

ECDC/EFSA/EMA second joint report on the integrated analysis of the consumption of antimicrobial agents and occurrence of antimicrobial resistance in bacteria from humans and food- producing animals

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'One Health' Network on Antimicrobial Resistance

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CCAB - Rue Froissart 36 – 1040 - Brussels

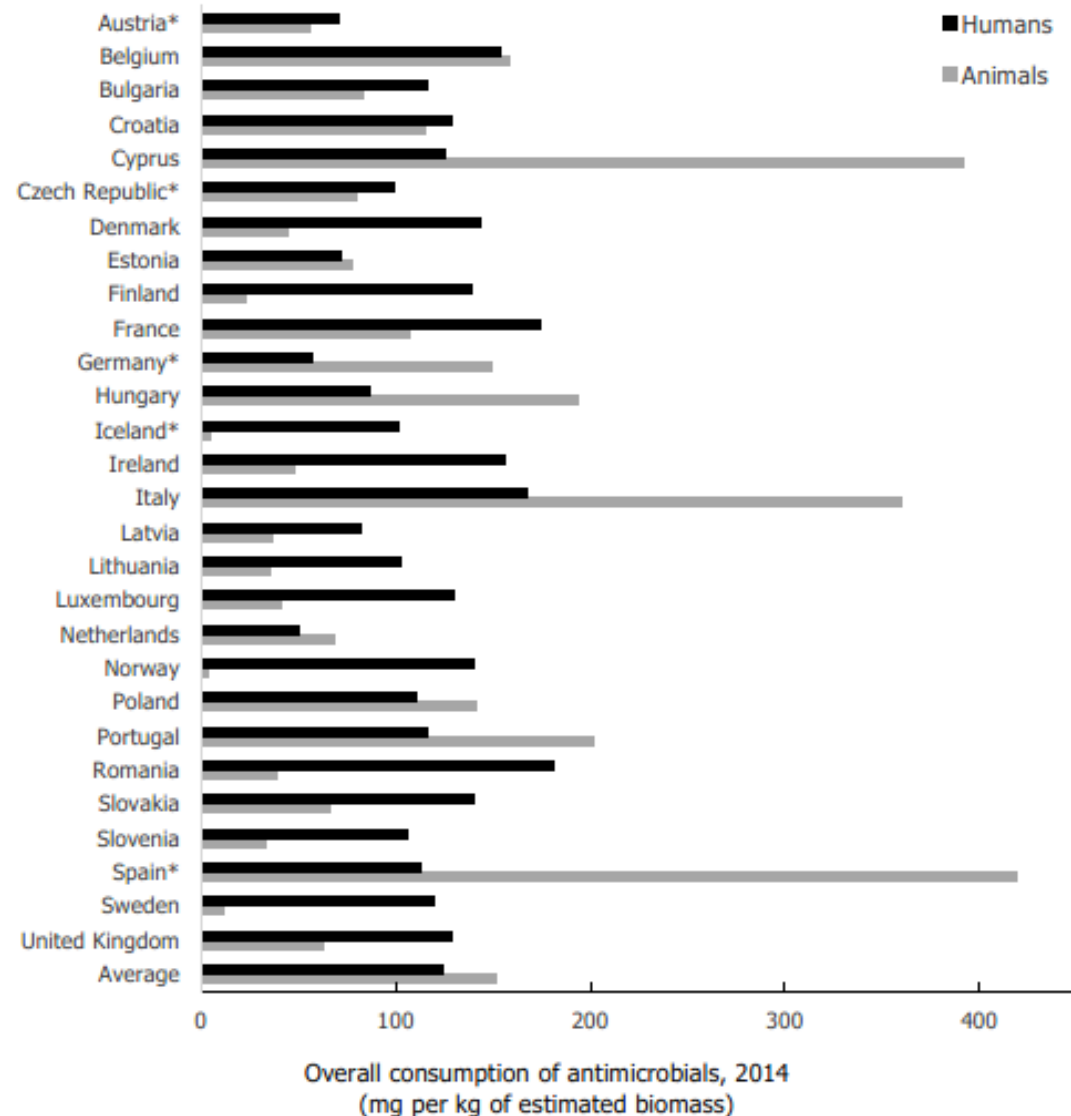
ANALYSIS OF ANTIMICROBIAL USE AND RESISTANCE

- Interagency collaboration
- Analysis of the relationships, in humans/animals, between:
 - Antimicrobial Consumption (AMC) **vs.** Antimicrobial Resistance (AMR)
- To cover the years 2013, 2014 and 2015



