

# Stemming the Superbug Tide

Just a Few Dollars More

Policy brief





This policy brief...

... gives an insight to key messages and various highlights from the new OECD report [Stemming the Superbug Tide: Just a Few Dollars More](#), which analyses the impact of antimicrobial resistance (AMR).

The report, based on new forecasts of the growth in resistance to 2050, outlines how countries can tackle AMR and significantly reduce the personal and economic costs.

## Key messages

### Antimicrobial resistance is a threat to people's health...

Antimicrobial resistance (AMR) is growing, posing a significant threat to people's health and to economies.

Resistance to back-up antibiotics (second and third-line) will be 70% higher in 2030 compared to 2005 in OECD countries. In the same period, resistance to third-line treatments will double across EU countries.

Around 2.4 million people could die in Europe, North America and Australia between 2015 and 2050 due to AMR, without prompt and effective action.

Between 2015 and 2050, AMR would cost about USD PPP<sup>1</sup> 3.5 billion per year to the healthcare services of the 33 countries included in the analysis.

### ... but could be tackled for a little cost

Just a few dollars per person each year would be enough to stem the superbug tide; savings will outpace investments.

Many interventions to promote prudent use of antibiotics and enhance hygiene in hospitals cost 0.3 to 2.7 USD PPP per capita per year in many OECD countries and are affordable in countries at lower levels of income.

Investing 2 USD PPP per capita per year in a comprehensive package encompassing public health measures would avoid about 47 000 deaths per year in OECD countries.

The public health package could pay for itself within just one year and end up by saving USD 4.8 billions of dollars<sup>2</sup> per year in OECD countries.

<sup>1</sup> PPPs or purchasing power parities is used to adjust USD for differences in prices across countries.

<sup>2</sup> Including savings due to a reduction in infections susceptible to antimicrobials produced by interventions enhancing hygiene in the health care sector.





## Highlights from the report

### Antimicrobial resistance (AMR) will become a growing concern

Rising rates of antimicrobial resistance (AMR) – the ability of bacteria to resist antimicrobials – will become a growing concern unless governments embrace a more robust response to the threat.

AMR rates have been relentlessly increasing across OECD countries between 2005 and 2015 and in Turkey, Korea and Greece about 35% of infections<sup>2</sup> are already resistant (figure 1).

Outside OECD countries, resistance rates are even higher with average prevalence of AMR in India, the People's Republic of China and the Russian Federation above 42%, and as high as between 80% and 90% for some antibiotic-bacteria combinations.

