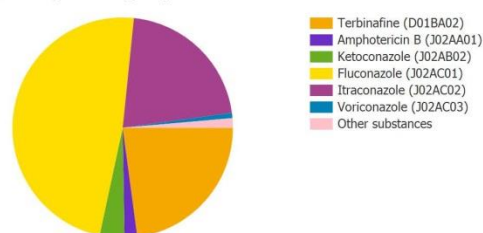
Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

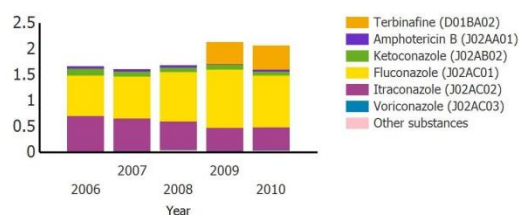
ATC groups J02 & D01BA	Community (primary care sector)*	Hospital sector
Terbinafine (D01BA02)	0.47	-
Amphotericin B (J02AA01)	0.04	-
Ketoconazole (J02AB02)	0.07	-
Fluconazole (J02AC01)	1.00	-
Itraconazole (J02AC02)	0.44	-
Voriconazole (J02AC03)	0.02	-
Other substances	0.03	-
Total	2.07	-

* Country provided only total care data.

Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

Data about antibiotic consumption in Greece are derived from a database of the National Organization for Medicines, after its help and official permission. This database was built for the survey of competence of the market in medicinal products and includes sales data of all these products (not only antibiotics) at a national level. Since 2006 data enter the database electronically from the pharma companies on a monthly basis (and this probably led to an obvious increase in sales consumption data). Sales data are available for ambulatory (AC) and hospital care (HC), except for years 2004-2008 and 2010 for which total consumption data are available. AC includes sales data from private sector pharmacies and also private hospitals, clinics, nursing homes and parallel exports. HC includes sales data to public hospitals. Since 2004 data about parallel exports are also available to the National Organization for Medicines and since 2008 they are subtracted from ambulatory care and/or total consumption sales data. Parallel exports proved to represent a very small fraction of total antibiotic consumption. Sales data can be to a great extent cross-checked by the National Organization for Medicines, but this cannot be done for declared data about parallel exports. An electronic prescription program for all medicines has been applied since the last trimester of 2010 and is expected to reduce consumption of medicines in total. Prescription and regional data are not available from the medicines database currently in use.



Antimicrobial consumption in Hungary, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Marketing Research Company	10 014 324	Eurostat
Hospital sector	Sales	100%	Marketing Research Company	10 014 324	Eurostat

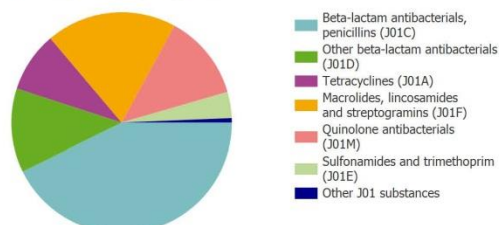
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

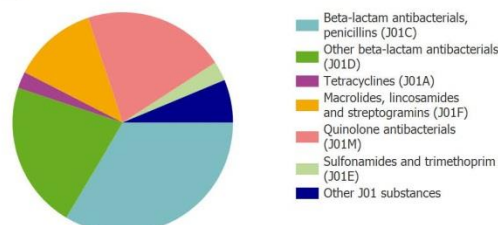
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	6.69	0.45
Other beta-lactam antibacterials (J01D)	1.92	0.29
Tetracyclines (J01A)	1.38	0.03
Macrolides, lincosamides and streptogramins (J01F)	3.00	0.17
Quinolone antibacterials (J01M)	1.97	0.28
Sulfonamides and trimethoprim (J01E)	0.60	0.04
Other J01 substances	0.10	0.08
Total	15.67	1.33

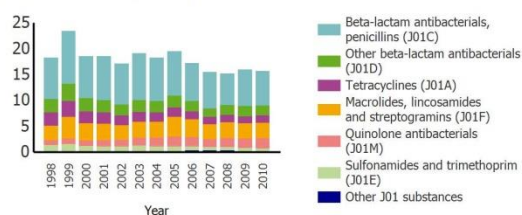
Distribution of the consumption in the community (primary care sector) of ATC group J01



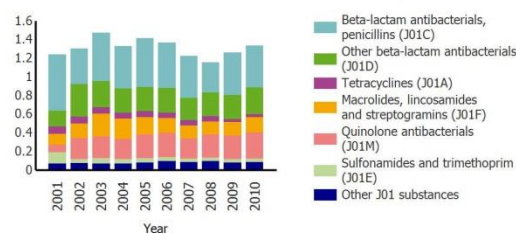
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





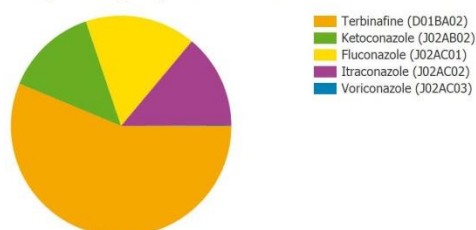
Antimicrobial consumption in Hungary, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

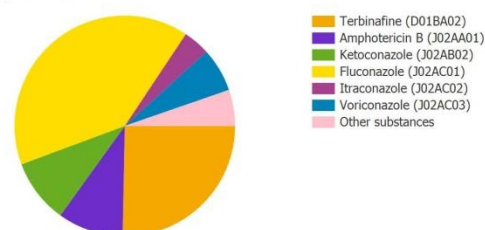
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.57	<0.01
Amphotericin B (J02AA01)	0.00	<0.01
Ketoconazole (J02AB02)	0.14	<0.01
Fluconazole (J02AC01)	0.17	0.02
Itraconazole (J02AC02)	0.14	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	0.00	<0.01
Total	1.02	0.04

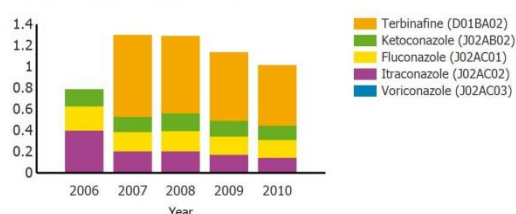
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



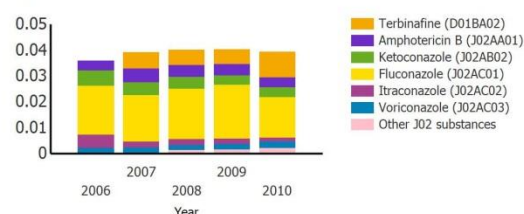
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

In Hungary, in ambulatory care, antimicrobials for systemic use are prescription-only, reimbursed medicines available only through pharmacies. Ambulatory care data cover antimicrobial consumption in primary care, policlinics, hospital outpatient departments, dental offices, nursing homes and elderly homes. From 2001 through 2010 the consumption of systemic antibacterials in hospitals was relatively stable, while a decrease was seen in ambulatory care through 2006-2007. This could be explained by a reduced reimbursement of antimicrobials due to financial restrictions in ambulatory care, while in hospital care antimicrobial treatment costs remained incorporated in diagnosis-related groups. Overall the total antibiotic consumption expressed in DDD per 1000 inhabitants and per day appears to be favourable in both sectors, yet quality indicators (e.g. high ratio of broad- to narrow-spectrum penicillins, cephalosporines and macrolides in the community) suggest issues to be addressed. For many years now, penicillin combinations - namely co-amoxiclav - have been the most widely used agents in both ambulatory and hospital settings, comprising approximately 30% of the total systemic antibacterial use in both sectors in 2010. Regarding the use of other agents, some changes were observed, e.g. the use of sulfonamides has been gradually decreasing while the consumption of quinolones has been gradually increasing in the community, yet no major differences or trends can be detected in absolute or relative consumption patterns in the last years. Besides the data reported, more detailed findings on antimicrobial use in Hungary can be accessed in scientific publications. Antimicrobial consumption data in Hungary in 2010 were based on sales data provided by the International Medical Services Ltd. A national surveillance system of antimicrobial consumption is currently being developed. Reimbursement data for ambulatory care and data from hospital pharmacies are planned to be used for monitoring antimicrobial consumption in the future.



Antimicrobial consumption in Iceland, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Total care	Sales	100%	Medicines Agency	318 006	National Statistics Agency

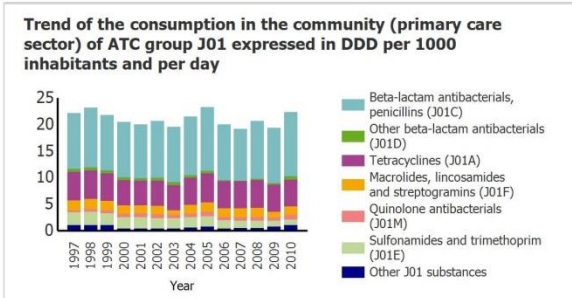
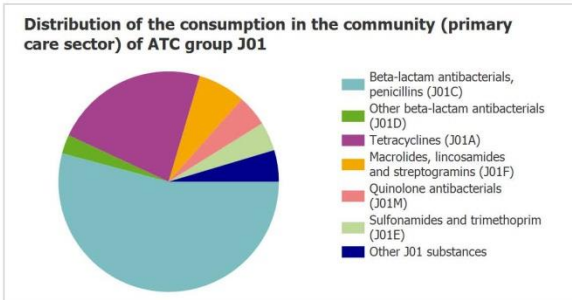
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)*	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	12.08	-
Other beta-lactam antibacterials (J01D)	0.62	-
Tetracyclines (J01A)	5.05	-
Macrolides, lincosamides and streptogramins (J01F)	1.56	-
Quinolone antibacterials (J01M)	1.02	-
Sulfonamides and trimethoprim (J01E)	0.95	-
Other J01 substances	1.03	-
Total	22.31	-

* Country provided only total care data.





