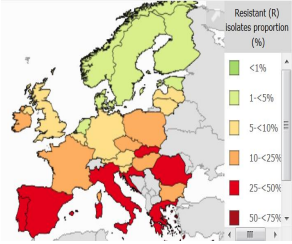


Antibiotic use in the Nordic countries: What are they (we) doing right ?

Niels Frimodt-Møller,

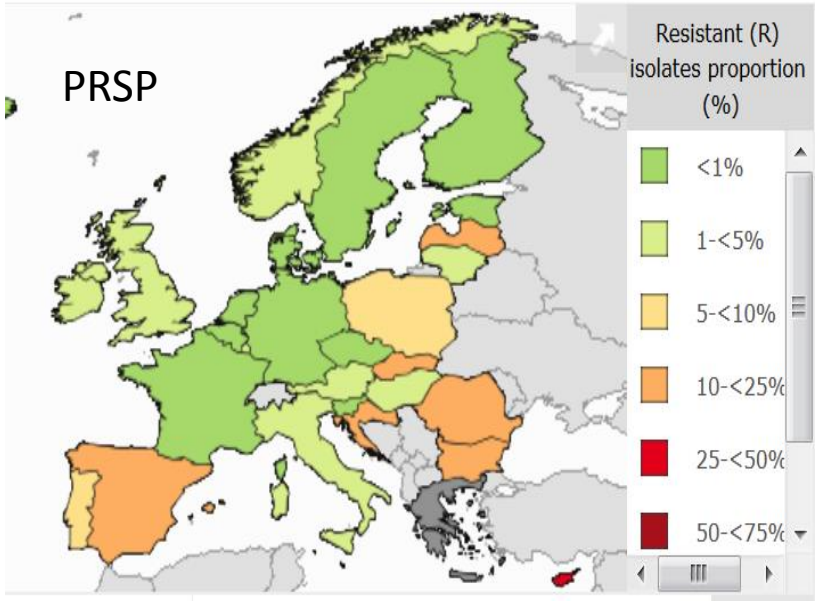
Professor, MD, DMSc, Head

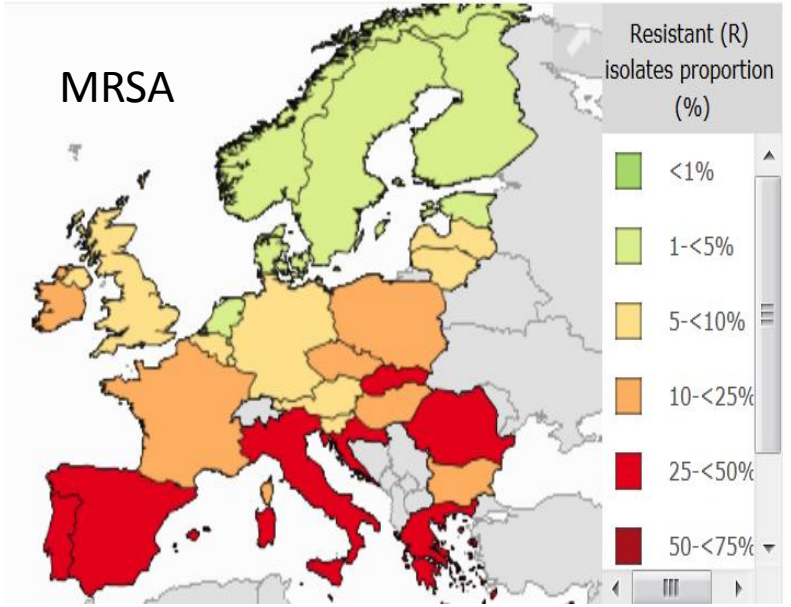
Dept. of Clinical Microbiology

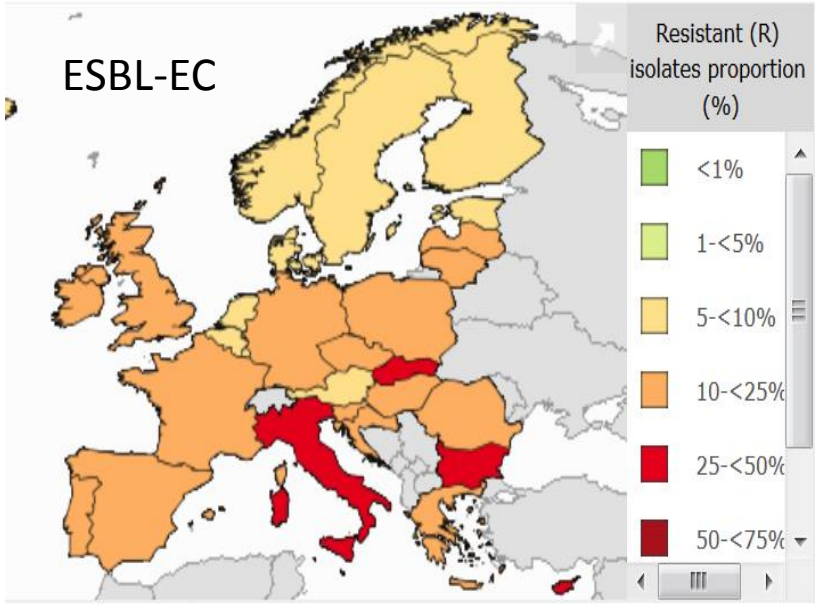
Rigshospitalet

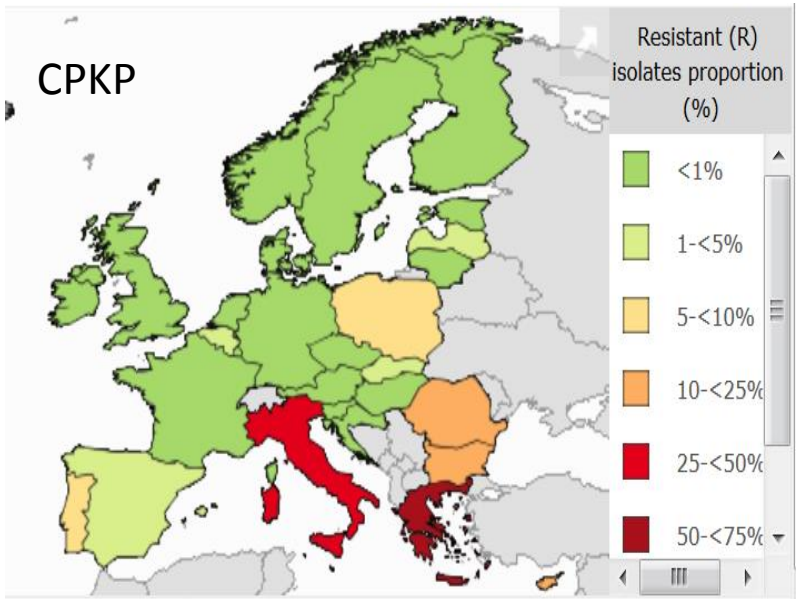
Copenhagen, Denmark

EARS-NET 2017:
Blood culture isolates

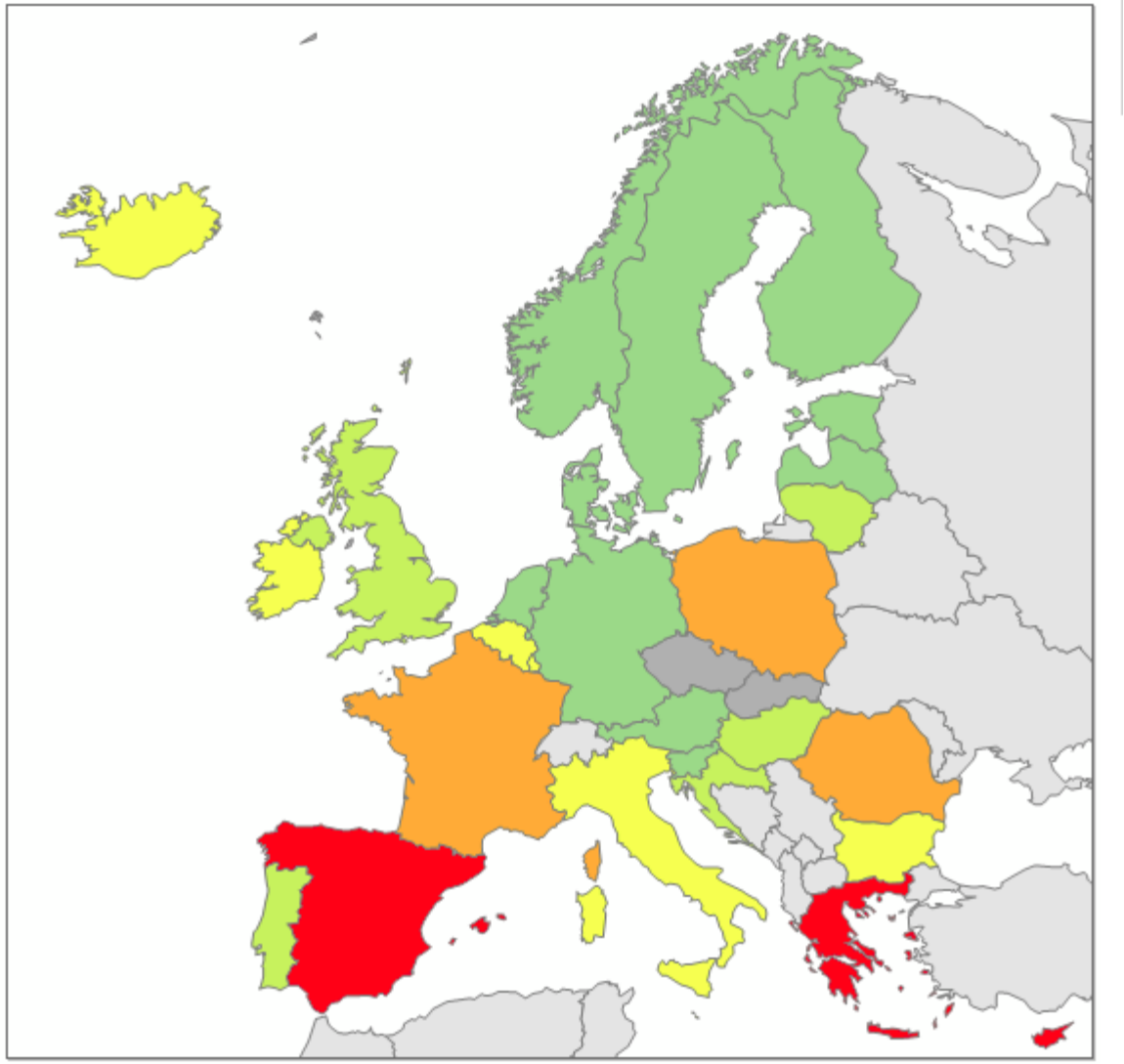


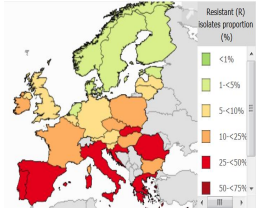






ESAC-NET : Consumption of Antibacterials for systemic use (ATC group J01) in the community (primary care sector) in Europe, reporting year 2017





