EU-JAMRAI-2 Survey on existing environmental AMR surveillance in Europe - goals, sampling and indicators

Fields marked with * are mandatory.

1 Introduction

Background

Antimicrobial resistance (AMR) is one of the most serious cross-border threats to health. To mitigate AMR, a One Health approach is needed, considering the interconnection between humans, animals and the environment.

Following the 2017 EU One-Health Action Plan against AMR and the 2023 Council Recommendation, the European Commission has financed a 2nd European Joint Action on AMR and Healthcare-associated infections (EU-JAMRAI-2) within the EU4Health programme. This project brings together 128 partners from the EU, Iceland, Norway and Ukraine, and will last from 2024 to 2027. For more information on EU-JAMRAI-2, please visit the website here: https://eu-jamrai.eu/.

EARS-Env
EU-JAMRAI-2 aims to establish a European One Health community among countries, institutions, and sectors to combat AMR. Among its activities is the development of a European surveillance network for AMR in the environment: EARS-Env. Within EARS-Env, the objectives and setup of environmental AMR surveillance (matrices, samples, and indicators) will be summarized, and a blueprint and guidance for a common environmental AMR surveillance will be developed, and subsequently piloted in the 16 participating countries. “The environment” is understood as the living environment (water, soil, air), including modifications by various discharges (wastewater, hospital effluents), or amendments (organic amendment, slurry, manure, sludge).

Surveys
To achieve this, two separate but related surveys have been developed. The outcomes of the surveys will serve as input for the development of the above-mentioned guidance and protocols for environmental AMR surveillance. The surveys address two objectives:

A) This survey aims to draw up an inventory of existing AMR monitoring of environmental compartments (wastewaters, soils etc).

B) The second survey will examine surveillance objectives, samples / matrices and indicators desirable for future environmental AMR surveillance (Please use this link to survey B: Future environmental surveillance)

Survey A Structure: Existing Environmental Surveillance

The survey has the following structure:

- Consent
- Participant profile
- Existing environmental surveillance
- Satisfaction
- Annexes

Survey A on existing environmental surveillance includes the responsible sector/actors, objectives, sampling, indicators, laws/regulations, data linkages, representativeness and usefulness of environmental surveillance systems that you are aware of.

Deadlines

The final date to receive responses is 15th March 2025.
Reminders will be sent one month and two weeks before the final dates.

Annexes (top right corner of the screen)

A list of human and veterinary antimicrobials and AMR genes is available in Annex 1.
A list of term definitions together with the related EU regulations is available in Annex 2.

Contact

For questions, please email your national contact point.

Thank you very much for your valuable contributions.

On behalf of the full team of EU-JAMRAI 2 work package 8.3 - Roosmarijn Luiken, Luis Lucena, Thibault Stalder,

Christophe Dagot and Heike Schmitt.

2 Practical instructions and FAQ's

IMPORTANT WHEN SUBMITING YOUR RESPONSE:

Due to technical issues, there is a need to wait around 10 minutes for the survey's submission button to appear when finalising your response. After pressing the submission button, one should land in a confirmation page where you can download your pdf submission containing a contribution ID to your indicated email.

Please remember to save a draft when completing the survey and right before submitting. When reloading your draft response from your draf link, it may appear blank but it can take around 10 minutes for all the saved answers to appear, so you need to wait until then to submit. If you submitted your response and you did not land in a confirmation page, you most probably did not succeed in the submitting process.

It is also not possible to add more than 3 surveillance systems per survey as there will be difficulties when submitting. Therefore, we recommend you create another survey response for additional surveillance systems.

For any issue encountered after following our recommendations, please contact directly the email indicated in our EU survey at the right panel.

What is understood as surveillance in this survey?

For this questionnaire, a surveillance system is defined as a structured approach targeting specific environmental compartments (such as wastewater, or surface water, or soil), with a set selection of sampling sites, frequencies of sampling and indicators such as specific resistant bacteria and/or resistance genes.

What types of surveillance are within scope of this questionnaire?

- Ongoing surveillance conducted within existing legal frameworks
- Ongoing, repeated surveillance in environmental compartments not required through existing legal frameworks
- Surveillance conducted as a pilot study, repeated or at a single time point, by governmental institutions, or research organizations / universities

Can surveillance systems of local / regional scale, and surveillance executed by research institutions also be included?

Activities at local, regional scale and at national scale can be entered into the questionnaire. Also, we encourage inclusion of surveillance executed by research organisations, if environmental surveillance is a major goal of a research study.

The reason for this is that we expect that very few ongoing, repeated surveillance systems exist at national levels, and on the other hand are aware of a number of pilot studies and research projects that are aiming at providing methodology for systematic surveillance. We also realize that for some countries with strong regional differences, different regional approaches are used. We are aware that a complete listing of all research studies into environmental surveillance may be unattainable. We leave it to the national experts working within EU-JAMRAI-2 to identify relevant research studies conducted within their respective country.

