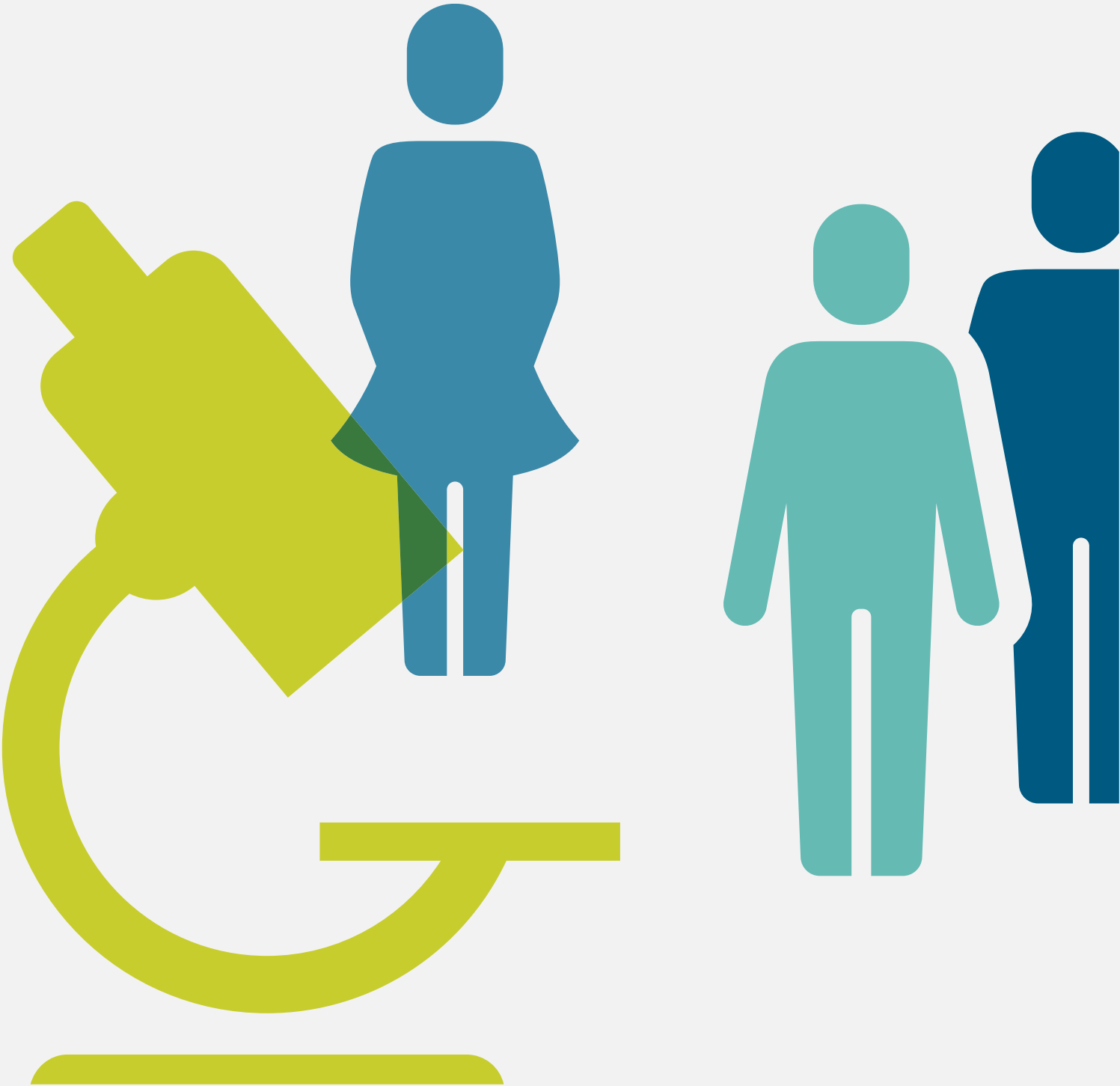
Die
Bundesregierung

1st DART 2030 Action Plan

2024-2026



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Introduction

The health-related and economic effects of antimicrobial resistance (AMR)[1] pose a tremendous challenge, both in Germany and in countries around the world. According to estimates, in 2019 a total of 1.27 million deaths were attributed to AMR. The Global Action Plan on Antimicrobial Resistance adopted by the World Health Organization (WHO) in 2015 calls upon member states to devise their own national action plans.

For Germany, the measures needed in combating AMR are consolidated in the German Antimicrobial Resistance Strategy (DART). The Strategy's overarching goal is to reduce AMR and thereby preserve the effectiveness of antibiotics.

The current German Antimicrobial Resistance Strategy – DART 2030 – was adopted by the Federal Cabinet in April 2023. Considering the One Health approach, it sets out the strategic goals to be achieved until 2030 across all sectors to combat AMR in human and veterinary medicine, agriculture, the environment, education and research, and international cooperation. As a supplement to DART 2030, this Action Plan sets out the initial priority measures to be implemented in the different action areas in order to achieve the Strategy's goals. Annex 1 gives an overview of the planned activities, the respective goals and objectives and the sectors involved (human or veterinary medicine, agriculture, food and the environment). The Action Plan will be subject to evaluation and revised in 2026. Revision may be necessary in areas where a step-by-step approach is needed.

The Action Plan shall also implement the measures Germany has agreed to at both EU and international level, such as during its G7 presidency in 2022 and in the adoption of the "Council recommendation on stepping up EU actions to combat antimicrobial resistance under the One Health approach" in June 2023. This includes defining concrete targets on antibiotic use as well as on resistance rates for certain priority pathogens. In 2022, the G7 Ministers of Health agreed to define a set of measurable, targets at national-level for human medicine by the end of 2023. The EU Council recommendation on AMR sets out proposals for each member state. The targets Germany will focus on in the future are set out in Annex 2.

In 2020, the EU Commission's Farm to Fork Strategy set the target of reducing total sales of antimicrobials used in livestock farming and aquaculture in the EU by 50% by 2030. Germany's antibiotics minimisation concept for livestock kept on farms has the explicit objective of contributing to reaching that target.

In line with the tried and tested approach used in the predecessor strategy DART 2020, regular reports will be published on the progress made in achieving the goals of the DART 2030. The first report will be presented in 2026.

[1] While it uses the accepted international abbreviation AMR (antimicrobial resistance), the aim of DART 2030 is to reduce antibiotic resistance in bacterial pathogens. Also, for the purposes of this report the term 'antibiotics' refers to antibacterial substances only.

Action Area 1: Prevention

Prevention refers to the prevention of infections that would otherwise require treatment, through measures of infection protection and control. In particular, this includes the implementation of hygiene measures and vaccination.

Antibiotic resistance can be reduced by preventing infections and serious cases of infection, respectively. This includes viral infections in which bacterial superinfections often lead to severe courses of disease. Measures to prevent infection can also have a positive effect on the prevalence of sepsis thus reducing the cases. For human medicine, the focus lies on the availability of current recommendations for infection prevention which address not only medical, but also care and facilities for integration assistance, and on the actual implementation of the recommendations in the facilities themselves. Obstacles that hinder their implementation must be identified and eliminated.

Vaccinations prevent infections and their transmission regardless of whether the pathogens involved are resistant to antimicrobial agents. Sepsis, which is the most severe form of infection, is often caused by pathogens against which vaccines exist. It is thus important to consider the vaccinations recommended by the Standing Committee on Vaccination (STIKO) in order to meet the vaccination targets, set out for Germany in the National Vaccination Schedule.

The necessity for vaccinations in livestock and pets is both uncontested and a long-established practice. Vaccination helps to maintain and promote animals' health and productivity. It protects individual animals and, with adequate vaccination coverage to ensure herd immunity, also protects the population as a whole. It helps to reduce the use of antibiotics by reducing vaccine-preventable diseases and secondary infections. In this way, vaccinations also protect humans against zoonotic animal disease.

The environment harbours a reservoir of resistance determinants and acts as an interface for the spread of AMR among humans and animals. Thus, preventing the environmental release of antibiotics and AMR lies at the centre of activities to limit the further spread of AMR in the environment. Many of the known clinically relevant AMR spread as a result of selection from non-pathogenic environmental bacteria. A key aspect of infection prevention therefore involves improving the practices applied in the treatment of drinking water and wastewater disposal, including in production facilities, to reduce pathogens including antibiotic-resistant bacteria and antibiotic residues.

Action Area 2: Surveillance and Monitoring

Surveillance and monitoring of antibiotic use and AMR are needed to assess the situation in all healthcare sectors, identify changes, processes and trends, and then use the findings to implement targeted action and measure its effects.