OVERALL ANTIMICROBIAL CONSUMPTION IN THE ANIMAL AND HUMAN SECTORS

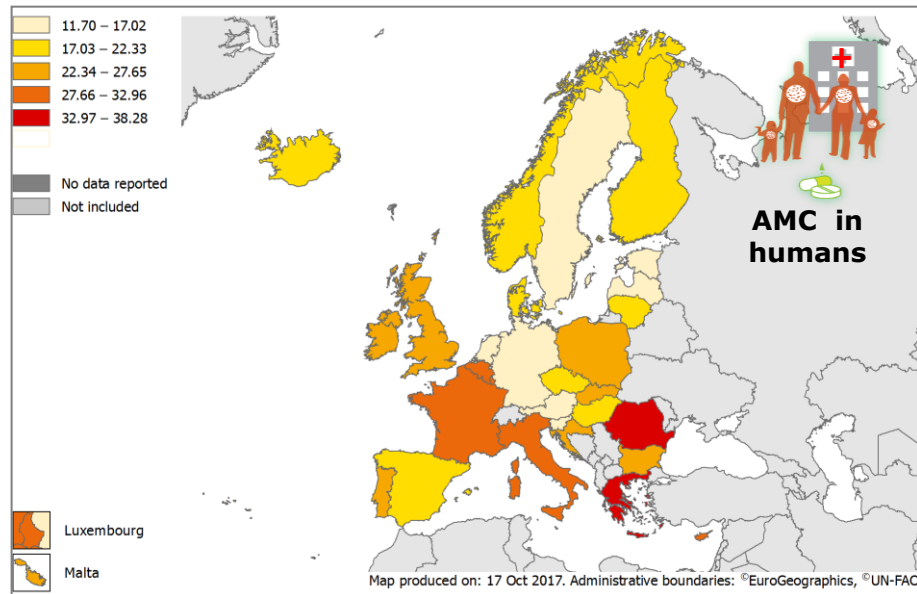
- Considerable variations between countries and between the human and animal sectors



*Only community consumption was provided for human medicine

CONSIDERABLE VARIATIONS IN CONSUMPTION BETWEEN COUNTRIES WITHIN THE ANIMAL AND HUMAN SECTORS, RESPECTIVELY

Consumption of antibacterials for systemic use (ATC group J01) in the community and hospitals, EU/EEA countries, 2015, expressed as DDD per 1 000 inhabitants and per day



For Austria, Czech Republic, Germany, Iceland and Spain, only community data were reported.

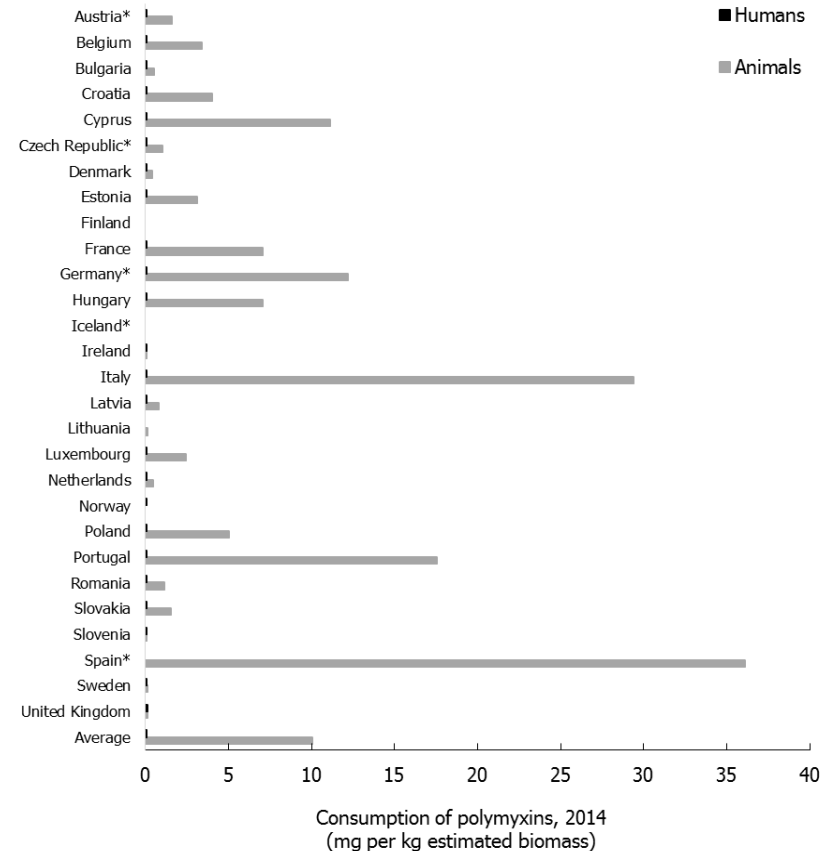
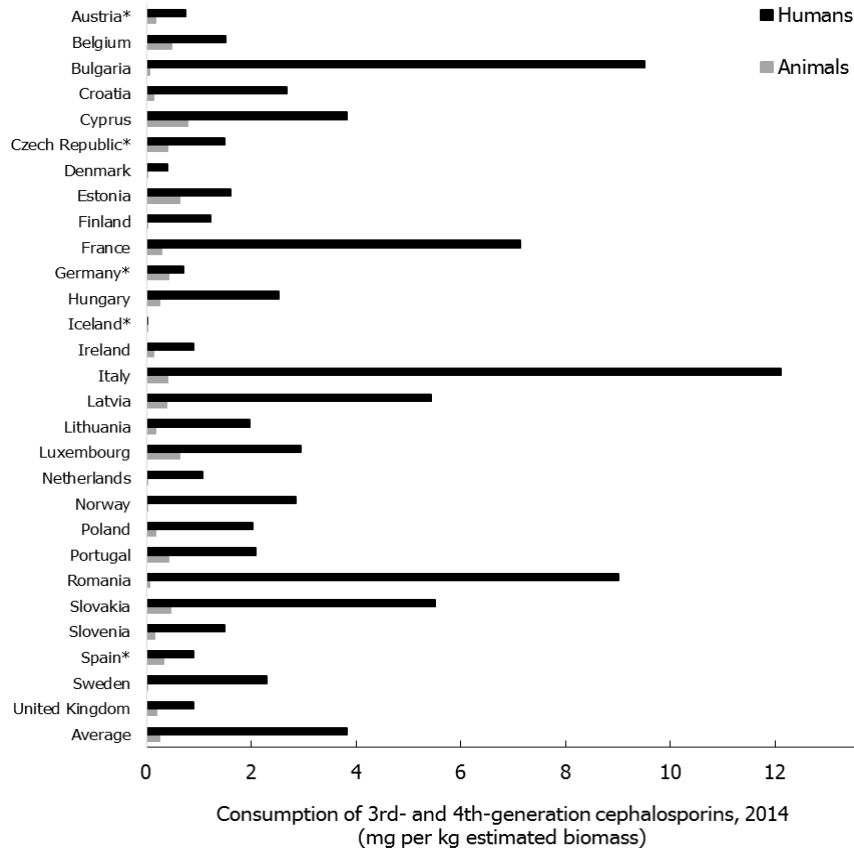
- » Indicates that there is an obvious potential for reduction in other countries, particularly among the highest users.