Antimicrobial consumption in Iceland, 2010

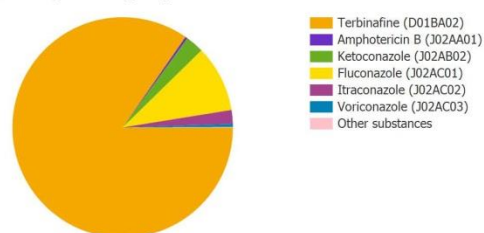
Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

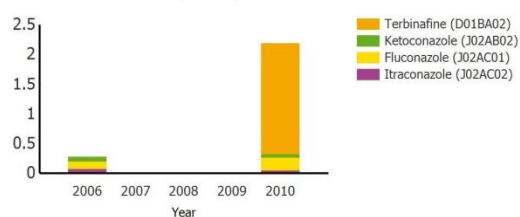
ATC groups J02 & D01BA	Community (primary care sector)*	Hospital sector
Terbinafine (D01BA02)	1.87	-
Amphotericin B (J02AA01)	<0.01	-
Ketoconazole (J02AB02)	0.06	-
Fluconazole (J02AC01)	0.22	-
Itraconazole (J02AC02)	0.04	-
Voriconazole (J02AC03)	0.01	-
Other substances	<0.01	-
Total	2.21	-

* Country provided only total care data.

Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in Ireland, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Marketing Research Company	4 470 600	National Statistics Agency
Hospital sector	Both	90%	Hospital network	4 470 600	National Statistics Agency

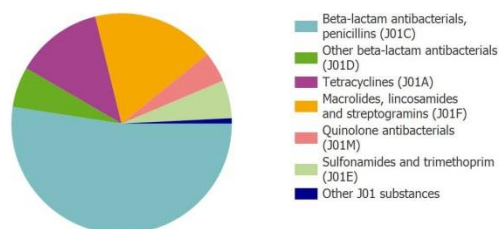
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

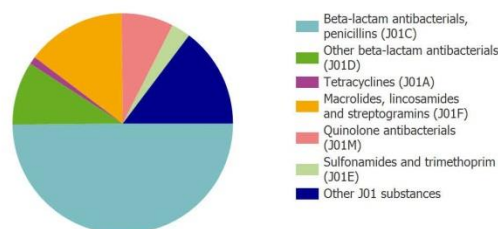
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	10.65	0.89
Other beta-lactam antibacterials (J01D)	1.21	0.17
Tetracyclines (J01A)	2.60	0.02
Macrolides, lincosamides and streptogramins (J01F)	3.66	0.26
Quinolone antibacterials (J01M)	0.91	0.14
Sulfonamides and trimethoprim (J01E)	1.14	0.05
Other J01 substances	0.16	0.26
Total	20.32	1.78

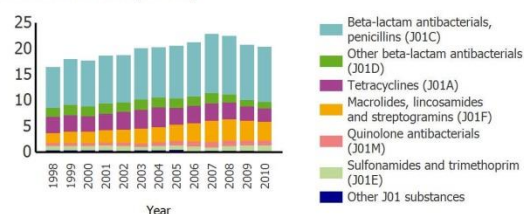
Distribution of the consumption in the community (primary care sector) of ATC group J01



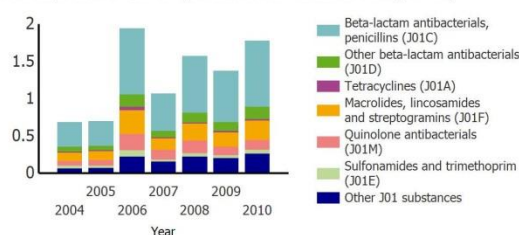
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





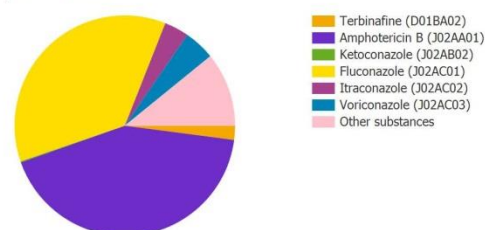
Antimicrobial consumption in Ireland, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

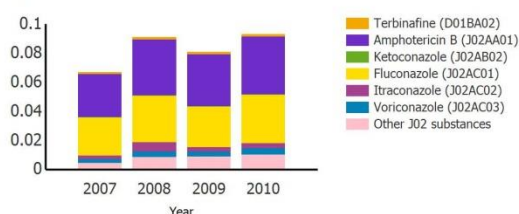
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	-	<0.01
Amphotericin B (J02AA01)	-	0.04
Ketoconazole (J02AB02)	-	<0.01
Fluconazole (J02AC01)	-	0.03
Itraconazole (J02AC02)	-	<0.01
Voriconazole (J02AC03)	-	<0.01
Other substances	-	0.01
Total	-	0.09

Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

Seasonal peaks in ambulatory care antibacterial consumption in Ireland have been shown to closely match peaks in respiratory viral activity. The development of an education programme and prescribing guidelines for General Practitioners, along with a public education campaign, in late-2008 coincided with the decrease in ambulatory antibiotic use. The decrease has continued into 2010. Hospital care data are obtained directly from the pharmacy departments of publically funded hospitals. The Irish Health Services Executive sanctioned the appointment of additional antibiotic liaison hospital pharmacists in 2006/7, and national hospital antibiotic stewardship programmes began in 2008. Since then, there was an overall decrease in hospital antibiotic use, compared to previous years, with a considerable decrease in the consumption of quinolone antibiotics. The decrease continued into 2009, however, the consumption increased slightly in 2010.



Antimicrobial consumption in Italy, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Both	100%	Medicines Agency	60 340 328	Eurostat
Hospital sector	Reimbursement	100%	Medicines Agency	60 340 328	Eurostat

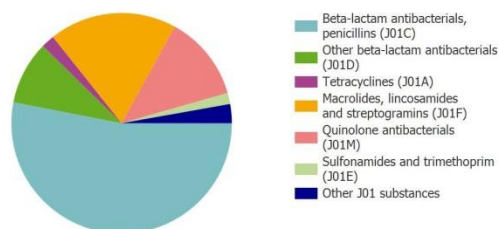
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

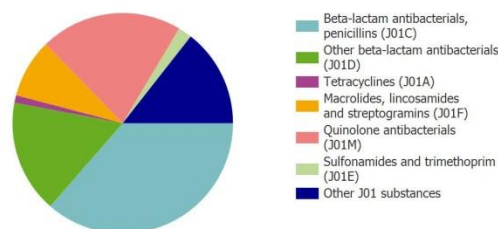
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	14.55	0.78
Other beta-lactam antibacterials (J01D)	2.55	0.35
Tetracyclines (J01A)	0.53	0.02
Macrolides, lincosamides and streptogramins (J01F)	5.13	0.18
Quinolone antibacterials (J01M)	3.45	0.45
Sulfonamides and trimethoprim (J01E)	0.45	0.04
Other J01 substances	0.77	0.31
Total	27.43	2.14

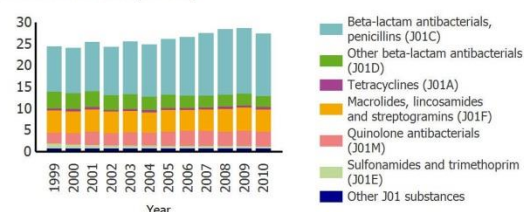
Distribution of the consumption in the community (primary care sector) of ATC group J01



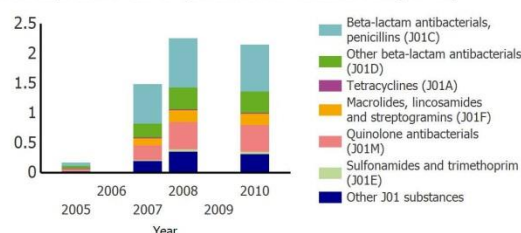
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





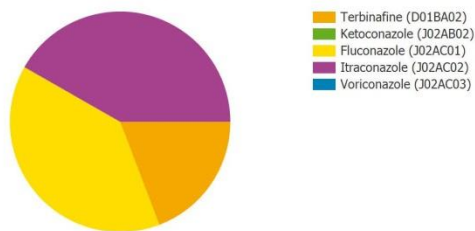
Antimicrobial consumption in Italy, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

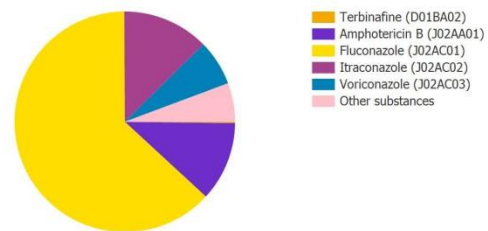
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.20	<0.01
Amphotericin B (J02AA01)	0.00	0.01
Ketoconazole (J02AB02)	<0.01	0.00
Fluconazole (J02AC01)	0.41	0.08
Itraconazole (J02AC02)	0.44	0.02
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	0.00	<0.01
Total	1.04	0.13

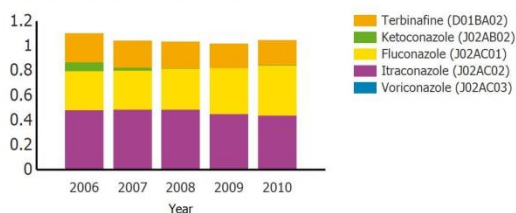
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