The data situation for Germany is to be further improved in the coming years. From mid-2024, the technical interface of the Antibiotic Resistance Surveillance (ARS) system for human medicine is to be integrated into the German Electronic Reporting and Information System for Infection Protection (DEMIS). This provides the technical basis to enable data transfer via DEMIS. The existing surveillance systems will be further expanded, with integration of the AVS and ADKA-if-DGI surveillance systems used to monitor antibiotic use in Germany. The feedback mechanism trialled in a feasibility study on establishing an antibiotic use surveillance system for the outpatient sector is to be used as extensively as possible. In addition, a number of research projects are exploring the options provided by wastewater monitoring for resistant pathogens and resistance genes, and how this can complement existing surveillance systems. And by the end of 2025, a research project on establishing cross-pathogen, integrated molecular surveillance will investigate the linking of genome data from certain antibiotic-resistant pathogens with reporting data under the German Infection Protection Act (*Infektionsschutzgesetz*).

The established surveillance and monitoring structures for antibiotic use in the veterinary sector will be further developed. For example, the monitoring established since 2023 of antibiotic use in cattle, pigs, chickens and turkeys will be gradually expanded in the coming years to take in dogs and cats (2025) and also other food-producing animal species (sheep, goats, geese, ducks, fish and horses, in 2026). Along with continued data collection and analyses on the quantities of antibiotic veterinary medicinal products sold to veterinarians and the resistance situation as part of resistance monitoring of animal pathogens and in the food chain, the information gathered is intended to enable both further evaluation of the measures introduced in the veterinary sector so far and early identification of the need to introduce additional measures to reduce AMR. One particular area of focus involves studies on the epidemiology of ESBL-producing enterobacteria (extended spectrum beta-lactamase) in various farm animal species. ESBL-producing enterobacteria play an important role as infection pathogens, especially in hospital settings and are among the bacterial pathogens prioritised by the WHO for which there is an especially great medical need for the development of novel antibiotics as well as other antimicrobial medicinal products and antimicrobial procedures.

An integrated analysis of data on AMR and the use of antibiotics in human and veterinary medicine and their occurrence in the environment is a key prerequisite for fact-based, comprehensive evaluation of the resistance situation in Germany. The long-term aim of DART 2030 is to establish this kind of integrated surveillance system for Germany. In a first step, a website is to be created by the end of 2025 linking the surveillance data from all sectors.

Action Area 3: Appropriate Use of Antibiotics including Laboratory Diagnostics

Appropriate use of antibiotics is a key prerequisite in combatting AMR. By minimising selection pressure, the development of resistance can be reduced. Antibiotic stewardship (ABS) is designed to ensure both indication-appropriate use of antibiotics and best-possible antibiotic treatment. In addition to adequate infectiology expertise, this calls for high-quality medical guidelines on diagnosis and treatment of infectious diseases which take account of the prevailing resistance situation along with the availability of suitable and rapid diagnostics.

In human medicine, the existing funding opportunities for the development of medical guidelines should continue to be used in the form of the funding opportunities provided by the Innovation Fund of the Federal Joint Committee (G-BA) and the commissioning by the Federal Ministry of Health (BMG) following a proposal by the Association of the Scientific Medical Societies (*Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften*, AWMF) of the Institute for Quality and Efficiency in Health Care (IQWiG) to conduct evidence research. Until the end of 2025, the infectiology funding programme will continue to provide funding for staff recruitment, further and continuing training, as well as infectiology consulting services in inpatient medical facilities. Because the infectiology funding programme targets inpatient facilities only but infectiology expertise will increasingly also be needed in the outpatient sector, an assessment is to be made by the end of 2025 to examine how infectiology expertise can be promoted in the outpatient sector as well. Use of suitable diagnostics is to be supported, especially point-of-care diagnostics in the outpatient sector.

In the veterinary sector, the antibiotics minimisation concept, which was updated at the end of 2022 and thus expanded to include additional animal categories, continues to pursue the goal of reducing antibiotic use in livestock farming to the therapeutically required minimum, while maintaining animal health and safeguarding animal welfare. Further, it is planned to continue and expand restrictive provisions on the use of certain antibiotics in veterinary medicine that are of critical importance in the treatment of humans. For example, the use of veterinary medicinal products for oral administration that contain colistin, an antibiotic of critical importance in the treatment of humans, is to be further restricted in food-producing animals by means of a new provision in the Ordinance on Veterinary In-House Dispensaries (TÄHAV). The use of appropriate diagnostics will also be promoted in the veterinary sector. This includes the development of rapid and mobile on-site diagnostics to detect and monitor relevant multi-resistant pathogens on poultry farms.

Action Area 4: Communication and Cooperation

There is a great need for information on the emergence and spread of AMR – both among the general public and for human and veterinary medicine professionals, animal owners and keepers, and people working in agriculture and the food processing industry. In particular, little is known about the role of the environment as a carrier and reservoir of AMR. Fact-based awareness among the general public of the problem of infections, of the link between non-targeted antibiotic treatment and AMR, and of the relationship between infectious diseases and the development of sepsis as a severe complication, aids appropriate antibiotic use. This also applies to the dissemination of information in and by specialist groups, including in further education and training.

The established formats for cross-sectoral dialogue and exchange will be continued. This applies both to the exchange on the coordination, monitoring and further development of DART 2030 in the Interministerial Working Group on AMR and to the exchange between practitioners in human and veterinary medicine, farming, water management and the environment sector. In human medicine, the “Deutschland erkennt Sepsis” (Germany Recognises Sepsis) awareness campaign, which among other things provides information on the prevention, symptoms and treatment of sepsis, will be continued. And by the end of 2025, a communication strategy is to be developed which addresses the content of and the communication channels used to disseminate public information on AMR and its effects, as well as the presentation of relevant information for the respective specialist groups.

The presentation of relevant information for professionals, the general public and the education and training of veterinarians also forms a focus of communication on AMR and antibiotic use in the veterinary sector. This information is based on regularly collected data from resistance monitoring programmes and on antibiotic use. The information is evaluated and published in reports and risk assessments on antibiotic use and AMR in the veterinary sector.

Action Area 5: European and international Cooperation

Cooperation at international level is a key component in combating AMR, which does not stop at borders. The Global Action Plan on Antimicrobial Resistance adopted in 2015 consolidates the measures that are needed globally and places great importance on building capacities to combat AMR. Under the International Pandemic Accord currently being negotiated, the regional, national and global capacities to prevent pandemics are to be strengthened by means of binding commitments. Germany advocates embedding AMR and the One Health approach into the Accord. It is also participating in the substantive preparation for the second UN High-Level Meeting on AMR planned for September 2024 and will ensure that Germany's position is incorporated into the policy declaration.

To contain the emergence and spread of AMR and also ensure the efficacy of antimicrobial medical products in the longer term, global-level collaboration is needed along with a multidimensional partnership which secures both sustainable and equitable access to essential, high-quality antimicrobial medicines. This is why Germany actively engages in international collaboration at both technological and financial level, thereby making a significant contribution to achieving the Sustainable Development Goals (SDGs). To further support and strengthen international efforts and policy processes on research and development in the field of AMR, and better coordinate relevant activities, the Global AMR Research and Development (R&D) Hub was established following the G20 talks under the German presidency in 2017. In line with the One Health approach, the Hub provides evidence-based information for stakeholders across all sectors, i.e. including human and veterinary medicine as well as environmental disciplines, while also raising awareness to and improving knowledge on AMR, making it more visible in the political process.

The prevalence of infections and the AMR burden (among humans, animals and plants) is to be reduced by means of effective water management, sanitation, hygiene and infection prevention measures. For this purpose, support is provided for infection prevention and control (IPC) programmes in hospitals and other medical facilities (hospital partnerships, up to 2027) and measures to improve water, sanitation and hygiene (WASH) infrastructure (e.g. Sanitation for Millions, up to 2025). Vaccination programmes for humans and animals as well as antibiotic stewardship (ABS) interventions all play an important role in infection prevention and appropriate use of antimicrobial substances in humans, animals and food production. Through effective communication, education and training, both knowledge and handling of AMR are to be improved. For example, training projects are to be promoted in the area of local-authority veterinary services and food safety (green innovation centres, up to 2026). This includes the establishment and expansion of laboratories along with training of laboratory personnel – including beyond major cities – in the African Regional Economic Communities (EAC and ECOWAS). The data collected in these activities provide the basis for appropriate use of antimicrobial substances and for global AMR surveillance systems. This is where monitoring of wastewater harbours great potential for cost-effective identification of AMR hotspots and the spread of AMR via the environment, especially in regions where no hospital laboratory data is available. In addition, the AMR knowledge and evidence base is to be further improved through the funding of research-related platforms – such as the One Health Research, Education and Outreach Centre in Africa (OHRECA).

Action Area 6: Research and Development

Research, innovation and development can contribute significantly to reducing AMR. This means bolstering all relevant research areas that impact human, animal and environmental health through the One Health approach – from basic research to clinical research, healthcare research, research on public health issues, environmental and climate research, and collaborative research with the healthcare and veterinary services, as well as the food production industry. An understanding of global needs and actual clinical practice is necessary and needs to be adequately considered in all phases of research and development. Thus, researchers, clinicians and relevant stakeholders from governmental agencies at local, regional and national level are required to cooperate in respective in projects.