Spatial distribution of overall sales of all antimicrobials for food-producing animals, in mg/PCU, for 30 countries, 2015



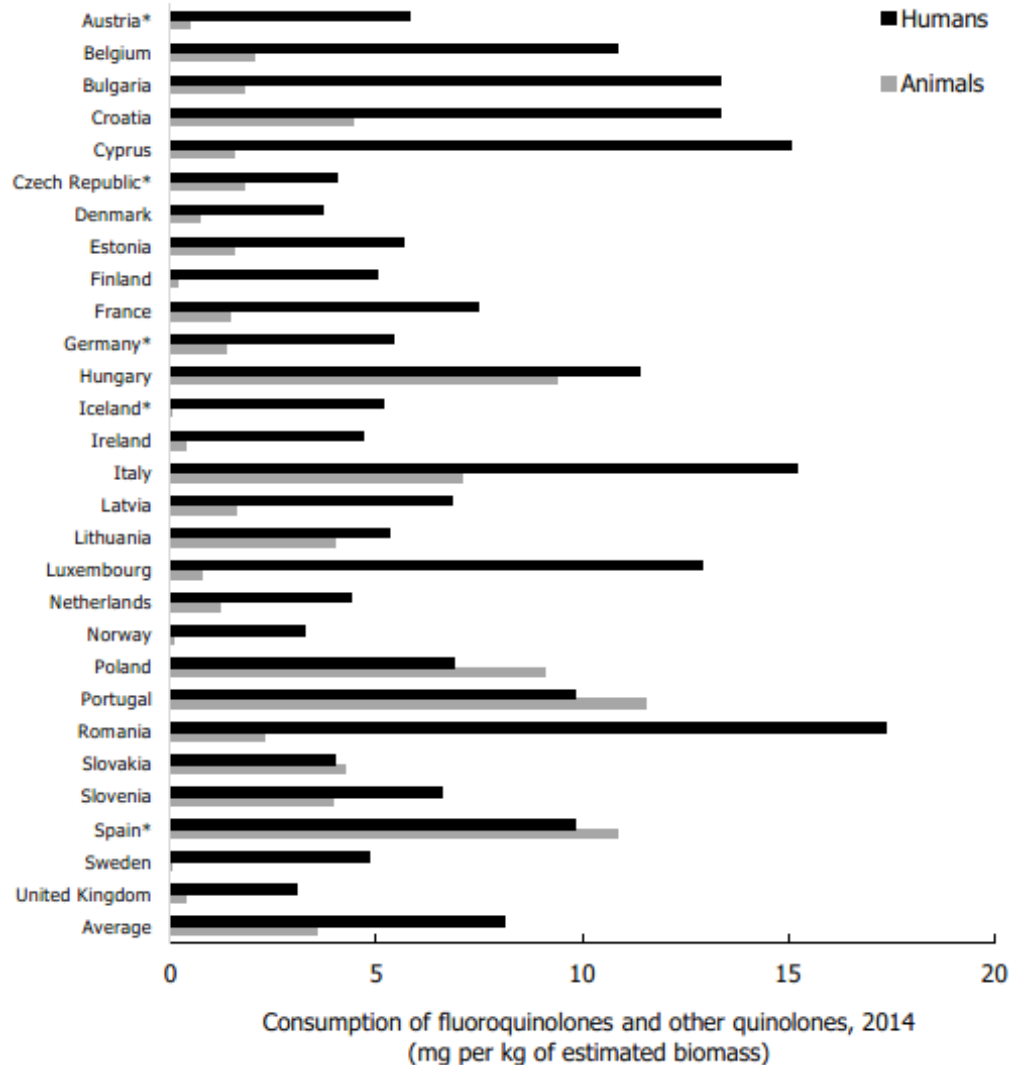
- » Several countries have reduced their consumption substantially, in particular in the animal sector.

CONSUMPTION OF 3RD- AND 4TH-GENERATION CEPHALOSPORINS (left) AND POLYMYXINS (right)



- Overall, the consumption of 3rd- and 4th-generation cephalosporins in humans by far outweighed that reported for animals.
- For polymyxins, consumption in animals outweighed that reported for humans.

