

Swedish work against antibiotic resistance – a One Health approach



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Levels of antibiotic use and resistance in Sweden are among the lowest of the European countries, both in the human and animal sector. Early awareness and long-term interdisciplinary and intersectoral actions are important contributors to this relatively favorable situation. The global rise and unprecedented spread of resistance calls for continuous and intensified work. The Swedish experience is that antibiotic resistance can be tackled more efficiently if all levels of society work together towards a common goal.

Long-standing national consensus

There is a broad and historic national consensus among stakeholders from all relevant sectors on the overarching goal of preserving the possibility of effective treatment of bacterial infections in humans and animals. This is reflected in the common priorities of the Swedish government and governmental agencies, as well as organisations within the healthcare sector, veterinary medicine, animal husbandry and the food production.

The first Swedish national action plan was published in 2000 and emphasised the importance of taking a One Health approach. Today there is a long-term government strategy as well as a national action plan against antibiotic resistance. The latter is evaluated and updated by the intersectoral coordinating mechanism. This group engages 25 governmental agencies and organisations working in human health, animal health, food, environment, research, trade and civil contingency planning. Another example of the One Health approach is the annual surveillance report on resistance and consumption of antibiotics, published jointly by the National Veterinary Institute and the Public Health Agency of Sweden.

Key components in the Swedish work against antibiotic resistance

Continuous work, with political and legislative support

Consensus and cooperation locally, regionally and nationally, within and between sectors

Disease prevention – healthy people and animals do not need antibiotics

Transparent and reliable data for action and follow-up

Active involvement in international efforts

Human health

The initiation of Strama, the Swedish Strategic Programme against Antibiotic Resistance, in 1995 has been essential to counteract antibiotic resistance. Other important factors are the regulated sales of antibiotics, up-to-date treatment recommendations and the good availability of data on antibiotic use and resistance, as well as a long tradition of infection prevention and control. Importantly, surveillance data is transparent and communicated widely.

The Strama model for collaborations at all levels

The Swedish experience demonstrates that work to achieve prudent use of antibiotics should be carried out close to the prescribers. The regional Strama groups are key actors in facilitating the implementation of national and regional initiatives as well as identifying barriers that need to be addressed.

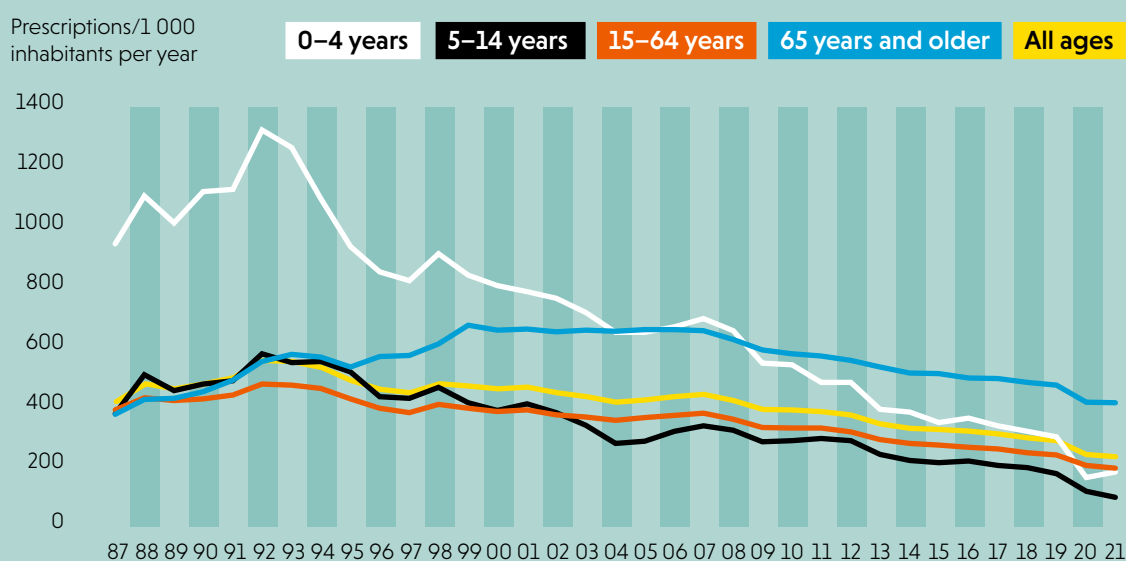
Strama was originally formed as a voluntary network of regional groups and national authorities and organisations to promote collaborations and share best practices. The regional Strama groups typically have representatives from various fields of healthcare such as infectious disease, primary care, pharmacy, communicable disease control, microbiology, and infection control. Strama is also active within dentistry.