To achieve this goal, the Federal Ministry of Education and Research (BMBF) is funding the German Centre for Infection Research (DZIF) and the Helmholtz Center for Infection Research (HZI), with a newly established Helmholtz Institute for One Health (HIOH). At the DZIF, the research areas of “antibiotic-resistant and healthcare-related bacterial infections” and “novel antibiotics” deal specifically with AMR. At the HZI, scientists of different institutes investigate research questions surrounding AMR, while one of the three departments in the newly established HIOH is specifically researching the epidemiology and ecology of AMR.

To further promote career paths of qualified junior researchers that specialize in infection research in Germany, a BMBF funding programme promotes six junior researcher groups. Four of these groups are investigating alternative strategies to combat infection with resistant bacteria. Two additional projects look at antibiotic resistance mechanisms and the spread as well as population dynamics of resistant bacterial pathogens.

By means of long-term strategic partnerships, the BMBF funds the transfer-oriented InfectoGnostics research campus that promotes the development of novel processes in applied diagnostics for reliable detection of pathogens and their antimicrobial resistance profiles as well as the development of innovative test procedures, especially point-of-care testing (POCT).

As part of European networking activities on AMR, Germany is participating until the end of 2027 in the Joint Action on Antimicrobial Resistance and Healthcare-Associated Infections (JAMRAI 2). In line with the 2017 EU Action Plan on AMR, JAMRAI 2 promotes capacity building with the aim of making Europe a best-practice region. Germany is especially involved in the two work packages on AMR surveillance and appropriate use of antibiotics.

At European level, the BMBF is a partner in the Joint Programming Initiative on Antimicrobial Resistance (JPIAMR). By 2025, the JPIAMR is to be further developed to form a European Partnership on One Health/AMR with one aim of implementing the European One Health Action Plan and the WHO Global Action Plan on Antimicrobial Resistance. As part of the European Partnership on Global Health EDCTP3 Joint Undertaking, which the BMBF co-funds, the topic of AMR is addressed with a focus on Sub-Saharan Africa.

The BMBF’s funding strategy for global health research focuses on Africa. In the Research Networks for Health Innovations in Sub-Saharan Africa, the establishment and expansion of research capacities, networking between African and German stakeholders as equal partners and

rapid translation of research results into policy and practice in Sub-Saharan Africa are funded up to 2028. Two networks focus on AMR-related research questions: The aim of the research network "STAIRS – Sub-Saharan Africa Consortium on the Advancement of Innovative Research and Care in Sepsis" aims to establish a network of African research institutions, which are able to manage and conduct sepsis-based studies in healthcare facilities and at local authority level. The research network "African One Health Network for Disease Prevention" aims to improve management of AMR (especially E. coli and salmonella) and neglected tropical diseases, as well as stewardship of antimicrobial substances.

This is also the focus of the international cooperation projects "Enhancing One Health Institutionalization in Namibia" (IOH-Nam) and "Nigeria Engaging One Health – Phase II" (NEOH) conducted under the Global Health Protection Programme (GHPP) that are partly designed to assist veterinary authorities in Namibia and Nigeria in implementing their national action plans to combat antimicrobial resistance.

Another area of focus in the BMBF's international funding involves promoting clinical studies on novel antibacterial substances, e.g. for the treatment of tuberculosis. The BMBF funds the Global Antibiotic Research & Development Partnership (GARDP), a non-profit organisation with over 70 partners from 20 countries. GARDP focuses on bacterial infections that already present with AMR or for which treatment options are currently insufficient, as seen in certain cases of sexually transmitted diseases or infectious diseases in children. The aim is to develop five new antimicrobial agents to combat drug-resistant infections by 2025 (5by25). In addition, GARDP pursues the goal of ensuring sustainable, equitable and affordable access to the newly developed treatments. Also via the BMBF, Germany funds the non-profit organisation Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator (CARB-X) since 2019. CARB-X focuses its work on priority pathogens and promotes preclinical research and development as well as clinical Phase I studies on novel antimicrobial products (therapeutics, vaccines and diagnostics). In addition to direct funding of CARB-X, the BMBF also funds the so-called CARB-X Accelerator in which the DZIF, the Federal Institute for Drugs and Medical Devices (BfArM) and the Paul Ehrlich Institute (PEI) collaborate in advising German and European applicants as well as companies already receiving funding under the CARB-X portfolio.

The BMBF also plays an active role at national level, funding research and development of novel antibiotics, alternative drugs and treatment approaches through university and non-university institutions, as well as small and medium-sized enterprises (SMEs).
The ministry of food and agriculture (BMEL) places a focus on funding innovative research and development projects aimed at reducing the incidence of infectious diseases requiring treatment with antibiotics in poultry farming in order to reduce the use of antibiotics – and especially so-called reserve antibiotics – in poultry. The aim of the "MiniAB#Broiler" project is for poultry farms that keep broiler (fattening) chickens and use high quantities of antibiotics to learn from poultry farms with comparatively low levels of antibiotic use, and to enable parameters to be identified and optimised with the aim of improving animal health and thereby reducing antibiotic use. The focus here lies in knowledge transfer between farms with low and high levels of antibiotic use. The "MAGniFlex" project aims to develop both mobile rapid tests for the detection of bacterial pathogens, antimicrobial resistance profiles and antibiotic residues in poultry farming, as well as a highly integrative, digital data collection platform to help derive and implement targeted preventive and interventional hygiene measures, thereby preventing the spread of AMR.

Annex 1 - Overview of Planned Measures

Action Area 1 – Prevention

Goal and Objective	Measure, Duration	Sectors
Improve knowledge on hygiene and infection control among the German population	Continue, strengthen and interlink Federal Centre for Health Education (BZgA) information services and campaigns with specialist information programmes of the Robert Koch Institute (RKI). **Ongoing**	Human medicine
Availability of current evidence-based recommendations on infection prevention	The Commission for Infection Prevention in Medical Facilities and in Facilities and Companies for Care and Integration at the Robert Koch Institute (KRINKO) develops, among other things, recommendations for the prevention of nosocomial and other infections. Taking account of prevailing infection epidemiological evaluations, existing recommendations are regularly reviewed and revised, and new recommendations developed. **Ongoing**	Human medicine
Greater consideration of the needs of care and integration assistance in infection prevention and control	The remit of the KRINKO was expanded as part of the revision of the IfSG in September 2022. When appointing the new KRINKO, expertise in care and integration assistance is to be added to the KRINKO portfolio. **To be implemented by Q2 2024**	Human medicine
Strengthen implementation of structures and measures for infection prevention in medical facilities	In many cases, recommendations and guidelines on hygiene and infection prevention are not adequately implemented in the facilities themselves. Potential barriers to their implementation are to be identified and suitable solutions developed. **To be implemented by the end of 2025**	Human medicine
Prevent vaccine-preventable infections	The Standing Committee on Vaccination (STIKO) at the Robert Koch Institute (RKI) develops evidence-based vaccination recommendations for the German population. The National Vaccination Schedule sets out Germany's vaccination targets. Its implementation is intended to further increase vaccination rates among the population, especially among at-risk and vulnerable groups, so that the emergence of infections and severe cases of disease are prevented. This is an effective way to reduce the need for antibiotic use. **Ongoing**	Human medicine
Evaluate the use of animal vaccines in veterinary medicine, and develop recommendations for vaccine use	The Standing Vaccination Commission for Veterinary Medicine (StIKo Vet) evaluates the use of vaccines in veterinary medicine. It publishes its recommendations on the use of vaccines and advises the Federal Government.	Veterinary medicine

	Ongoing	
Derive and evaluate new strategies to reduce the incidence of disease in organic broiler farming, giving special consideration to the gut microbiome (ProBioHuhn project)	Expand knowledge on the incidence of disease and treatment as well as AMR among three different broiler types. Inform and educate about the links between broiler type and the gut microbiome, disease rates and AMR, and taking account of, among other things, fattening capacity, housing environment and management. Derive and evaluate new strategies to reduce the incidence of disease in organic broiler farming. **Project lifecycle up to 28 February 2026**	Veterinary medicine
Identify functional active areas in the genome of cattle for improved selection of mastitis susceptibility in cattle breeding and i.a. the associated reduction in antibiotic use (BovReg project)	Develop models and methods to enable the use of functional genome information to improve selection against mastitis susceptibility in cattle through improved breeding success for immunity against mastitis. **Project lifecycle up to 29 February 2024**	Veterinary medicine
Reduce environmental releases of antibiotics and AMR	Improving and expanding wastewater treatment is an ongoing task, while measures such as introducing a so-called fourth treatment stage also aid reduction of environmental contamination with trace substances like antibiotics. To minimise antibiotic emissions from production sites, the Allgemeine Ortskrankenkasse (AOK) Baden-Württemberg (a statutory health insurance fund) examined the suitability of and then introduced bonus criteria in discount agreements to encourage producers to comply with scientifically derived and contractually agreed maximum antibiotic concentrations in production wastewater, which are also subject to monitoring and control. **Pilot project 2020-2023; follow-on pilot currently underway**	Environment