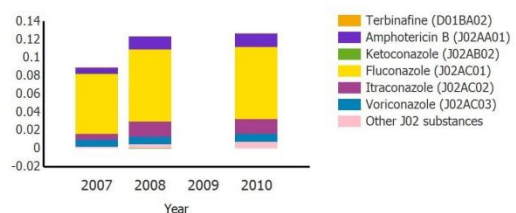
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in Latvia, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Medicines Agency	2 120 504	National Statistics Agency
Hospital sector	Sales	100%	Medicines Agency	2 120 504	National Statistics Agency

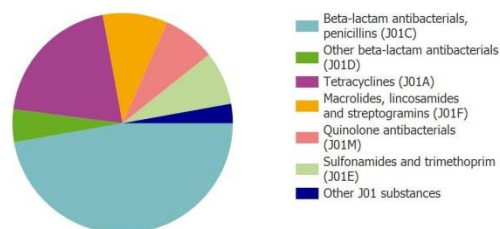
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

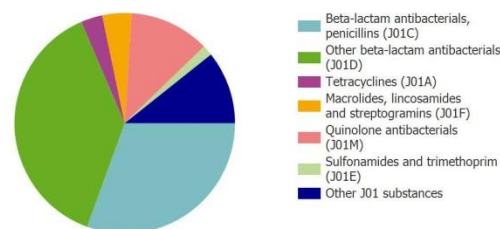
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	5.59	0.97
Other beta-lactam antibacterials (J01D)	0.57	1.20
Tetracyclines (J01A)	2.38	0.10
Macrolides, lincosamides and streptogramins (J01F)	1.13	0.13
Quinolone antibacterials (J01M)	0.91	0.37
Sulfonamides and trimethoprim (J01E)	0.93	0.05
Other J01 substances	0.34	0.34
Total	11.84	3.16

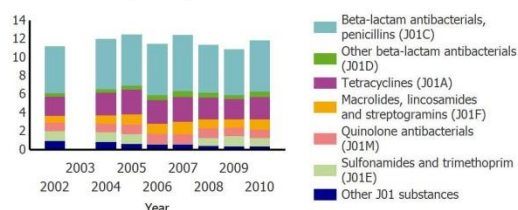
Distribution of the consumption in the community (primary care sector) of ATC group J01



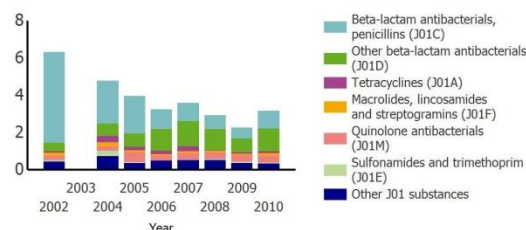
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





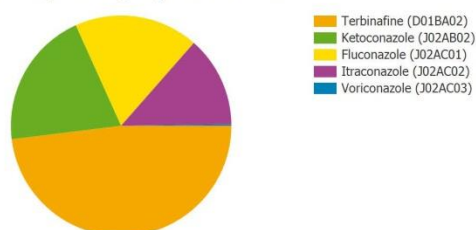
Antimicrobial consumption in Latvia, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

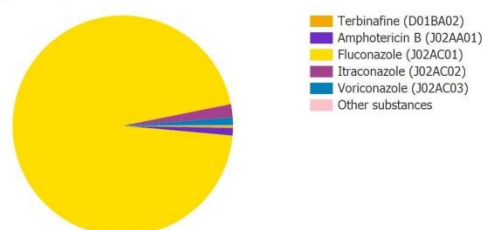
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.23	<0.01
Amphotericin B (J02AA01)	0.00	<0.01
Ketoconazole (J02AB02)	0.10	0.00
Fluconazole (J02AC01)	0.09	0.05
Itraconazole (J02AC02)	0.06	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	0.00	<0.01
Total	0.48	0.06

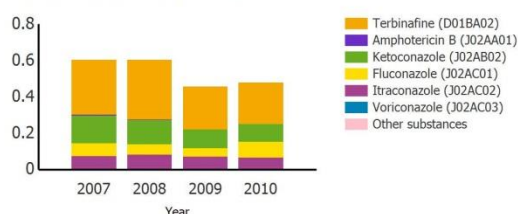
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



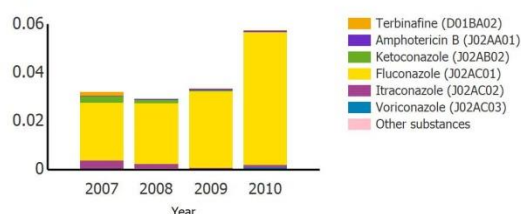
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

Data on medicines consumption in Latvia is provided by the State Agency of Medicines. Data is collected from medicines wholesalers who provide sales reports to ambulatory care (AC) and hospital care (HC) sectors separately. During the past years a decrease was observed in antibiotic consumption, however in year 2010 the total consumption of antibiotics as well as other medicines increased, which partly can be explained by the improvement of the economic situation in the country. The most used antibiotics in ambulatory care are penicillins (J01C) - 47% of total consumption in this sector. While in the hospital care most used antibiotics are cephalosporins (J01D) - 38% of total consumption in HC sector. Consumption of sulfonamide and trimethoprim (J01E) has been decreased in both AC and HC sectors.



Antimicrobial consumption in Lithuania, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Medicines Agency	3 329 039	Eurostat
Hospital sector	Sales	100%	Medicines Agency	3 329 039	Eurostat

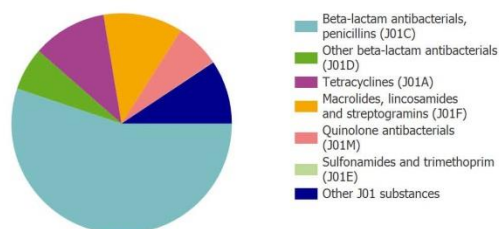
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

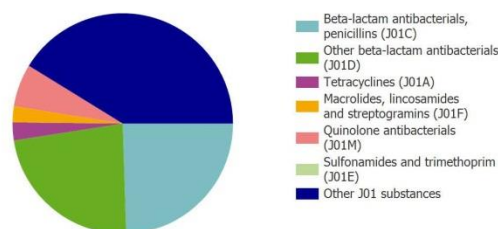
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	6.99	0.58
Other beta-lactam antibacterials (J01D)	0.80	0.54
Tetracyclines (J01A)	1.38	0.06
Macrolides, lincosamides and streptogramins (J01F)	1.48	0.06
Quinolone antibacterials (J01M)	0.83	0.15
Sulfonamides and trimethoprim (J01E)	<0.01	<0.01
Other J01 substances	1.19	0.97
Total	12.68	2.36

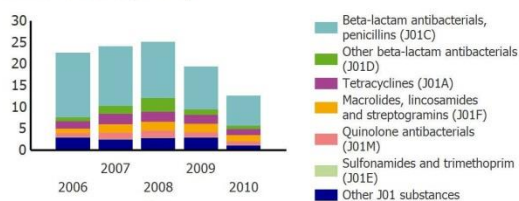
Distribution of the consumption in the community (primary care sector) of ATC group J01



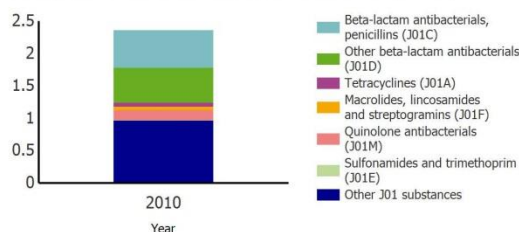
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





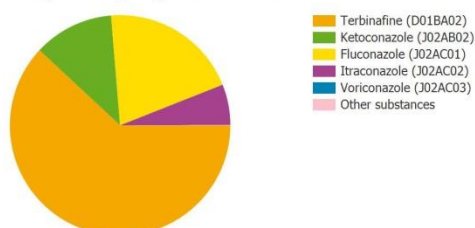
Antimicrobial consumption in Lithuania, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

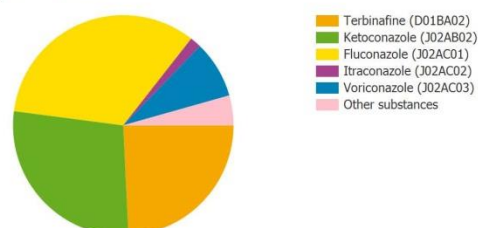
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.28	<0.01
Amphotericin B (J02AA01)	0.00	0.00
Ketoconazole (J02AB02)	0.05	<0.01
Fluconazole (J02AC01)	0.09	<0.01
Itraconazole (J02AC02)	0.03	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	<0.01	<0.01
Total	0.45	0.02

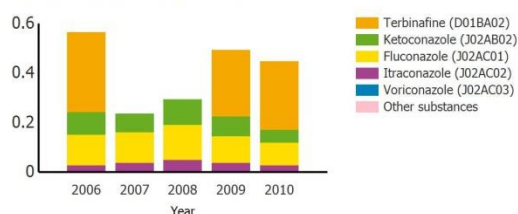
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



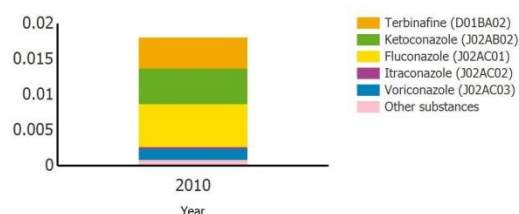
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

In Lithuania, all antimicrobial agents for human use are prescription-only medicines. Data on Lithuanian medicine use is obtained from the State Medicines Control Agency, further processed by Institute of Hygiene. In 2010 for the first time State Medicines Control Agency obtained data separately in primary care and hospital sectors. For this reason it is difficult to compare 2010 data with data from other years, when the total consumption of antibiotics was presented. However the decrease in consumption of antibiotics for systemic use (J01) has continued into 2010. As a potential cause may be economical situation in Lithuania and changes in the reimbursement of antibiotics costs for children. But exact reasons of such decrease are still unclear and need particular analysis and further observation.



