Antibiotic resistance occurs when bacteria become resistant or less responsive to antibiotics. These resistant bacteria can make treatment longer or even impossible. The evolution of antibiotic consumption in humans, livestock, domestic animals and the environment is therefore monitored in Switzerland. The results of this surveillance are published every two years in the ‘Swiss Antibiotic Resistance Report’.

Evolution of antibiotic consumption in Switzerland

In human medicine, antibiotic consumption has remained stable in both inpatient and outpatient settings.

In human medicine, total antibiotic consumption (in inpatient and outpatient settings) totalled 10.7 defined daily doses (DDD) per 1,000 inhabitants in 2019 (2018: 10.6). The EU average was 20.1 (lowest and highest consumption in EU countries ranging from 9.7 to 34.0).

Almost 90% of the antibiotics were used in outpatient settings.

In outpatient settings, total antibiotic consumption has been stable since 2017. In 2018 and 2019, proportionally few antibiotics were consumed per capita, with an average of 9.1 defined daily doses per 1,000 inhabitants (2017: 9.0). The EU average was 18.4.

There are regional differences across Switzerland: antibiotic consumption is above-average in the French- and Italian-speaking parts of the country, and below the national average in German-speaking Switzerland.

In Swiss hospitals, total antibiotic consumption is below the EU average (2019: 1.6 defined daily doses per 1,000 inhabitants versus 1.8 (EU average)). In relation to the number of days of therapy, the average antibiotic consumption was stable between 2017 and 2019 (2017: 54.4 defined daily doses per 100 days of therapy; 2019: 51.8). Between 2010 and 2019, this antibiotic consumption rose by 13% overall (14% in German-speaking Switzerland, 7% in French-speaking Switzerland and 14% in Italian-speaking Switzerland). The average antibiotic consumption per day of therapy was lower in small hospitals (47.6 defined daily doses per 100 days of therapy) than in medium-sized hospitals (50.7) and large ones (55.5).
Antibiotic consumption in veterinary medicine continues to decline.

Antibiotics are also used to treat bacterial infections in livestock and domestic animals. Just over 30 tonnes of antibiotics were used to treat animals in 2019 – a year-on-year decrease of around 7%. Since 2010, antibiotic use in veterinary medicine has been reduced by more than half. In addition, use of ‘critically important antibiotics’, which are used as last-resort antibiotics in human medicine, has been reduced by more than half since 2016. In domestic animals, antibiotic consumption has decreased by 19% in the last ten years.

Environmental pollution by antibiotics

Antibiotics in rivers, lakes and groundwater can be reduced by upgrading sewage treatment plants.

After antibiotics have been taken, they are partially excreted by humans and animals and therefore end up in wastewater and soil. The concentrations of antibiotics are reduced from wastewater to surface water through dilution. From surface water to ground water the concentrations become smaller again as antibiotics are partially filtered out or broken down during bank filtration and groundwater seepage. Conventional sewage treatment plants cannot completely remove antibiotics. Since 2016, sewage treatment plants have therefore been upgraded to include additional treatment steps to eliminate microcontaminants, such as antibiotics. This will significantly reduce the quantity of antibiotics that end up in waterbodies through wastewater.

Resistance situation

Many microorganisms are naturally present on the skin, in the mucosa and in the intestine. Humans and animals need bacteria and other microorganisms, e.g. for digestion. However, if these microorganisms enter the body and multiply excessively, this will lead to an infection. This happens, for example, if the skin or mucosa are damaged, or in people with immunodeficiency. If the bacteria that cause the infection are resistant to certain bacteria, it becomes difficult, or even impossible, to treat the infection.

Relative to the size of its population, Switzerland is less affected by infections caused by resistant bacteria than France, Italy or the UK, but is more affected than the Netherlands and Scandinavian countries. The data collected on humans since 2004 and on animals since 2006 reveal a mixed picture: while antibiotic resistance has significantly increased in some bacteria, it has remained stable or decreased in others.

In human medicine, resistance is different in Gram-positive and Gram-negative bacteria.