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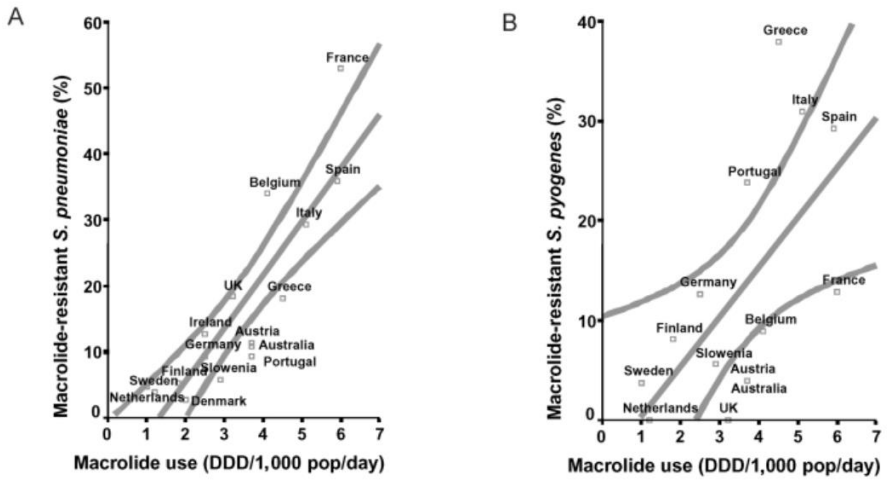
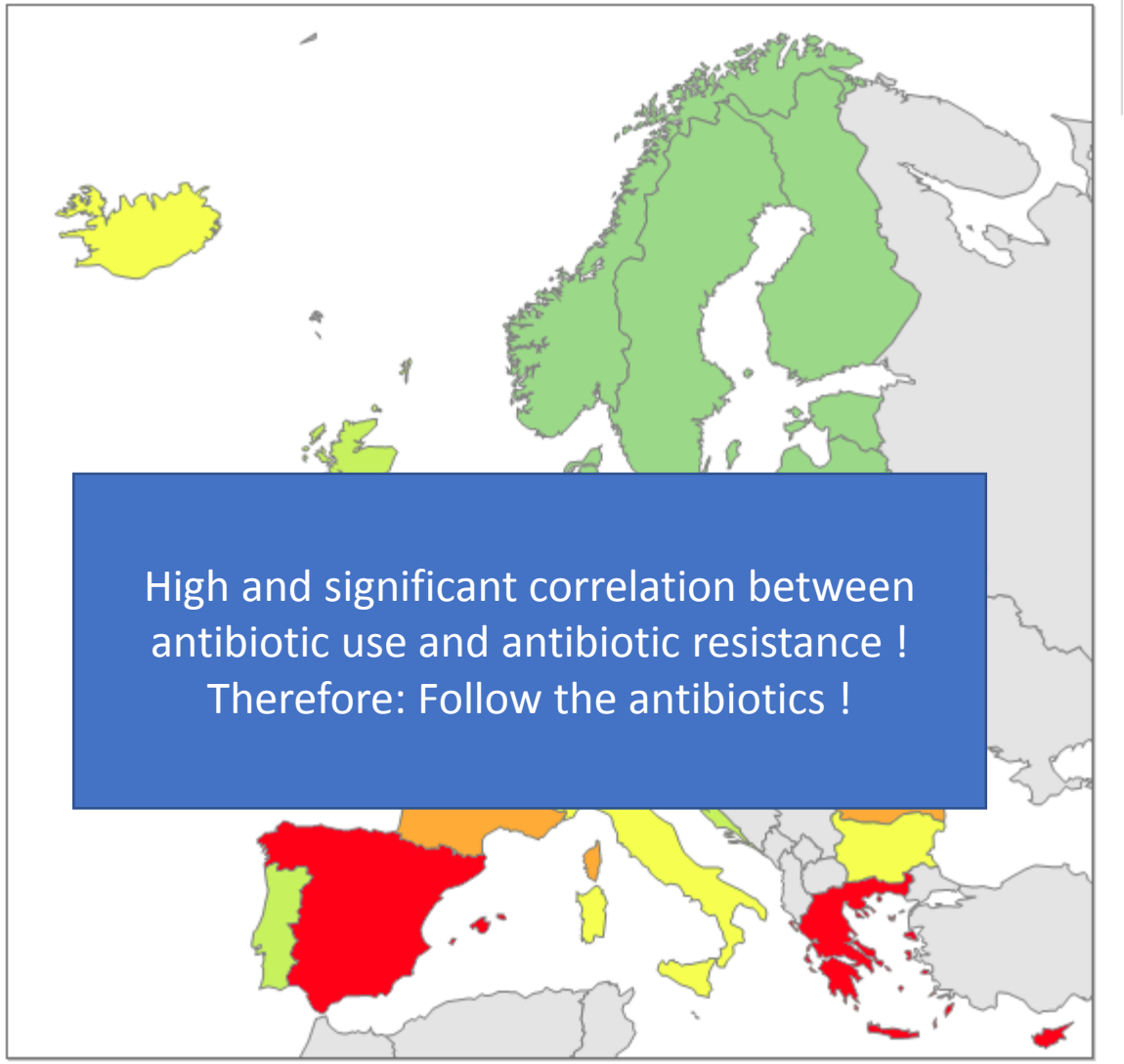
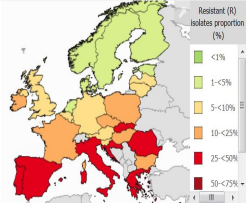
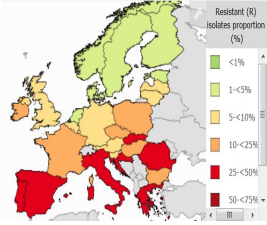


Albrich et al. Emerg Infect Dis. 2004 Mar;10(3):514-7



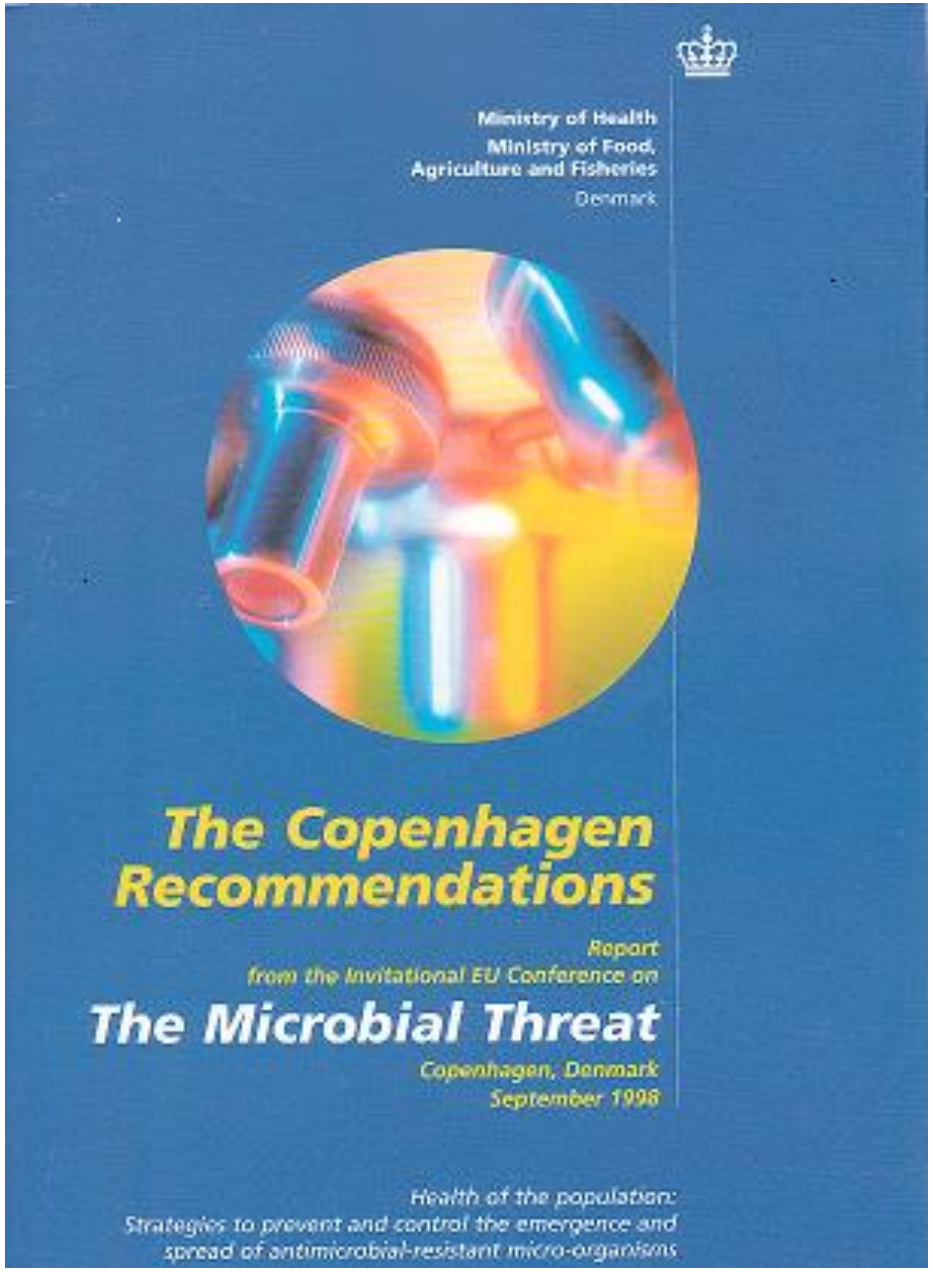




EU invitational conference organised by Danish National Health Board in 1998

3 day conference attended by leaders of national health boards of all EU-countries – and experts

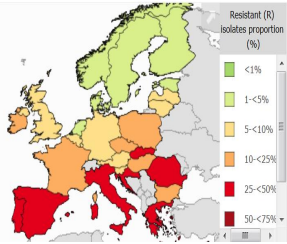
Deliverable: The Copenhagen Recommendations for Antibiotic policy



Copenhagen Recommendations vs. EU Council Recommendation (1998) (15.11.2001)

Copenhagen Recommendations:

- Recognise AMR as major EU and global problem
- Encourage search for new AM
- Setup EU surveillance on AMR
- Collect data on supply and consumption of AM agents
- EU Encourage prudent use of AM
- EU, member states and nat.res.councils research on AMR high priority
- Review progress on recommendation



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<u>EU Council recommendation</u>:

I Recognise problem and promote strategy for prudent use of AM

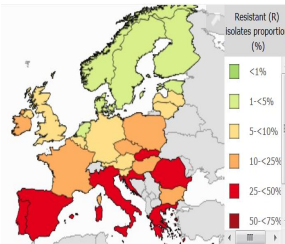
Establish surveillance on AMR

- and AM use

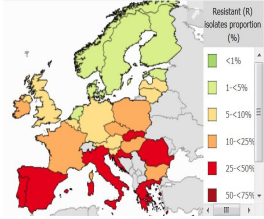
- Prescription only, guidelines, good practise for managing comm.dis., education of health professionals and information of public

- Cooperate, coordinate and report to EU

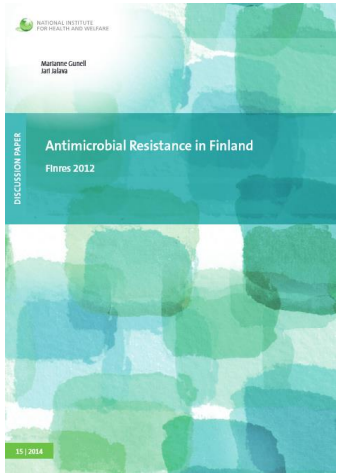
II ”Intersectorial mechanism” for coordinated implementation of strategy

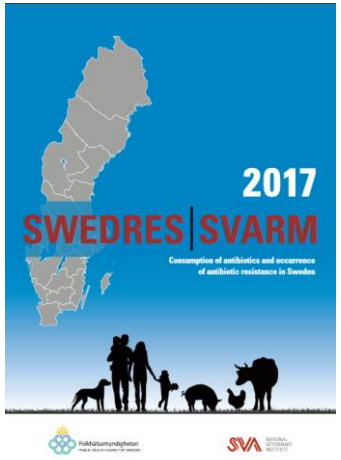


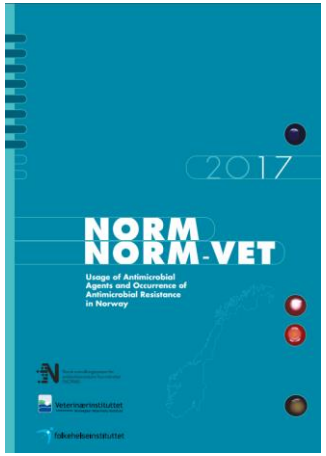
Antibiotic policy issues re. EU Commission Recommendation

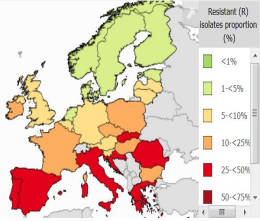


Country	Monitoring System (R + U) – reporting to ECDC	Inter-sectional mechanism	National treatment guidelines	Prescription only enforced	Education – student, MD, specialist, public
Finland	FINRES/FINRES-Vet	FiRe/EVIRA	+	+	+++
Sweden	SWEDRES/SVARM	STRAMA	+	+	+++
Norway	NORM/NORM-VET	NORM	+	+	+++
Denmark	DANMAP	Antibiotika-rådet	+	+	+++









Why is antimicrobial resistance (and use) so low in the Nordic countries?