Antimicrobial consumption in Luxembourg, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	95%	Health Insurance Company	478 747	Health Insurance Company
Hospital sector	Sales	95%	Other	506 953	National Statistics Agency

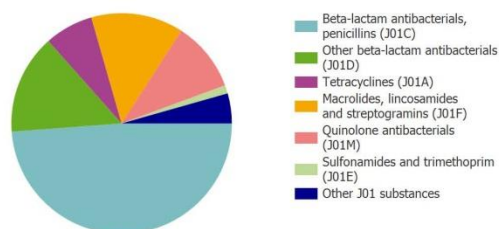
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

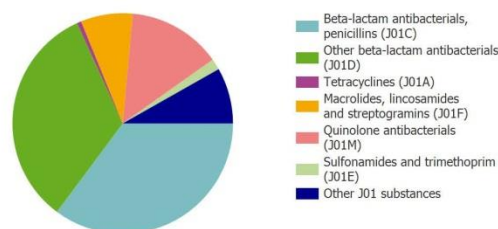
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	13.96	0.73
Other beta-lactam antibacterials (J01D)	4.18	0.69
Tetracyclines (J01A)	2.04	0.01
Macrolides, lincosamides and streptogramins (J01F)	3.87	0.16
Quinolone antibacterials (J01M)	2.94	0.29
Sulfonamides and trimethoprim (J01E)	0.35	0.03
Other J01 substances	1.26	0.17
Total	28.60	2.08

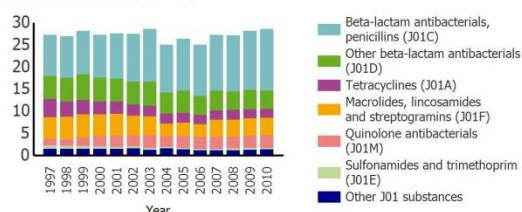
Distribution of the consumption in the community (primary care sector) of ATC group J01



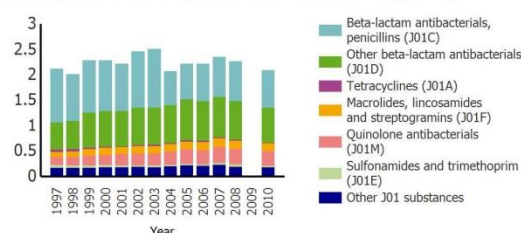
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





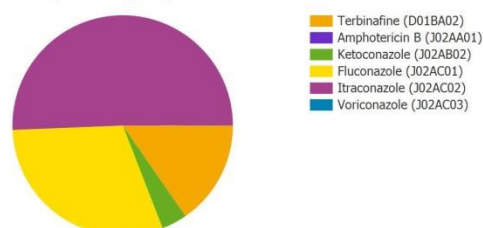
Antimicrobial consumption in Luxembourg, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

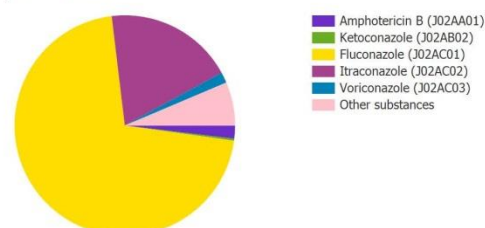
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.29	0.00
Amphotericin B (J02AA01)	<0.01	<0.01
Ketoconazole (J02AB02)	0.07	<0.01
Fluconazole (J02AC01)	0.56	0.10
Itraconazole (J02AC02)	0.94	0.03
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	0.00	<0.01
Total	1.86	0.15

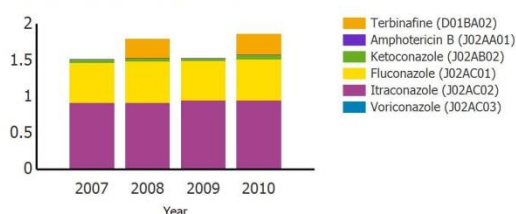
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



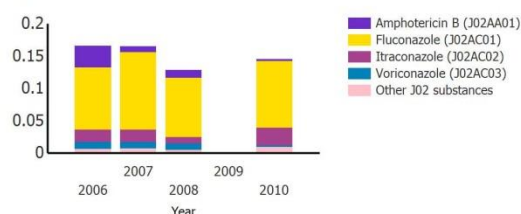
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

National ESAC-Net: In Luxembourg antibacterial agents for systemic human use (J01) in ambulatory care are prescription only and reimbursed medicines. Crude prescription data provided by the Luxembourgish Social Security Institution were treated according to the ATC/DDD methodology. Data refer to the insured resident population covered by the general health insurance regime which constitutes about 95% of the total population. When expressed in DDDs per thousand inhabitants per day (DID), the use of the entire group (J01) was high and increased further by 1.5% in comparison with 2009. The most used antibiotics were penicillins (J01CA/J01CR) with extended spectrum (mainly amoxicillin) and combinations of penicillins with beta-lactamase inhibitors (amoxicillin with clavulanic acid) each representing 17.0% and 30.9% of the total ambulatory care use respectively. Other frequently prescribed antibiotics were cephalosporines, macrolides and fluoroquinolones, each representing 14.6%, 13.5% and 10.3% of the total use respectively. In the past decade, the use of penicillins increased continuously whereas a slight decrease of the use of tetracyclines was observed. Reimbursement data of prescriptions in ambulatory care made possible to determine the proportion of treated patients in the insured resident population. In the year 2010, 44.9% of the resident population received at least one antibiotic treatment; 53.0% of them had a single prescription whereas 47.0% had two or more prescriptions. Antimycotic and antifungal use (J02, D01B) in ambulatory care increased slightly. Most used substances are itraconazole (50%) and fluconazole (30%) terbinafine (16%). Antibacterial agents for systemic human use (J01) in hospital care have been monitored since 1997. In 2010, hospital use did not change significantly in comparison with 2009 and accounts for 7.5% of the total use. Penicillins (J01C) and other beta-lactam antibiotics (J01D) were the most used groups and represent 68% of the total hospital use.



Antimicrobial consumption in Malta, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Ministry of Health	413 609	Ministry of Health
Hospital sector	Sales	100%	Ministry of Health	414 372	Eurostat

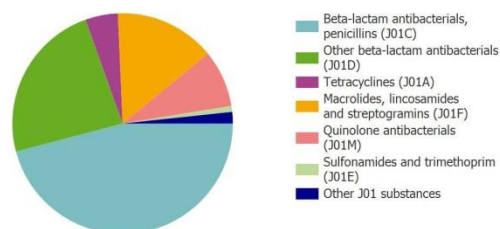
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

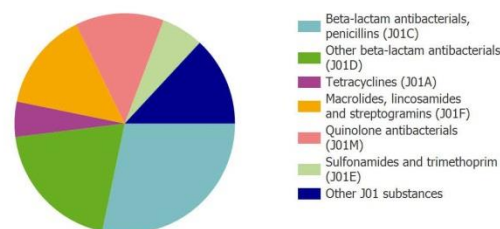
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	9.80	0.56
Other beta-lactam antibacterials (J01D)	5.04	0.39
Tetracyclines (J01A)	1.02	0.10
Macrolides, lincosamides and streptogramins (J01F)	3.15	0.29
Quinolone antibacterials (J01M)	1.79	0.26
Sulfonamides and trimethoprim (J01E)	0.19	0.12
Other J01 substances	0.36	0.26
Total	21.34	1.97

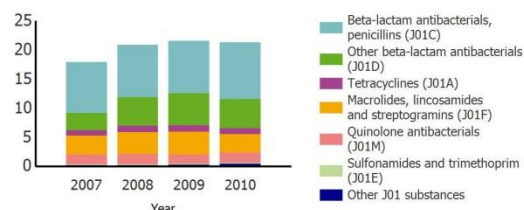
Distribution of the consumption in the community (primary care sector) of ATC group J01



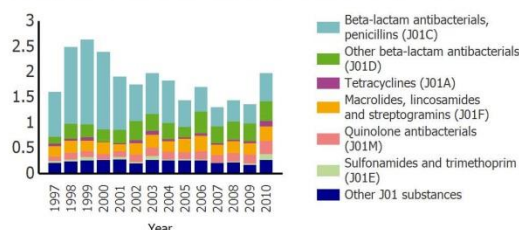
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





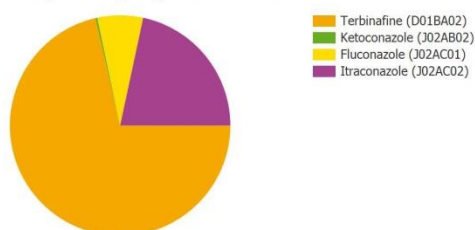
Antimicrobial consumption in Malta, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