Who can fill in the questionnaire?

This questionnaire is open to experts involved in current environmental surveillance activities. Each expert

consulted should focus on surveillance systems within their domain of expertise. Collaboration with colleagues and other experts is encouraged to provide comprehensive responses.

Answers can be submitted directly. However, for some countries, answers are collected by one national contact point. If you are aware of other experts who should be consulted, please let the contact person in your country know.

Survey platform

The questionnaire is publicly available and runs on the EU survey platform. It can be answered without an EU login. Please be aware that we will not accept any response or data outside this platform.

How long will it take me to fill in this survey?

The estimated time to complete the survey ranges from 1 to 4 hours, depending on the complexity and scope of the systems to be reported.

Can I save a draft while working on the survey?

Respondents can save drafts multiple times and are encouraged to test this functionality early to avoid data loss. Ensure your final draft is saved before submission.

Can my contribution be modified or submitted after the submission deadline?

Only in exceptional circumstances (e.g. technical issues or data errors) will it be possible to extend the deadline or allow re-submission. We strongly recommend that you allow yourself sufficient time ahead of the submission deadline to input your response. We also recommend you save your draft frequently and review thoroughly before final submission.

If you want to report on another environmental surveillance system after your initial submission, you can always use the survey link and submit another survey.

How will the results be used?

Survey responses will guide the development of standardized protocols and sampling strategies for environmental surveillance, contributing to more integrated systems aligned with the One Health framework.

The survey aims to offer a detailed overview of ongoing and planned activities, research initiatives, and policies addressing AMR, enabling better national and partner inventories.

After data analysis, interpretation, and consultation, the results of all contributing countries in this survey will be published in a scientific journal.

A pilot on environmental AMR surveillance will be organized in a second phase of EU-JAMRAI-2.

Will my contribution to this survey be anonymous?

Yes, the name of each specific respondent and all accompanying personal data (email addresses, etc.) will be strictly anonymized in the resulting scientific publication, deliverables, EU-JAMRAI-2 policy reports and in any other communication and dissemination materials.

Will my contribution to this survey be acknowledged?

All contributors will be acknowledged in publications in a special acknowledgement section in the form they prefer (ie, name and/or institution). If you are interested in a more formal recognition of your contribution (e. g. co-authorship with associated responsibilities) you can let us know via your country contact point.

How will my personal data be used?

As this online service collects and further processes personal data, Regulation (EU) N° 2018/1725 of the European Parliament and of the Council of 23 October 2018 on the protection of individuals with regard to the processing of personal data by the Community institutions and bodies and on the free movement of such data, is applicable.

The personal data collected and further processed are data necessary for the participation in this questionnaire, namely organization, country of residence and your contact details (name and email of the contributors). These will be only used to contact the respondents in case we have additional questions (e.g. whether SOPs could be supplied).

For the collection of data in this survey, we rely on the EU Survey external system. For more information on how EU Survey processes personal data, please see: https://ec.europa.eu/eusurvey/home /privacystatement.

How long do we keep your data?

Your personal data will remain in the database until the results have been completely analyzed and exploited for EU-JAMRAI-2. The project EU-JAMRAI-2 ends in December 2027.

3 Consent

Your consent to the processing of your data

When you submit this questionnaire, you consent that EU-JAMRAI-2 will process your personal data provided in the questionnaire as explained in this data protection statement. You may also withdraw your consent later at any time. However, this will not affect the lawfulness of any data processing carried out before your consent is withdrawn.

* 3.1 Please confirm that you have read and understood the Data Protection Statement above and that you consent to the processing of your personal data:

- ☐ Yes
- ☐ No

* 3.2 Please confirm that you consent to the publication of your anonymized survey responses in EU-JAMRAI-2 reporting and possible scientific publications:

- [ ] Yes
- [ ] No

* 3.3 Please confirm that you consent to possibly be contacted by EU-JAMRAI-2 survey organizers in relation to your responses to support the finalization of this survey:

- [ ] Yes
- [ ] No

* 3.4 I would like to be acknowledged in the acknowledgement section of a possible publication:

- [ ] Yes
- [ ] No

* 3.5 For acknowledgements, please use the following (we suggest name and institution but are open to other possibilities):

50 character(s) maximum

4 Participant profile

* 4.1 Which country are you working in?