- Primary health care
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  - Number of pharmacies; OTC, non-compliance; Re-imbursement
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- Education
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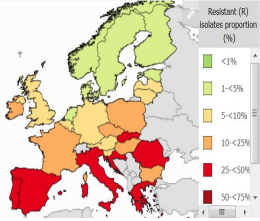

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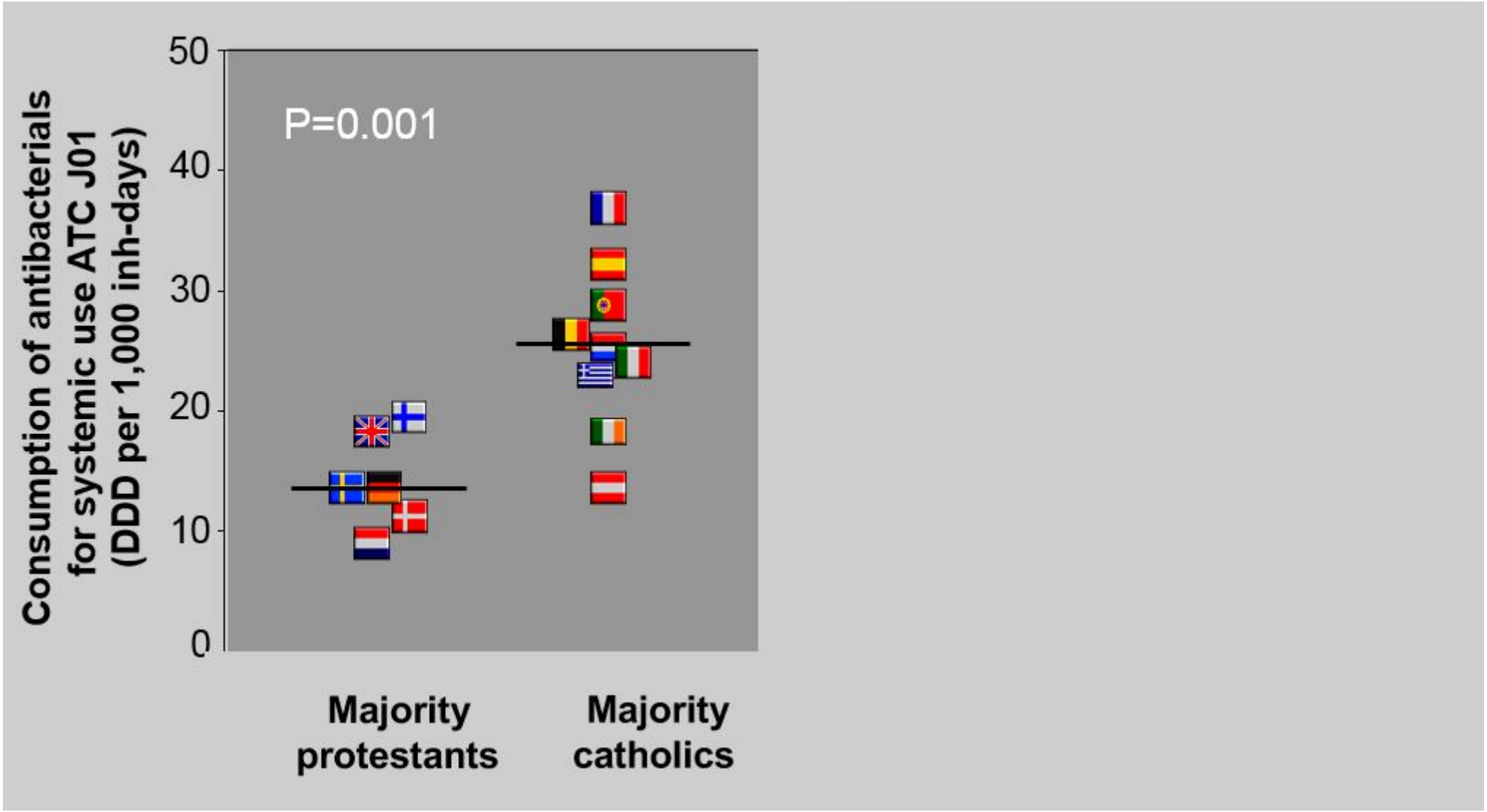
Importance of cultural differences for antibiotic use (European Union)



D. Monnet; ESAC-Net

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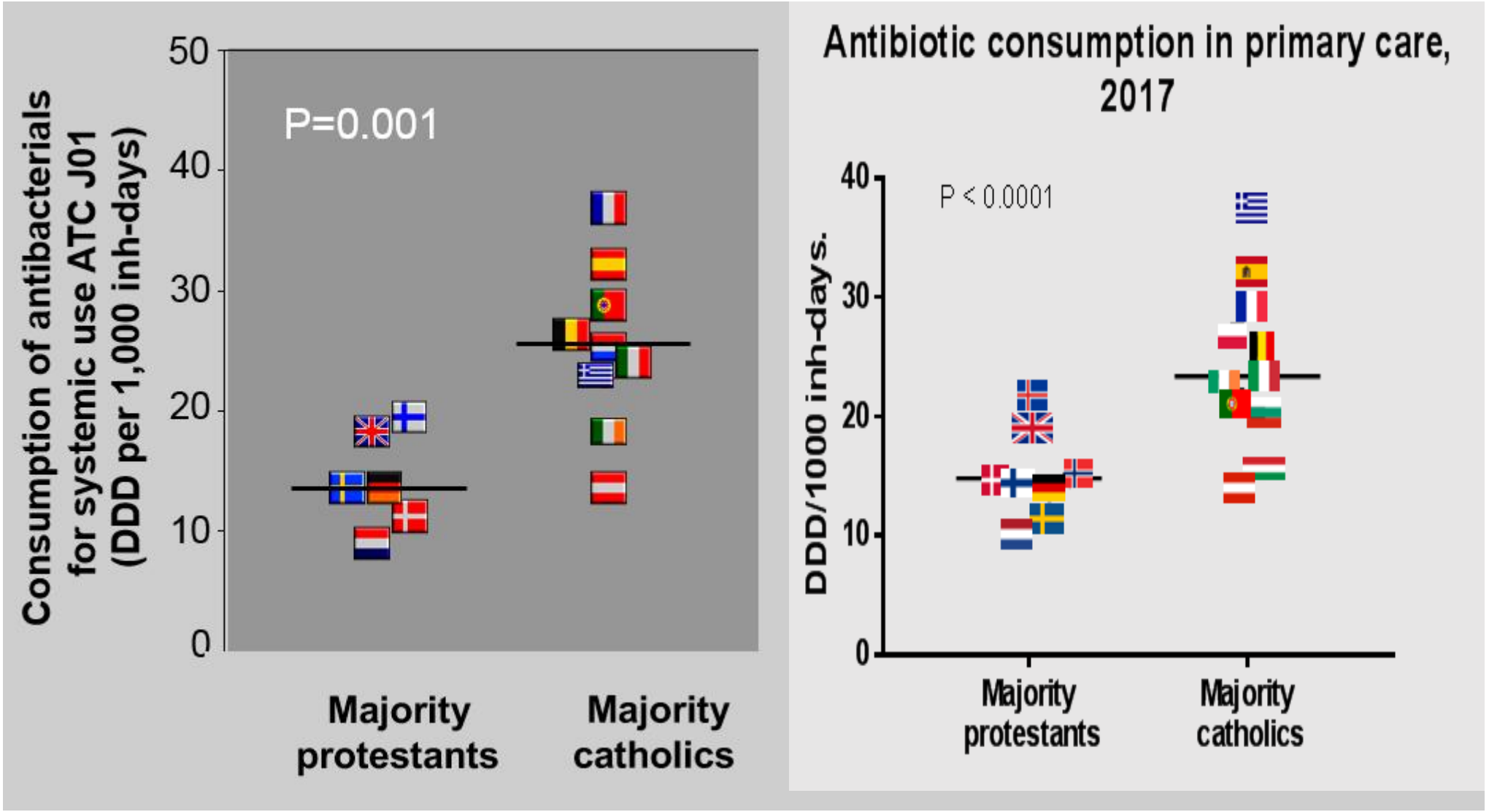

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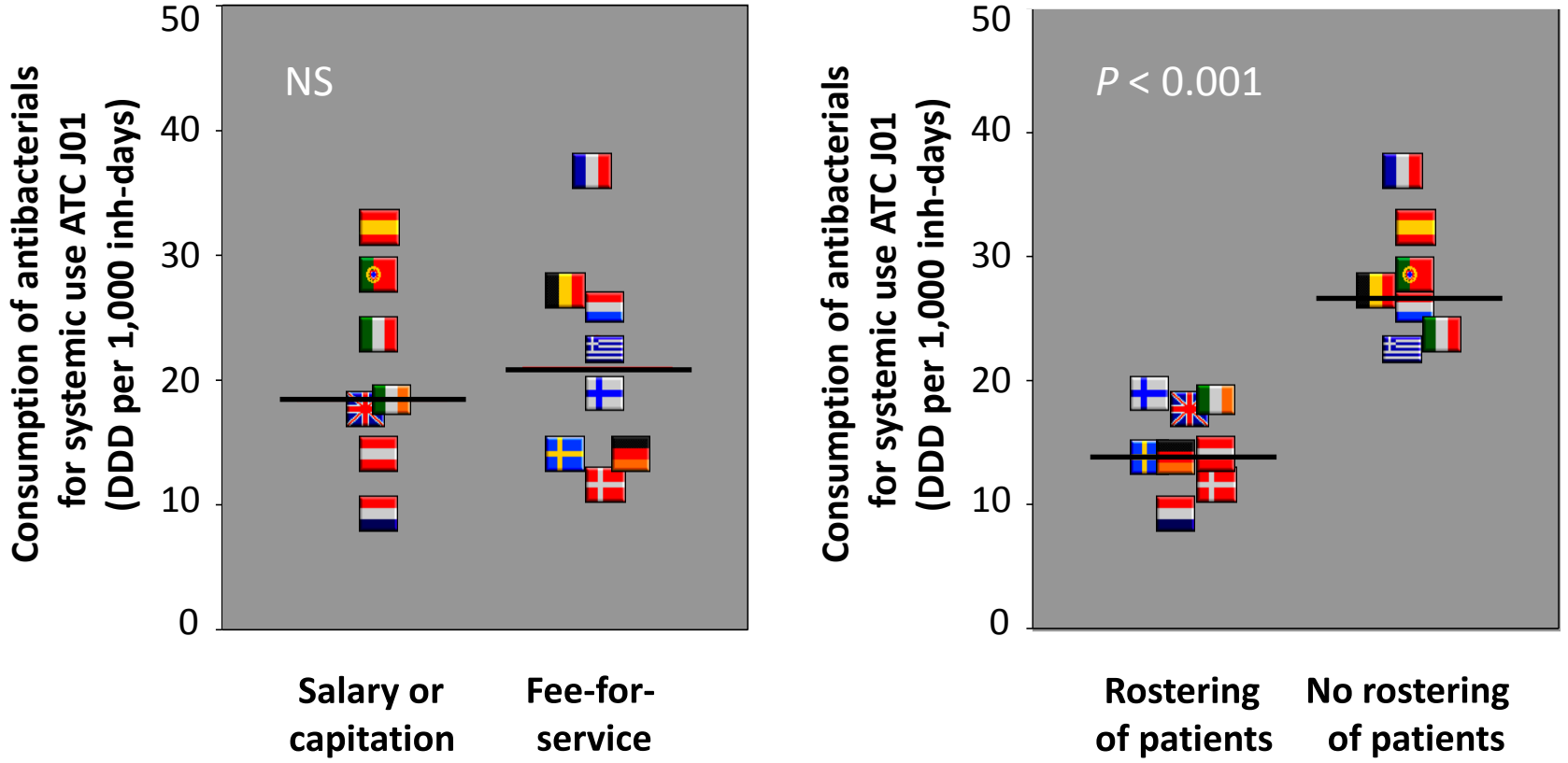
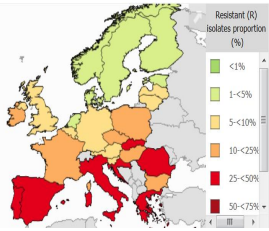
Overall Consumption of Systemic Antibacterials (ATC J01) in Primary Health Care, Fee-for-Service and Rostering of Patients by GPs, EU, 1997