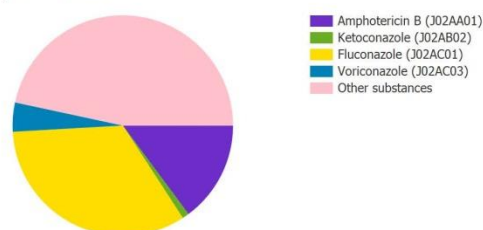
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.35	0.00
Amphotericin B (J02AA01)	0.00	0.02
Ketoconazole (J02AB02)	<0.01	<0.01
Fluconazole (J02AC01)	0.03	0.04
Itraconazole (J02AC02)	0.11	0.00
Voriconazole (J02AC03)	0.00	<0.01
Other substances	0.00	0.06
Total	0.50	0.12

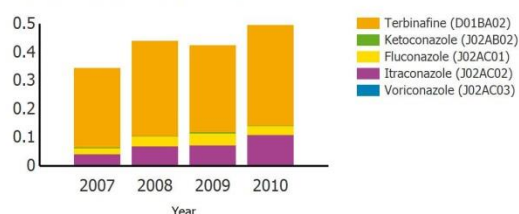
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



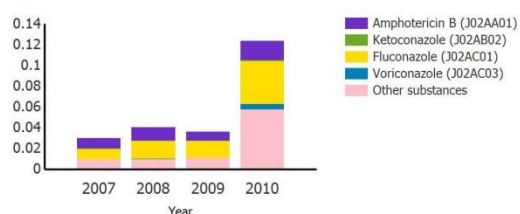
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

A striking feature of the Maltese hospital (and also community) data is the heavy reliance on a limited number of drugs or drug classes. In J01 category there is > 50% reliance on beta-lactam antibacterials (J01C and J01D). Macrolides also contribute a high proportion of use which would be expected in ambulatory care but not in hospital care. Similarly, although use is very low for antifungals, this is almost exclusively based on amphotericin B and fluconazole, despite the availability of other triazole derivatives and an echinocardin. The increase in Community consumption from 2007 to 2009 was almost exclusively due to the increase in the use of second generation cephalosporins and was very likely due to the H1N1 pandemic influenza. Indeed the consumption in 2010 is back almost to 2008 levels.



Antimicrobial consumption in Netherlands, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	92%	Community Pharmacists	15 301 000	Other
Hospital sector	Both	100%	Hospital network	16 574 989	National Statistics Agency

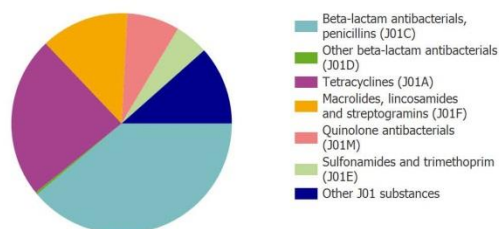
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

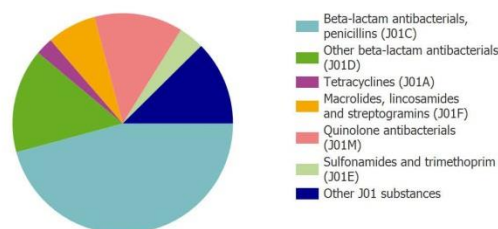
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	4.36	0.49
Other beta-lactam antibacterials (J01D)	0.04	0.16
Tetracyclines (J01A)	2.66	0.03
Macrolides, lincosamides and streptogramins (J01F)	1.45	0.08
Quinolone antibacterials (J01M)	0.87	0.14
Sulfonamides and trimethoprim (J01E)	0.55	0.04
Other J01 substances	1.29	0.13
Total	11.21	1.06

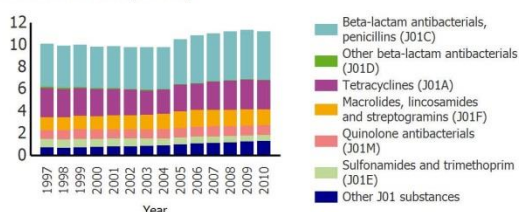
Distribution of the consumption in the community (primary care sector) of ATC group J01



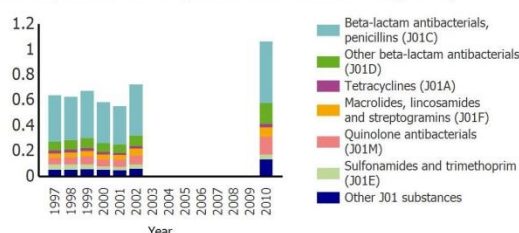
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





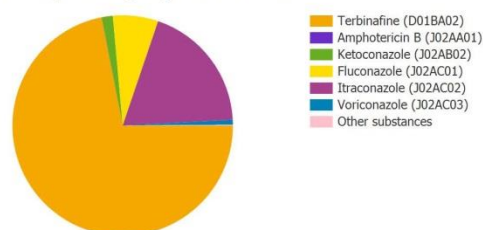
Antimicrobial consumption in Netherlands, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

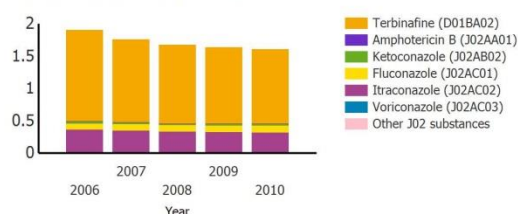
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	1.16	-
Amphotericin B (J02AA01)	<0.01	-
Ketoconazole (J02AB02)	0.03	-
Fluconazole (J02AC01)	0.11	-
Itraconazole (J02AC02)	0.31	-
Voriconazole (J02AC03)	0.01	-
Other substances	<0.01	-
Total	1.61	-

Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

Data on use of antibiotics in the Netherlands are yearly published in the SWAB/RIVM NethMap report. Over the past five years, the total use of antibiotics in primary health care gradually increased from 10 to 11 DDD/1000 inhabitants/day. Tetracyclines (mainly doxycycline) represented 24% of total antibiotic use in primary health care. Other frequently used antibiotics were penicillins with extended spectrum (mainly amoxicillin), combinations of penicillins with beta-lactamase inhibitors (essentially amoxicillin with clavulanic acid) and macrolides, each representing 17%, 16% and 13% of the total use respectively. In the past 11 years the use of penicillins with beta-lactamase inhibitors, macrolides and nitrofurantoin increased, whereas the use of penicillins with extended spectrum decreased and tetracyclines with the other antibiotics remained stable. With in the class of macrolides we see a shift from erythromycin to the newer macrolides such as azithromycin and clarithromycin, the latter being the most commonly used macrolide. Overall consumption of fluorquinolones slightly increased, whereas the use of ciprofloxacin more than doubled. This increased use of ciprofloxacin seems to be offset by a decrease in ofloxacin and norfloxacin. The use of nitrofurantoin more than doubled, whereas the use of sulphonamides and trimethoprim decreased. These changes may be explained by the national guidelines of the Dutch College of General practitioners (NHG) that have been changed over the years with regard to the pharmacotherapy of urinary tract infections. For the first time in years, the total systemic use of antibiotics in Dutch hospitals slightly decreased, whereas the use only increased the years before. A similar decrease was seen in almost all groups of antibiotics. Over recent years, the use of the different subclasses of antibiotics remained relatively stable, except for the use of combinations of penicillin, beta-lactamase resistant penicillins, cephalosporins, fluorquinolones, glycopeptides, carbapenems and aminoglycosides which showed a significant increase. Regarding to the different subclasses the use of penicillins includes the largest proportion namely 46%. Second are the cephalosporins followed by the quinolones. Within the Dutch hospitals the total number of admissions had increased, whereas the total number of patient-days decreased. This reflects the decrease in the duration of hospital stay in the Netherlands (from an average of 7.6 days per admission in 2000 to 4.5 days per admission this year). The use of antibiotics per individual patient has remained constant. Therefore, the selection pressure on the hospital ward has increased. The question that now arises is whether the development of resistance is more relevant in the patient or in the surrounding environment?



Antimicrobial consumption in Norway, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Both	100%	Other	4 888 946	National Statistics Agency
Hospital sector	Both	100%	Hospital network	4 888 946	

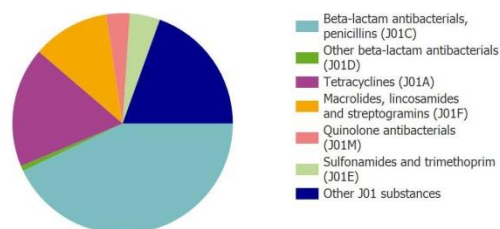
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

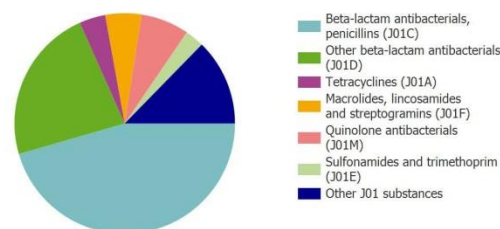
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	6.77	0.66
Other beta-lactam antibacterials (J01D)	0.12	0.33
Tetracyclines (J01A)	2.77	0.06
Macrolides, lincosamides and streptogramins (J01F)	1.79	0.08
Quinolone antibacterials (J01M)	0.54	0.10
Sulfonamides and trimethoprim (J01E)	0.70	0.04
Other J01 substances	3.08	0.18
Total	15.77	1.44

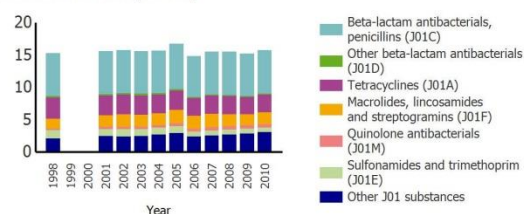
Distribution of the consumption in the community (primary care sector) of ATC group J01