- ( ) Afghanistan
- ( ) Albania
- ( ) Algeria
- ( ) American_Samoa
- ( ) Andorra
- ( ) Angola
- ( ) Anguilla
- ( ) Antigua_and_Barbuda
- ( ) Argentina
- ( ) Armenia
- ( ) Aruba
- ( ) Australia
- ( ) Austria
- ( ) Azerbaijan
- ( ) Bahamas
- ( ) Bahrain
- ( ) Bangladesh
- ( ) Barbados
- ( ) Belarus
- ( ) Belgium
- ( ) Belize
- ( ) Benin
- ( ) Bermuda

- Bhutan
- Bolivia
- Bosnia_and_Herzegovina
- Botswana
- Brazil
- British_Virgin_Islands
- Brunei_Darussalam
- Bulgaria
- Burkina_Faso
- Burundi
- Cambodia
- Cameroon
- Canada
- Cape_Verde
- Cayman_Islands
- Central_African_Republic
- Chad
- Chile
- China
- Colombia
- Comoros
- Congo
- Costa_Rica
- Cote_dIvoire
- Croatia
- Cuba
- Curaçao
- Cyprus
- Czechia
- Dem_Peoples_Rep_of_Korea
- Democratic_Republic_of_the_Congo
- Denmark
- Djibouti
- Dominica
- Dominican_Republic
- Ecuador
- Egypt
- El_Salvador
- Equatorial_Guinea
- Eritrea
- Estonia
- Eswatini
- Ethiopia
- Faroe_Islands
- Fiji
- Finland
- France

- French_Polynesia
- Gabon
- Gambia
- Georgia
- Germany
- Ghana
- Gibraltar
- Greece
- Greenland
- Grenada
- Guam
- Guatemala
- Guernsey
- Guinea
- Guinea_Bissau
- Guyana
- Haiti
- Holy_See
- Honduras
- Hungary
- Iceland
- India
- Indonesia
- Iran
- Iraq
- Ireland
- Isle_of_Man
- Israel
- Italy
- Jamaica
- Japan
- Jersey
- Jordan
- Kazakhstan
- Kenya
- Kosovo
- Kuwait
- Kyrgyzstan
- Laos
- Latvia
- Lebanon
- Lesotho
- Liberia
- Libya
- Liechtenstein
- Lithuania
- Luxembourg

- Madagascar
- Malawi
- Malaysia
- Maldives
- Mali
- Malta
- Marshall_Islands
- Mauritania
- Mauritius
- Mexico
- Moldova
- Monaco
- Mongolia
- Montenegro
- Montserrat
- Morocco
- Mozambique
- Myanmar
- Namibia
- Nepal
- Netherlands
- New_Caledonia
- New_Zealand
- Nicaragua
- Niger
- Nigeria
- North_Macedonia
- Northern_Mariana_Islands
- Norway
- Oman
- Pakistan
- Palau
- Palestine
- Panama
- Papua_New_Guinea
- Paraguay
- Peru
- Philippines
- Poland
- Portugal
- Puerto_Rico
- Qatar
- Romania
- Russia
- Rwanda
- Saba
- Saint_Kitts_and_Nevis

- Saint_Lucia
- Saint_Vincent_and_the_Grenadines
- Samoa
- San_Marino
- Sao_Tome_and_Principe
- Saudi_Arabia
- Senegal
- Serbia
- Seychelles
- Sierra_Leone
- Singapore
- Sint_Eustatius
- Sint_Maarten
- Slovakia
- Slovenia
- Solomon_Islands
- Somalia
- South_Africa
- South_Korea
- South_Sudan
- Spain
- Sri_Lanka
- Sudan
- Suriname
- Sweden
- Switzerland
- Syria
- Taiwan
- Tajikistan
- Thailand
- Timor_Leste
- Togo
- Tonga
- Trinidad_and_Tobago
- Tunisia
- Turkey
- Turks_and_Caicos_islands
- Uganda
- Ukraine
- United Kingdom
- United_Arab_Emirates
- United_Kingdom
- United_Republic_of_Tanzania
- United_States_of_America
- United_States_Virgin_Islands
- Uruguay
- Uzbekistan

- Vanuatu
- Venezuela
- Vietnam
- Wallis_and_Futuna
- Western_Sahara
- Yemen
- Zambia
- Zimbabwe

* 4.2 What type of institution do you work for?

between 1 and 13 choices

- Ministry of Environment
- Ministry of Health
- Ministry of Agriculture
- Ministry, other
- Governmental institute (environmental domain / environmental protection agency)
- Governmental institute (human / public health domain)
- Governmental institute (animal health domain)
- Governmental institute (other)
- Research Institution / Academia / University
- Healthcare institution
- NGO / non-profit organisation
- Waterboard / water sector
- Other

4.3 Other institution:

100 character(s) maximum

* 4.4 At which territorial scale do you mainly work in your country?

- National
- Regional
- Local
- Other

4.5 Please describe 'other'

50 character(s) maximum

4.6 Can you give contact details of the person / persons that helped complete this survey, one for each surveillance system that is included in your answers? If it is just you/one person, just fill one row.