Action Area 2 – Surveillance and Monitoring

Goal and Objective	**Measure, Duration**	**Sectors**
Availability of current data on antibiotic resistance and antibiotic use in human medicine	The surveillance systems established at the RKI on antibiotic resistance (ARS) and on antibiotic use in the inpatient sector (AVS), and also the ARVIA system (ARS and AVS Integrated Analysis), which evaluates data from ARS and AVS in relation to one another, is to be continued and expanded. AVS and the surveillance system on antibiotic use (ADKA-if-DGI) also used in Germany are both being integrated. The data will also be used to comply with reporting requirements at both EU and global level. **Ongoing**	Human medicine
Monitoring of the resistance situation and antibiotic use, focusing on newly approved reserve antibiotics	In line with the Federal Joint Committee (G-BA) decision, treatment facilities which use antibiotics classified as reserve antibiotics under Section 35a SGB V participate in the AVS, ARS and ARVIA surveillance systems. In the integration of technical interfaces from ARS into the German Electronic Reporting and In-	Human medicine

	formation System for Infection Protection (DEMIS), the technical basis is to be provided for enabling data transfer via DEMIS. **To be implemented by the end of 2024**	
Strengthening surveillance of antibiotic use in the outpatient sector	In the SAMBA feasibility study (2019-2022), the feasibility of implementing a national surveillance system to monitor antibiotic use in the outpatient sector was assessed and a suitable format developed for a feedback report to prescribing physicians. The work products are to be established for the long term and the feedback report used as widely as possible. Any remaining obstacles are to be identified and solutions developed. **To be implemented by the end of 2025**	Human medicine
Public accessibility of data on fungal resistance	Resistance in fungi is also increasing and this must be monitored and taken into account in recommendations for treatment. Resistance data on fungi from AMR surveillance should be made publicly accessible on the ARS website. **To be implemented by the end of 2024**	Human medicine
Availability of prevalence data on nosocomial infections and on antibiotic use	Data and trend analyses on the prevalence of nosocomial infections and on antibiotic use are needed for the evaluation and revision of the measures introduced. The European Centre for Disease Prevention and Control (ECDC) initiates regular surveys in hospitals (PPS) and long-term care facilities (HALT), with Germany participating in both. **Project (HALT 4) runs to the end of 2024**	Human medicine
Study on the usability of wastewater monitoring for antibiotic resistant pathogens and resistance genes	In the course of the SARS-CoV-2 pandemic, Germany established a wastewater monitoring system. In research projects, the potential is to be examined for expanding wastewater monitoring to take in antibiotic resistant pathogens and resistant genes. The aim, among other things, is to identify the bacterial pathogens for which wastewater monitoring is deemed suitable and how it can supplement the ARS monitoring system which uses data from routine diagnostics. **Project runs to the end of 2025**	Human medicine Environment
Establish a system for molecular surveillance of antibiotic resistant pathogens	Cross-pathogen, integrated molecular surveillance, (IMS) which the RKI uses to link pathogen genome data with data from the reporting system in accordance with the IfSG, also covers antibiotic resistant pathogens (carbapenem-resistant, multiresistant gram-negative pathogens with resistance to four antibiotic groups and methicillin-resistant Staphylococcus aureus (MRSA). By linking this data, IMS enables both the spatial and temporal prevalence of infection cases to be detected at an early stage. Pathogen types are also recorded. This enables faster initiation of measures to contain outbreaks. **Project runs to the end of 2025**	Human medicine
Establish an integrated One Health surveillance system	Integrated analysis of data on AMR and antibiotic use from the human, veterinary and environment sectors is a key prerequisite for fact-based, cross-sectoral assessment of the resistance situation in Germany. Establishing an integrated One Health surveillance system calls for a step-by-step approach. In a first step, a website is to be created which links to surveillance data from all sectors. **To be implemented by the end of 2025**	Human medicine Veterinary medicine Agriculture Environment

National resistance monitoring of animal pathogens	Data collection on the current resistance situation concerning animal pathogenic bacteria in annual studies, i.a. to derive recommendations for treatment for veterinarians. Publication of resistance findings in annual reports. **Ongoing**	Veterinary medicine
Veterinary Drug Dispensing Registry (TAR)	Recording of the quantities of i.a. antibiotics dispensed in veterinary medicine. The quantities of antibiotic medicinal products sold to veterinarians in Germany has been recorded, evaluated and published since 2011. The results are used i.a. to evaluate the efficacy of measures introduced. They serve as a decision-making aid in introducing further measures or discontinuing existing ones. **Ongoing**	Veterinary medicine
Record quantities of antibiotics used in veterinary medicine	Recording of antibiotic use among animals in accordance with Article 57 of Regulation (EU) 2019/6. Since January 2023, the use of antimicrobial medicinal products among the animal species cattle, pigs, chickens and turkeys in the EU must be recorded and reported to the EMA on an annual basis. Antimicrobial use is to be recorded for dogs and cats as of 2025 and for various food-supplying animal species (sheep, goats, geese, ducks, fish and horses) as of 2026. The results are i.a. used to evaluate the efficacy of measures introduced. They serve as a decision-making aid in introducing further measures or discontinuing existing ones. **Ongoing**	Veterinary medicine
Monitoring AMR in the food chain as part of the AVV zoonoses food chain and salmonella eradication programmes	Acquisition of representative, comparable data to evaluate the current situation and development trends in resistance among zoonotic pathogens and commensal bacteria along the food chain, as well as other programmes, to gain an insight into the resistance situation and the underlying genetic determinants. **Ongoing**	Veterinary medicine
Various studies on the epidemiology of antibiotic resistant bacteria in animal husbandry to derive intervention strategies	Studies on gut-associated antibiotic resistant bacteria in various livestock species and husbandry systems to determine the prevalence and on-farm spread of resistant bacteria. The focus is on ESBL-producing enterobacteria. **Ongoing**	Veterinary medicine
Availability of data on antibiotics found in the environment	The UBA Pharmaceuticals in the Environment Database: Publicly available, continuously updated database on the measured environmental concentration (MEC) of human and veterinary pharmaceuticals in various environmental components (https://www.umweltbundesamt.de/en/database-pharmaceuticals-in-the-environment-1) and IPCheM Portal (europa.eu). **Ongoing**	Environment

Action Area 3 – Appropriate Use of Antibiotics Including Laboratory Diagnostics

Goal and Objective	Measure, Duration	Sectors

Availability of current infectiology guidelines for human medicine	Evidence-based medical guidelines for appropriate use of antibiotics, diagnostics and treatment of common infectious diseases are to be developed and/or updated by the scientific medical societies, taking account of current resistance data, and made available to all areas of healthcare. To enable this, use can be made of the existing funding opportunities for the development of guidelines and recommendations provided by the Innovation Fund of the Federal Joint Committee (G-BA) and the commissioning by the BMG following a proposal by the Association of the Scientific Medical Societies (*Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften*, AWMF) of the Institute for Quality and Efficiency in Health Care (IQWiG) to conduct evidence research. **Ongoing**	Human medicine
Strengthening infectiology expertise in the inpatient sector	The availability of adequately trained staff is a prerequisite for appropriate use of antibiotics and in reducing the comparatively high rate of sepsis-related deaths in German hospitals. The infectiology funding programme will continue to provide funding for staff recruitment, further and continuing training, as well as infectiology consulting services in inpatient medical facilities. **Programme lifecycle January 2023 – December 2025**	Human medicine
Strengthening infectiology expertise in the outpatient sector	The infectiology funding programme focuses exclusively on inpatient medical facilities. An assessment is to be made by the end of 2025 to examine how infectiology expertise can be promoted in the outpatient sector as well. **To be implemented by mid-2025**	Human medicine
Provision of current resistance data for product information on antibiotics	The resistance data contained in product information on approved antibiotic-containing pharmaceuticals is intended to assist users in selecting suitable antibiotics. In the feasibility study on developing an integrated electronic platform for continuous assessment of the resistance situation for approved antibiotics in Germany (AntibioResDE), a tool is to be developed and implemented for standardised evaluation of resistance data. This will enable faster and continuous updating of the data contained in product information. **Project runs to the end of 2026**	Human medicine
Strengthening the role of the Commission on Anti-infectives, Resistance and Therapy (ART)	The Commission ART at the RKI compiles recommendations containing general principles for diagnostics and antimicrobial treatments, especially for infections with resistant pathogens. It also monitors and evaluates any obstacles to appropriate antibiotic treatment. An assessment is to be made to examine how the Commission ART's role can be strengthened, such as in relation to recommendations on operational and organisational measures to promote appropriate antibiotic use. **To be implemented by the end of 2024**	Human medicine
Improving diagnostics for bacterial infection pathogens and their antibiotic resistance in the outpatient and inpatient sector	In recent years, new test methods have been developed – including for point-of-care diagnostics. These can assist rational and targeted antibiotic treatment in particular in outpatient human medicine, where the vast majority of antibiotics are prescribed. The use of diagnostics, especially point-of-care tests, is to be promoted and expanded. **To be implemented by the end of 2024**	Human medicine