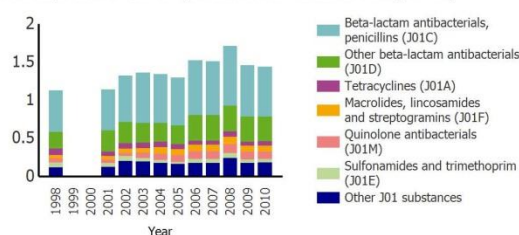
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





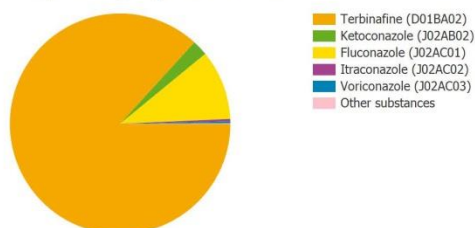
Antimicrobial consumption in Norway, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

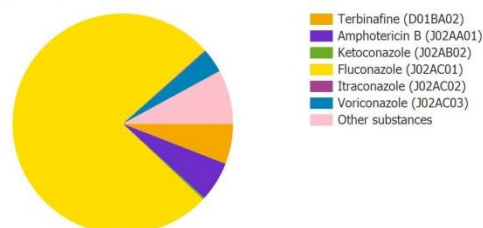
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	1.01	<0.01
Amphotericin B (J02AA01)	0.00	<0.01
Ketoconazole (J02AB02)	0.03	<0.01
Fluconazole (J02AC01)	0.12	0.04
Itraconazole (J02AC02)	<0.01	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	<0.01	<0.01
Total	1.17	0.06

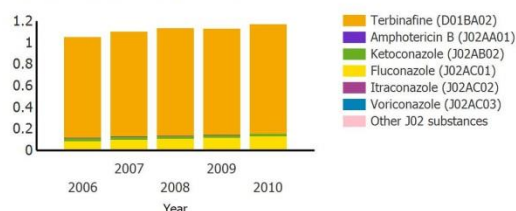
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



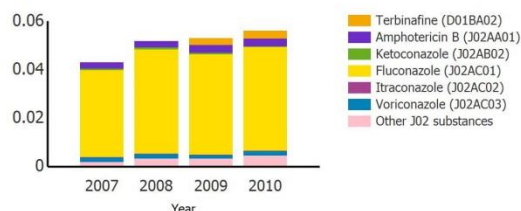
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

In Norway, antimicrobials are prescription-only medicines and the majority of antibacterial use in ambulatory care is not reimbursed. Data on use of antibiotics in Norway both for humans and animals are provided from the Norwegian Institute of Public Health and cover the entire population in Norway. Data on antimicrobial use are published in two annual publications; Drug consumption in Norway and NORM/NORM-vet. The overall sales of antibacterials for systemic use in Norway have been relatively stable for many years and is characterised by the use of narrow-spectrum antibacterials. In 2010 there was an increase of use in ambulatory care and a slight decrease in hospital care, compared to 2009. Phenoxymethylpenicillin is the drug most frequently used in Norway, representing 23% of all antibacterial use in ambulatory care measured in DDDs. In Norway, the sales of methenamine (J01XX05) is high, representing 17% of all antibacterial use measured in DDDs. Methenamine is a urinary tract antiseptic hardly used in other countries. In the ESAC report, data have been retrieved from different databases over the years, which results in some differences in the figures shown. From 2006, the data for ambulatory care have been retrieved from the Norwegian prescription database (NorPD) which contains data on all prescriptions to individuals with a personal identification number in Norway. Data for hospital care data are from 2006 collected from all hospital pharmacies to a common database. Before 2006, both ambulatory care and hospital care data were estimated from total wholesales data.



Antimicrobial consumption in Poland, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	100%	Ministry of Health	38 167 329	Eurostat

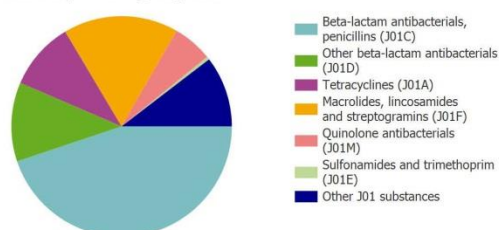
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

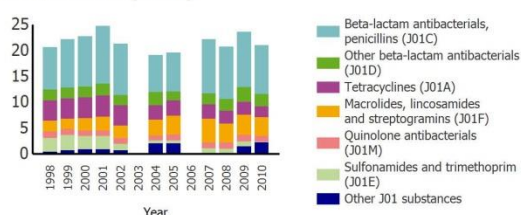
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	9.43	-
Other beta-lactam antibacterials (J01D)	2.44	-
Tetracyclines (J01A)	2.10	-
Macrolides, lincosamides and streptogramins (J01F)	3.54	-
Quinolone antibacterials (J01M)	1.23	-
Sulfonamides and trimethoprim (J01E)	0.09	-
Other J01 substances	2.19	-
Total	21.03	-

Distribution of the consumption in the community (primary care sector) of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

No data available



Antimicrobial consumption in Portugal, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	80%	Ministry of Health	8 177 019	Ministry of Health
Hospital sector	Both	95%	Ministry of Health	8 177 019	Ministry of Health

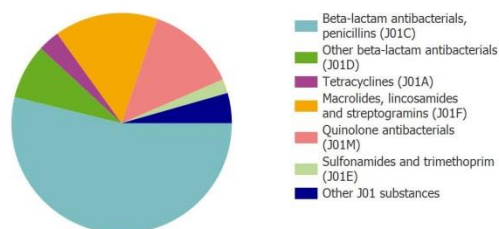
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

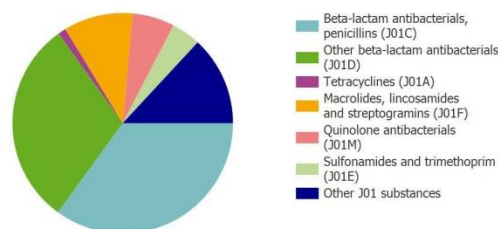
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	12.08	0.49
Other beta-lactam antibacterials (J01D)	1.81	0.42
Tetracyclines (J01A)	0.71	0.02
Macrolides, lincosamides and streptogramins (J01F)	3.41	0.14
Quinolone antibacterials (J01M)	2.97	0.09
Sulfonamides and trimethoprim (J01E)	0.47	0.06
Other J01 substances	0.99	0.18
Total	22.44	1.40

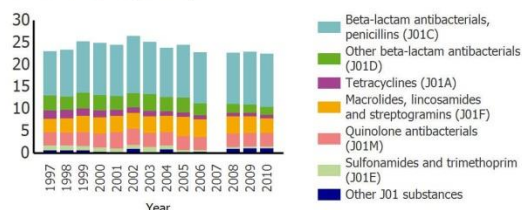
Distribution of the consumption in the community (primary care sector) of ATC group J01



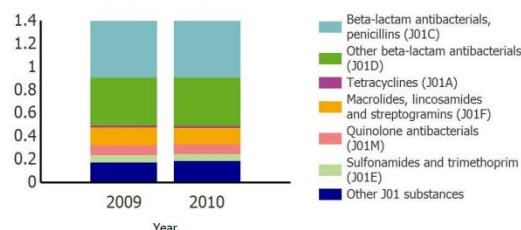
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





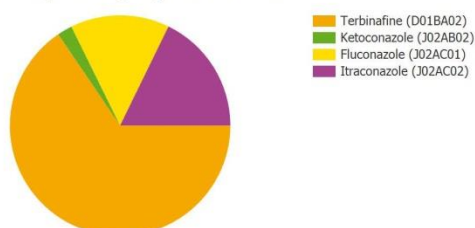
Antimicrobial consumption in Portugal, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

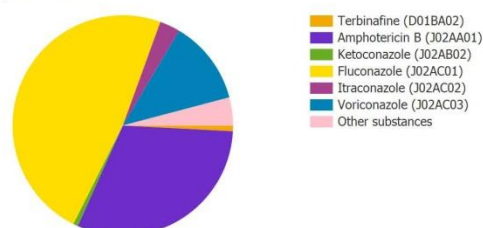
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	1.52	<0.01
Amphotericin B (J02AA01)	0.00	0.02
Ketoconazole (J02AB02)	0.05	<0.01
Fluconazole (J02AC01)	0.34	0.04
Itraconazole (J02AC02)	0.41	<0.01
Voriconazole (J02AC03)	0.00	<0.01
Other substances	0.00	<0.01
Total	2.32	0.07

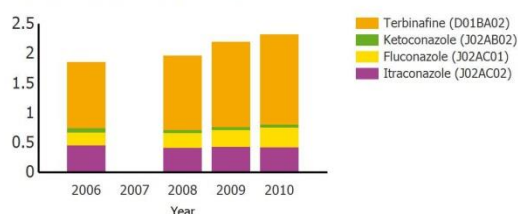
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



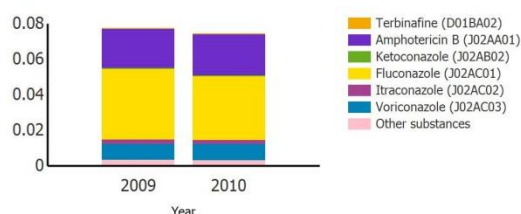
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

As in previous years, data for ambulatory care was collected from the NHS (National Health Service) database which reflects medicines prescribed, in a prescription form, and then dispensed in pharmacies to the population covered by the NHS. Hospital care data refers to public hospitals that reported INFARMED (National Authority of Medicines and Health Products) their hospital consumption for medicines dispensed within their pharmacies. In the past five years ambulatory care utilisation of antimicrobials has been rather stable featuring 22.4 DID in year 2010. This is a small decrease of 2.2% when compared to 2009 and it's mainly due to the decrease of 11.1% registered in macrolides, lincosamides and streptogramins group (J01F). However, despite the decrease, some groups showed an augment in their utilisation, namely sulfonamides and trimethoprim (J01E), other J01 substances and penicilins (J01C) with growth rates of 8.3%, 3.3% and 0.7%, respectively. Most prescribed antibiotics are penicilins representing 54% of total antibiotic use in ambulatory care and 35% in hospital care. Following penicilins, other beta-lactams (J01D), mostly ceftriaxone, account for 30% of total use. In hospital care, the use of antimicrobials stands for 1.4 DID. Concerning antimycotics and antifungals, while in hospital care the use is almost the same as observed in 2009, in ambulatory care, it increased from 2.19 DID to 2.32 DID. This 5.9% augment is mainly due to terbinafine which represents more than 65% of total antimycotics and antifungals for systemic use consumed in ambulatory care (community).