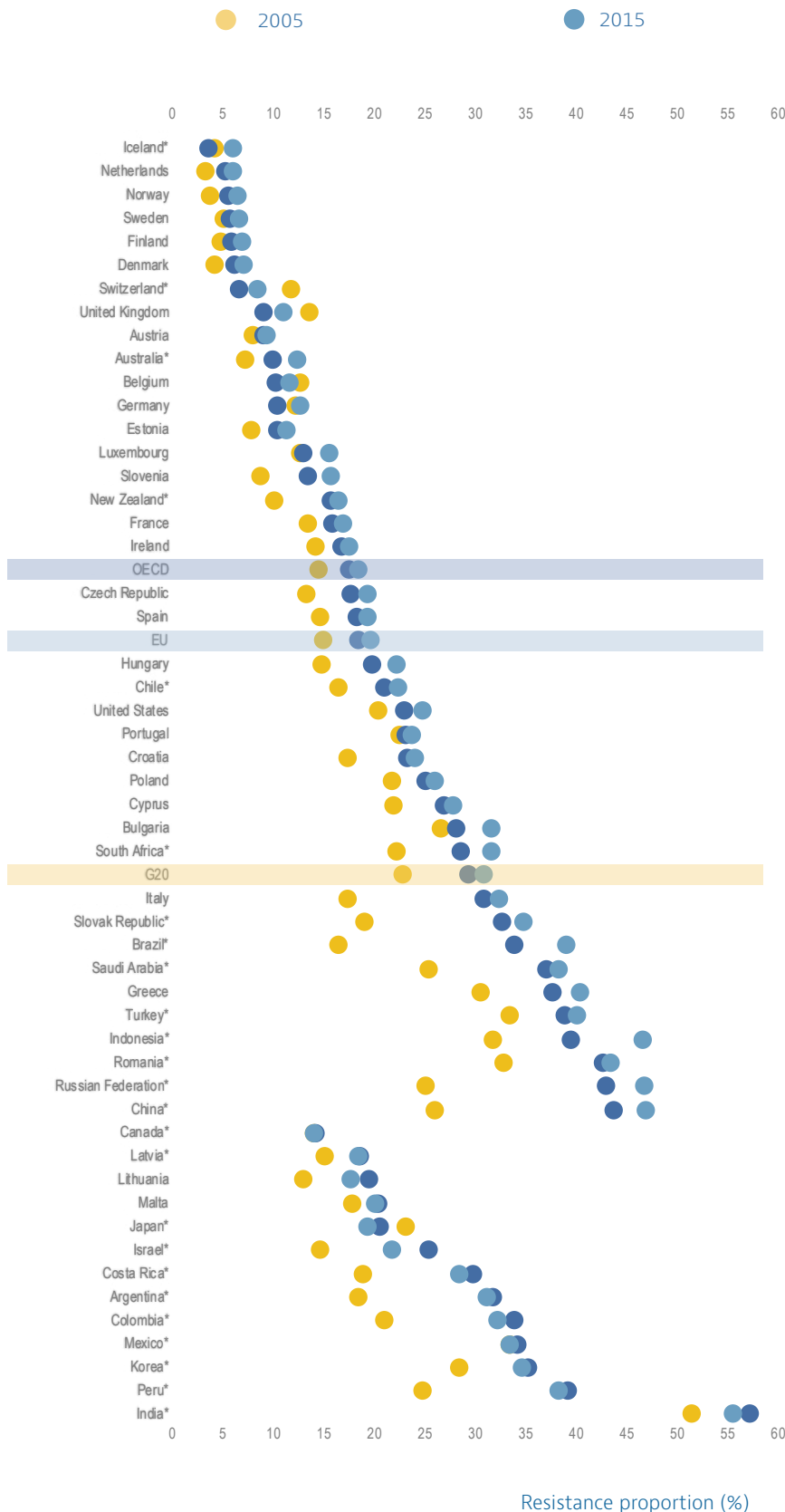
OECD projections suggest that AMR will keep growing from 17% in 2015 to 18% in 2030 across OECD countries (figure 1):

Despite projected reductions in average resistance in Canada, Japan and Mexico, no single country will see resistance reduced for all eight bug-drugs combinations. Rather, Denmark, Iceland, Luxembourg and Slovenia could see resistance increase.

In some low and middle-income countries, AMR will grow more rapidly than in OECD countries. For example, in Indonesia, Brazil and the Russian Federation, growth of AMR rates is forecast to be 4 to 7 times faster than growth in OECD countries.

<sup>2</sup> The antibiotic-bacterium combinations included in the analysis are: third-generation cephalosporin-resistant *E. coli*, fluoroquinolones-resistant *E. coli*, penicillin-resistant *S. pneumoniae*, methicillin-resistant *S. aureus* (MRSA), carbapenem-resistant *K. pneumoniae*, third-generation cephalosporin-resistant *K. pneumoniae*, carbapenem-resistant *P. aeruginosa*, and vancomycin-resistant *E. faecalis* and *E. faecium*.

Figure 1. Resistance proportions<sup>2</sup> will grow further across 39 countries in OECD, EU and G20, if no effective action is put in place



**Source:** OECD (2018), Stemming the Superbug Tide: Just a Few Dollars More; 2018. Available at [oe.cd/amr-2018](http://oe.cd/amr-2018).

**Note:** Asterisk (\*) indicates that country is missing more than 50% of observations, across all eight antibiotic-bacterium pairs. For countries on the top of this graph (Iceland to China), resistance proportions will be higher in 2030, compared to 2015. For countries on the bottom (Canada to India), rates will be lower in 2030. Otherwise, countries are sorted top to bottom based on ascending resistance proportions in 2015.

<sup>2</sup> The antibiotic-bacterium combinations included in the analysis are: third-generation cephalosporin-resistant *E. coli*, fluoroquinolones-resistant *E. coli*, penicillin-resistant *S. pneumoniae*, meticillin-resistant *S. aureus* (MRSA), carbapenem-resistant *K. pneumoniae*, third-generation cephalosporin-resistant *K. pneumoniae*, carbapenem-resistant *P. aeruginosa*, and vancomycin-resistant *E. faecalis* and *E. faecium*.