	Name of institution	Type of institution	Name and surname of contact person	Email	Name of surveillance system for which the contact person provided details
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

5 Mapping existing environmental surveillance systems

A 'surveillance system' is defined here as a coherent approach towards environmental surveillance in one or more environmental compartments that uses a set of common indicators in a common set of samples in one timeframe. This includes

- national, regional and local surveillance systems,
- surveillance conducted regularly and repeatedly, but also surveillance executed only once in time (surveillance pilots),
- surveillance executed by governmental agencies, but also surveillance executed by research institutes.

* 5.1 Do you - or did you previously - have a surveillance system in place for antimicrobial resistance or other general pollutants that are related to AMR (such as antibiotics, or fungicides) in an environmental compartment?
  - Yes (questions about the system will appear)
  - No (please consider answering survey B 'future environmental surveillance')

5.1 Existing environmental surveillance system 1

Please answer the following questions for **one single environmental surveillance system** of which you have expert knowledge.

More surveillance systems:
If you are aware / are an expert of multiple surveillance systems that differ with respect to their environmental compartment or geographical range or if the surveillance system you would like to describe changed significantly over time (or differ in an other way), please enter them in additional subsections. These will open based on the last question in this section "Do you want to describe another surveillance system?". If you answer yes, an additional question set will appear for completion.

* 5.1.1 In which environmental compartment is the surveillance taking place that you want to describe with this survey? *(questions will appear after selection)*
  - Wastewater
  - Surface water (and/or ground water)
  - Soil environment (including manure and sludge)
  - Other (e.g. air)

5.1.2 What is the name of the surveillance system?

Text of 1 to 120 characters will be accepted

5.1.3 The authority or institution in charge is:
  - Governmental
  - Non-governmental (ie academic)
  - Other

5.1.4 Please specify 'other':

50 character(s) maximum

5.1.5 Please name the corresponding authority, institution and or expert group in charge of this surveillance.

100 character(s) maximum

5.1.6 Does the National Action Plan of your country contain activities in the environmental domain?

- ☐ Yes, including for environmental surveillance
- ☐ Yes, for other activities
- ☐ No
- ☐ I don't know

* 5.1.7 Is this surveillance executed as one activity within the National Action Plan of your country?

- ○ Yes
- ○ No
- ○ I don't know

5.1.8 Please share links to any publicly available information (i.e. webpage, scientific paper, databases, data warehouse, open repositories, dashboards, etc):

800 character(s) maximum

5.1.1 Sectors and actors implementing the surveillance

* 5.1.1.1 Which institution is responsible for carrying out the sampling? Please select all that apply.

between 1 and 14 choices

- ☐ Ministry of Environment
- ☐ Ministry of Health
- ☐ Ministry of Agriculture
- ☐ Ministry, other
- ☐ Governmental institute (environmental domain / environmental protection agency)
- ☐ Governmental institute (human / public health domain)
- ☐ Governmental institute (animal health domain)
- ☐ Governmental institute (other)
- ☐ Research Institution / Academia / University
- ☐ Healthcare institution
- ☐ NGO / non-profit organisation
- ☐ Waterboard / water sector
- ☐ Other
- ☐ National Reference Laboratory

5.1.1.2 Please specify 'other':

50 character(s) maximum

* 5.1.1.3 Who is carrying out the sample analysis and data analysis? Please select all that apply.

between 1 and 14 choices

- Ministry of Environment
- Ministry of Health
- Ministry of Agriculture
- Ministry, other
- Governmental institute (environmental domain / environmental protection agency)
- Governmental institute (human / public health domain)
- Governmental institute (animal health domain)
- Governmental institute (other)
- Research Institution / Academia / University
- Healthcare institution
- NGO / non-profit organisation
- Waterboard / water sector
- Other
- National Reference Laboratory

5.1.1.4 Please specify 'other':

50 character(s) maximum

* 5.1.1.5 Who is financing this surveillance? Please select all that apply.

between 1 and 14 choices

- Ministry of Environment
- Ministry of Health
- Ministry of Agriculture
- Ministry, other
- Governmental institute (environmental domain / environmental protection agency)
- Governmental institute (human / public health domain)
- Governmental institute (animal health domain)
- Governmental institute (other)
- Research grants to Research institution / Academia / University
- Healthcare institution
- NGO / non-profit organisation
- Waterboard / water sector
- Other
- National Reference Laboratory

5.1.1.6 Please specify 'other':

50 character(s) maximum

5.1.1.7 Are any experimental research sites, public health observatories or living labs at national/regional level involved?