Antimicrobial consumption in Slovenia, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Both	100%	Other	2 049 261	National Statistics Agency
Hospital sector	Both	100%	Hospital network	2 049 261	Other

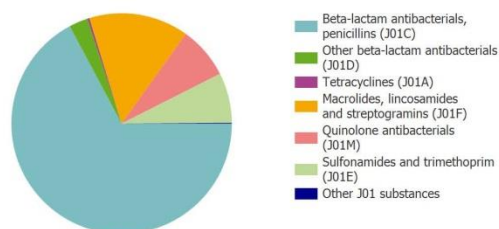
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

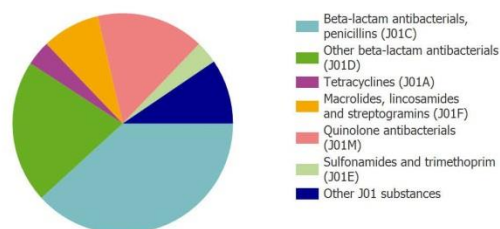
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	9.67	0.66
Other beta-lactam antibacterials (J01D)	0.40	0.36
Tetracyclines (J01A)	0.04	0.06
Macrolides, lincosamides and streptogramins (J01F)	2.10	0.15
Quinolone antibacterials (J01M)	1.10	0.27
Sulfonamides and trimethoprim (J01E)	1.06	0.06
Other J01 substances	0.02	0.16
Total	14.39	1.72

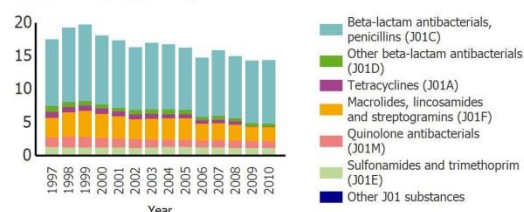
Distribution of the consumption in the community (primary care sector) of ATC group J01



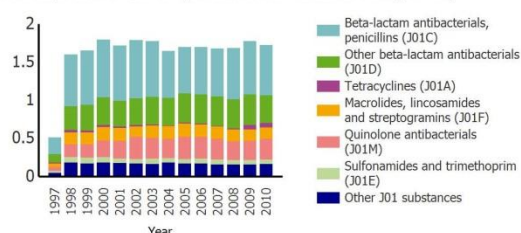
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



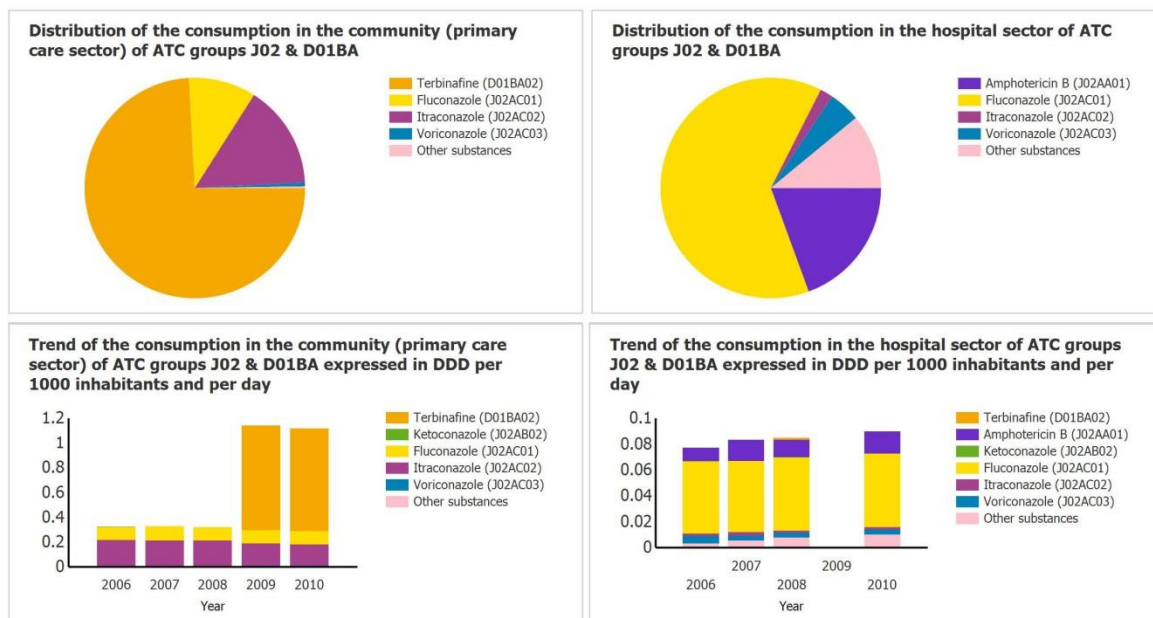
Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in Slovenia, 2010

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Comments

Data on use of antimicrobials are provided by National Institute of Public Health and hospital pharmacists and cover entire population in Slovenia. The consumption of antibiotics for systemic use (J01) in the community declined by 4.1% in 2010 compared with 2008 (27.2% reduction vs 1999 when we had the highest consumption of antibiotics in ambulatory care - AC). The consumption of parenteral antibiotics which are prescribed for patients in AC are not included, but they represent according to previous analysis less than 1% of total consumption in AC. The consumption of antifungals for systemic use (D01BA) was not included in the report but was analysed afterwards. The consumption of the D01BA (only D01BA02) was 0.83 DDD per 1000 inhabitants per day (DID). In 2010 the consumption of antibiotics in hospital care (HC) was lower than in 2009 (1.72 DID vs 1.78 DID). The explanation for lower use is lower use of doxycycline. In 2008 and 2009 Slovenia has shortage of doxycycline and doxycycline used in outpatients was provided by hospital pharmacies instead of community pharmacies.



Antimicrobial consumption in Spain, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	100%	Ministry of Health	47 021 031	National Statistics Agency

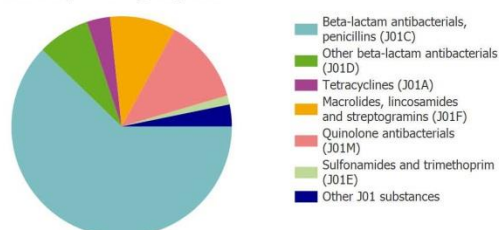
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

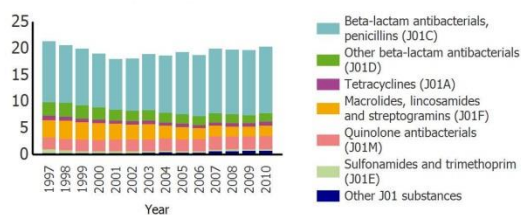
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	12.64	-
Other beta-lactam antibacterials (J01D)	1.56	-
Tetracyclines (J01A)	0.70	-
Macrolides, lincosamides and streptogramins (J01F)	1.96	-
Quinolone antibacterials (J01M)	2.54	-
Sulfonamides and trimethoprim (J01E)	0.27	-
Other J01 substances	0.65	-
Total	20.31	-

Distribution of the consumption in the community (primary care sector) of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in Spain, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

No data available

Comments

Since 1997 there has been a downward trend in the overall use of antibiotics in Spain until 2003 when a slight increase was detected. From 2007 to 2009 the consumption has been stabilised. In 2010 there has been an increase in total consumption of 4% over 2009. This increase is observed in most of the subgroups (tetracyclines, penicillins, macrolides, quinolones, sulfonamides and trimethoprim, other antibacterials). The pattern of use continues to be essentially the same, with broad-spectrum penicillins accounting for 62% of the overall use in 2010. The ratio amoxicillin/amoxicillin-clavulanic acid was maintained greater than 1 up to 2001 when an inversion occurred, reaching 0.57 in 2010. The increase in use of amoxicillin-clavulanic acid expressed in DDD per 1000 inhabitants per day was mostly due to the progressive increase of share of high-strength presentations, while the number of packages sold did not substantially change.