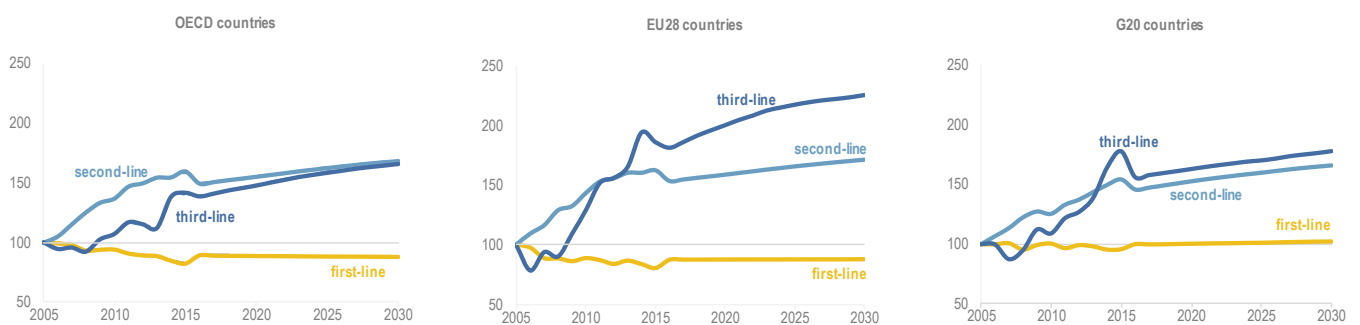


Average resistance growth seems to be slowing down, but there are serious causes for concern. Across OECD and G20 countries, resistance to second and third-line antibiotics – which present our back-up line of defence to prevent infections – is expected to be 70% higher in 2030, compared to AMR rates in 2005 (figure 2).

Across EU countries, resistance to third-line treatments will double in the same period. The growing resistance to the second and third-line of treatment is an extremely worrying scenario, as it means that, de facto, we are exhausting our antibiotics armoury.

Figure 2. Resistance to second- and third-line antibiotics will grow the most in OECD, EU and G20 countries

Antimicrobial resistance index (2005 = 100)



**Source:** OECD (2018), Stemming the Superbug Tide: Just a Few Dollars More. Available at [oe.cd/amr-2018](https://oe.cd/amr-2018).

**Note:** Resistance to first-line treatments is defined as the average of the proportions of penicillin-resistant *S. pneumoniae* and MRSA. Resistance to second-line treatments is the average of the proportions of *E. coli* and *K. pneumoniae* resistant to 3rd-generation cephalosporins and of *E. coli* resistant to fluoroquinolones. Resistance to third-line treatments is defined as the proportion of *K. pneumoniae* resistant to carbapenems.



## AMR damages population health and healthcare budgets

If no effective action is promptly put in place and AMR rates follow the projected trend, around 2.4 million individuals could die in Europe, North America and Australia between 2015 and 2050. Italy and Greece are forecast to top the list, with an average mortality rate of, respectively, 18 and 15 deaths per 100 000 persons per year between 2015 and 2050 (figure 3, left panel).

In absolute terms, the United States would have the highest number of AMR deaths with an average of almost 30 000 per year, followed by Italy with around 11 000 deaths per year. The impact on quality of life, measured through disability-adjusted life years (DALYs) will be even larger, with up to one person every 205 losing one year of life in good health because of AMR in the case of Italy. In low and middle-income countries, in which AMR is already high and project-