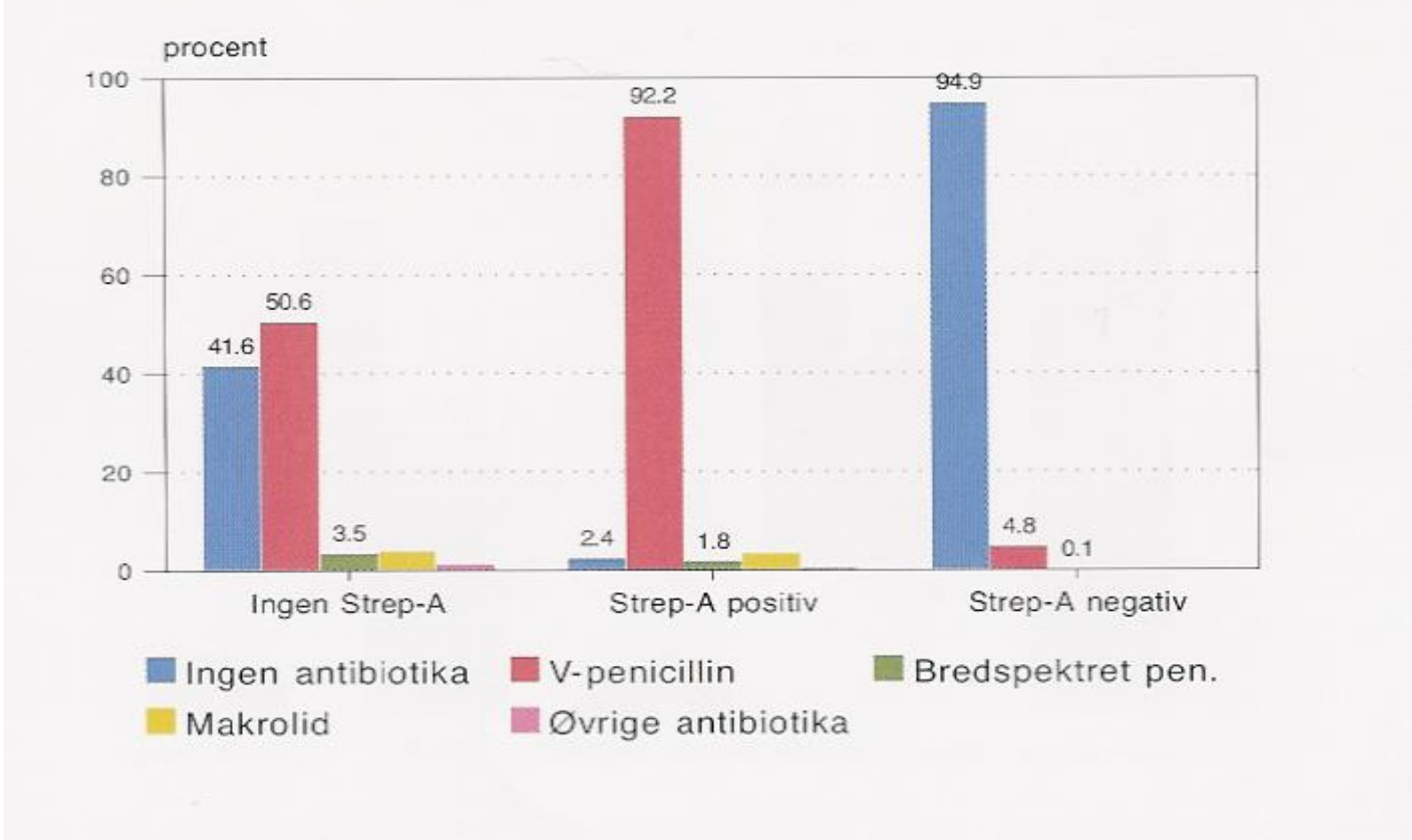


Sources: Monnet DL; Cars O, et al. Lancet 2001; 357: 1851-3, and ”Highlights on Health”, WHO/EURO.

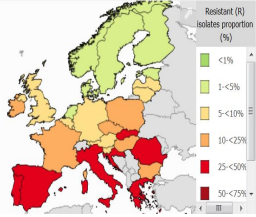
POCTests in primary care Reimbursed by National Health Insurance



Antibiotic treatment of tonsillitis according to use of *Streptococcus pyogenes* antigen test in primary care clinic



Audit of respiratory tract infections in primary care 2001; by courtesy of Jens K. Møller



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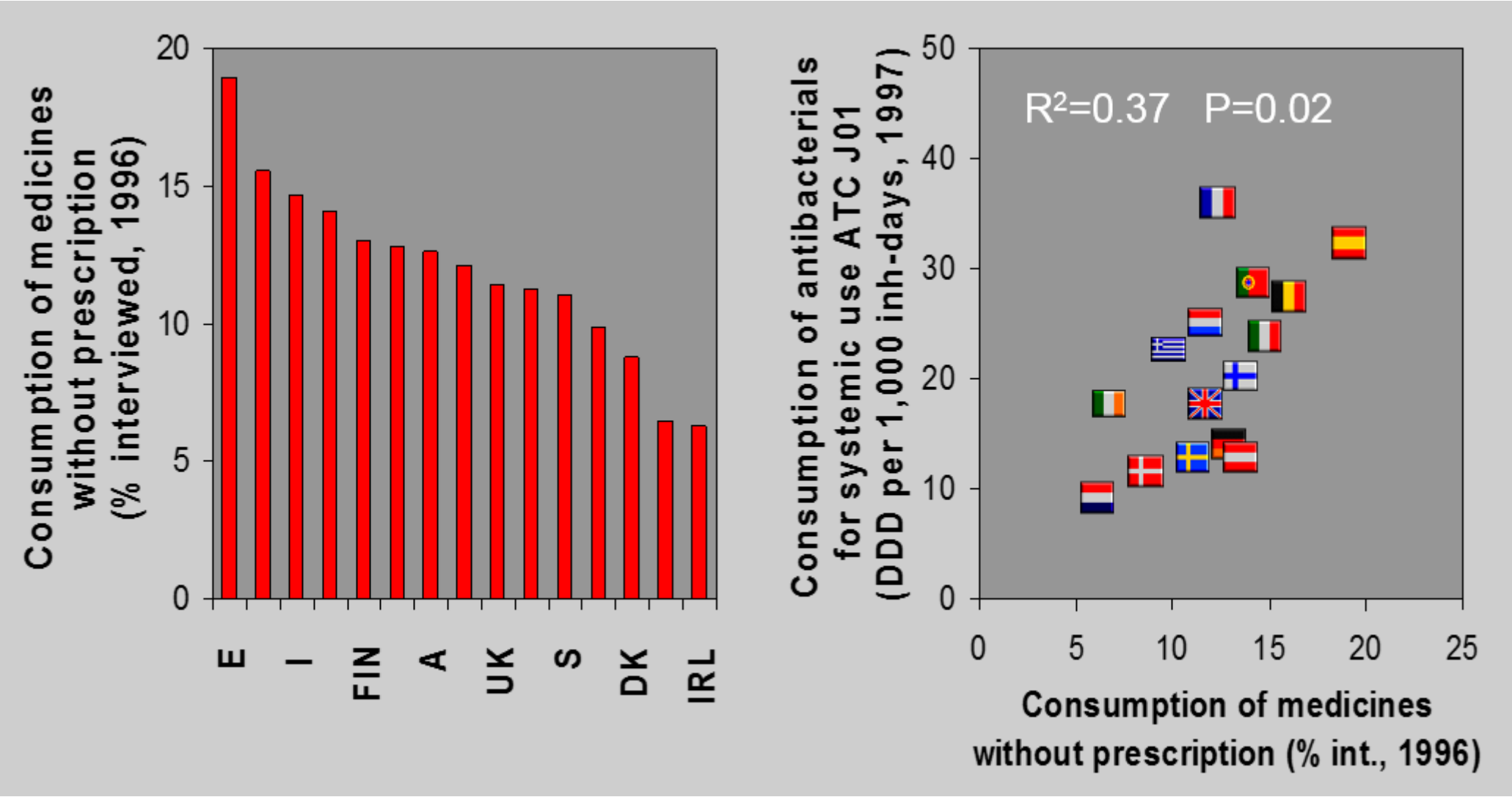
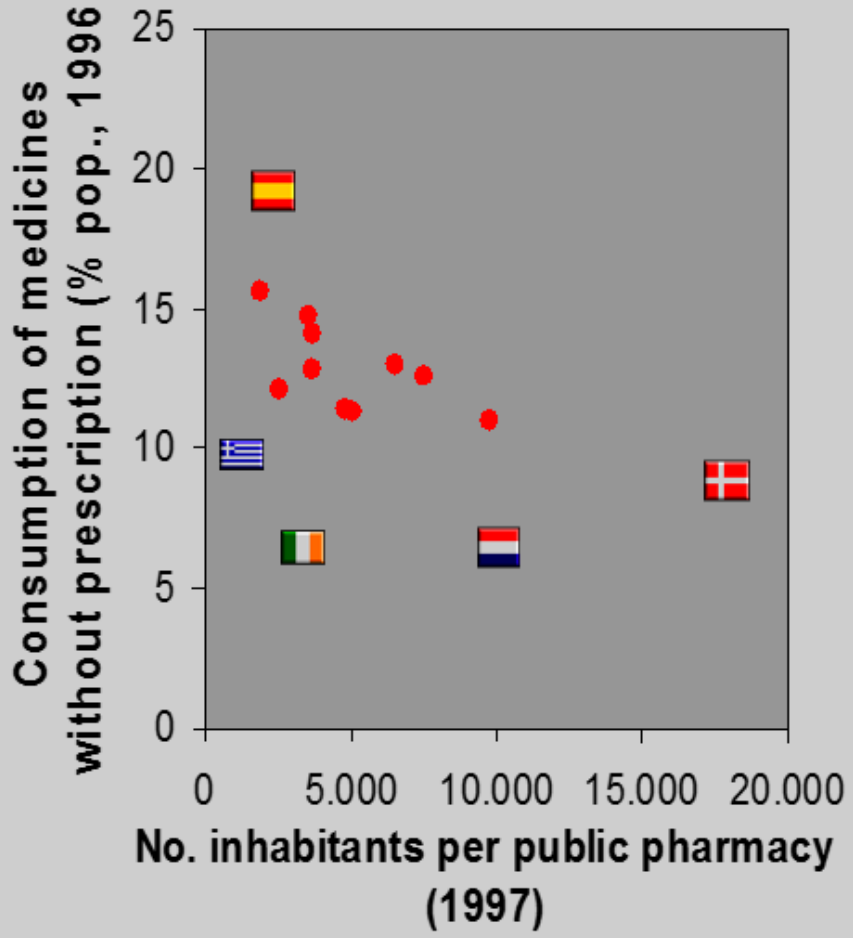
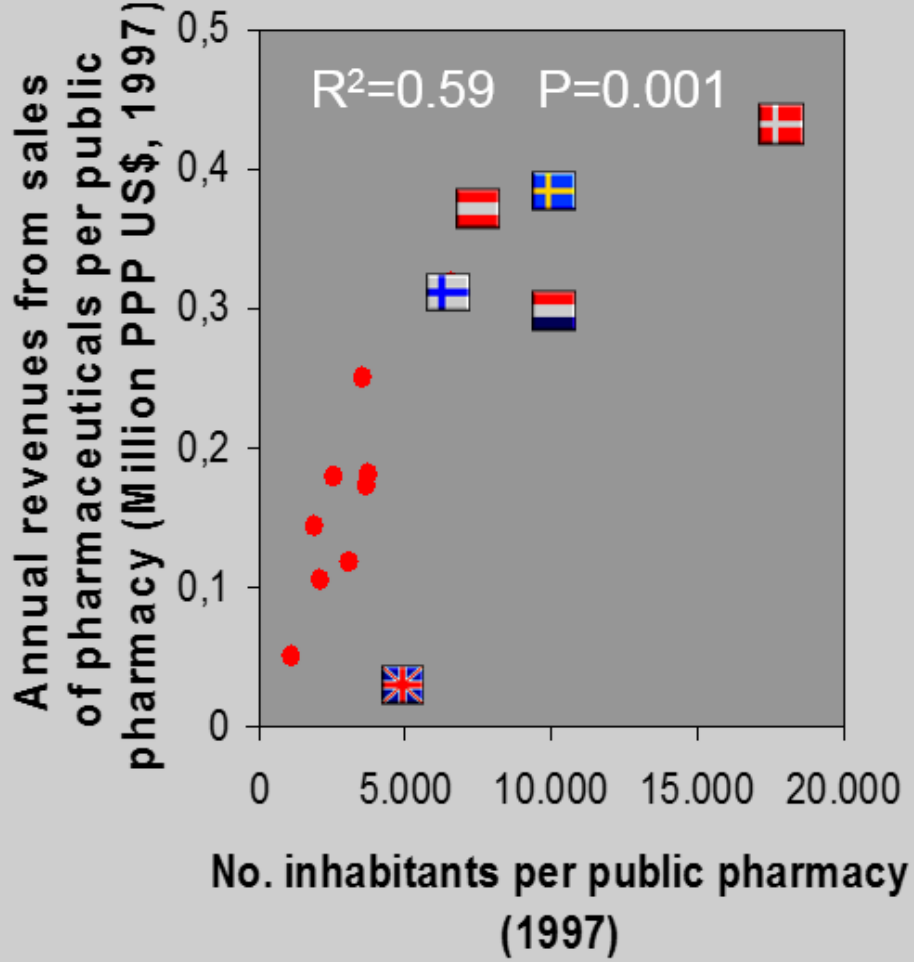
Overall Consumption of Systemic Antibacterials (ATC J01) in Primary Health Care and Consumption of Medicines Without Prescription, EU, 1996-1997



