

## Summary of Latest European Data on Antibiotic Resistance

### Highlights on antibiotic resistance

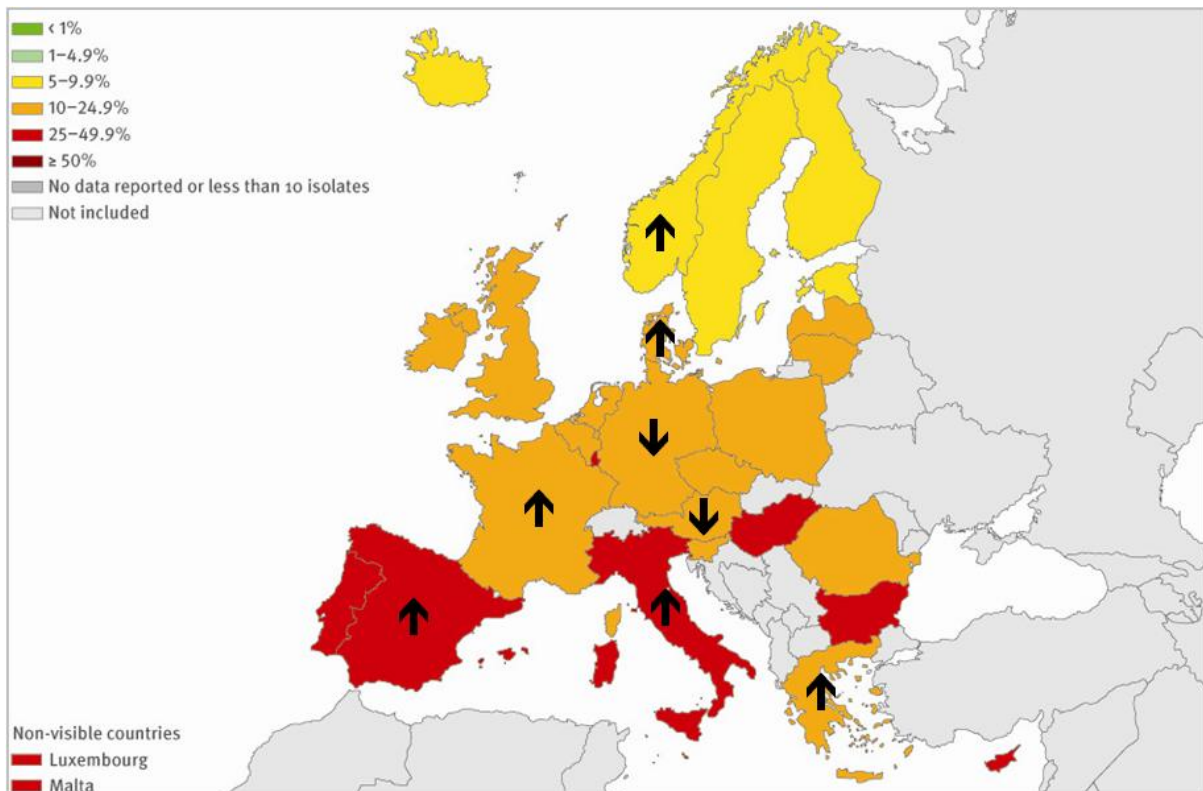
- Antibiotic resistance is a major European and global public health problem and is, for a large part, driven by misuse of antibiotics. As a result, patients are suffering from infections caused by bacteria that are resistant to multiple antibiotics.
- Resistance in bacteria commonly responsible for infections such as *Escherichia coli* and *Klebsiella pneumoniae* has been increasing Europe-wide for all antimicrobial classes under surveillance.
- Combined resistance to several antibiotics (multi-drug resistance) continues to increase in these bacteria (e.g., *Escherichia coli* and *Klebsiella pneumoniae*).
- Moreover, in *Klebsiella pneumoniae*, resistance to last-line antibiotics, which further reduces available options for treatment of infected patients, is now established in one country, Greece, and is emerging in all other European countries.
- The occurrence of methicillin-resistant *Staphylococcus aureus* (MRSA) – a multidrug-resistant bacteria – shows a decrease in some European countries. However, one third of countries are still reporting that of all *Staphylococcus aureus* invasive infections, more than 25% are MRSA.

### Antibiotic resistance in Europe

The data presented in this section were collected by the European Antimicrobial Resistance Surveillance Network (EARS-Net) which is coordinated by the European Centre for Disease Prevention and Control (ECDC). The maps presented in this summary show the occurrence of antimicrobial resistance in selected bacteria causing invasive infections and are based on laboratory results reported by countries participating in EARS-Net.