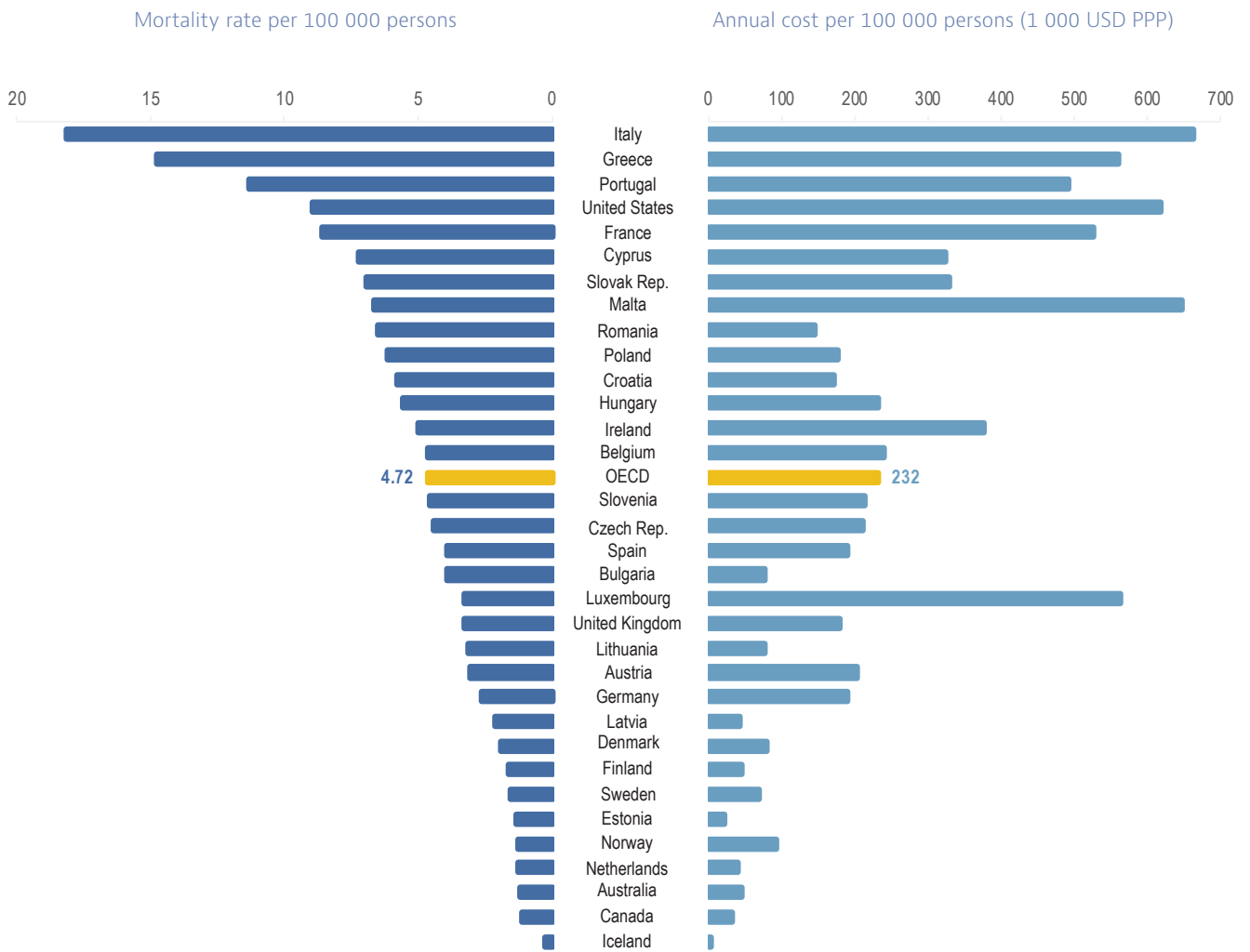
ed to grow rapidly and where health care systems are weakened by constrained budgets, AMR is likely to cause an enormous death toll that will be mainly borne by new-borns, very young children and the elderly population.

Under the same scenario, up to 3.5 billion USD PPP is expected to be spent yearly between 2015 and 2050 on AMR-related complications across 33 OECD and EU countries. This corresponds to 10% of health care costs caused by communicable diseases, or to about USD PPP 2.4 per capita per year on average, with about USD PPP 6.2-6.6 per capita in Italy, Malta and the United States (Figure 3, right panel).

Longer hospital stay, caused by slower recovery and higher risk of complications will be one of the key drivers causing an increase in healthcare expenditure. Each year, AMR will result in over 700 million extra hospital days across all the countries included in the OECD model, and 568 million in the European region.



Figure 3. Without prompt and effective action, AMR will damage population health and healthcare budgets in OECD and EU countries between 2015 and 2050



**Source:** OECD (2018), Stemming the Superbug Tide: Just a Few Dollars More. Available at [oe.cd/amr-2018](http://oe.cd/amr-2018).