Sources: Eurobarometer 44.3, European Commission; Cars O, et al. Lancet 2001; 357: 1851-3.

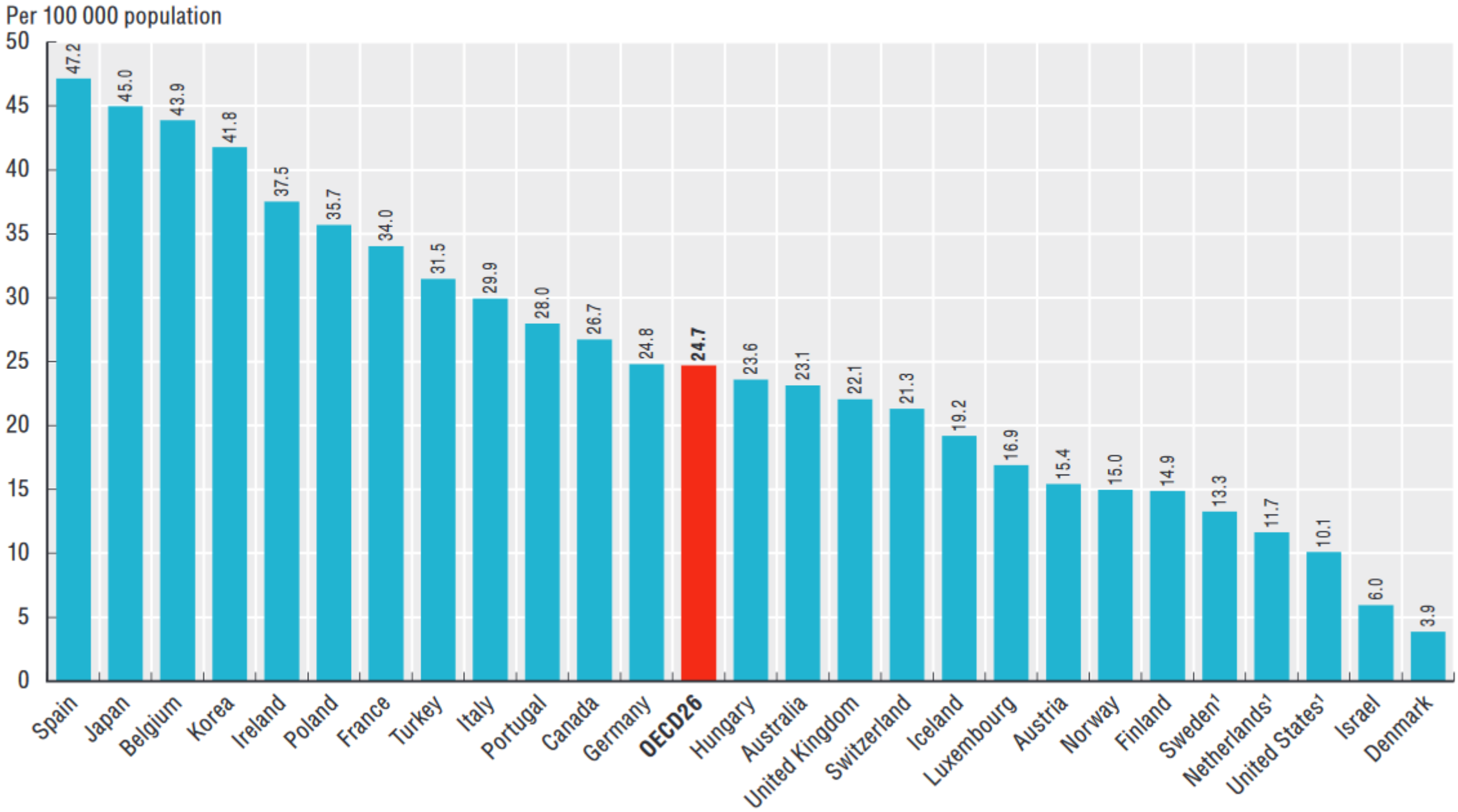
Consumption of Medicines Without Prescription, No. Inhabitants per Pharmacy, and Annual Revenues from Sales of Pharmaceuticals per Pharmacy, EU, 1996-1997



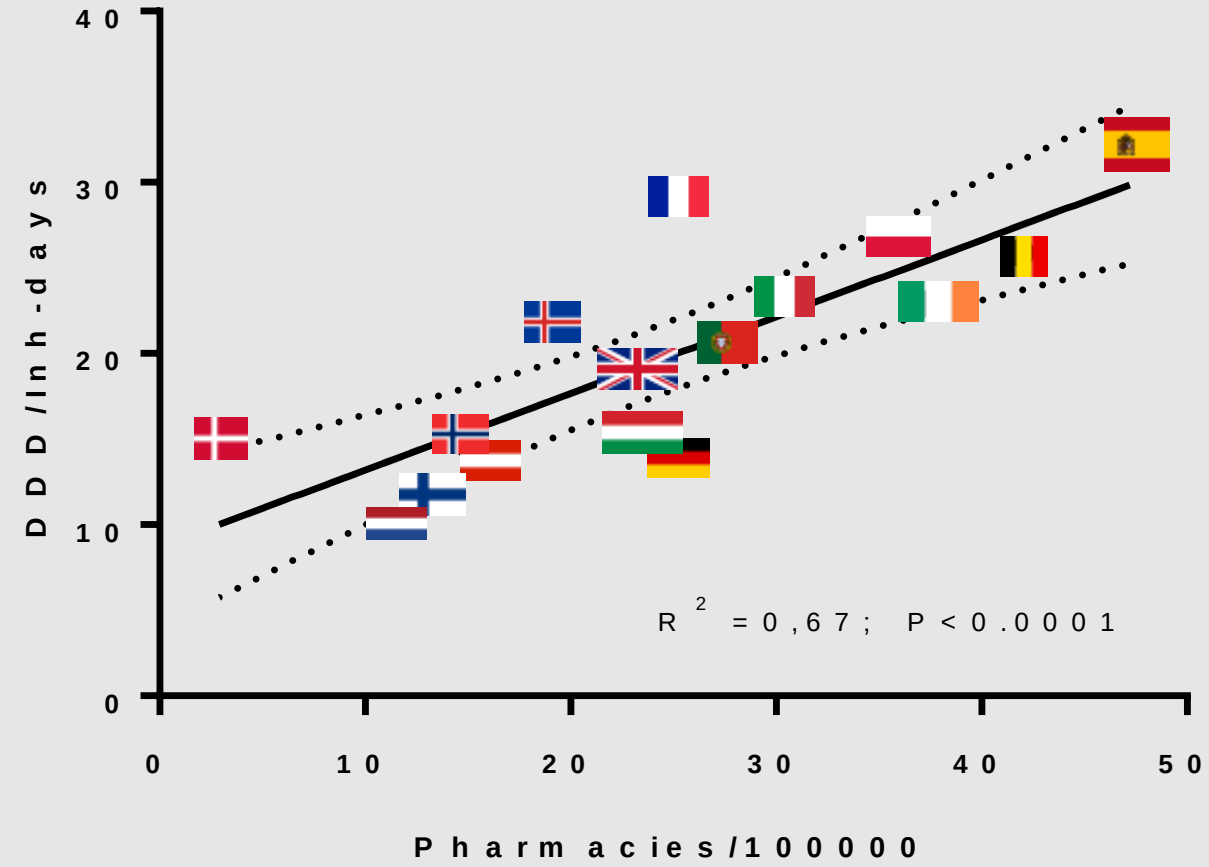


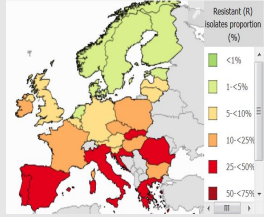
Sources: Eurobarometer 44.3, European Commission in Key Data on Health 2000, Eurostat; and GIRP and IMS Health.

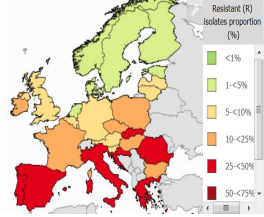
10.5. Community pharmacies, 2015 (or nearest year)