Feedback and benchmarking of data on antibiotic consumption and use

All antibiotic use is by prescription only. All pharmacies in Sweden supply daily statistics on sales of medicinal products, which enables a comprehensive analysis of antibiotic sales. Complementary IT systems that automatically include additional information, such as diagnosis, are now also available for improved analyses.

Data on antibiotic consumption and use is widely communicated by the Public Health Agency and the regional Strama groups, for example to benchmark regions and healthcare centers. Strama groups also use the data to lead peer-to-peer discussions about prescribing policies and adherence to treatment guidelines.

Figure 1. Since the mid-90s, total sales of antibiotics on prescription have decreased by about 50 %. The greatest change during these years is seen among young children (age group 0–4 years), where sales decreased by more than 75 %. Sales of antibiotics (J01 excl. methenamine) for use in humans (all genders) for the years 1987–2021, separated by age (prescriptions/1 000 inhabitants per year).



Decreased antibiotic consumption and improved quality of prescribing

The community sector (primary care) accounts for the vast majority of antibiotic consumption in Sweden. Part of the strategy targeting this sector has been the implementation of easy-to-use national treatment recommendations for common infections in community care. Quality indicators and a quantitative national target of no more than 250 prescriptions per 1 000 inhabitants per year in the community sector have also been important tools for improving antibiotic prescribing. This has led to a continuous decrease in antibiotic consumption along with improvements regarding the use of the optimal type of antibiotic for the given situation. In addition, several Swedish authorities have been commissioned by the government to work on new models and measures to ensure access to both new and older antibiotics on the Swedish market.

Resistance monitoring with good geographic coverage

The collection of high quality and comparable resistance data is ensured as all laboratories use the same standardised methods and there is an established collaboration between the national and local laboratories. Resistance monitoring is largely based on voluntary, automated and daily reporting from the laboratories to a national system. This allows for an early alert on findings of very serious antibiotic resistance as well as for continuous resistance monitoring, locally and nationally. This data is essential for the development and continuous update of treatment guidelines. Four types of antibiotic resistance are notifiable in line with the Communicable Disease Act. Data on notifiable types of antibiotic resistance has also been used to model future costs for Swedish health care.

Long tradition of infection prevention and control

Sweden has a long tradition of working on infection prevention and control (IPC). This is supported by several legally binding

regulations, such as standard precautions for all healthcare professionals, requirements of good quality in healthcare, including good IPC practices, and regulations that aim to protect employees from being exposed to infectious diseases. In addition, healthcare providers must have access to expert advice on IPC.

Swedish healthcare professionals are generally well aware of the procedures for IPC, and surveys show that it is considered a priority. To identify areas of improvement, regular assessments are carried out regarding compliance with the standard precautions for infection prevention as well as occurrence of healthcare associated infections in hospitals, in primary care and in long-term care facilities.

Animal health and food

Many factors have led to the current relatively favourable resistance situation among farm and companion animals in Sweden, as well as in domestically produced food. Cornerstones in the work have been the early ban on antibiotics as growth promoter, a strong tradition of control of infectious diseases, strict regulations on animal welfare, and access to data on sales of antibiotics for animals. Close collaboration between academia, authorities and stakeholders has been vital for continued improvement.

Early awareness and action

In 1980, the Federation of Swedish Farmers adopted a sector-wide policy on antibiotic use. The policy aimed for a more controlled use of antibiotics, with a strong focus on prevention of diseases. Since 1986, the use of antibiotics for growth promotion is no longer authorised. Following this change, an increase in health disturbances was noted, and efforts to implement preventive strategies were strengthened. Over time, the need to use antibiotics to treat infections has declined.

Prevent infections and spread of resistance

Sweden has a long tradition of control of infections in animals. Several infectious agents are notifiable in Sweden. Since 2008 certain types of resistance are also notifiable which allows for monitoring of trends. Disease control programmes create incentives for the introduction of biosecurity measures at the farm level and in trade. Today, a general biosecurity programme is run by animal health service organisations. Preventing the spread of animal diseases and zoonotic pathogens also have an impact on food safety and the environment and therefore constitute an important safeguard to human health.

Advice on disease prevention is available through organised animal health services. Farmers regularly receive farm specific advice on disease prevention on their own farm. These organisations provide a vital link between authorities and academia on one side, and practising veterinarians and farmers on the other.

A regulation on infection prevention and control (IPC) was introduced in 2014 stipulating that all veterinary practices must have an IPC programme. The implementation of this regulation was supported by expertise from the human health sector. Comprehensive guidance was developed on how to develop an IPC-programme as well as practical aspects, such as hand washing, disinfection, clothing and cleaning.