**Note:** PPP is purchasing power parity

Public health actions to tackle AMR have a positive impact on population health...

The OECD has identified interventions that, for their impact on population health and heavy costs voided, could be defined 'best buys' to tackle AMR. The set of policies assessed are aligned with the WHO Global Action Plan on AMR and encompass:

- improving hygiene in healthcare facilities, including promotion of handwashing and better hospital hygiene;

stewardship programmes promoting more prudent use of antibiotics to end decades of over-prescription;

the use of rapid diagnostic tests in primary care to detect whether an infection is bacterial or viral;

delayed prescription; and

public awareness campaigns.



Simple measures, such as promoting hand washing and better hygiene in healthcare facilities more than halve the risk of death and decrease the health burden of AMR – measured in DALYs – by about 40%. Stewardship programmes are also similarly effective. Interventions designed to tackle AMR outside hospitals, such as delayed prescriptions, the use of rapid diagnostic tests, and mass media campaigns would have a more limited health impact but remain important policies to address a multifaceted and complex phenomenon.

### ...and are an excellent investment for OECD and EU countries

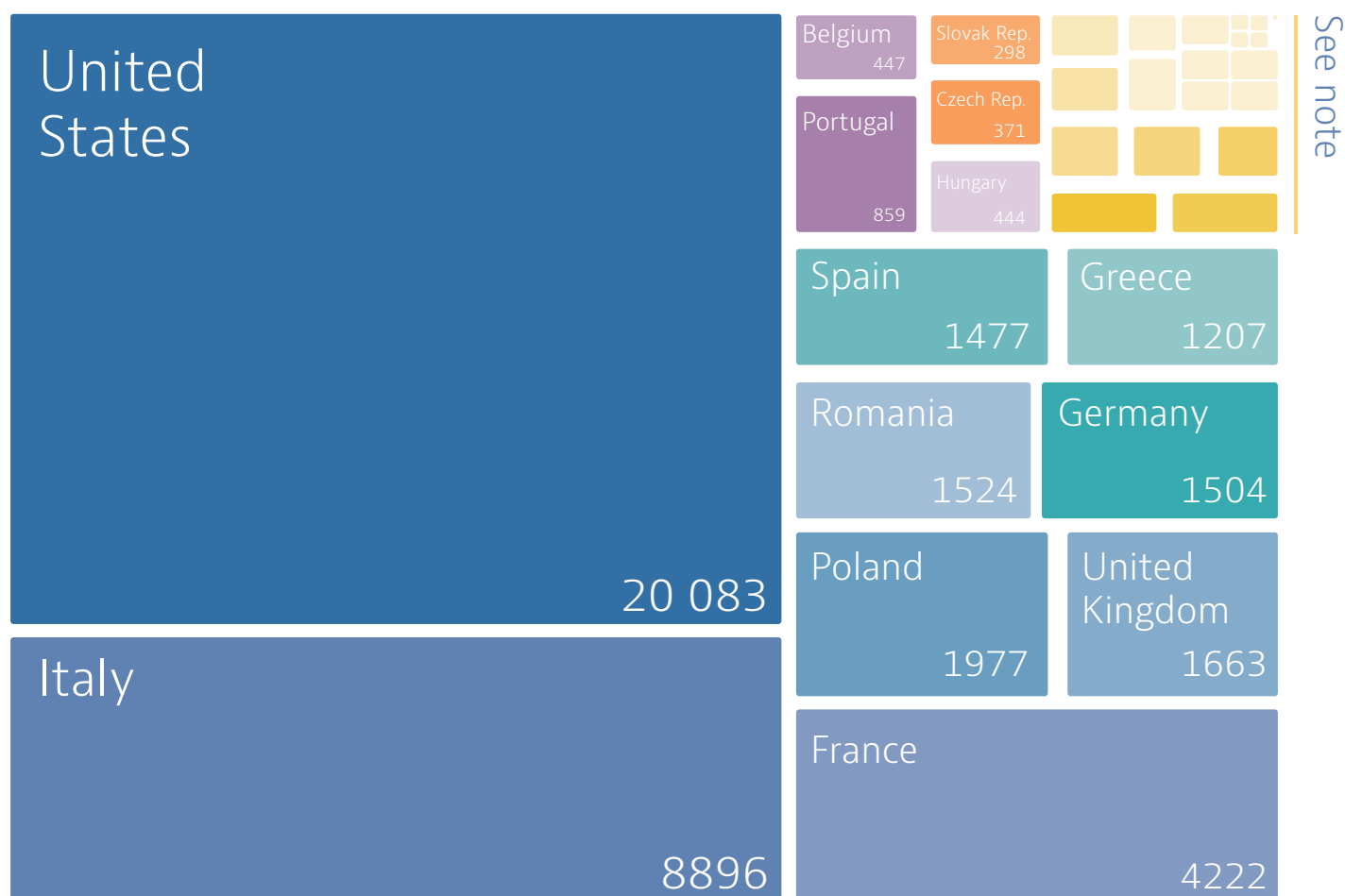
All these interventions are affordable for OECD countries and, in some cases, for countries at lower level of income. Mass media campaigns, delayed prescriptions and improved hand hygiene cost from as little