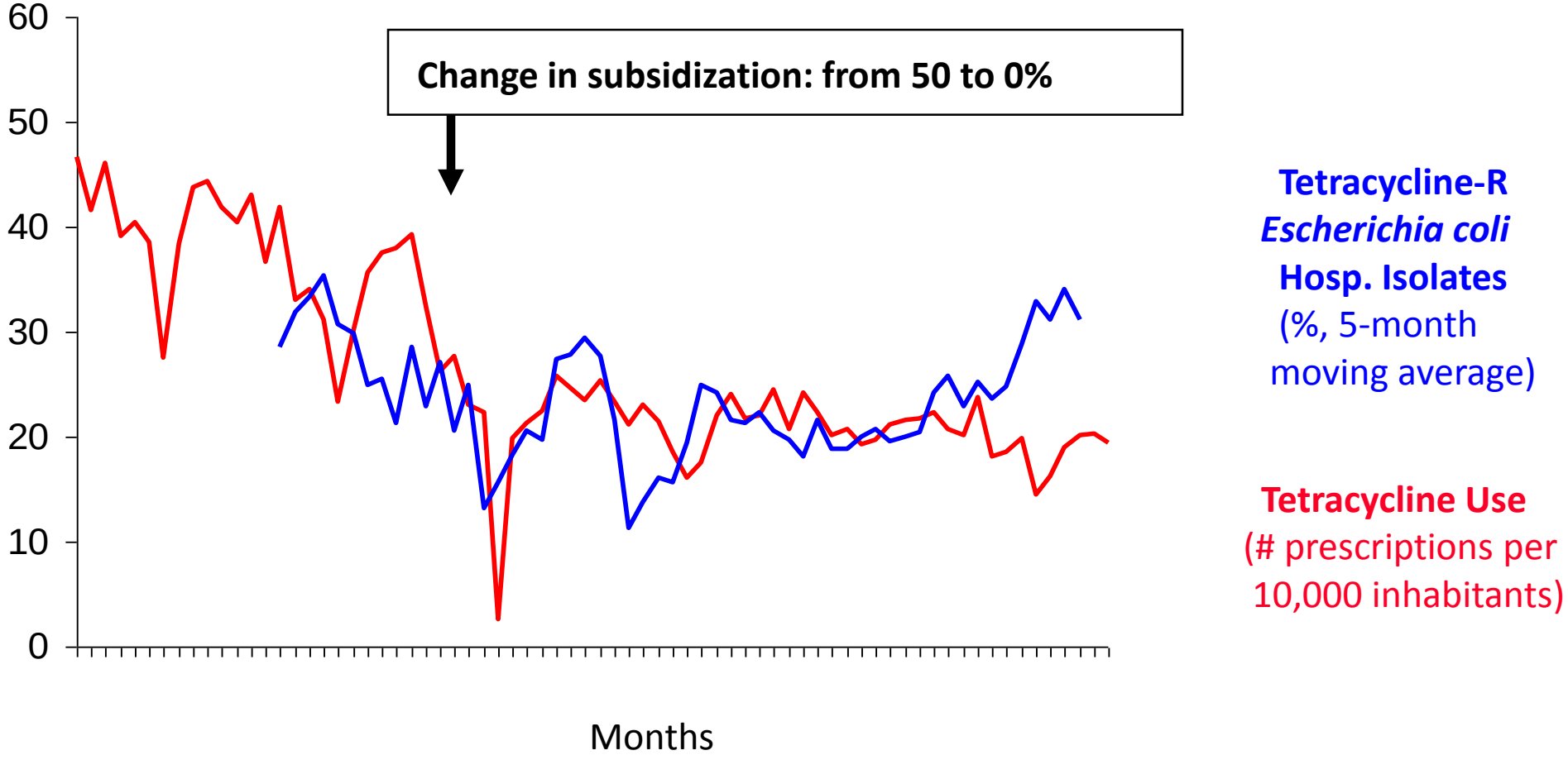
Correlation between number of pharmacies pr. 100.000 population and antibiotic use (ATC J01) in primary care (2017) in selected European countries







Monthly Tetracycline Prescription Rate and Tetracycline- Resistant *Escherichia coli* Hospital Isolates, Copenhagen and Frederiksberg Municipalities, 01/1994-12/1999



Tetracycline-R *Escherichia coli* Hosp. Isolates (%, 5-month moving average)

Tetracycline Use (# prescriptions per 10,000 inhabitants)

Source: Danish Medicines Agency, and H. Westh, Hvidovre Hospital, 2000.

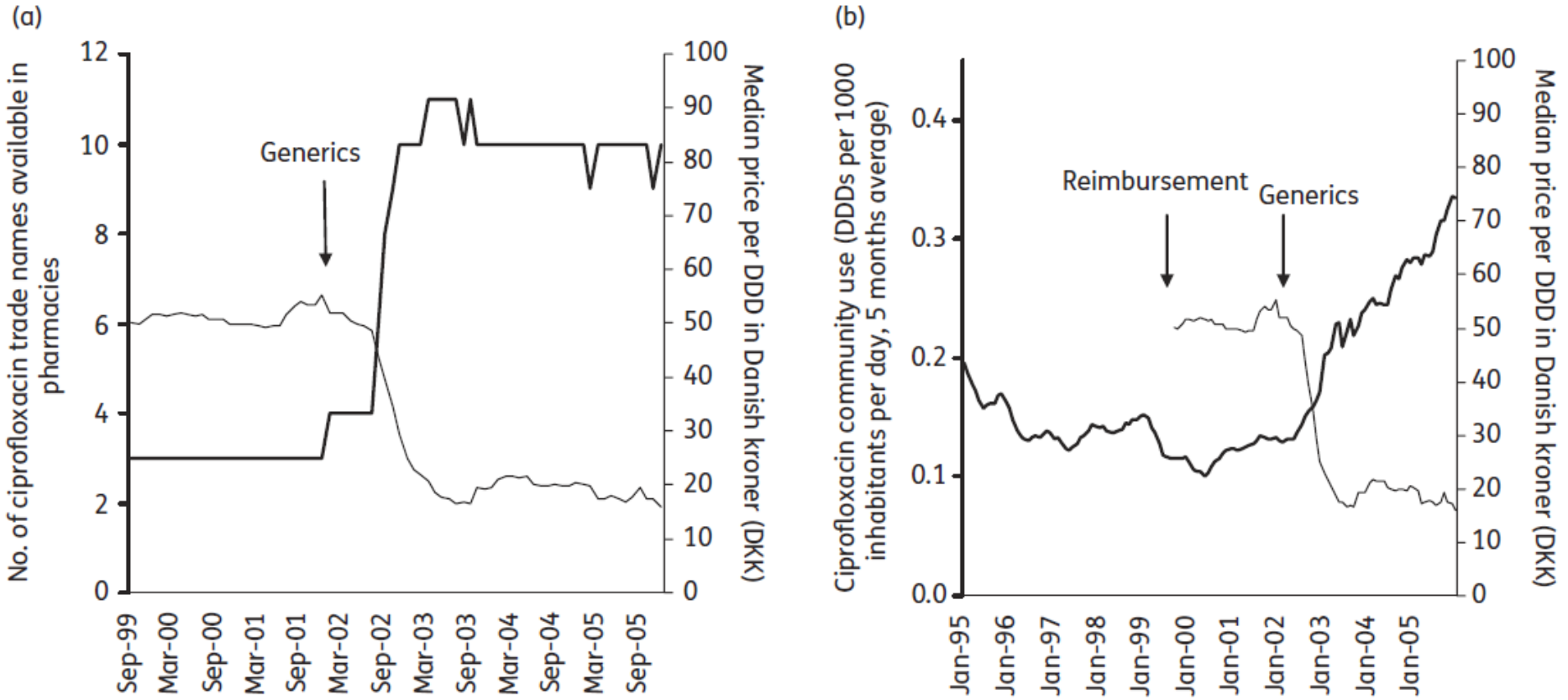
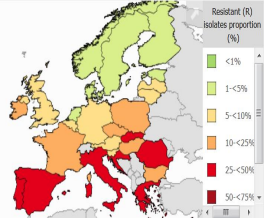
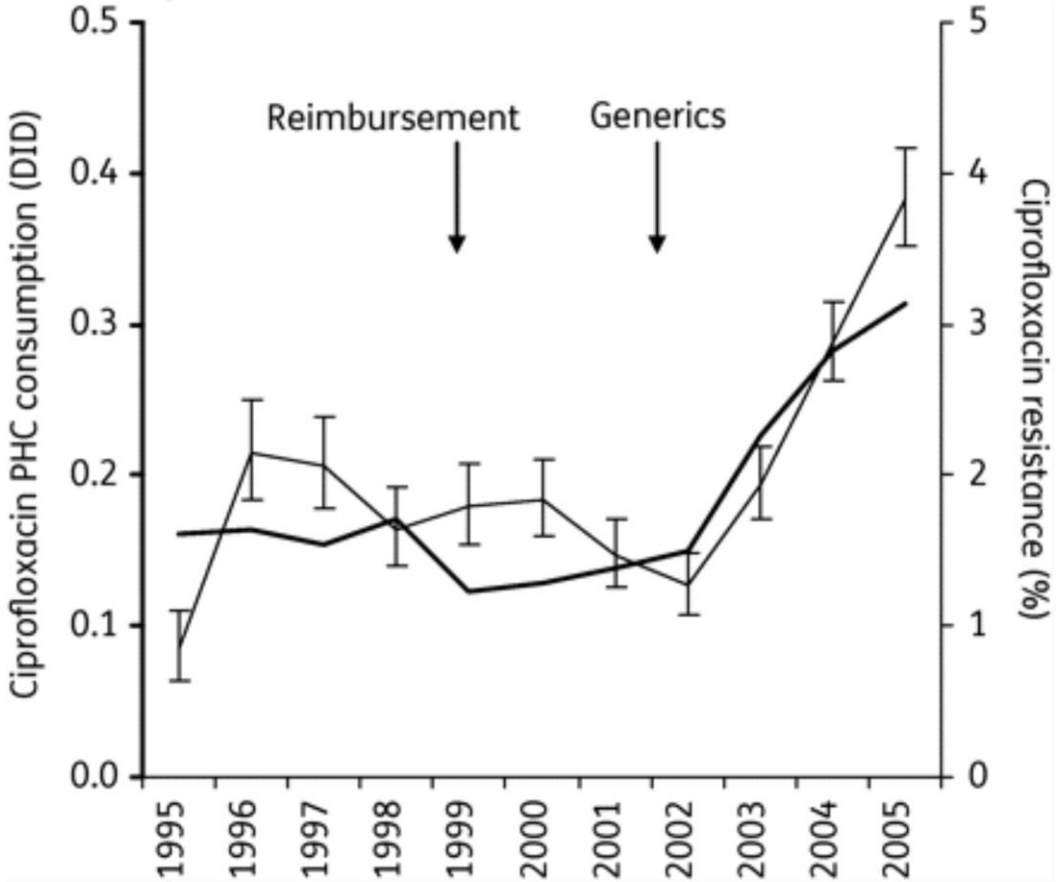


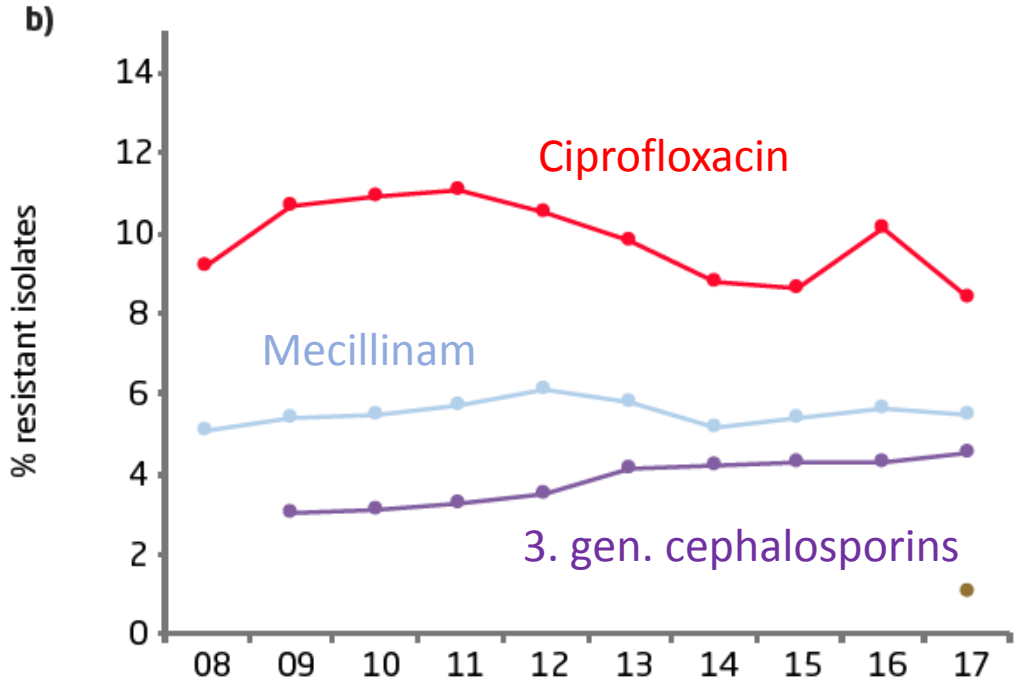
Figure 1. (a) Comparison of the number of ciprofloxacin trade names for oral use (thick line) and the median price per DDD registered monthly in PHC in Denmark (thin line), and the influence of the introduction of generics. The arrow marks the time of introduction of generic versions of ciprofloxacin. (b) The influence of removal of 50% reimbursement and of the introduction of generics on the total use of ciprofloxacin and median price per DDD registered monthly in PHC in Denmark (thin line). Consumption (thick line) is expressed in terms of DDDs per 1000 inhabitants per day. The arrows mark the times of removal of reimbursement of ciprofloxacin and the introduction of generic versions, respectively. 100 DDK≈13 EUR.