100 character(s) maximum

5.1.2 Objectives

5.1.2.1 What is the main purpose of this surveillance system?

- ☐ Provide information about patterns and trends in AMR (including identification of emission sources)
- ☐ Support and inform risk analysis of AMR in the environment
- ☐ Alert on emergence and evolution of AMR
- ☐ Assess the effectiveness of interventions
- ☐ Wastewater-based epidemiology: provide data on AMR in the human population
- ☐ Other

5.1.2.2 What 'other' purpose:

100 character(s) maximum

5.1.3 Design of sampling

5.1.3.1 Please tick below the wastewater subcompartment you are assessing within this surveillance system:

- ☐ Municipal WasteWater (WW)
- ☐ Hospital WW
- ☐ LTCF (long-term care facility) WW
- ☐ Animal husbandry WW
- ☐ Aquaculture WW
- ☐ Industrial effluents
- ☐ Reused water
- ☐ Urban water runoff
- ☐ Other

5.1.3.2 Please tick below the surface water subcompartment you are assessing within this surveillance system:

- ☐ Inland water at river basins, including streams, rivers and lakes
- ☐ Transitional water, including river mouths, estuaries and deltas
- ☐ Snow, glacier, permafrost
- ☐ Coastal water, including wetlands, swamps and marshes but excluding marine/oceanic water
- ☐ Storm water
- ☐ Drinking water
- ☐ Recreational water
- ☐ Groundwater

- [ ] Other

5.1.3.3 Please tick below the soil you are assessing according to the land cover and land use terminology and hierarchy system Copernicus nomenclature within this surveillance system:

- [ ] Agricultural soils
- [ ] Wetlands
- [ ] Urban soils
- [ ] Artificial soils
- [ ] Forest and seminatural areas
- [ ] Other
- [ ] None of the above

5.1.3.4 Please specify which 'other' compartment or sub-compartment is addressed in the surveillance:

50 character(s) maximum

5.1.3.5 For wastewater experts: In your country is hospital wastewater being emitted into the general urban sewer system or is hospital wastewater treated prior to discharge to the sewer system?

500 character(s) maximum

5.1.3.6 Please tick below soil interventions / manipulations (if any) that are monitored within this surveillance system:

- [ ] Irrigation
- [ ] Irrigation with re-used wastewater
- [ ] Fertilisation with manure
- [ ] Fertilisation with sludge
- [ ] Other
- [ ] None of the above

5.1.3.7 Please describe the 'other' manipulation:

50 character(s) maximum

5.1.3.8 Please provide the type of sample (material, location etc) if you are responding to the "Other" surveillance system.

100 character(s) maximum

5.1.3.9 You can provide further explanation on the compartments / subcompartments of this surveillance here if necessary

500 character(s) maximum

5.1.3.10 In what year did the first sampling take place?

(use 01/01/20xx as format)

5.1.3.11 Is there already an end date set for the sampling?

- Yes
- No, it will continue (with an unknown end date)
- I don't know

5.1.3.12 In what year will the last sampling take place?

(use 01/01/20xx as format)

5.1.3.13 How often are samples collected?

- Daily
- More than one day per week
- Weekly
- Monthly
- Every 3 (2-4) months
- Every 6 (or 5-11) months
- Once per year
- It varies per sampling site and/or target
- Other frequency

5.1.3.14 Please shortly describe the frequency:

500 character(s) maximum

5.1.3.15 How often are samples collected?

400 character(s) maximum

5.1.3.16 How many sampling sites are included in the surveillance system?

Text of 1 to 4 characters will be accepted

5.1.3.17 Are samples taken specifically for this surveillance, or are they obtained in the course of another activity?

- Specifically sampled for this surveillance system
- Obtained in another sampling activity
- Both

- I don't know

5.1.3.18 Please specify the 'other' activity, if applicable:

100 character(s) maximum

5.1.3.19 Is a Standard Operational Procedure for sampling applied?

- Yes
- No
- I don't know

5.1.4 Surveillance Indicators

5.1.4.1 Which AMR or AMR-related indicator are you monitoring in this surveillance system?

between 1 and 7 choices

- Antibiotic-resistant bacteria
- Antibiotic resistance genes (including the metagenome)
- Antimycotic-resistant fungi
- Microbiological fecal indicators
- Other microorganisms / genetic information (e.g. MGE)
- Antimicrobials/ Antimicrobial residues
- Other AMR related indicators

5.1.4.2 **Surveillance Indicators - resistant bacteria**

Are specific antibiotic-resistant bacteria being monitored through selective isolation?

between 1 and 9 choices

- *Acinetobacter baumannii*, carbapenem-resistant
- *E. coli* / Enterobacterales, carbapenem-resistant
- *E. coli* / Enterobacterales, 3rd and/or 4th generation cephalosporin-resistant
- *E. coli* / Enterobacterales, 1st and 2nd generation cephalosporin-resistant
- *Enterococcus faecium,* vancomycin-resistant
- Non-typhoidal Salmonella, fluoroquinolone-resistant
- *Pseudomonas aeruginosa*, carbapenem-resistant
- *Staphylococcus aureus*, methicillin-resistant
- Other