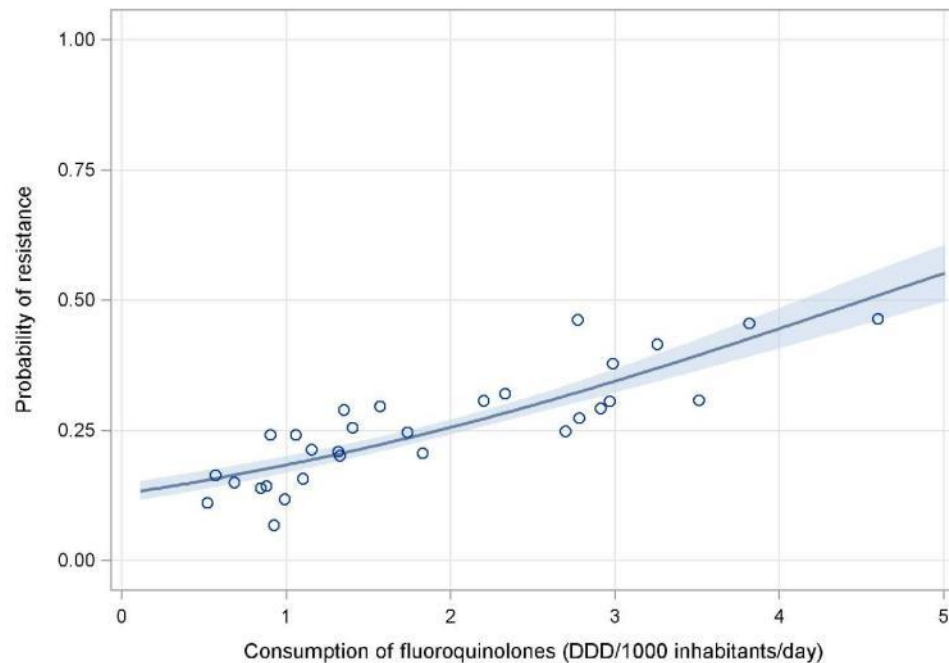
CONSUMPTION OF FLUOROQUINOLONES



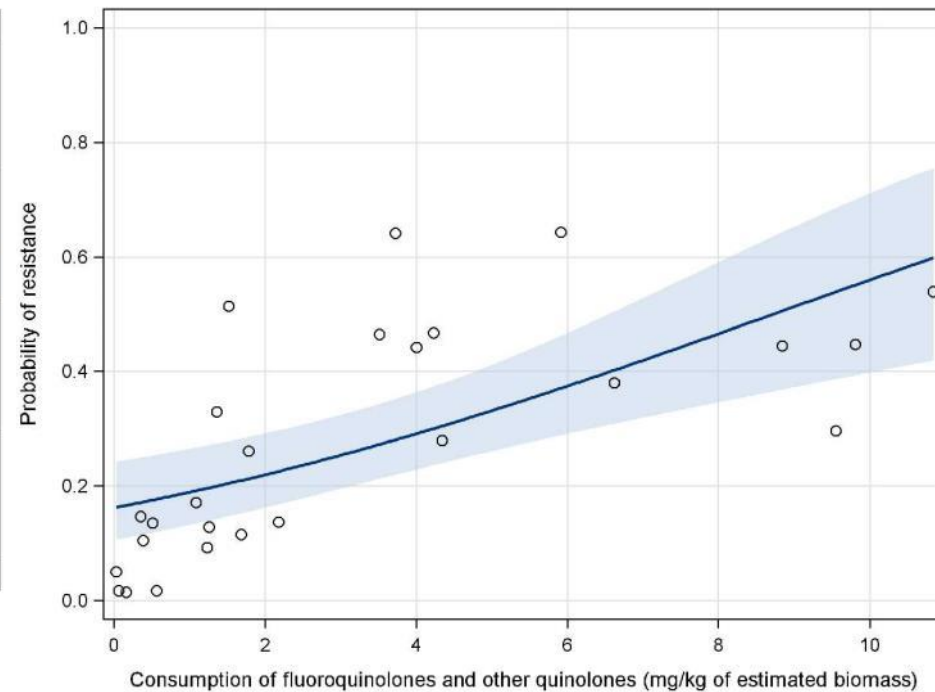
- Considerable variations between countries in consumption patterns between the human and animal sectors and within the sectors