From: Effect of generics on price and consumption of ciprofloxacin in primary healthcare: the relationship to increasing resistance
J Antimicrob Chemother. 2010;65(6):1286-1291. doi:10.1093/jac/dkq093



Antibiotic resistance in *E. coli* from urine in primary care. DANMAP 2017





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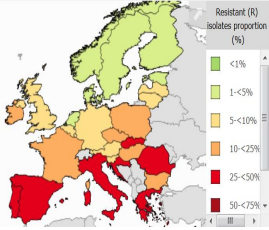

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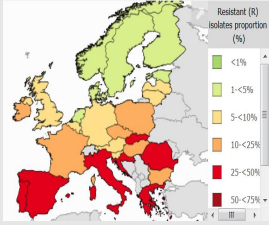
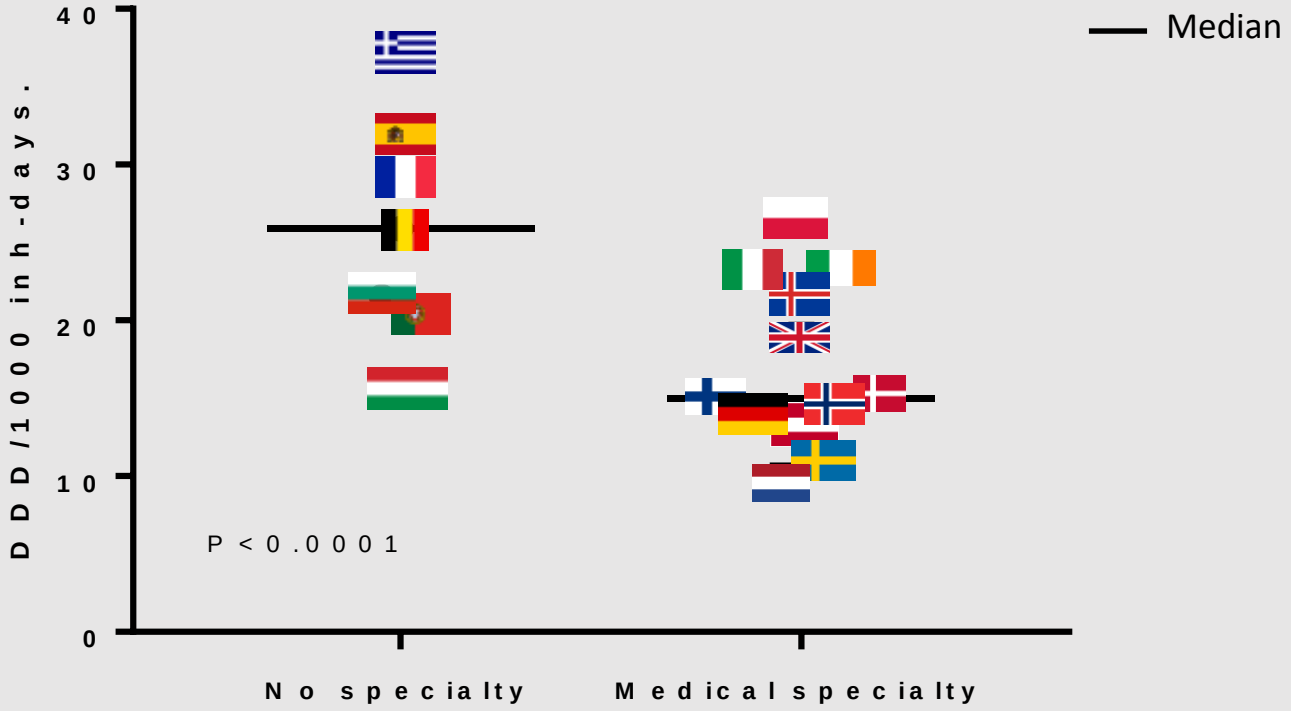
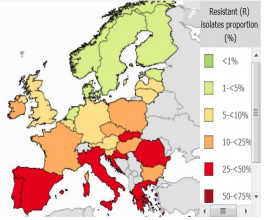
Antibiotic use (DDD/1000 inhabitants/day; ATC J01) in primary care in 2017 in European countries stratified according to whether they have clinical microbiology as medical specialty or not.





4-5 year residency, consultations on diagnosis and AB treatment; 24/7 call; infection control; design of treatment guidelines; monitoring of AB resistance

*UEMS SPECIALTY MEDICAL MICROBIOLOGY as of 1 June, 2018



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Dyar et al. **Do medical students feel prepared to prescribe antibiotics responsibly? Results from a cross-sectional survey in 29 European countries.** J Antimicrob Chemother 2018; 73: 2236–2242

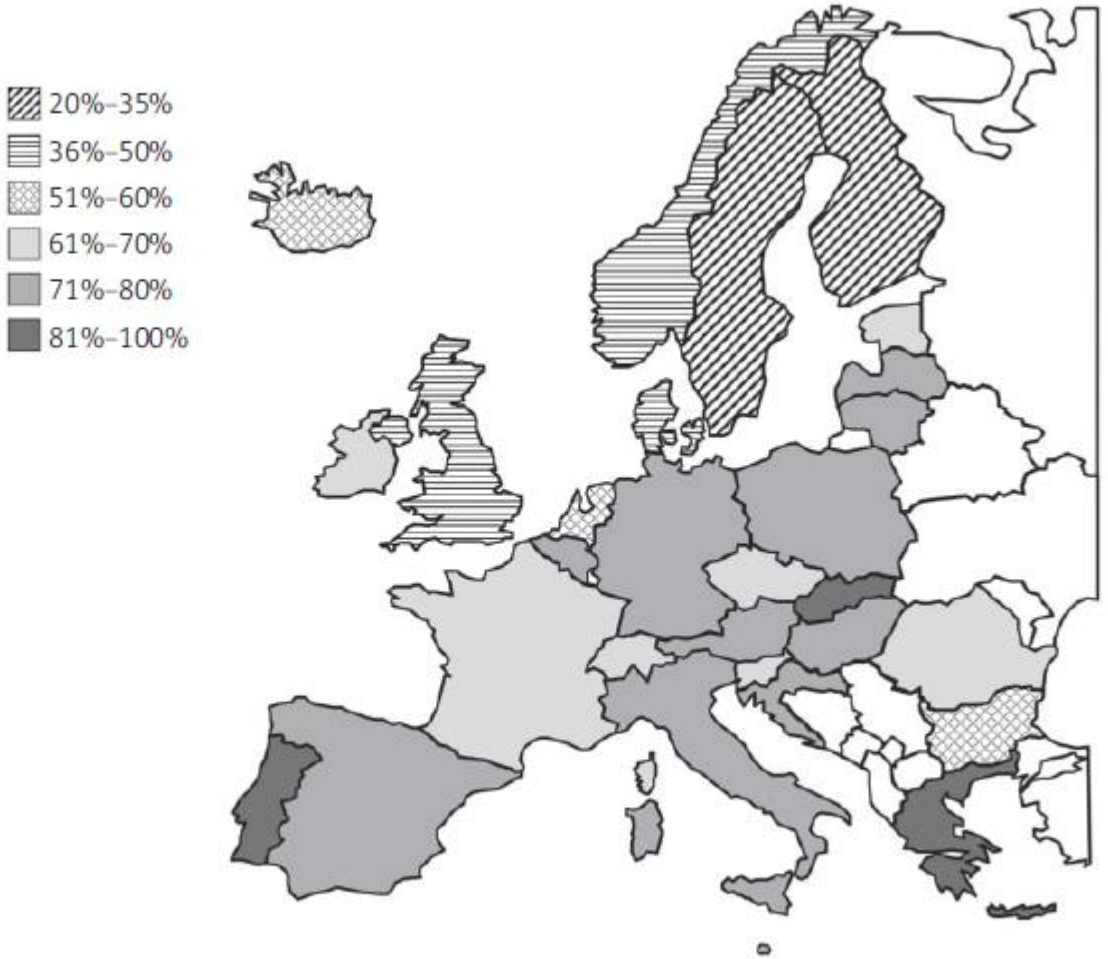


Figure 1. Percentage of European medical students who feel they need more education on antibiotic use, illustrated by country, 2015. The figure is based on responses from 7044 students and presents results aggregated first at medical school level within a country, then at country level.

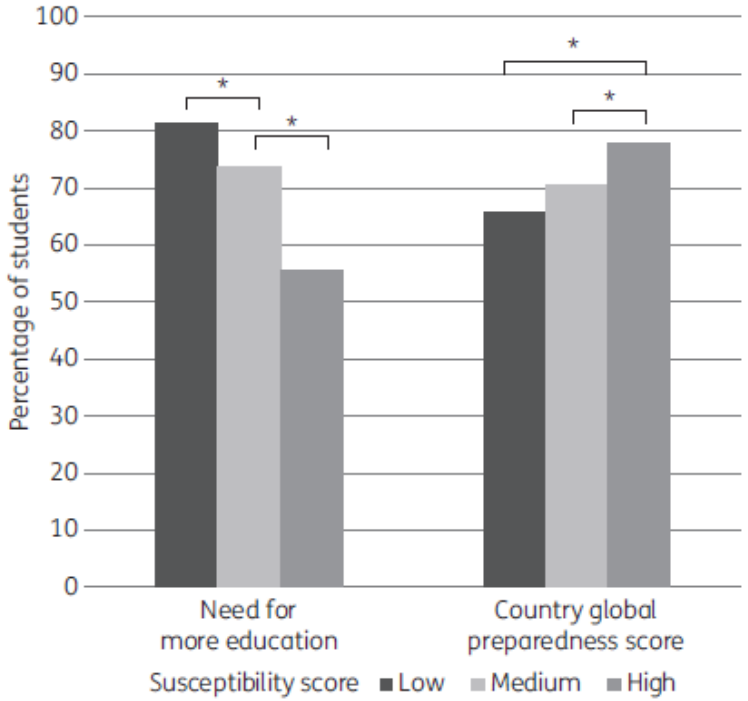
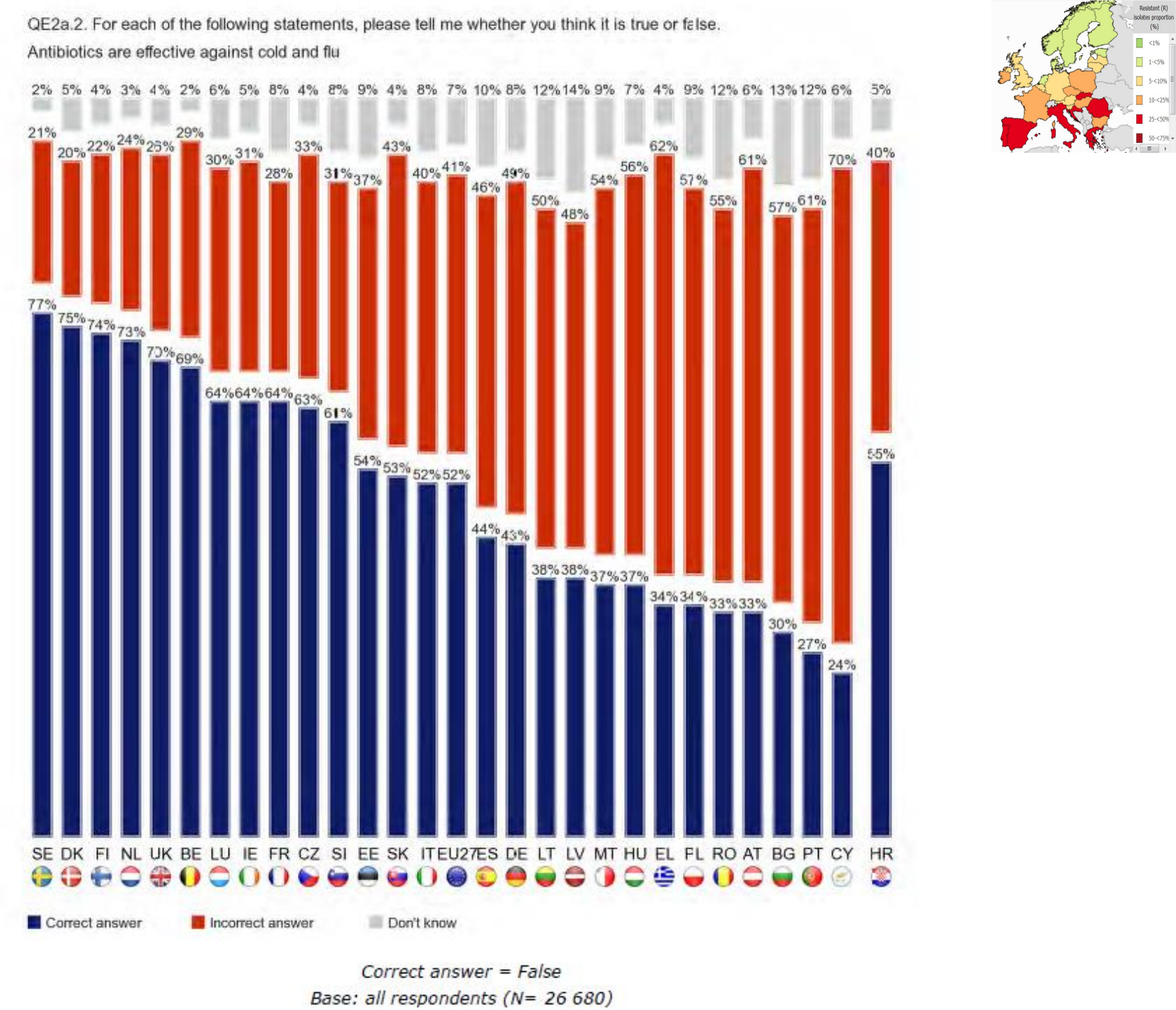