5.1.4.3 Which other antibiotic-resistant bacteria are monitored?

100 character(s) maximum

5.1.4.4 How are the isolated bacteria further characterised?

- Tested for phenotypic resistance (MIC)
- Resistance genes by PCR
-

WGS (part of the isolates)

- [ ] WGS (all isolates)

5.1.4.5 Are specific bacteria being monitored through isolation followed by characterisation of their resistance profile?

between 1 and 9 choices

- [ ] *Acinetobacter baumannii*
- [ ] *E. coli*
- [ ] *Klebsiella pneumoniae*
- [ ] Enterobacterales
- [ ] *Enterococcus faecium* and/or *faecalis*
- [ ] Non-typhoidal Salmonella
- [ ] *Pseudomonas aeruginosa*
- [ ] *Staphylococcus aureus*
- [ ] Other

5.1.4.6 Which other bacteria are monitored?

100 character(s) maximum

5.1.4.7 **Surveillance Indicators - resistant fungi**

Which antimycotic-resistant fungi are monitored?

between 1 and 4 choices

- [ ] *Aspergillus fumigatus*
- [ ] *Candida albicans*
- [ ] *Candida auris*
- [ ] Other

5.1.4.8 Which other antimycotic-resistant fungi are monitored?

100 character(s) maximum

5.1.4.9 Which antimycotic resistance genes are monitored in relation to the antimycotic families shown below?

- [ ] Azoles
- [ ] Amphotericin B
- [ ] Echinocandins
- [ ] Terbinafine
- [ ] Others

5.1.4.10 Which other antimycotic resistance genes are monitored?

100 character(s) maximum

5.1.4.11 **Surveillance Indicators - Genes**

Are antibiotic resistance genes for the gene families below monitored?

- ☐ Aminoglycosides
- ☐ Amphenicols
- ☐ Carbapenems and monobactams
- ☐ First- and second-generation cephalosporins
- ☐ Fluoroquinolones
- ☐ Glycopeptides
- ☐ Imidazole derivatives
- ☐ Lincosamides and Streptogramins
- ☐ Macrolides
- ☐ Penicillins
- ☐ Polymyxins
- ☐ Tetracyclines
- ☐ Third- and/or fourth-generation cephalosporins
- ☐ Trimethoprim/sulphonamides
- ☐ Metagenome/resistome
- ☐ Other antibiotic resistance genes

5.1.4.12 Which other antibiotic resistance gene families are monitored?

100 character(s) maximum

5.1.4.13 **Surveillance Indicators - Fecal indicators**

Which fecal indicators are monitored?

- ☐ *E. coli*
- ☐ Coliforms
- ☐ Enterococci
- ☐ Phages
- ☐ Viruses
- ☐ Other fecal indicators

5.1.4.14 Which other fecal indicators are monitored?

100 character(s) maximum

5.1.4.15 Which other microorganisms / genetic information (e.g. MGE) are monitored?

100 character(s) maximum

5.1.4.16 Which other AMR related indicators are monitored?

100 character(s) maximum

5.1.4.17 **Surveillance Indicators - Antimicrobials and residues**

Which antibiotics / antibiotic residues are monitored?

- ☐ Aminoglycosides
- ☐ Amphenicols
- ☐ Carbapenems and monobactams
- ☐ First- and second-generation cephalosporins
- ☐ Fluoroquinolones
- ☐ Glycopeptides
- ☐ Imidazole derivatives
- ☐ Lincosamides and Streptogramins
- ☐ Macrolides
- ☐ Penicillins
- ☐ Polymyxins
- ☐ Tetracyclines
- ☐ Third- and/or fourth-generation cephalosporins
- ☐ Trimethoprim/sulphonamides
- ☐ Other antibiotics

5.1.4.18 Please specify 'other':

100 character(s) maximum

5.1.4.19 Are you also monitoring the following chemical agents in this surveillance system?

- ☐ Pesticides
- ☐ Fungicides
- ☐ Biocides
- ☐ None of the above
- ☐ I don't know

5.1.4.20 Are disinfectant/preservative resistance genes of the families shown below monitored?

- ☐ Triclosan
- ☐ Quaternary ammonium compounds QACs
- ☐ Chlorhexidine
- ☐ Chlorine-releasing compounds
- ☐ Aldehyde-based compounds
- ☐ Alcohols
- ☐ Hydrogen peroxide
- ☐ Peracetic acid
- ☐ Weak organic acids
- ☐ Others

5.1.4.21 Which other disinfectant/preservative resistance genes are monitored?

100 character(s) maximum

5.1.4.22 Which antimycotics / antimycotic residues are monitored?

- ☐ Azoles
- ☐ Amphotericin B
- ☐ Echinocandins
- ☐ Terbinafine
- ☐ Others

5.1.4.23 Please specify 'other':

100 character(s) maximum

5.1.4.24 From the WHO’s AWaRe classification list of antibiotics shown in the annex, please indicate which are your national limit values (ng/L), if any. Please use number units, commas for decimals and dots for thousandths and avoid using spaces.