as USD PPP 0.3 up to USD PPP 2.7 per capita per year in many OECD countries.

Interventions that are not particularly expensive, such as improved hand hygiene and mass media campaigns are also affordable in countries at lower level of income. More resource-intensive interventions can cost up to a few hundreds USD PPP per hospitalised patient, as in the case of actions to improve hygiene in health facilities.

Delayed prescriptions, improved hand hygiene in health care setting and most stewardship programmes generate health care savings that are higher than the implementation cost of the intervention, according to the OECD model. They are therefore all cost-effective 'best buy' investments to tackle AMR. What is more, if they are implemented together, by combining policies into a coherent strategy, they produce an even bigger impact.

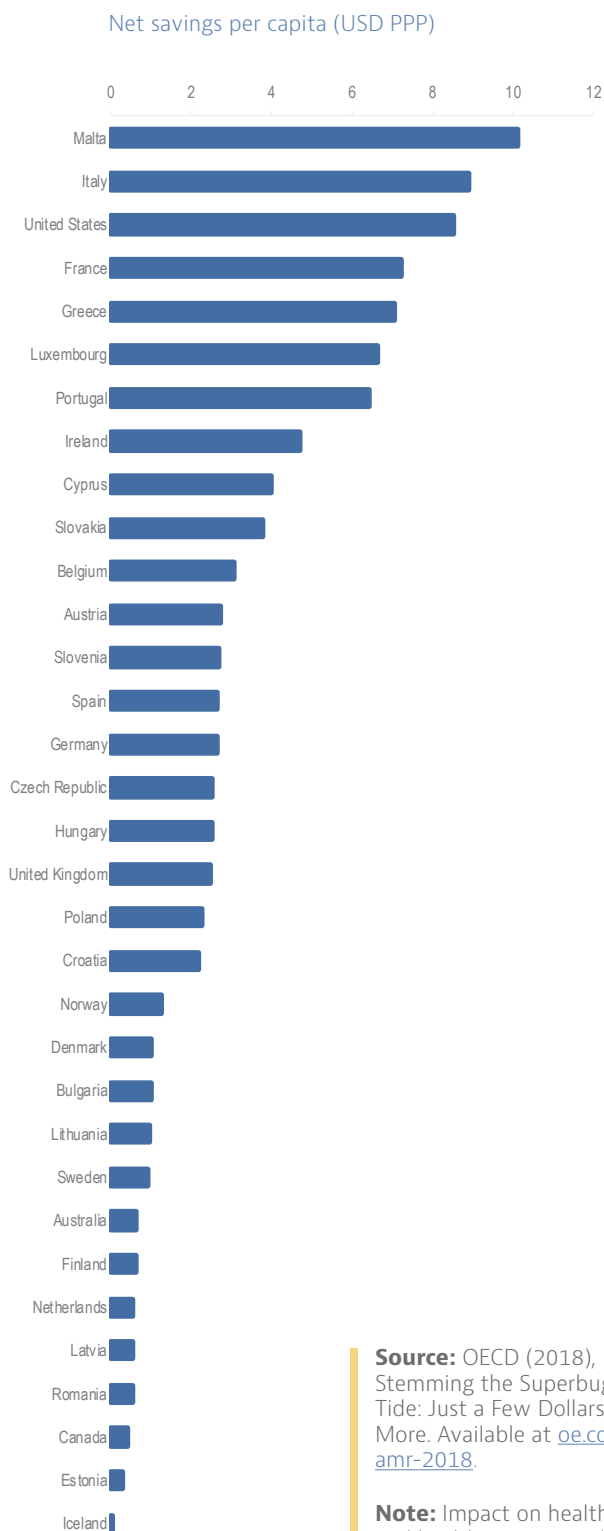
Figure 4. A mixed intervention package would save up to 47 000 lives per year across OECD and EU countries