Figure 2. Associations between national antibiotic susceptibility score, need for more education and global preparedness score. Countries were grouped into tertiles based on national antibiotic susceptibility score: low antibiotic susceptibility score, meaning higher resistance prevalence rates for four common pathogens, ($n = 10$); medium antibiotic susceptibility score ($n = 9$); and high antibiotic susceptibility score ($n = 9$). Comparisons were made using analysis of variance; *$P < 0.05$.

Questionaire to general public (ca. 1.000 individuals/country): ”Antibiotics are effective against cold and flu ?”



European Commission. *Special Eurobarometer 407. Antimicrobial Resistance. May-June 2013*. Brussels: TNS Opinion & Social, 2013. http://ec.europa.eu/health/antimicrobial_resistance/docs/ebs_407_en.pdf.

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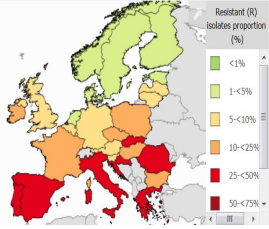
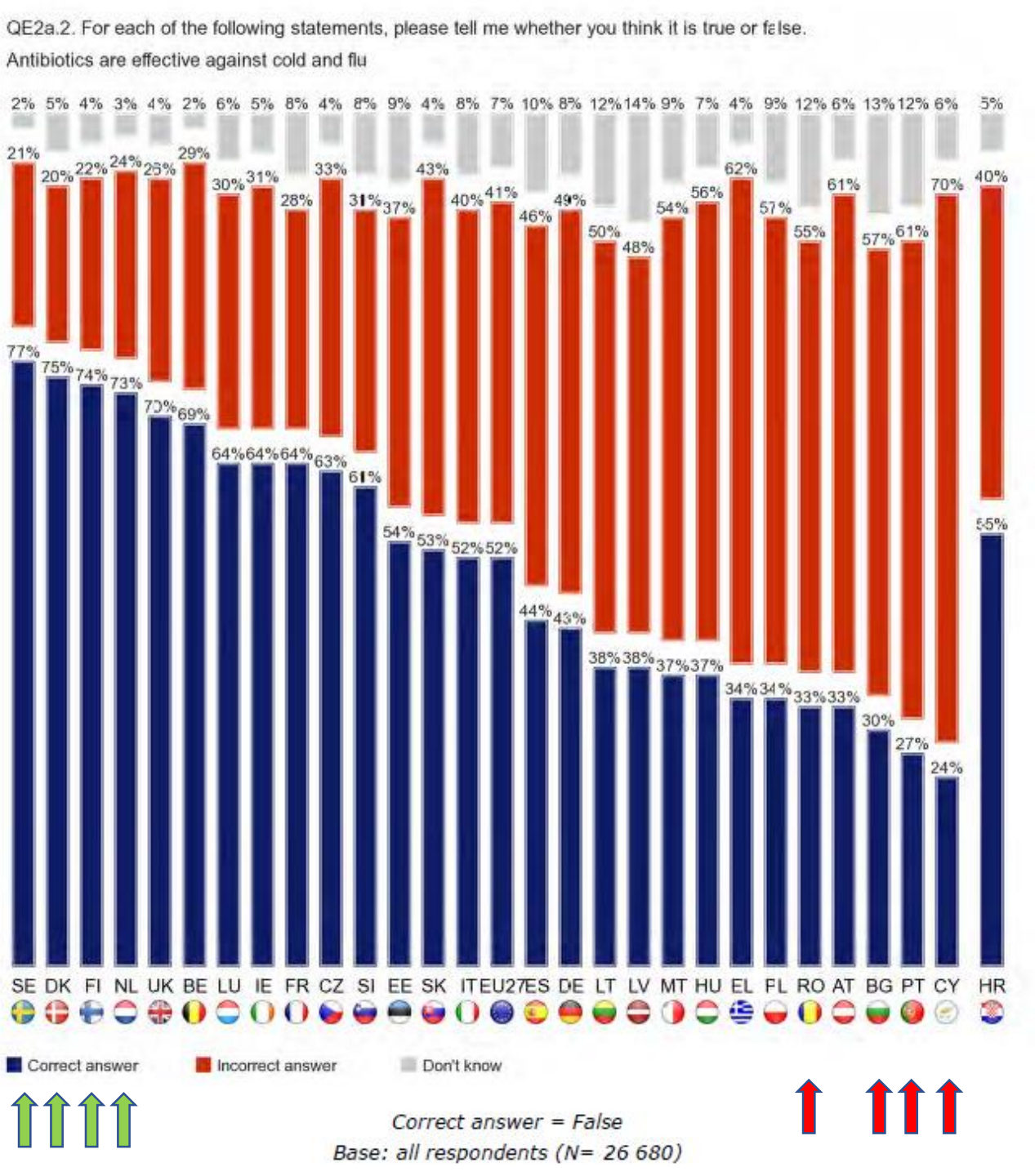
MRSA-rate

1 – 5% 25-50%

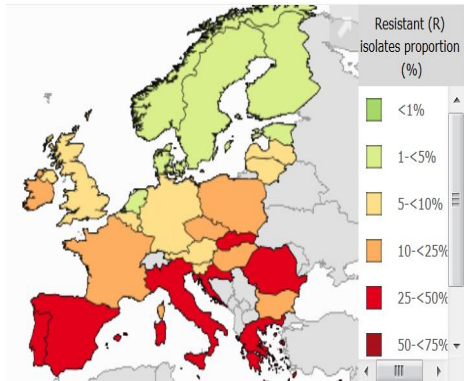




European Commission. *Special Eurobarometer 407. Antimicrobial Resistance. May-June 2013*. Brussels: TNS Opinion & Social, 2013. http://ec.europa.eu/health/antimicrobial_resistance/docs/ebs_407_en.pdf.

Conclusion: Low AB use in Nordic countries

- EU-Antibiotic policy recommendations followed
- Intersectorial mechanism in place – ministry level
- Ab use and Ab R monitoring systems in place, both for human and veterinary sectors
- General practioner allocation/rostering
- Ab prescription rules enforced
- Pharmacy regulation, low prevalence
- Clinical microbiology as medical specialty
- Education enforced at all levels



Men: Forbrug af antibiotika totalt og meropenem på hospitaler i Europa

Table 3. Trends in consumption of antibiotics for systemic use in the hospital sector, EU/EEA countries, 2011–2015 (expressed as DDD per 1 000 inhabitants and per day)

Country	2011	2012	2013	2014	2015	Trends in antimicrobial consumption, 2011–2015	Average annual change 2011–2015	Statistically singificant trend
Netherlands	0.97	0.96	0.95	0.95	0.98		<0.01	
Hungary	1.20	1.23	1.20	1.25	1.23		0.01	
Norway	1.47	1.44	1.39	1.41	1.40		-0.02	
Bulgaria	1.45	1.40	1.41	1.45	1.40		<0.01	
Poland (a)				1.43	1.43			N/A
Portugal (c)	1.45	1.46	1.64	1.55	1.57		0.03	
Belgium	2.02	1.71	1.67	1.60	1.66		-0.08	
Sweden	1.60	1.65	1.67	1.57	1.67		0.01	
Slovenia	1.66	1.56	1.55	1.61	1.68		0.01	
Luxembourg	2.02	2.02	2.00	1.81	1.78		-0.07	<
Estonia	1.86	2.11	1.91	1.94	1.82		-0.03	
Croatia	1.88	1.98	1.80	1.86	1.91		-0.01	
Ireland	1.79	1.76	1.79	1.66	1.91		0.01	
EU/EEA	**1.96**	**1.98**	**2.05**	**2.01**	**2.05**		**0.02**	
Greece	2.18	2.08	2.00	2.11	2.14		-0.01	
France	2.12	2.12	2.17	2.20	2.18		0.02	
Latvia	2.39	2.27	2.30	2.25	2.24		-0.03	
Denmark	1.74	1.78	2.02	2.13	2.34		0.16	>
Slovakia (a)		2.02	2.30	2.47	2.40			N/A
Italy	2.32	2.46	2.23	2.22	2.43		<0.01	
Finland (b)	3.09	2.79	2.77	2.64	2.50		-0.13	<
Lithuania (a)		2.39	2.38	2.35	2.54			N/A
United Kingdom (a)			2.45	2.59	2.55			N/A
Malta	1.67	1.44	1.75	2.18	2.86		0.31	>

Table 4. Trends in consumption of carbapenems in the hospital sector, EU/EEA countries, 2011–2015 (expressed as DDD per 1 000 inhabitants and per day)

Country	2011	2012	2013	2014	2015	Trends in consumption of carbapenems, 2011–2015	Average annual change 2011–2015	Statistically significant trend
Bulgaria	0.013	0.013	0.014	0.020	0.019		0.002	>
Poland (a)				0.024	0.020			N/A
Netherlands	0.018	0.019	0.020	0.019	0.021		0.001	>
Latvia	0.029	0.019	0.022	0.027	0.033		0.002	
France	0.030	0.021	0.033	0.033	0.035		0.002	
Norway	0.044	0.045	0.046	0.047	0.039		-0.001	
Hungary	0.028	0.032	0.037	0.042	0.046		0.005	>
Lithuania (a)		0.026	0.026	0.033	0.046			N/A
Slovakia (a)		0.027	0.034	0.042	0.048			N/A
Romania	0.023*	0.024*	0.024*	0.032*	0.049*		0.006	
Estonia	0.036	0.036	0.033	0.043	0.050		0.003	
Sweden	0.052	0.053	0.056	0.053	0.050		<0.001	
EU/EEA	**0.048**	**0.053**	**0.060**	**0.058**	**0.054**		**0.002**	
Italy	0.039	0.073	0.076	0.081	0.056		0.004	
Finland (b)	0.094	0.074	0.088	0.081	0.065		-0.005	
Belgium	0.079	0.062	0.062	0.063	0.065		-0.003	
United Kingdom (a)			0.064	0.071	0.071			N/A
Slovenia	0.078	0.074	0.061	0.066	0.072		-0.002	
Croatia	0.058	0.065	0.060	0.073	0.079		0.005	>
Denmark	0.060	0.063	0.087	0.085	0.083		0.007	
Luxembourg	0.086	0.101	0.095	0.087	0.089		-0.001	
Ireland	0.057	0.061	0.088	0.109	0.091		0.011	
Malta	0.105	0.052	0.066	0.101	0.107		0.005	
Cyprus	0.087*	0.102*	0.118*	0.121*	0.132*		0.011	>
Portugal (c)	0.139	0.143	0.146	0.139	0.133		-0.002	
Greece	0.130	0.133	0.135	0.143	0.137		0.002	>

Thank you for your attention!

"He spoke in millions. Then I learned he was a bacteriologist."