The rate of invasive infections caused by methicillin-resistant Staphylococcus aureus (MRSA) continues to decline. This progress can be attributed to the efforts of hospitals to rapidly identify colonised and infected patients, isolate, and treat them. This trend was also observed in several other European countries. Nevertheless, the rate of MRSA infections in wounds and abscesses in outpatient settings increased. While vancomycin-resistant Enterococci (E. faecium) are still rare, an increase in resistance rates has been observed in the last four years. This has mainly concerned local and regional outbreaks. The situation is being closely monitored. The resistance rates against fluoroquinolones and third-/fourth-generation cephalosporins in E. coli and Klebsiella pneumoniae, which were steadily increasing from 2004, have fortunately stabilised in the last two to four years.
Resistance of bacteria that cause food-borne infections in poultry is in decline.

Most bacterial food-borne infections in humans are caused by bacteria of the genus Campylobacter. While fluoroquinolone-resistant Campylobacter detected in poultry meat samples had been steadily increasing in recent years, a significant fall was observed for the first time in 2018. Rates of fluoroquinolone-resistant Campylobacter in pigs continue to rise, but are not detectable in pork meat samples. Fortunately, the resistance of these bacteria to macrolides – antibiotics used to treat severe infections caused by Campylobacter – is still low, and well below the levels in several EU member states.

Contamination of Swiss raw meat with resistant bacteria continues to fall.

When animals are slaughtered, bacteria can find their way into the raw meat produced. Poultry samples contaminated with E. coli, which were resistant to various classes of antibiotics, fell significantly in 2018: in poultry of Swiss origin this figure was 21.1% of samples, and in poultry of foreign origin it was 63.1%. Detection rates in Swiss poultry in particular have significantly decreased in recent years (2014: 65.5%, 2016:41.9%). In pork and beef, these values have been very low for some years (under 1%).

There were virtually no cases of Methicillin-resistant Staphylococcus aureus (MRSA) in raw Swiss pork, beef and poultry. A significant decrease in MRSA prevalence was recorded in poultry produced outside Switzerland.

Indicator bacteria collected from healthy animals show a varied picture in terms of antibiotic resistance.

The monitoring of antibiotic resistance in indicator bacteria from healthy slaughter animals is designed to provide information on the type of resistances found in intestinal bacteria of animal origin. These resistances can be passed on to other bacteria, including those with zoonotic potential. Every time antibiotics are used, they can result in selective pressure, giving rise to resistant bacteria in the intestinal flora of the animals concerned. Consequently, E. coli indicators are a useful instrument with which to observe changes in resistance and to track the spread of resistance. Resistance of the E. coli bacterium to various antibiotics in the intestines of broilers, fattening pigs and vealers increased until 2014, but has since largely stabilised. Multi-resistant E. coli, which is resistant to various classes of antibiotics, were detected in broilers (30.6%), calves (33.2%) and fattening pigs (13.1%). These detection rates show differing trends: the rates fell significantly in broilers, decreased slightly in fattening pigs and remained stable in calves. Methicillin-resistant Staphylococcus aureus is also tested as an indicator bacterium. While MRSA was only detected in 2% of broiler nasal swabs in 2009, the detection rate rose to 52.8% in 2019.

Carbapenem resistance in human and veterinary medicine

Carbapenems are important antibiotics in human medicine as they are used as a last resort when no other antibiotic can be used to treat a patient. Carbapenems are not permitted in veterinary medicine; they cannot be used on livestock and can only be used on domestic animals in exceptional cases. Since 1 January 2016, carbapenemase-producing Enterobacterales (CPE) have had to be reported to the Federal Office of Public Health (FOPH). As is the case in most European countries, this emerging form of resistance is still rare. Although consumption of carbapenems has not increased in human medicine for six years, a significant
increase in CPEs has been recorded. No cases of CPE have been detected in livestock in Switzerland to date; however, CPE was recently detected in domestic animals (cats and dogs) and veterinary staff at a veterinary clinic. This highlights the importance of the 'One Health' approach.