Identify and publish national key indicators on the treatment frequencies regarding antibiotic use in livestock(antibiotic minimisation concept)	Annual survey and publishing of national figures as part of the antibiotic minimisation concept. The aim is to reduce the use of antibiotics and promote prudent and responsible use of antibiotics in veterinary medicine in order to reduce the risks of AMR. This is achieved by means of benchmarking antibiotic use in different animal categories of livestock at farm level and the corresponding development of farm-specific action plans to reduce antibiotic use. **Ongoing**	Veterinary medicine
Current legislative plans at the BMEL regarding national provisions on antibiotic use in veterinary medicine	• Ordinance amending the Ordinance on Veterinary In-House Dispensaries (TÄHAV) and amending other provisions. It is i.a. planned to continue and supplement restrictive provisions on antibiotic use in veterinary medicine that are of critical importance in humans medicine. **Implementation planned for 2024** • Amendment of the Act on Veterinary Medicinal Products (TAMG) with the issuance of further provisions on implementing Article 57 of Regulation (EU) 2019/6 (collection of data on the quantities of antimicrobials used in food-producing animals other than cattle, pigs, chickens and turkeys, as well as dogs and cats). **Implementation planned for 2025**	Veterinary medicine
Develop rapid and mobile on-site diagnostics to detect and monitor multiresistant pathogens in poultry farms, and of relevant antibiotic resistant genes in the One Health approach (MEDiaG)	Develop rapid and mobile on-site diagnostics for the detection and monitoring of relevant multiresistant pathogens in poultry farms. Provide the basis to enable decision-making and management of intervention measures and appropriate antibiotic treatment. **Project runs until 30 June 2026**	Veterinary medicine
Long-term minimisation of antibiotic use via quarter-selective antibiotic drying off treatment among dairy cows (MinimA)	Develop a strategy for quarter-selective drying off of dairy cows on dairy farms. Identify the potential for reducing antibiotics under practical conditions and identify sources of error and obstacles. Intensive knowledge transfer with the dairy industry, veterinary medicine and agricultural advisory services to aid strategy implementation. Following project completion, the results are to be prepared for the veterinary medicine regulation authorities. **Project runs until 31 December 2023**	Veterinary medicine

Action Area 4 – Communication and Cooperation

Goal and Objective	**Measure, Duration**	**Sectors**
Coordination, monitoring and further development of DART 2030	In the Interministerial Working Group on AMR (IMAG AMR), the ministries involved in DART 2030 work together with the authorities within their respective remits. This form of collaboration has proven valuable and is to be continued, with greater focus being placed on coordinating measures and monitoring implementation of DART 2030. **Ongoing**	All sectors

Cross-sectoral dialogue and exchange	Human and veterinary medicine each have their own discipline-specific AMR problems. Preventing the emergence and spread of AMR calls for active, cross-sectoral dialogue and exchange. Thus, in March 2023 an initial workshop was held with practitioners from human and veterinary medicine. This cross-sectoral approach is to be continued and expanded to take in other sectors, such as agriculture and the environment. **One workshop planned per year**	All sectors
Information programmes for specialist groups and the general public	Both among the general public and in specialist groups, there is a need for up-to-date information on, among other things, the resistance situation and appropriate antibiotic use. A strategy for use in providing information to specialist groups and to the general public is to be developed with the participation of communication experts and scientific medical societies. In this work, the results of relevant research projects are to be taken into account. **To be implemented by the end of Q1 2025**	Human medicine
Information programmes for specialist groups and the general public	Provision and updating of target group-specific information and teaching materials for specialist groups and the general public on the German Environment Agency (UBA) website (human and veterinary pharmaceuticals portal) with the aim of providing information about environmental impacts, practice-relevant measures to reduce environmental inputs and appropriate disposal of pharmaceutical drugs, including antibiotics. **Ongoing**	Environment
Improve knowledge on the early symptoms of sepsis	Knowledge gaps among medical personnel and among the general public on the early symptoms of sepsis can mean that both diagnosis and treatment of a sepsis infection come too late. The #DeutschlanderkenntSepsis# (Germany Recognises Sepsis) campaign uses target group-focused materials to inform about the prevention, symptoms, diagnosis and treatment of sepsis. **Project runs until the end of 2026**	Human medicine
Strengthening regional MDRO networks	In the regional MDRO networks, collaboration between hospitals, rehabilitation facilities, care homes and medical practices is coordinated by the Public Health Service with the aim of containing the spread of MDROs by means of regionally coordinated action. The network moderators meet at the RKI every two to three years to exchange experience on MDROs. **Ongoing**	Human medicine
Working Group on Antibiotic Resistance in the administrative domain of the BMEL	Regular meetings to discuss current topics, including further development of the antibiotic minimisation concept, design and structure of new requirements in EU legislation, preparation of new legislative measures, exchange of information on developments and trends in the resistance situation, and the emergence of novel resistance mechanisms. Potential intervention strategies are discussed and research needs identified. **Ongoing**	Veterinary medicine
Improving information for professionals	Provision of information on and training for prudent and responsible use of antibiotics and the legal obligations in relation to measures to reduce AMR, especially assistance for veterinarians in collecting data for recording the quantities of antibiotics used. Development of informational material, presence at professional trainings with presentations, information campaigns.	Veterinary medicine

	Ongoing	
Issuing of reports (including zoonoses monitoring report)	Preparation and provision of data collected for the competent federal and Länder authorities and for the interested general public, linking of resistance data from the different monitoring programmes with antibiotic uses in veterinary medicine and also data from human medicine. Communication of monitoring results in professional groups and for training of veterinarians. **Ongoing**	Veterinary medicine
Analysis of data from state-run antibiotic monitoring (antibiotic minimisation concept)	Provision of current risk assessments on the situation concerning antibiotic uses in farm animals, especially with regard to the treatment frequencies and quantities of antibiotics used in cattle, pigs, chickens and turkeys. **Ongoing**	Veterinary medicine
AI and data accelerator/Zoonotify – improved communication and Dash Board	Online provision of data from antibiotic resistance monitoring for zoonotic pathogens in an improved, addressee-appropriate form as sub-projects in a collaborative project. Following project completion, the dashboard is permanently available at https://zoonotify.bfr.berlin/ to enable searches for detected pathogens in a simplified database. **Project runs until 31 December 2023**	Veterinary medicine
Improving knowledge of One Health and AMR in the environment	PharmaSmart project: Targeted information campaign for pharmacists on AMR and the environment, committee work and policy consultation. **Project runs until 2025**	Human medicine Environment

Action Area 5 – European and international Cooperation

Goal and Objective	**Measure, Duration**	**Sectors**
Representing the German position on AMR in the international context	In order to make the Federal Government's position visible internationally, share Germany's AMR experience and best practices, and foster cooperation, the position of an AMR Ambassador has been established at the BMG, following the example of other countries. The main role of the Ambassador is to support international activities on AMR. **Initially until the end of 2025**	All sectors
Contributing the German position in technical working groups	A number of working groups and networks on AMR exist at both European and international level, including the EU One Health Network on AMR, the Global Taskforce on WASH in Healthcare Facilities and the Multi-Stakeholder Partnership Platform. The Federal Government is working within the scope of its possibilities to achieve the broadest possible participation in these networks. The aim is to contribute German experiences and positions, and share best practice examples. This also serves capacity building in other countries' efforts to combat AMR. **Ongoing**	All sectors