	Antibiotic	Antibiotic class	National limit values (ng/L)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

5.1.4.25 Please specify if the wastewater surveillance, including DNA sequencing, is centralised or decentralised in your country.

500 character(s) maximum

5.1.4.26 Is a Standard Operational Procedure for sample analysis applied?

- Yes
- No
- I don't know

5.1.5 Laws and regulations

5.1.5.1 Are any elements of the previously mentioned indicators mandatory (regulated by law)?

	Yes	No	I don't know
Antibiotic-resistant bacteria			
Antibiotic resistance genes (including the metagenome)			
Antimycotic-resistant fungi			
Fecal indicators			
Other microorganisms / genetic information (e.g. MGE)			
Antimicrobials / Antimicrobial residues			
Other AMR related indicators			

5.1.5.2 Please specify the name and add the links (website, report) of any related legal instrument (legislation, regulation, policy, guidelines, etc) covering this monitoring:

500 character(s) maximum

5.1.6 Representativeness

5.1.6.1 For wastewater-based surveillance: What is the population under surveillance?

- General population
- Other (e.g. single institutions)
- If the general population is targeted: does the surveillance cover <15% of the population?
- If the general population is targeted: does the surveillance cover 15-30% of the population?
- If the general population is targeted: does the surveillance cover 30-60% of the population?
- If the general population is targeted: does the surveillance cover >60% of the population?
- Not applicable for this/my surveillance system

5.1.6.2 What is the geographical coverage of the surveillance system?

- [ ] International
- [ ] National
- [ ] Regional
- [ ] Other

5.1.6.3 Please describe 'other' geographical coverage:

50 character(s) maximum

5.1.6.4 Please specify the corresponding NUTS scale applied to this surveillance system in your country:

(NUTS): a hierarchical classification of statistical regions which subdivides the economic territory into regions of three different levels:

- NUTS 1: major socio-economic regions
- NUTS 2: basic regions for the application of regional policies
- NUTS 3: small regions for specific diagnoses

An additional country level (NUTS 0) is also available for countries where the nation at statistical level does not coincide with the administrative boundaries.

For more information on NUTS legislations and datasets and maps of NUTS of your country, please visit https://ec.europa.eu/eurostat/web/nuts/maps.

- ( ) NUTS 0
- ( ) NUTS 1
- ( ) NUTS 2
- ( ) NUTS 3

5.1.6.5 Do you consider the system to be representative for the whole country?

- ( ) Very
- ( ) Medium
- ( ) Low
- ( ) Other
- ( ) I don't know

5.1.6.6 Please describe 'other' representativeness:

50 character(s) maximum

5.1.7 Data reporting / data use

5.1.7.1 Is a Standard Operational Procedure for data reporting and data analysis applied?

- ( ) Yes
- ( ) No
- ( ) I don't know

5.1.7.2 How is the surveillance data communicated?

- [ ] Internal reports
- [ ] Public report
- [ ] Scientific publication
- [ ] (Social) media
- [ ] Other

5.1.7.3 What other ways are used for communication on the data / results?

100 character(s) maximum

5.1.7.4 Which actors use the data generated from surveillance according to your opinion?

- [ ] Environmental protection agency (national or regional)
- [ ] Government and/or regulatory organization
- [ ] Healthcare
- [ ] Ministry of Agriculture
- [ ] Ministry of Environment
- [ ] Ministry of Health
- [ ] National Reference Laboratory
- [ ] NGO/Non-profit organisation
- [ ] Other
- [ ] Public health institution (national or regional)
- [ ] Research institution/Academia/University
- [ ] Water board
- [ ] Other

5.1.7.5 Please specify 'other':

50 character(s) maximum

5.1.7.6 How useful for public health decision-making do you consider the system to be according to your opinion?

- ( ) Very
- ( ) Medium
- ( ) Low
- ( ) Other
- ( ) I don't know

5.1.7.7 Please describe 'other':

100 character(s) maximum

5.1.8 One Health: linkage with other surveillance systems

5.1.8.1 Please specify which of the following sectors the surveillance system is linked to (select all that apply - at national or regional / local level):

- [ ] Human
- [ ] Animal
- [ ] Environment
- [ ] Other

5.1.8.2 Please specify 'other':

50 character(s) maximum

5.1.8.3 Is there an intersectoral body (such as a One Health coordination group or technical group, or an interdepartmental group) in which the results of this surveillance are discussed and related to surveillance in other sectors?