CONSUMPTION VS. RESISTANCE TO (FLUORO)QUINOLONES

In humans Invasive *E. coli*, 2015

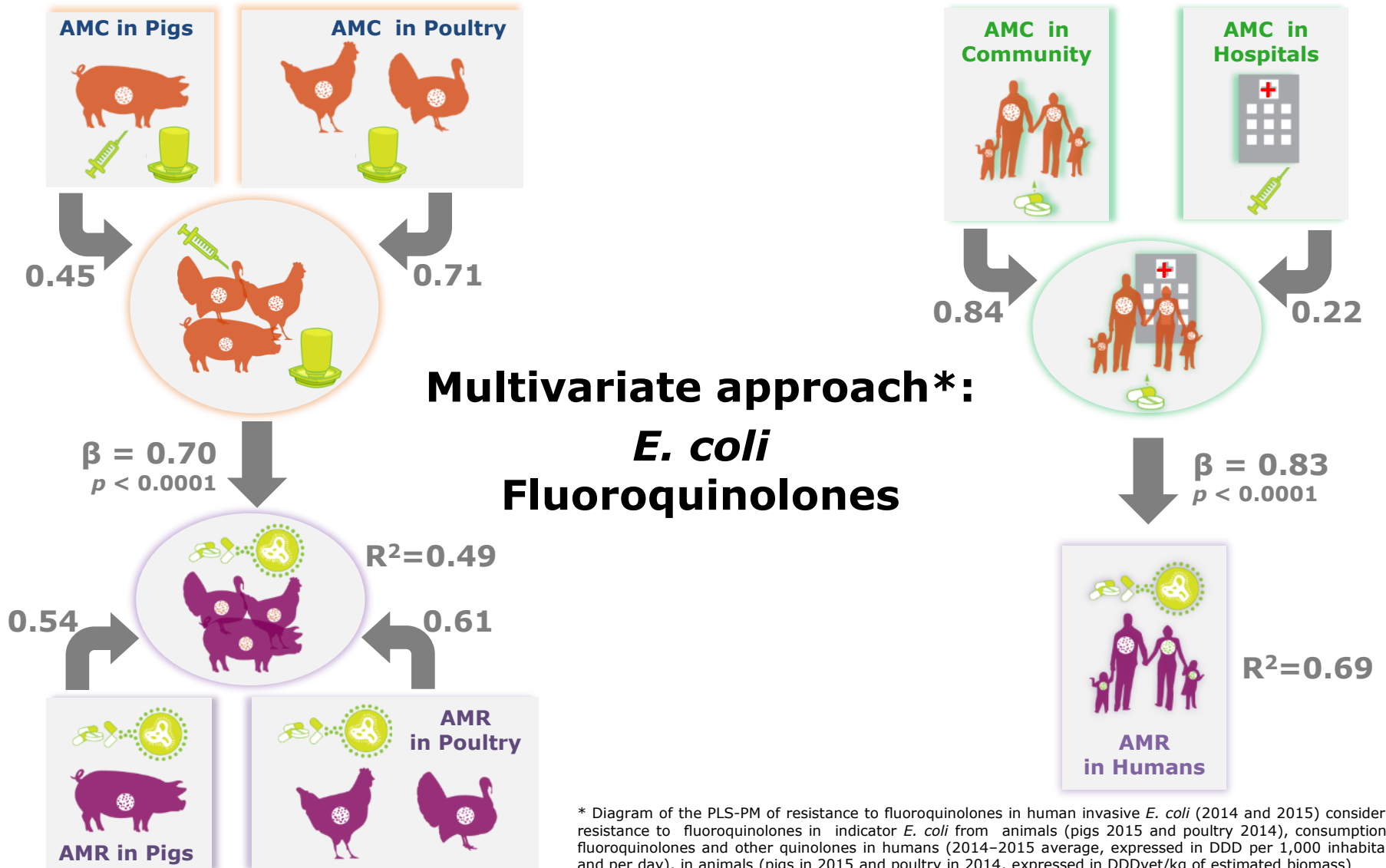


In food-producing animals* Indicator *E. coli*, 2014-2015

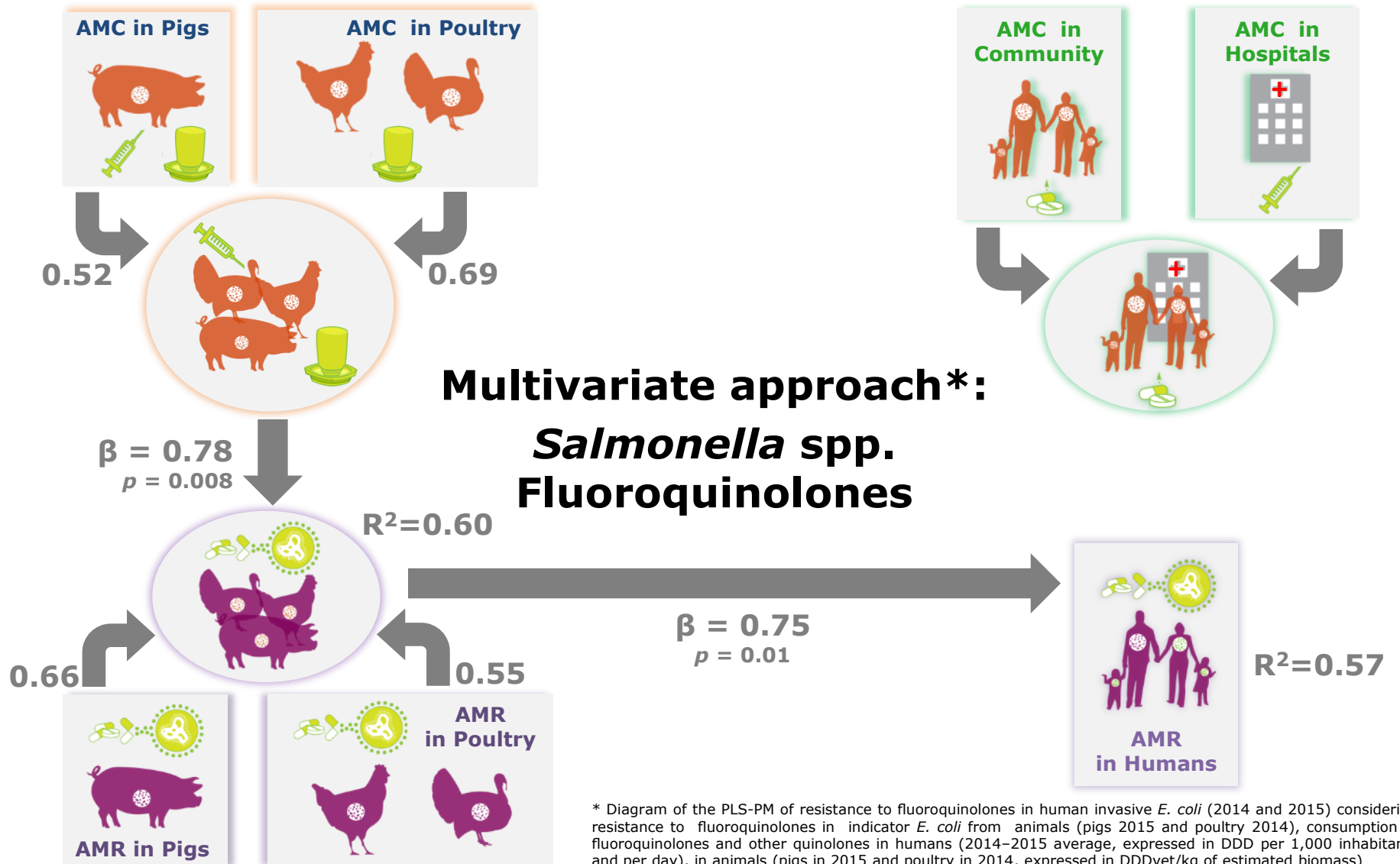


* The category 'food-producing animals' includes broilers, turkeys, pigs and calves for 2014-2015.

The dots represent the EU/EEA MSs involved in the analysis.

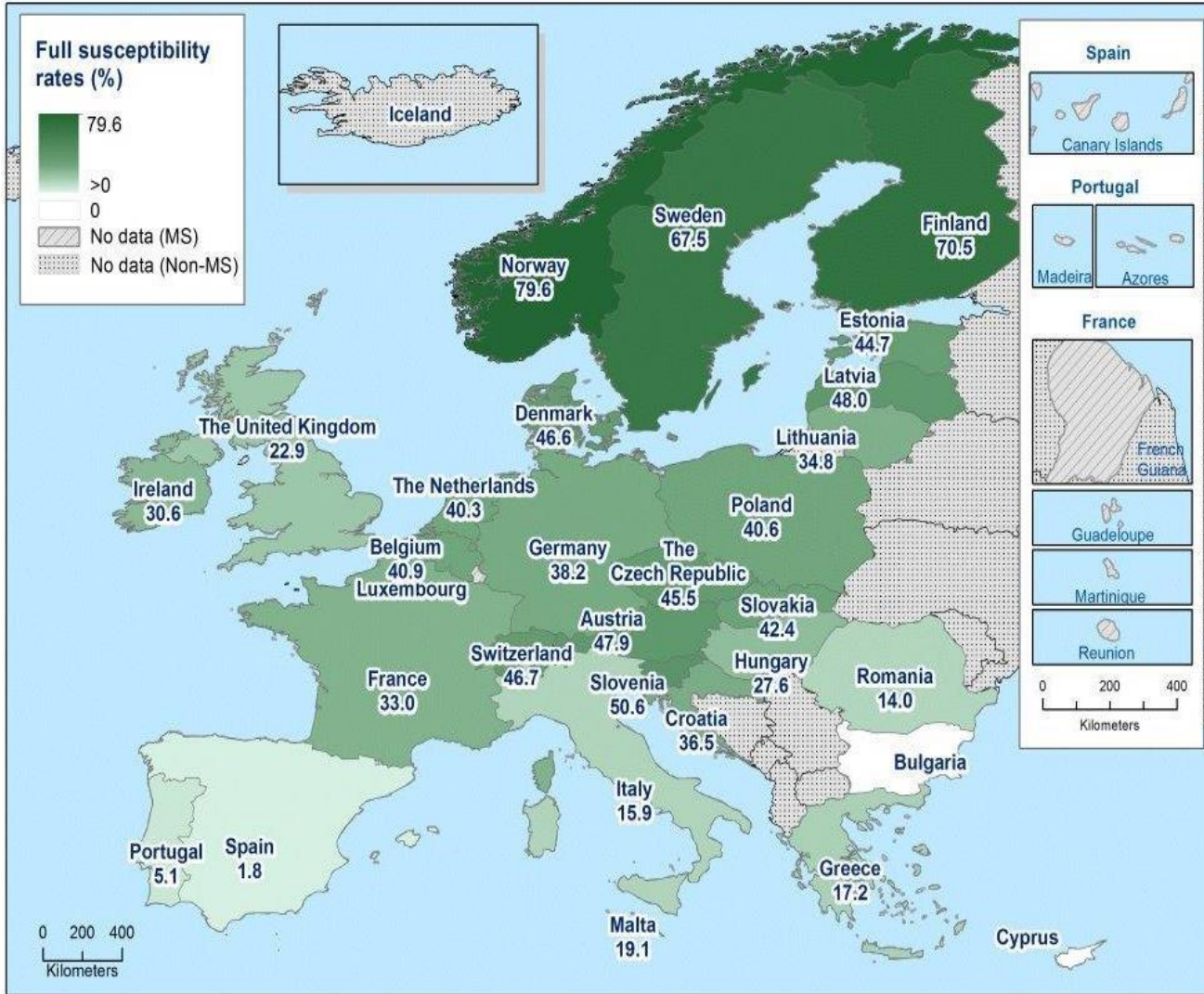


* Diagram of the PLS-PM of resistance to fluoroquinolones in human invasive *E. coli* (2014 and 2015) considering resistance to fluoroquinolones in indicator *E. coli* from animals (pigs 2015 and poultry 2014), consumption of fluoroquinolones and other quinolones in humans (2014–2015 average, expressed in DDD per 1,000 inhabitants and per day), in animals (pigs in 2015 and poultry in 2014, expressed in DDDvet/kg of estimated biomass)