*Escherichia coli* (*E. coli*) is the most frequent cause of bacteraemia caused by Gram-negative bacteria, as well as community and hospital-acquired urinary tract infections.

The occurrence of antimicrobial resistance in *E. coli* continues to increase Europe-wide for both multi-drug resistance and for single antimicrobials under surveillance. For some antimicrobials the increase is evident even among countries already presenting relatively high levels of resistance. For fluoroquinolones, which are important antimicrobials for treatment of *E. coli* infections, the resistance situation in Europe in 2009 is displayed in Fig. 1.

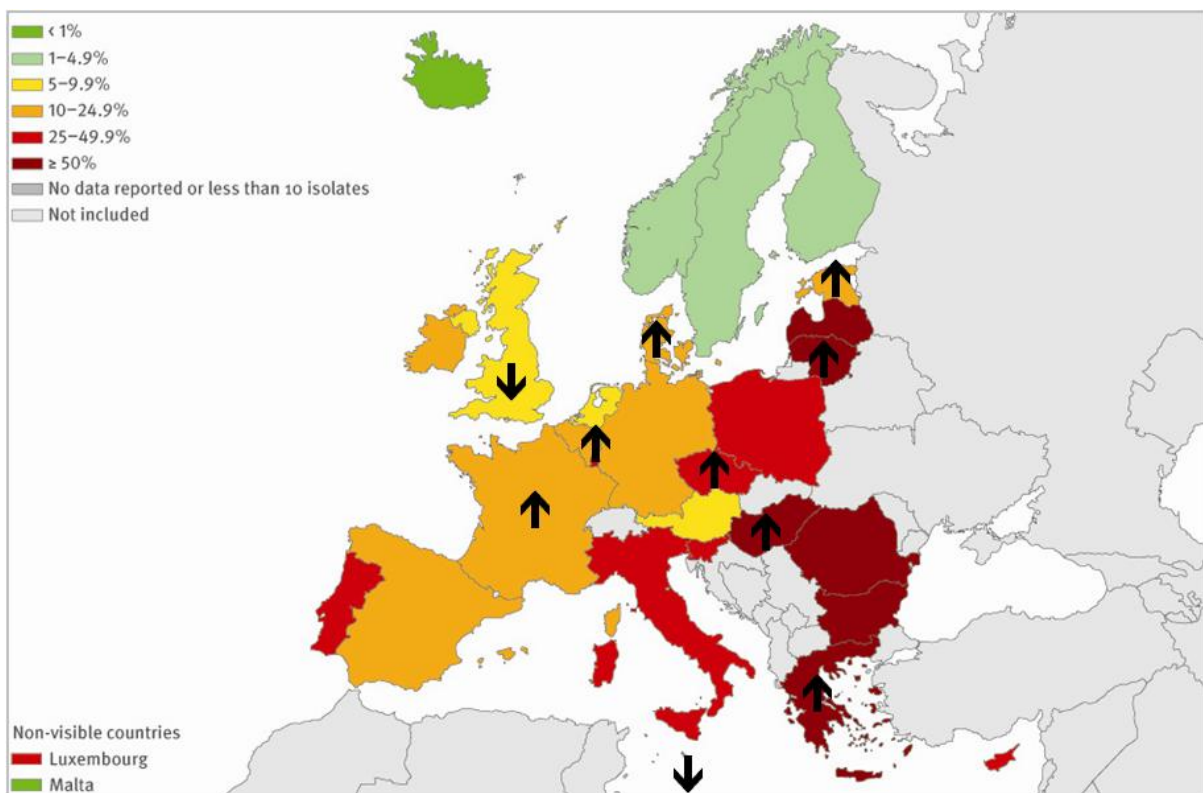


**Figure 1. *Escherichia coli*: Proportion of invasive isolates with resistance to fluoroquinolones in 2009 (Data source: EARS-Net).**

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2006-2009, respectively. These trends were calculated on laboratories that consistently reported during 2006-2009.

*Klebsiella pneumoniae* (*K. pneumoniae*) is an important cause of urinary and respiratory tract infections, especially in patients with impaired immune systems.

In *K. pneumoniae*, a high frequency of resistance to third-generation cephalosporins (Fig. 2), fluoroquinolones and aminoglycosides becomes evident in Southern, Central and Eastern Europe. Many of these strains have acquired resistance to all of the above mentioned antimicrobial classes.