High-level international forums addressing AMR	By addressing the topic of AMR in high-level international forums, such as the G7 and G20, and adopting corresponding commitments, the objective is to raise awareness to the need for measures to combat AMR and promote implementation of the Global Action Plan on Antimicrobial Resistance. Germany is working to ensure that AMR remains on international forums' agendas. **Ongoing**	All sectors
Exchange on and coordination of R&D funding and activities focused on AMR at international level	The Global Antimicrobial Resistance Research & Development Hub (Global AMR R&D Hub) was established following the G20 consultations under the German presidency in 2017. The Hub is designed as a partnership between 17 countries, non-governmental funds and intergovernmental organisations. The Hub Secretariat located at the German Center for Infection Research (DZIF), which is currently funded by the BMBF, provides information on international R&D funding programmes to combat AMR, delivers analyses and uses its findings to produce evidence-based recommendations for action. The One Health approach lies at the forefront of the Hub's activities. **Project runs until the end of 2024**	All sectors
Embedding AMR in the International Pandemic Accord	With the current negotiations on the International Pandemic Accord, regional, national and global capacities to prevent pandemics are to be strengthened by means of binding commitments. Germany advocates embedding AMR and the One Health approach into the Accord. The idea is to strengthen existing commitments to combat AMR and make them legally binding. **Ongoing**	All sectors
Supporting the UN High-Level Meeting on AMR 2024	The second UN High-Level Meeting on AMR planned for September 2024 builds on the outcomes of the first meeting in 2016. Germany is actively involved in preparing the agenda and brings its position into the planned political declaration. **To be implemented by September 2024**	All sectors
Establish and strengthen epidemiological surveillance systems	For the Regional Network of Reference Laboratories of Economic Community of West African States (ECOWAS) region, with German support, specialist staff will be trained and equipment supplied for a total of 24 laboratories in nine ECOWAS member states. This aids the development and implementation of a regional Roadmap on Antimicrobial Resistance. Germany also supports the laboratory network in the East African Community (EAC) to establish rapid and effective diagnostics for infectious diseases and AMR. Container-based mobile laboratory units and supranational reference laboratories will be set up for the purpose. **Project runs until 2025**	Human medicine
Improve animal health and strengthen the veterinary sector	To improve husbandry conditions, biosafety and access to veterinary services, Germany assists in the provision of AMR training for veterinarians and animal health assistants in local-authority veterinary services, and in the dairy industry in Kenya, Zambia and Tunisia. In poultry production in Cameroon and Benin, training is provided on hygiene measures and rational use and handling of antimicrobial substances. **Project runs until 2025**	Veterinary medicine Agriculture Food

Strengthen research and international research dialogue and exchange	The One Health Research, Education and Outreach Centre in Africa (OHRECA), which receives funding from Germany, conducts applied research in the field of One Health, e.g. on the transmission of AMR at the human-animal-environment interface. In particular, local interventions are developed to promote more effective use of antimicrobial drugs in Sub-Saharan Africa. **Project runs until 2025**	All sectors
Strengthening antimicrobial stewardship (AMS) and infection prevention and control (PIC) in hospitals	Germany supports partnerships between healthcare facilities in Germany and Sub-Saharan Africa in the area of antimicrobial stewardship and IPC. The aim is to improve the appropriate use of antibiotics and hygiene in hospitals, and optimise wound care. Through related measures, the best-possible treatment for patients is to be ensured and the spread of resistant pathogens prevented. **Project runs until 2026**	Human medicine
Strengthening vaccination-based prevention in line with the One Health approach	Vaccination programmes can serve in reducing the use of antimicrobial drugs and also help to control the spread of AMR. Germany promotes vaccination programmes against animal disease and zoonoses, especially in rural regions in South-, West- and East Africa. **Project runs until 2026**	Veterinary medicine Agriculture Human medicine
Improving WASH (Water, Sanitation and Hygiene) in public institutions, especially healthcare facilities, schools and religious institutions	Poor sanitary facilities, a lack of handwashing opportunities and limited access to clean water in healthcare facilities promote the spread of infection and AMR. As a result, measures in this area are in many cases not only critical for overall health, but also an integral component of the fight against AMR. German-funded infrastructural measures in the field of sanitation are accompanied by training and education campaigns to improve hygiene practices, especially handwashing in healthcare facilities, schools and religious institutions. Supported countries are Colombia, Jordan, Pakistan and Uganda. In Nepal, promotion of waste management in the healthcare sector is the primary focus, while in the DR Congo, it is ensuring the supply of drinking water in healthcare facilities. **Project runs until 2024 or 2025**	Human medicine
Strengthening food safety and health-related consumer protection	Tunisian authorities are advised by Germany in the implementation of the Tunisian Food and Feed Safety Law adopted in 2019 (including safety in relation to AMR). This takes place, among other things, via training of staff, policy and organisational consultation, train-the-trainer and leadership training programmes. **Project runs until 2025**	Food
Improving international coordination and cooperation	As part of the Team Europe Initiative on Sustainable Health Security with Africa using a One Health Approach (TEI HSOH), Germany together with France, Denmark and the EU Commission assists in the implementation of the African Union Framework for Antimicrobial Resistance – for example, through informational campaigns, educational and communication programmes, and capacity building initiatives to aid implementation of the African AMR Strategy. **Project lifecycle 2024-2027**	All sectors
Funding of multilateral AMR activities	Germany participates in funding the AMR Multi-Partner Trust Fund (MPTF) of the Quadripartite Organisations (WHO, WOAH, FAO and UNEP) and the World Bank Multi-Donor Trust Fund	All sectors

	Food Systems 2030. The MPTF supports selected countries in the implementation and execution of national action plans on AMR. By strengthening international cooperation, antibiotic use is reduced in human and animal medicine and in agriculture, monitoring of AMR is improved and the development of novel antibiotics promoted. The World Bank Fund supports programmes worldwide, which serve to transform food systems and links activities to reduce inappropriate use of antimicrobial substances in farming with improved surveillance systems and national One Health platforms. **Runs until 2025**	
Capacity development among specialist personnel	As part of the WHO Special Programme for Research on Diseases of Poverty, Germany supports cross-sectoral research for improved AMR monitoring, risk assessment, prevention and diagnostics. **Project runs until 2026**	All sectors
Participation in the European Medicines Agency Network Strategy (2025): Team lead for the focal topic “Antimicrobial resistance and other emerging health threats”	Implementation of a Joint European Strategy on Antimicrobial Resistance (European Medicines Agency Network (EMA) and Heads of Medicines Agency (HMA): 1. Provision of information on the use of antimicrobial agents and of monitoring data on antimicrobial resistance in animals and humans. 2. Promotion of responsible handling of antimicrobial drugs and effective regulatory stewardship in human and veterinary medicine. 3. Provision of regulatory instruments that guarantee treatment options, while minimising the impact of resistance on public health and the environment. 4. Provision of incentives for novel and existing antimicrobial agents, including testing of and support for new business models and funding of non-profit organisations. 5. Promotion of dialogue with developers of novel antimicrobial drugs and alternatives to generic antimicrobial pharmaceuticals. 6. Improvement of regulatory provision for newly emerging health risks. **To be implemented by 31 December 2030**	Veterinary medicine Human medicine
JIACRA (Joint inter-agency report on integrated analysis of antimicrobial agent consumption and occurrence of antimicrobial resistance in bacteria from humans and food-producing animals in the EU/EEA)	Drafting of the 4th Report on Antimicrobial Consumption and Resistance in Bacteria from Humans and Food-producing Animals. An interdisciplinary working group is preparing the fourth joint inter-agency report on integrated analysis of antimicrobial agent consumption and occurrence of antimicrobial resistance in bacteria from humans and food-producing animals in the EU/EEA. **Publication 21 February 2024**	Veterinary medicine Human medicine Food

Action Area 6 - Research and Development

Institutional research funding

Goal and Objective	Measure, Duration	Sectors

Strengthening infection research with the One Health approach in Germany	Since its establishment in April 2022, the Helmholtz Institute for One Health (HIOH) has focused its interdisciplinary research on the relationships between human, animal and environmental health. The aim is to gain a better understanding of zoonotic diseases, antimicrobial resistance and the evolution of pathogens as a prerequisite for effective pandemic preparedness and prevention. Participating stakeholders: The Helmholtz Center for Infection Research (HZI), the University of Greifswald (UG), Greifswald University Medicine (UMG) and the Friedrich Loeffler Institute (FLI). **Ongoing**	Human medicine Veterinary medicine Environment
Develop strategies to combat the emergence and spread of AMR	Since its foundation in 2012, the German Center for Infection Research (DZIF) has had a dedicated research area on antibiotic resistant bacteria. In the research area “healthcare-associated and antibiotic resistant bacterial infections”, research is conducted on alternatives to conventional antibiotic treatments, such as vaccinations, microbiota-based therapies and the use of bacteriophages. Intervention strategies are developed to enable timely elimination of multiresistant bacteria, i.e. before a person becomes a risk patient. The research areas “novel antibiotics” and “gastrointestinal infections” are driving the development of novel, resistance-breaking antibiotics and patho- blockers. **Ongoing**	Human medicine
Develop novel anti-infectives	Biotechnological production platform for development of novel anti-infectives inspired by nature: At the Helmholtz Center for Infection Research (HZI), a system for process development is currently in use that enables production of active substances on a kilogram scale. The processes can be transferred to industrial enterprises which produce these substances for clinical development using good manufacturing practices (GMP). Participating stakeholders: The HZI, the Helmholtz Institute for Pharmaceutical Research Saarland (HIPS) and the DZIF. **Ongoing**	Human medicine
National project funding		
Funding of junior researchers in infection research on AMR	Six junior research groups address the topic of AMR. Four of the projects look at alternative strategies for combating infections with resistant bacteria. The other two projects look at mechanisms of antibiotic resistance and the spread, as well as population dynamics of resistant bacterial pathogens. Participating stakeholders: University of Greifswald, University of Freiburg, Kiel University, Julius-Maximilians-Universität of Würzburg, University of Cologne, and Bernhard Nocht Institute for Tropical Medicine (BNITM). **Project runs until 2027**	Human medicine
Funding of research and development of novel antibiotics and alternative agents and treatments	National initiative to secure and strengthen research and development of anti-infective agents. As part of the initiative, funding measures are addressing the topic of AMR, among other things. Participating stakeholders:	Human medicine