Source: OECD (2018), Stemming the Superbug Tide: Just a Few Dollars More. Available at [oe.cd/amr-2018](http://oe.cd/amr-2018).

Note: The countries shown in yellow are the following, by descending order: **Canada** (292), **Bulgaria** (286), **Austria** (230), **Croatia** (218), **The Netherlands** (193), **Australia** (181), **Ireland** (170), **Sweden** (149), **Denmark**, **Lithuania** (79), **Slovenia** (77), **Finland** (74), **Cyprus** (63), **Norway** (53), **Latvia** (33), **Malta** (25), **Luxembourg** (15), **Estonia** (14) and **Iceland** (1).

Figure 5. The implementation of a mixed intervention package would result in yearly net savings of about 3 USD PPP per capita across OECD and EU countries



**Source:** OECD (2018), Stemming the Superbug Tide: Just a Few Dollars More. Available at [oe.cd/amr-2018](http://oe.cd/amr-2018).

**Note:** Impact on health and health care expenditure includes effects on both resistant and susceptible infections.

### The OECD analysis considers three main packages of interventions

The first, for hospitals, includes improved hand hygiene, stewardship programmes and enhanced environmental hygiene in health care settings.

The second one consists of community actions including delayed prescriptions, mass media campaigns and use of rapid diagnostic tests.

The third one consists of a mixed intervention package including stewardship programmes, enhanced environmental hygiene, mass media campaigns, and use of rapid diagnostic tests.

These packages would reduce the burden of disease from AMR by, respectively, 85%, 23% and 73%, while producing savings of USD PPP 4.1, 0.9 and 3 per capita per year.

For example, the mixed intervention package would save 47 000 lives each year across the 33 countries included in the analysis (figure 4). In terms of health expenditure, this policy approach would result in an annual average net saving (i.e. after accounting for the implementation cost of each intervention) of USD PPP 3 per capita (figure 5).

In practice, this would mean millions of people in these countries would avoid AMR-related complications and health problems.



## Contact, References, Disclaimers

### For further information

Please visit our website

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### Disclaimers

This policy brief and the data herein presented are based on the OECD report [Stemming the Superbug Tide: Just a Few Dollars More](#), OECD Publishing 2018 [<https://doi.org/10.1787/9789264307599-en>], which has been produced with the financial and substantive assistance of the European Union.

The contents of this report are the sole responsibility of the OECD and can in no way be taken to reflect the views of the European Union.

The opinions expressed and arguments employed herein do not necessarily reflect the official views of the OECD member countries.

Data extracted from EARS-Net were modelled for representativeness of each country and for estimation of non-BSIs. This work was done by experts at ECDC in collaboration with national-designated experts and ECDC National Focal Points for AMR and HAIs.

More information on the selection of the antibiotic resistance-bacterium combinations, the methodology for estimating their incidence and the disease models describing their attributable length of stay and attributable case fatality is published by Cassini et al., forthcoming. The authors acknowledge the work performed by the staff of the participating clinical microbiology laboratories and of the national health-care services that provided data to EARS-Net. The authors would like to thank all the hospitals participating in the PPS 2011-2012 and in particular, the hospital staff that collected, validated and entered the data during the survey, and the national teams that coordinated the survey in each participating country.

The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

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### Acknowledgements

Substance: Driss Ait Ouakrim, Tiago Cravo Olivera Hashiguchi, Michael Padget and Michele Cecchini.

Design and editorial support: Lukasz Lech with special thanks to Marie-Clémence Canaud, Leila Fardeau and Alastair Wood.

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This policy brief gives an insight to key messages and highlights some of the evidence presented in the report.

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