**Figure 2. *Klebsiella pneumoniae*: proportion of invasive isolates resistant to third-generation cephalosporins in 2009 (Data source: EARS-Net).**

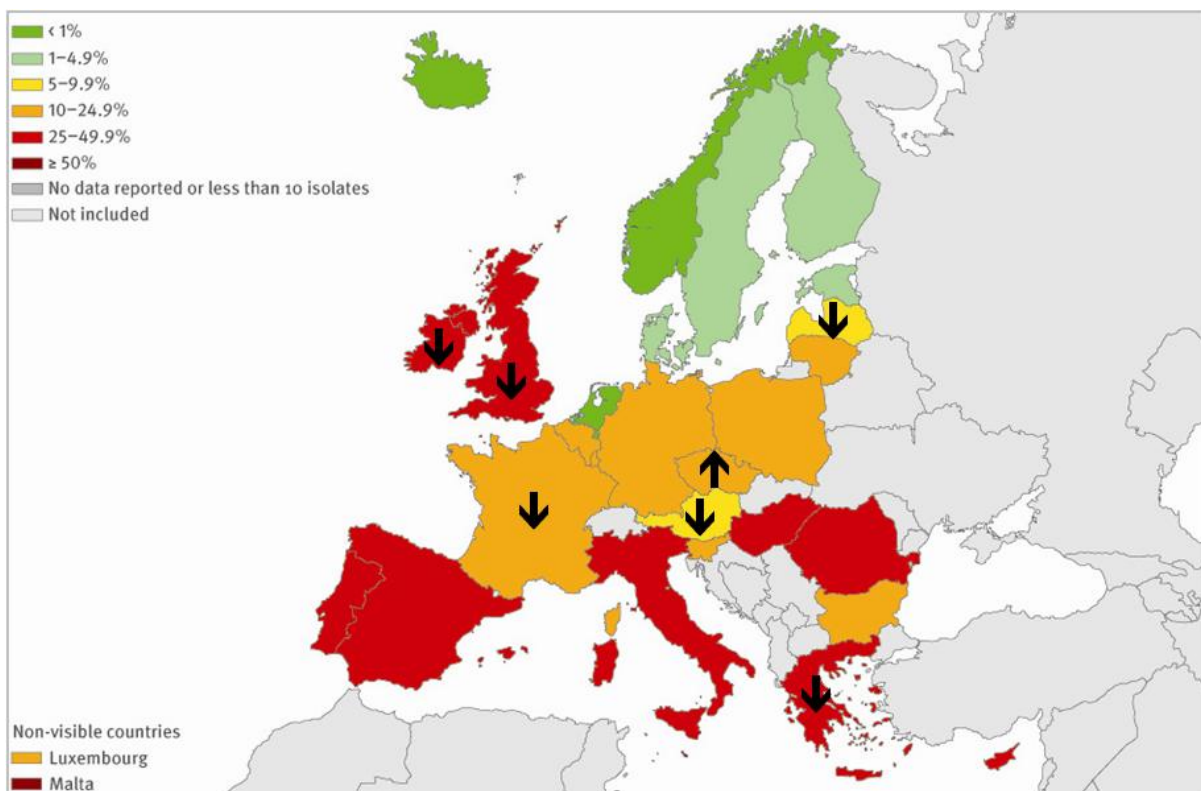
The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2006-2009, respectively. These trends were calculated on laboratories that consistently reported during 2006-2009.

Carbapenem resistance in *K. pneumoniae* is emerging in the European Union, with the exception of Greece where it is already established (Fig. 3). This is a particularly worrying phenomenon since carbapenems are last-line antibiotics and treatment options for patients infected with this and other carbapenem-resistant bacteria are severely limited.



**Figure 3. *Klebsiella pneumoniae*: proportion of invasive isolates resistant to carbapenems in 2009 (Data source: EARS-Net).**

Methicillin-resistant *Staphylococcus aureus* (MRSA) is the most important cause of antibiotic-resistant healthcare-associated infections worldwide. In 2009, six countries reported decreasing trends for MRSA while only one country reported an increase. Although the MRSA problem seems to have stabilised, or even decreased in some European countries, MRSA remains a public health priority, since the proportion of MRSA is still above 25% in more than one third of countries (Fig. 4).



**Figure 4. *Staphylococcus aureus*: proportion of invasive isolates resistant to methicillin (MRSA) in 2009 (Data source: EARS-Net).**

The symbols ↑ and ↓ indicate a significant increasing or decreasing trend for the period 2006-2009, respectively. These trends were calculated on laboratories that consistently reported during 2006-2009.

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