	University and non-university institutions as well as small and medium-sized enterprises (SMEs). **Ongoing**	
Funding of long-term strategic partnerships between science and industry	Research campus – public-private partnership for innovation: On the InfectoGnostics research campus in Jena, regional, national and international collaborations develop and combine light-based and molecular-biological processes to reliably detect pathogens (viruses, bacteria and fungi), their AMR profiles, and to better understand the host response, e.g. in cases of sepsis. The AMR Conference is the leading international platform that the InfectoGnostics research campus utilizes to enter dialogue and exchange with stakeholders involved in research transfer – such as the BEAM Alliance (Europe-wide), AMR Insights (NL), Innovate UK (UK), CARB-X (US) and DZIF (D) – and present its own research results. **Project runs until 2025**	Human medicine Veterinary medicine Environment
Risk assessment on the spread of resistance via the environment	Development of a method to assess the risk of AMR spreading via the environment as a result of human antibiotic pollution into the environment. **Project runs until 2024**	Environment
Quantification of antibiotic and resistance inputs into the environment	Development of a monitoring process for analysis of antibiotic pollution and detection of antimicrobial resistance in the environment via combined and separate sewage systems. **Project runs until 2024** Development of a national modelling tool (Modelling of Regionalized Emissions - MoRE) for modelling, among other things, of emissions of antibiotics and AMR into surface waters. **Project runs until 2024**	Environment
Quantification of antibiotics and resistance in the environment	Two projects to analyse antibiotic pollution of agricultural soil and the incidence of AMR. **Project runs until 2024**	Environment
Develop mobile rapid testing methods to detect bacterial pathogens, antimicrobial resistance profiles and antibiotic residues, and develop a highly integrative, digital data collection platform on AMR in poultry farming	Collaborative project “Magnetic amplification in poultry farming for flexible screening of infectious diseases and antibiotic resistance” (MAGniFlex). Participating stakeholders: Fraunhofer Institute for Molecular Biology and Applied Ecology (IME), South Westphalia University of Applied Sciences (FS SWF) – Department of Agriculture, Institute of Biological Information Processing (IBI-3), Forschungszentrum Jülich, ChainPoint GmbH (ChainPoint), Institute of Food Safety and Food Hygiene, Center for Veterinary Public Health, Freie Universität Berlin (FUB). **Project lifecycle: 2023 – 2026**	Veterinary medicine
Antibiotic minimisation in broiler farming via hygiene measures and optimised biosafety, animal health and antibiotic management	As part of the MiniAB#Broiler project, farms with high rates of antibiotic use learn from farms with comparatively lower antibiotic use. Relevant parameters are identified and optimised to improve animal health and ultimately reduce antibiotic use. **Project lifecycle: 2023 – 2025**	Veterinary medicine
European and international research funding		

Collaborating on and developing content for national AMR action plans by the EU member states	The "Joint Action Antimicrobial Resistance and Healthcare-associated Infections" (JAMRAI 2) serves networking between EU member states and collaboration in the development, updating and implementation of national AMR action plans. In line with the EU Action Plan on AMR from 2017, JAMRAI 2 promotes capacity building and aims to make Europe a best-practice region. Germany is especially active in the work package on surveillance and appropriate antibiotic use. **Project lifecycle: 1 January 2024 – 31 December 2027**	Human medicine Veterinary medicine
Reducing AMR using the One Health approach	Joint Programming Initiative on Antimicrobial Resistance (JPIAMR)/European Partnership One Health AMR: Further development of the JPIAMR into a European Partnership for One Health/AMR for the implementation of the European One Health Action Plan on AMR. Annual research calls with BMBF participation are planned for the funding of transnational research projects on treatment, diagnostics, surveillance, transmission and interventions. Participating stakeholders: 29 countries, projects at universities, non-university research institutions and in industry. **Runs until 2032**	Human medicine Veterinary medicine Food Environment
Supporting other countries in building capacities to combat AMR	Since 2016, via the Global Health Protection Programme (GHPP) and with funding provided by the BMG, among others, various countries in Africa and Asia receive support in establishing microbiological diagnostics, appropriate antibiotic use and infection prevention. In line with the One Health approach, the programme addresses both human and veterinary medicine. For more about the projects, including those related to AMR, see: https://ghpp.de/projekte/ **Lifecycles vary depending on the project**	Human medicine Veterinary medicine
Global Health Protection Programme: Enhancing One Health Institutionalization in Namibia (IOH Nam) Nigeria Engaging One Health – Phase II (NEOH)	Support for the veterinary authorities in Namibia and Nigeria in implementing their national action plans to combat antimicrobial resistance. Via bilateral projects, the veterinary authorities receive support in specialist consultations, establishing diagnostic capacities and implementing epidemiological field studies to record the incidence of antimicrobial resistance at the human-animal-environment interfaces. **Runs until the end of 2025**	All sectors
Global Health Protection Programme: Lead Coordinator for the WHO AMR Surveillance and Quality Assessment Collaborating Centres Network: Strengthen the global partnership on AMR (WHOCC-AMR)	The WHO AMR Surveillance and Quality Assessment Collaborating Centres Network (WHO AMR CC Network) funds joint activities of the Collaborating Centres, close gaps in AMR surveillance and quality assessment, and promote public health policy-making. The Network is coordinated by the RKI. The project includes close collaboration with the Global Leaders Group on Antimicrobial Resistance. **Project runs until the end of 2025**	Human medicine
Establish scientific capacities in Sub-Saharan Africa for the prevention of infectious disease, particularly AMR and neglected tropical diseases (NTDs)	ADAPT – African One Health Network for Disease Prevention: Management of AMR needs to be improved, especially in cases of infection with E. coli and salmonella, as well as neglected tropical diseases, alongside revised stewardship of antimicrobial substances. These measures are enacted in collaboration with national, local and regional stakeholders as part of the One	Human medicine Food

	Health approach. For example, local capacities for needs-based diagnostics are to be reviewed and strengthened, and a surveillance system established. ADAPT is one of six networks in the BMBF-funded Research Networks for Health Innovations in Sub-Saharan Africa (RHISSA). Participating stakeholders: German partners: Leipzig University, Federal Institute for Risk Assessment (BfR). African partners: Ethiopia, Democratic Republic of the Congo, Ghana, Nigeria, Senegal, Uganda. **Project runs until 2028**	
Establish a network of African research institutions able to manage and conduct sepsis-based studies in healthcare facilities and at community level	STAIRS – Sub-Saharan African ConsorTium for the Advancement of Innovative Research and Care in Sepsis: The quality of sepsis care needs to be improved through innovations to enhance diagnosis and monitoring, and standardise treatment procedures. Blood and urine samples from adults and children with sepsis are used to identify underlying pathogens and patients' immune response in order to determine markers for early and reliable detection of sepsis. An intervention study will investigate whether the clinical course of patients with sepsis can be influenced in a positive way. In addition, telemedicine expertise is to be expanded to improve early detection and diagnosis of sepsis. STAIRS is one of six networks in the BMBF-funded Research Networks for Health Innovations in Sub-Saharan Africa (RHISSA). Participating stakeholders: German partners: Charité Berlin, Heinrich Heine University Dusseldorf (HHU). African partners: Democratic Republic of the Congo, Ethiopia, Ghana, Mozambique, Nigeria, Sierra Leone and Uganda. **Project runs until 2028**	Human medicine
Product development activities		
Develop innovative compounds and novel combinations of drugs to treat tuberculosis (TB)	The international research consortium Academia and Industry United Innovation and Treatment for Tuberculosis (UNITE4TB) – a consortium of partners from industry and academia – receives funding from the Innovative Medicines Initiative 2 (IMI2). Funding provided by the BMBF enables two German associate partners to participate in the consortium. One of the funded projects focuses on the candidate anti-TB agent BTZ-043 developed at the Ludwig-Maximilians-Universität München (LMU) and the Leibniz Hans Knöll Institute (HKI) that undergoes preclinical development trials. The DZIF will establish an International Clinical Trial Unit (iCTU) in Munich which will conduct the exploratory combination studies with the candidate agent BTZ-043. **Project runs until 2027**	Human medicine
Promote preclinical research and development, and clinical Phase I studies in the field of novel antibacterial products (therapeutics, vaccines and diagnostics)	Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator (CARB-X) focuses on R&D efforts on bacterial pathogens classified in the pathogen priority lists of the WHO and the US Centers for Disease Control and Prevention (CDC) as critical/high and serious/urgent, respectively. CARB-X was established in 2016 as an internationally operating non-profit organisation located at Boston University School of Law, USA. Germany supports CARB-X via the BMBF since 2019	Human medicine