* Diagram of the PLS-PM of resistance to fluoroquinolones in human invasive *E. coli* (2014 and 2015) considering resistance to fluoroquinolones in indicator *E. coli* from animals (pigs 2015 and poultry 2014), consumption of fluoroquinolones and other quinolones in humans (2014–2015 average, expressed in DDD per 1,000 inhabitants and per day), in animals (pigs in 2015 and poultry in 2014, expressed in DDDvet/kg of estimated biomass)

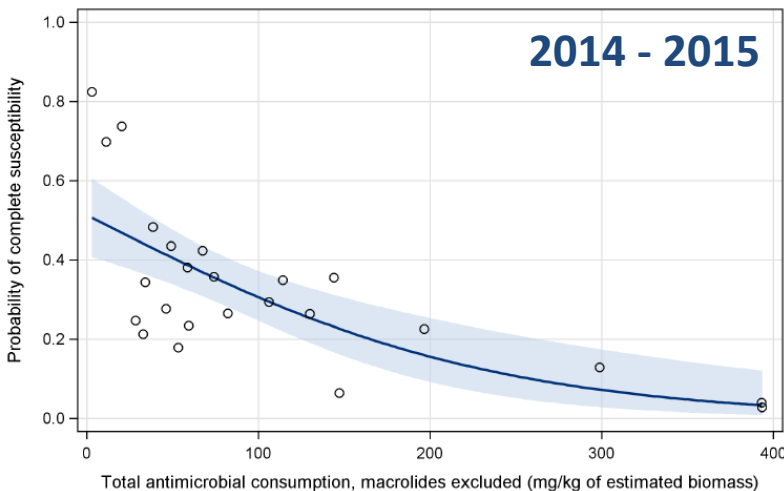
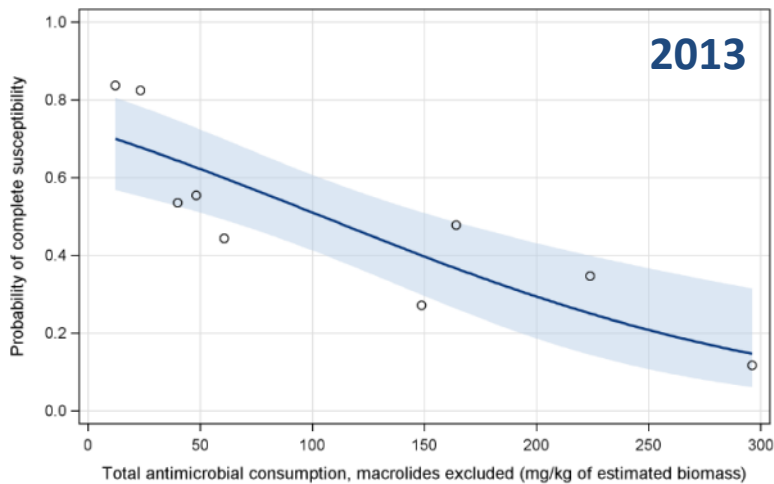
COMPLETE SUSCEPTIBILITY IN INDICATOR *E. COLI* FROM PIGS (2015)



- Complete susceptibility: susceptibility to all the antimicrobial classes tested of the harmonised panel tested
- North-South gradient
- Extended to:
 - Broilers,
 - Turkeys, and
 - Calves

OVERALL LINK AMC - COMPLETE SUSCEPTIBILITY

INDICATOR *E. COLI* – FOOD-PRODUCING ANIMALS



- Statistically-significant negative association between total AMC and complete susceptibility in food-producing animals
- » Prudent use should concern all antimicrobial classes consumed
- » Complete susceptibility: a potential candidate for an epidemiological indicator

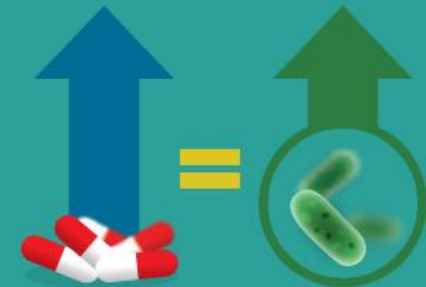
FROM SUMMARY JIACRA II

“Overall, this report confirms the positive association between AMC and AMR in both humans and food-producing animals and underlines the need to ensure prudent use so as **to reduce the consumption** of antimicrobials in both food-producing animals and humans”



important differences exist in the amounts of antibiotics people and animals consume in different EU countries

in different EU countries



an increase in antibiotics use = increase in **resistant bacteria**

bacteria

INDICATORS FOR MEASURING PROGRESS MADE IN IMPLEMENTING ACTION PLANS AGAINST AMR (1)



Primary indicator

- Overall sales of veterinary antimicrobials (in mg/PCU)

Secondary indicators

- Sales of 3rd- and 4th-generation cephalosporins (in mg/PCU)
- Sales of quinolones (in mg/PCU), specifying the proportion of fluoroquinolones
- Sales of polymyxins (in mg/PCU)



Primary indicator

- Consumption of all antimicrobials for systemic use (in DDD/1,000 inhabitants per day)

Secondary indicators

- Ratio of the consumption of broad-spectrum penicillins, cephalosporins¹, macrolides and fluoroquinolones to the consumption of narrow-spectrum penicillins, cephalosporins² and macrolides
- Consumption of glycopeptides, 3rd- and 4th-generation cephalosporins, monobactams, carbapenems, fluoroquinolones, polymyxins, piperacillin and enzyme inhibitor, linezolid, tedizolid and daptomycin

¹ Second- and third-generation cephalosporins

² First-generation cephalosporins

INDICATORS FOR MEASURING PROGRESS MADE IN IMPLEMENTING ACTION PLANS AGAINST AMR (2)