Prudent use of antibiotics

Antibiotics for animals are only available on prescription and can only be sold by pharmacies. Guidance on prudent use of antibiotics in various animal species, based on evidence or expert consensus, is readily available to veterinary prescribers.

Current regulations on the use of antibiotics are in line with the guidance on prudent use: antibiotics should only be used when needed and the risk of resistance should be considered when prescribing. A regulation from 2013 states that certain antibiotics must not be prescribed by veterinarians, and that restrictions apply for some other antibiotics (quinolones and 3rd generation cephalosporins).

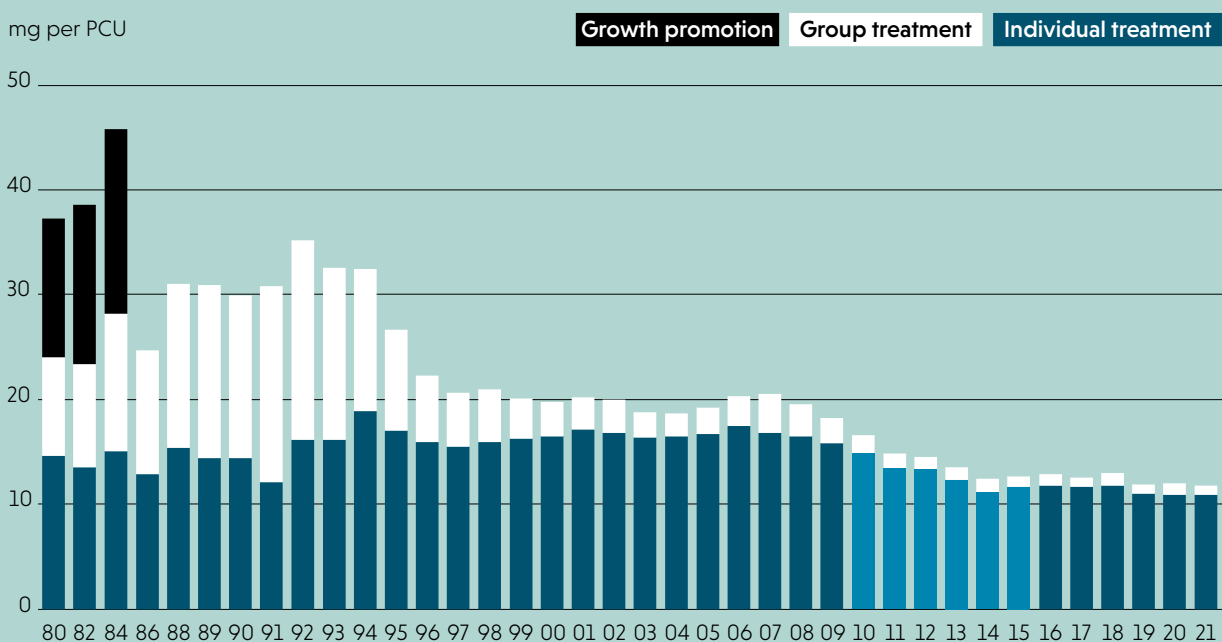
Access to data and communication

Data on sales of antibiotics for animals has been available since 1980. After the ban on antibiotics for growth promotion, there was a strong focus on reducing the need to medicate groups of animals. The quality of prescribing has improved, and today most animals are treated individually. Additionally, narrow-spectrum penicillins are the most commonly prescribed antibiotics.

The Svarm programme, a formalised monitoring of antibiotic resistance, was initiated in 2000. The programme includes resistance of potential significance for public health, but also resistance in animal pathogens. The programme Svarmpat supplements Svarm with data on antibiotic resistance in pathogens of farm animals. Monitoring results are communicated via various channels and are discussed with relevant stakeholders.

Figure 2. Since the mid-80s, sales of antibiotics for animal use have decreased by two thirds, corrected for the numbers of animals present each year.

PCU refers to population correction unit, an estimate of the biomass of animals in the country. Data regarding injectable products is incomplete for the years 2010-2015, indicated by a paler colour.



Environment

Maintaining low levels of resistant bacteria and antibiotics in the environment reduces the risk of transmission of resistant bacteria to humans and animals via water, food, soil, sludge and manure. To tackle the environmental dimension of antibiotic resistance, collaboration between and within sectors is needed. The national authorities responsible for managing environmental risks and other organisations are involved in a range of activities and initiatives.