Antimicrobial consumption in Sweden, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Sales	100%	Other	9 340 682	National Statistics Agency
Hospital sector	Sales	100%	Other	9 340 682	National Statistics Agency

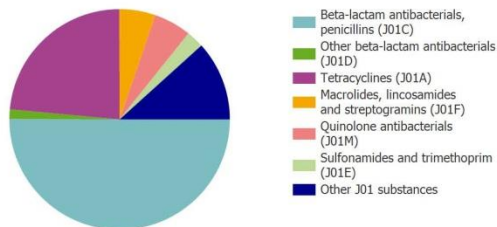
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

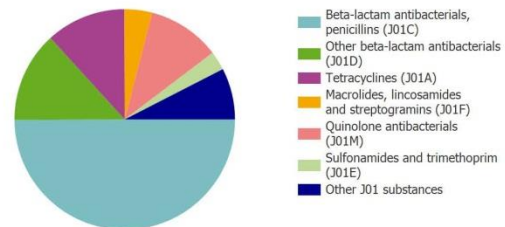
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	7.09	0.76
Other beta-lactam antibacterials (J01D)	0.20	0.20
Tetracyclines (J01A)	3.33	0.18
Macrolides, lincosamides and streptogramins (J01F)	0.75	0.06
Quinolone antibacterials (J01M)	0.77	0.16
Sulfonamides and trimethoprim (J01E)	0.36	0.04
Other J01 substances	1.66	0.11
Total	14.15	1.51

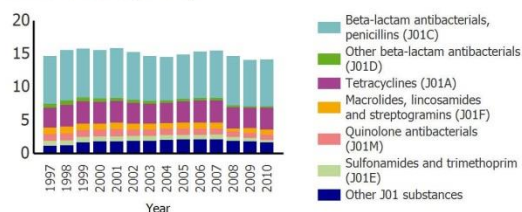
Distribution of the consumption in the community (primary care sector) of ATC group J01



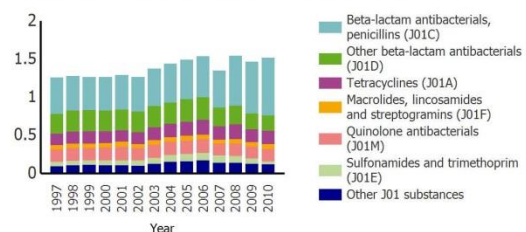
Distribution of the consumption in the hospital sector of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC group J01 expressed in DDD per 1000 inhabitants and per day





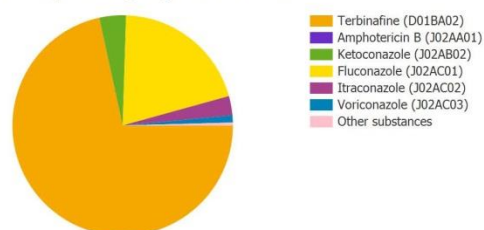
Antimicrobial consumption in Sweden, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

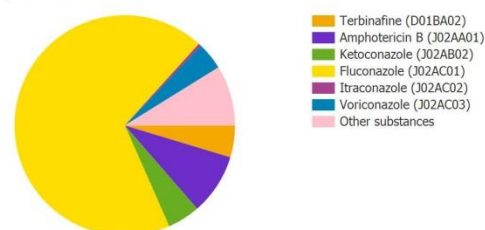
Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC groups J02 & D01BA	Community (primary care sector)	Hospital sector
Terbinafine (D01BA02)	0.55	<0.01
Amphotericin B (J02AA01)	<0.01	<0.01
Ketoconazole (J02AB02)	0.03	<0.01
Fluconazole (J02AC01)	0.15	0.04
Itraconazole (J02AC02)	0.02	<0.01
Voriconazole (J02AC03)	<0.01	<0.01
Other substances	<0.01	<0.01
Total	0.77	0.07

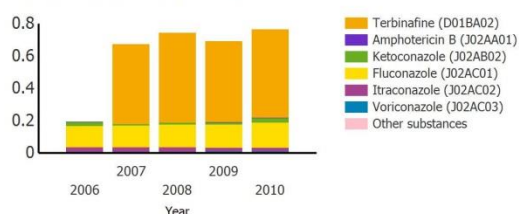
Distribution of the consumption in the community (primary care sector) of ATC groups J02 & D01BA



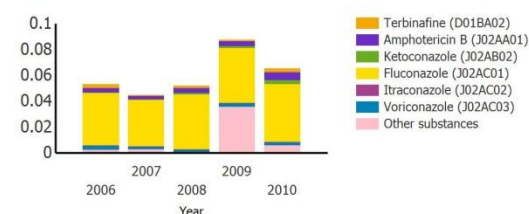
Distribution of the consumption in the hospital sector of ATC groups J02 & D01BA



Trend of the consumption in the community (primary care sector) of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Trend of the consumption in the hospital sector of ATC groups J02 & D01BA expressed in DDD per 1000 inhabitants and per day



Comments

Antibiotic consumption in Sweden is surveyed and analysed by the Swedish Institute for Communicable Disease Control (SMI). Data is obtained from a national agency responsible for infrastructure services to pharmacies in Sweden (Apotekens Service AB). All purchases of medicines, both medicines dispensed on prescriptions to patients and sales on requisitions to hospital wards etc. are recorded. Therefore, data represent total sales of antibiotics. An annual report covering antibiotic utilisation and resistance in human medicine, SWEDRES, is published by SMI. Antibiotic use in veterinary medicine is covered in the SVARM report, produced by the National Veterinary Institute. In outpatient care, the overall sales of antibiotics (J01 excl. methenamine) decrease with 1.2% in 2010 measured as prescriptions/1000 inhabitants and year. The small decrease encompasses almost all age groups and almost all antibiotic groups. About half of the Swedish counties showed a small decrease, the rest did not. However, there are still large differences within the country and prescriptions per 1000 inhabitants and year ranged from 419 in the county of Stockholm to 311 in the county of Jämtland. Beta-lactamase sensitive penicillins together with tetracyclines are the most commonly used antibiotics in outpatient care. Treatment of lower urinary tract infections in women has been the subject of information campaigns for several years. The use of the two first line recommended substances, pivmecillinam and nitrofurantoin, has increased every year and represented 71% of the total sale of antibiotics commonly used to treat urinary tract infections in this group in 2010. In recent years, antibiotic use in hospital care has shown a shift from an extensive use of cephalosporins to an increased use of narrow spectrum penicillins. This trend continued also in 2010. However, there are still large differences between counties in this respect. The regional differences are also evident regarding the use of newer classes of broad spectrum antibiotics such as carbapenems and piperacillin with tazobactam.



Antimicrobial consumption in United Kingdom, 2010

Data source

Health care	Data type	Coverage*	Data source (consumption)	Population (under surveillance)	Data source (population)
Community (primary care sector)	Reimbursement	100%	Ministry of Health	59 255 000	National Statistics Agency
Community (primary care sector)	Reimbursement	99%	Ministry of Health	3 006 000	National Statistics Agency

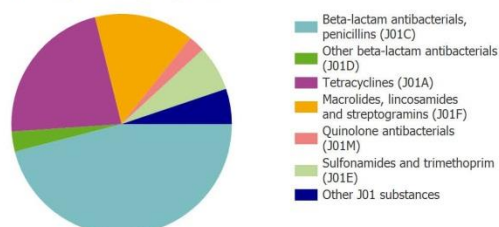
* Proportion of total country population under surveillance.

Antibacterials for systemic use (ATC group J01)

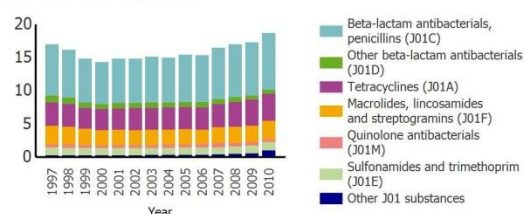
Consumption of antibacterials for systemic use (ATC group J01) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

ATC group J01	Community (primary care sector)	Hospital sector
Beta-lactam antibacterials, penicillins (J01C)	8.60	-
Other beta-lactam antibacterials (J01D)	0.55	-
Tetracyclines (J01A)	4.15	-
Macrolides, lincosamides and streptogramins (J01F)	2.73	-
Quinolone antibacterials (J01M)	0.46	-
Sulfonamides and trimethoprim (J01E)	1.24	-
Other J01 substances	0.97	-
Total	18.70	-

Distribution of the consumption in the community (primary care sector) of ATC group J01



Trend of the consumption in the community (primary care sector) of ATC group J01 expressed in DDD per 1000 inhabitants and per day





Antimicrobial consumption in United Kingdom, 2010

Antimycotics and antifungals for systemic use (ATC groups J02 & D01BA)

Consumption of antimycotics and antifungals for systemic use (ATC groups J02 & D01BA) in the community (primary care sector) and the hospital sector expressed in DDD per 1000 inhabitants and per day in 2010

No data available

Comments

The usage of amoxicillin for Community Acquired Pneumonia has increased in DDD terms, and local data suggests that this is due to increasing doses rather than increased numbers of patients treated. There is a very small amount of 'private' AC prescribing (community) in addition to the National Health Service data reported here. However, it is very difficult to provide a proportion for this, as our NHS data are based on prescriptions sent to a central agency for pharmacy reimbursement, and by definition, private prescriptions are not reimbursed - the prescription form is kept by the individual pharmacy.

There is a very small amount of 'private' AC prescribing in addition to the National Health Service data reported here. However, it is very difficult to provide a proportion for this, as our NHS data are based on prescriptions sent to a central agency for pharmacy reimbursement, and by definition, private prescriptions are not reimbursed - the prescription form is kept by the individual pharmacy.

Data for co-fluampicil, co-trimoxazole are not included. Also, there is a very small amount of 'private' AC prescribing in addition to the National Health Service data reported here. However, it is very difficult to provide a proportion for this, as our NHS data are based on prescriptions sent to a central agency for pharmacy reimbursement, and by definition, private prescriptions are not reimbursed - the prescription form is kept by the individual pharmacy.