AMR in
bacteria
from
Animals

Primary indicator

- Proportion of *E. coli* completely susceptible to antimicrobials tested in the EU monitoring*

Secondary indicators

- Proportion of samples containing ESBL-/AmpC-producing *E. coli**
- Proportion of *E. coli* resistant to three or more antimicrobial classes*
- Proportion of *E. coli* resistant to fluoroquinolones*

* All indicators are weighted for all food-producing animals (broilers, turkeys, pigs, calves)



AMR in
bacteria
from
Humans

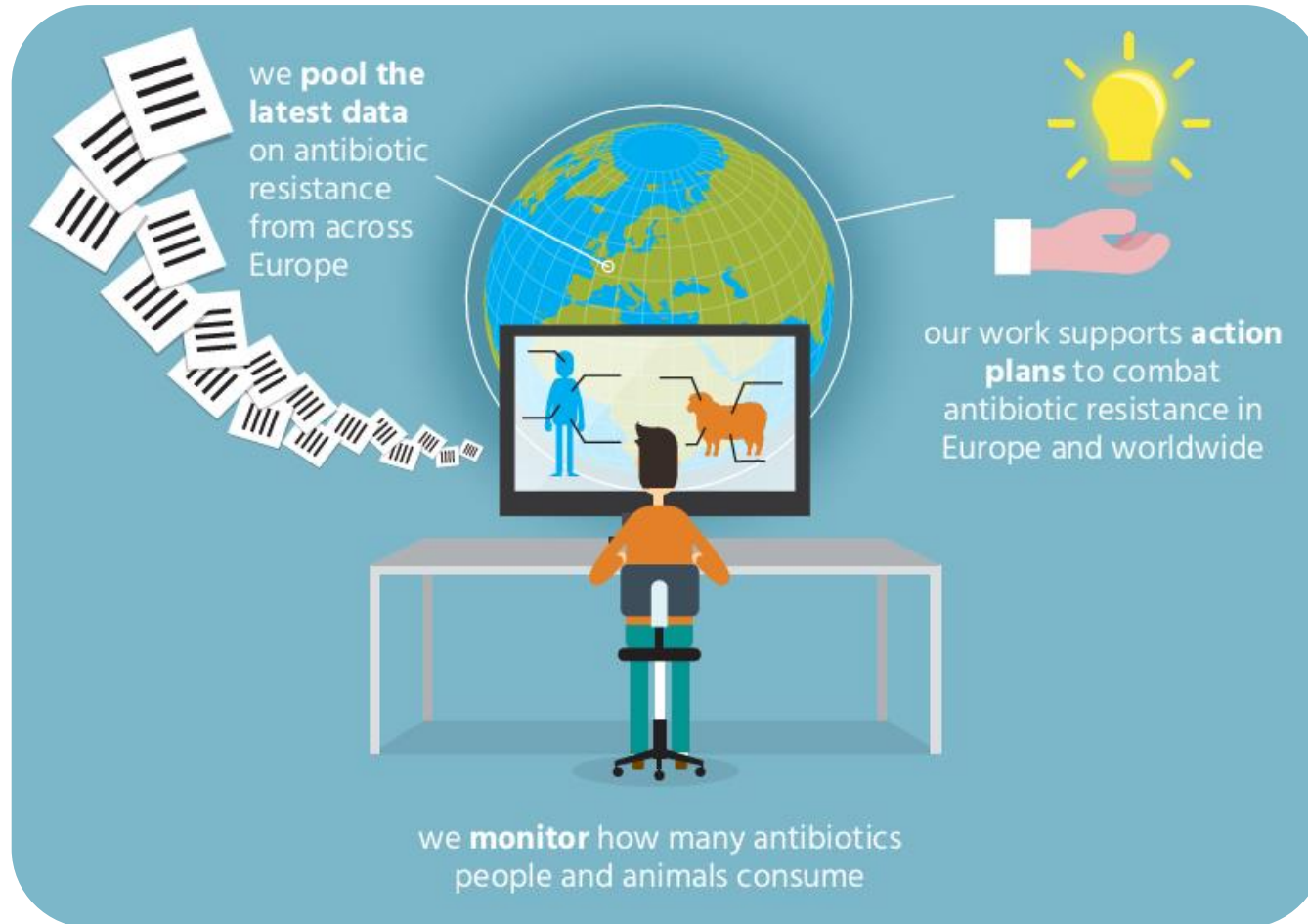
Primary indicator

- Proportion of meticillin-resistant *Staphylococcus aureus* (MRSA) and
- 3rd-generation cephalosporin resistant *E. coli* (3GCR *E. coli*).

Secondary indicators

- Proportion of *Klebsiella pneumoniae* with combined resistance to aminoglycosides, fluoroquinolones and 3rd-generation cephalosporins
- Proportion of penicillin resistant and macrolide resistant *Streptococcus pneumoniae*
- Proportion of carbapenem-resistant *Klebsiella pneumoniae*

INDICATORS FOR MEASURING PROGRESS MADE IN IMPLEMENTATION OF ACTION PLANS AGAINST AMR (3)



CONCLUSIONS

- ◆ Added value of linking AMC and AMR data
- ◆ Added value of a synthetic view of the AMC and AMR situation through limited number of consistent indicators to follow up the situation over time
- ◆ Higher is the AMC, higher is the risk of AMR!

THANK YOU FOR YOUR ATTENTION!



KEEPING ANTIBIOTICS WORKING!