	and has representation with voting rights in the Joint Oversight Board. Participating stakeholders: Boston University, governments and foundations, including the United States Department of Health and Human Services Biomedical Advanced Research and Development Authority (BARDA), the Bill & Melinda Gates Foundation (BMGF), the Global Antimicrobial Resistance Innovation Fund (GAMRIF, UK), the Wellcome Trust (UK). **Project runs until the end of 2026**	
Funding of research and development of antibiotics in the early stage of substance development as well as clinical development. The aim is to develop five new treatments to combat drug-resistant infections by 2025 (5by25).	The Global Antibiotic Research and Development Partnership (GARDP) focuses on bacterial pathogens that already present with AMR or for which current treatment options are insufficient, e.g. certain sexually transmitted diseases and antibiotics for children. GARDP also aims to ensure sustainable, equitable and affordable access to the newly developed antibiotics. GARDP is a non-profit initiative launched in 2016 by the WHO and the Drugs for Neglected Diseases initiative (DNDi). Germany is a founding member of GARDP. GARDP became an independent organisation in 2019. The BMBF has representations with voting rights on the Governing Board as well as on the Strategic Partnership Committee. Participating stakeholders: Over 70 partners from the public and private sectors in more than 20 countries, notably Germany, the UK, the Netherlands, Japan and Switzerland. **Project runs until 2027**	Human medicine

Annex 2 –Indicators and Targets for Human Medicine

The indicators and targets are to be regularly reviewed over the coming years and aligned to new scientific findings where appropriate.

Indicator	**2030 Target**
Incidence of methicillin-resistant Staphylococcus aureus (MRSA) bloodstream infections (number per 100,000 population)	10% reduction compared with the 2019 baseline
Incidence of third-generation cephalosporin-resistant Escherichia coli bloodstream infections (number per 100,000 population)	12% reduction compared with the 2019 baseline
Incidence of carbapenem-resistant Klebsiella pneumoniae Bloodstream infections (number per 100,000 population)	2% reduction compared with the 2019 baseline
Incidence of vancomycin-resistant Enterococcus faecium (VRE) bloodstream infections (number per 100,000 people)	20% reduction compared with the 2019 baseline
Total consumption of antibiotics in the community and hospital sectors combined, including long-term care facilities (DDD per 1000 inhabitants per day)	9% reduction compared with the 2019 baseline
Percentage of consumption of Access group antibiotics out of consumption of all antibiotics (Access, Watch, Reserve, Unclassified) listed in the AWaRe classification (https://www.who.int/publications/i/item/2021-aware-classification)	At least 65% of antibiotics used are in the Access group
Reduction of sepsis-related deaths	30% reduction compared with the 2019 baseline

List of Abbreviations

ADAPT	African One Health Network for Disease Prevention
ADKA-if-DGI	Bundesverband deutscher Krankenhausapotheker e.V. – Infektiologie Freiburg – Deutsche Gesellschaft für Infektiologie (Federal Association of German Hospital Pharmacists – Freiburg University Hospital Infectious Diseases Department – German Center for Infection Research)
AI	Artificial Intelligence
AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
AOK	Allgemeine Ortskrankenkasse (a statutory health insurance fund)
ARS	Antibiotic Resistance Surveillance
ART	Commission on Anti-infectives, Resistance and Therapy
ARVIA	Antimicrobial Resistance and Consumption – an integrated analysis
AVS	Antibiotika-Verbrauchs-Surveillance (Antimicrobial Use Surveillance)
AVV	Allgemeine Verwaltungsvorschrift (General Administrative Act)
AWaRe	Access, Watch and Reserve
AWMF	Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften (Association of the Scientific Medical Societies)
BfArM	Federal Institute for Drugs and Medical Devices
BfR	German Federal Institute for Risk Assessment
BMBF	Federal Ministry of Education and Research
BMEL	Federal Ministry of Food and Agriculture
BMG	Federal Ministry of Health
CARB-X	Combating Antibiotic-Resistant Bacteria Biopharmaceutical Accelerator
CDC	Centres for Disease Control and Prevention
DART	Deutsche Antibiotika-Resistenz-Strategy (German Antimicrobial Resistance Strategy)
DDD	Defined Daily Dose
DEMIS	Deutsches Elektronisches Melde- und Informationssystem für den Infektionsschutz (German Electronic Reporting and Information System for Infection Protection)
DNDi	Drugs for Neglected Diseases Initiative
DZIF	Deutsches Zentrum für Infektionsforschung (German Center for Infection Research)
EAC	East Africa Community
ECDC	European Centre for Disease Prevention and Control

ECOWAS	Economic Community of West African States
EDCTP	European & Developing Countries Clinical Trials Partnership
EEA	European Economic Area
EMA	European Medicines Agency
ESBL	Extended Spectrum β-Lactamase
EU	European Union
EEA	European Economic Area
FAO	Food and Agriculture Organization of the United Nations
FH SWF	South Westphalia University of Applied Sciences
FLI	Friedrich Loeffler Institute
FUB	Freie Universität Berlin
G20	Group of Twenty
G7	Group of Seven
GARDP	Global Antibiotic Research and Development Partnership
G-BA	Gemeinsamer Bundesausschuss (Federal Joint Committee)
GHPP	Global Health Protection Programme
GMP	Good Manufacturing Practice
HALT	Healthcare-associated infections in long-term care facilities
HIOH	Helmholtz Institute for One Health
HIPS	Helmholtz Institute for Pharmaceutical Research Saarland
HKI	Leibniz Institute for Natural Product Research and Infection Biology Hans Knöll Institute
HMA	Heads of Medicines Agency
HZI	Helmholtz Centre for Infection Research
IBI-3	Institute of Biological Information Processing
iCTU	International Clinical Trial Unit
IfSG	German Infection Protection Act
IMAG AMR	Interministerielle Arbeitsgruppe AMR (Interministerial Working Group on AMR)
IME	Fraunhofer Institute for Molecular Biology and Applied Ecology
IMI2	Innovative Medicines Initiative
IMS	Integrated Molecular Surveillance
IOH Nam	Enhancing One Health Institutionalization in Namibia
IPC	Infection Prevention and Control
IQWiG	Institut für Qualität und Wirtschaftlichkeit im Gesundheitswesen (Institute for Quality and Efficiency in Health Care)
JAMRAI	Joint Action on Antimicrobial Resistance and Healthcare-associated Infections
JIACRA	Joint inter-agency Antimicrobial Consumption and Resistance Analysis
JPIAMR	Joint Programming Initiative on Antimicrobial Resistance

AI	Artificial Intelligence
KRINKO	Commission for Infection Prevention in Medical Facilities and in Facilities and Companies for Care and Integration
LMU	Ludwig-Maximilians-Universität München
MDRO	Multidrug-resistant organism
MEC	Measured Environmental Concentration
MPTF	Multi-Partner Trust Fund
MRSA	Methicillin-resistant Staphylococcus aureus
NEOH	Nigeria Engaging One Health
NTD	Neglected Tropical Diseases
ÖGD	Öffentlicher Gesundheitsdienst (Public Health Service)
OHRECA	One Health Research, Education and Outreach Centre in Africa
PEI	Paul Ehrlich Institute
POCT	Point-of-care Tests
PPS	Point prevalence survey of healthcare-associated infections and antimicrobial use in European acute care hospitals
R&D	Research & Development
RHISSA	Research Networks for Health Innovations in Sub-Saharan Africa
RKI	Robert Koch Institute
SAMBA	Surveillance des ambulanten Antibiotikaeinsatzes (Surveillance of antibiotic use in the outpatient sector)
SARS-CoV-2	Severe acute respiratory syndrome coronavirus type 2
SDGs	Sustainable Development Goals
SGB V	Sozialgesetzbuch V (German Social Code Book V)
STAIRS	Sub-Saharan Africa ConsorTium for the Advancement of Innovative Research and Care in Sepsis
STIKO	Standing Committee on Vaccination
StIKo Vet	Standing Vaccination Commission for Veterinary Medicine
TAR	Tierarzneimittelabgabemengenregister (Veterinary Medicinal Product Dispensing Volume Register)
TB	Tuberculosis
TEI HSOH	Team Europe Initiative on Sustainable health Security with Africa using a One Health Approach
UBA	German Environment Agency
UG	University of Greifswald
UMG	Greifswald University Medicine
UN	United Nations
UNEP	United Nations Environment Programme
Unite4TB	Academia and Industry United Innovation and Treatment for Tuberculosis
VO	Verordnung (Regulation)

VRE	Vancomycin-resistant enterococci
WASH	Water, Sanitation, Hygiene
WHO	World Health Organization
WHO CC	WHO Collaborating Centre
WOAH	World Organization for Animal Health

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632@bmg.bund.de
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