Examples of initiated actions:

- Sweden promotes increased environmental consideration in legislation to reduce emissions stemming from pharmaceutical production to the environment.
- Sweden promotes increased implementation of measures by prescribers and stakeholders to reduce emissions from pharmaceutical use to the environment.
- The Swedish Environmental Protection Agency administers state funded grants to improve the technologies used in municipal wastewater treatment plants (WWT) to reduce the concentrations of pharmaceuticals, including antibiotics, in the effluent.
- The Swedish Water and Wastewater Association coordinates a pre-procurement group focusing on disseminating knowledge and facilitating the development and implementation of cost-efficient technologies to reduce emissions of antibiotics to the environment in advanced WWT.
- Within the framework of implementing the EU Strategy for the Baltic Sea Region (EUSBSR), Swedish government agencies cooperate with stakeholders in the Baltic Sea Region pharma platform. The platform is used to facilitate the dissemination of knowledge and encourage the implementation of measures aimed at decreasing the emission of pharmaceuticals to the environment.
- The transdisciplinary and cross-sectoral platform Swedish Knowledge Centre on Pharmaceuticals in the Environment is used to disseminate knowledge and facilitate dialogue between national and international stakeholders and governmental bodies concerning the life cycle of human and veterinary medicines. The Knowledge Centre is led by the Swedish Medical Products Agency.

Research

Swedish antimicrobial resistance research is coordinated by the Swedish National Research Programme on Antibiotic Resistance. The mission is to initiate and fund One Health antimicrobial resistance research in collaboration with national public funding agencies and other stakeholders. The programme is led by the Swedish Research Council and research priorities are defined in a national strategic research agenda. This agenda covers prevention and control of the emergence and spread of resistant bacteria between humans, animals, and the environment. It includes surveillance and diagnostics as well as development of new antibiotics, vaccines and alternatives to antibiotics.

The Swedish Research Council also hosts the international secretariat of the Joint Programming Initiative on Antimicrobial Resistance (JPIAMR) and is coordinating the preparation of the forthcoming European Partnership on One Health AMR, which is predicted to start in 2025. Sweden is funding international research and innovation collaborations through: the Swedish Research Council, the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning, the Swedish International Development Cooperation Agency and Sweden's Innovation Agency. Sweden also participates in calls for proposals from JPIAMR, Aquatic Pollutants, Developing Countries Clinical Trials Partnership (EDCTP) and Eurostars.

Active involvement in international efforts

Sweden is actively involved in international efforts regarding antibiotic resistance through cooperation with other countries and stakeholders, such as the EU, WHO, WOAHA, FAO, UNEP and UN. Furthermore, Sweden is home to the European office of ReAct, an international network dedicated to the issue of antibiotic resistance with the aim to stimulate and advocate for strengthened global engagement. The Public Health Agency of Sweden is a designated WHO Collaborating Centre for antimicrobial resistance containment, assisting WHO and its member states in the implementation of the Global Action Plan. This includes the development of the Global Antimicrobial Resistance and Use Surveillance System (GLASS). Swedish experts also engage in research and capacity-building together with other countries.

Communicating to a wider audience

The Swedish population has a broad understanding of the responsible use of antibiotics, as measured by the Eurobarometer. A contributing factor has been enduring communication efforts aimed at increasing the awareness of antibiotic resistance and knowledge of common infections as well as the importance of good hygiene and prudent use of antibiotics. Efforts to prevent the emergence and spread of infections have also included activities to achieve a high vaccination coverage.



This brochure is published by the agencies and organisations included in the Intersectoral Coordinating Mechanism, ICM, jointly run by the Public Health Agency of Sweden and the Swedish Board of Agriculture.

To download this brochure or find more information about the Swedish work against antibiotic resistance, please go to www.folkhalsomyndigheten.se/against-amr or scan the QR code below.



The Public Health Agency of Sweden | The Swedish Board of Agriculture | Formas - the Swedish Research Council for Environment, Agricultural Sciences and Spatial Planning | National Veterinary Institute | ReAct – Action on Antibiotic Resistance | Strama – the Swedish Strategic Programme Against Antibiotic Resistance | Sweden's Innovation Agency | Swedish International Development Cooperation Agency, Sida | The Association of Regional Medical Officers for Communicable Disease Control | The County Administrative Boards | The Dental and Pharmaceutical Benefits Agency | The Health and Social Care Inspectorate | The National Board of Health and Welfare | The National Board of Trade | The Swedish Association of Local Authorities and Regions | The Swedish Chemicals Agency | The Swedish Civil Contingencies Agency | The Swedish eHealth Agency | The Swedish Environmental Protection Agency | The Swedish Food Agency | The Swedish Medical Products Agency | The Swedish Research Council | The Swedish Research Council for Health, Working life and Welfare | The Swedish University of Agricultural Sciences | The Swedish Work Environment Authority