- [ ] There is such a group with regular meetings, and the findings of this surveillance are discussed there
- [ ] There is such a group with regular meetings, but the findings of this surveillance are not discussed there
- [ ] There are irregular intersectoral meetings, in which the results of this surveillance are discussed
- [ ] There are irregular intersectoral meetings, but the results of this surveillance are not discussed there
- [ ] There is no such body to my knowledge
- [ ] I don't know

5.1.8.4 Please specify if there is any linkage with registrations of release and of consumption data for pesticides or biocides *(see ? for more info)*:

500 character(s) maximum

*Please indicate any linkage with national or local pollutant transfer registers (e.g. to comply with Regulation (EC) No 166/2006 on the establishment of a European Pollutant Release and Transfer Register,), and with systems for collection of sales data or usage data (e.g. sales data on pesticides according to Regulation (EC) No 1185/2009, or national or local systems for collection of usage data of biocides or pharmaceuticals).

5.1.9 Current surveillance general questions

5.1.9.1 Is there a form of structural evaluation of the overall surveillance system? If yes, by what criteria and by whom?

- ( ) Yes
- ( ) No
- ( ) Other
- ( ) I don't know

5.1.9.2 By whom and what criteria?

100 character(s) maximum

5.1.9.3 Please describe 'other':

500 character(s) maximum

5.1.9.4 Please describe any significant major change(s) in the surveillance system since its start:

500 character(s) maximum

5.1.9.5 In your country, please briefly describe the level of deployment (material and human resources) of DNA sequencing capacity for AMR surveillance and what are your near future development plans, if any (e.g. procurement of NGS services, outsourcing, European grant applications for capacity building):

500 character(s) maximum

5.1.9.6 Please describe the stakeholders in your country performing DNA sequencing of surveillance samples (e.g. accredited private laboratories, universities, national reference centres):

500 character(s) maximum

* 5.1.9.7 **Do you want to describe another surveillance system, in the same or other environmental compartment?**

- Yes *(a new section with the same set of questions will open)*
- No

5.2 Existing environmental surveillance system 2

Please answer the following questions for **one single environmental surveillance system** of which you have expert knowledge.

More surveillance systems:
If you are aware / are an expert of multiple surveillance systems that differ with respect to their environmental compartment or geographical range or if the surveillance system you would like to describe changed significantly over time (or differ in an other way), please enter them in additional subsections. These will open based on the last question in this section "Do you want to describe another surveillance system?". If you answer yes, an additional question set will appear for completion.

* 5.2.1 In which environmental compartment is the surveillance taking place that you want to describe with this survey? *(questions will appear after selection)*

- Wastewater
- Surface water (and/or ground water)
- Soil environment (including manure and sludge)
- Other (e.g. air)

5.2.2 What is the name of the surveillance system?

Text of 1 to 120 characters will be accepted

5.2.3 The authority or institution in charge is:

- ○ Governmental
- ○ Non-governmental (ie academic)
- ○ Other

5.2.4 Please specify 'other':

50 character(s) maximum

5.2.5 Please name the corresponding authority, institution and or expert group in charge of this surveillance.

100 character(s) maximum

5.2.6 Does the National Action Plan of your country contain activities in the environmental domain?

- ☐ yes, including for environmental surveillance
- ☐ yes, for other activities
- ☐ no
- ☐ I don't know

5.2.7 Is this surveillance executed as an activity within the National Action Plan of your country?

- ○ Yes
- ○ No
- ○ I don't know

5.2.8 Please share links to any publicly available information (i.e. webpage, scientific paper, databases, data warehouse, open repositories, dashboards, etc):

800 character(s) maximum

5.2.1 Sectors and actors implementing the surveillance

* 5.2.1.1 Which institution is responsible for carrying out the sampling? Please select all that apply.

between 1 and 14 choices

- ☐ Ministry of Environment
- ☐ Ministry of Health
- ☐ Ministry of Agriculture
- ☐ Ministry, other
- ☐ Governmental institute (environmental domain / environmental protection agency)

- [ ] Governmental institute (human / public health domain)
- [ ] Governmental institute (animal health domain)
- [ ] Governmental institute (other)
- [ ] Research Institution / Academia / University
- [ ] Healthcare institution
- [ ] NGO / non-profit organisation
- [ ] Waterboard / water sector
- [ ] Other
- [ ] National Reference Laboratory

5.2.1.2 Please specify 'other':

50 character(s) maximum

* 5.2.1.3 Who is carrying out the sample analysis and data analysis? Please select all that apply.

between 1 and 14 choices

- [ ] Ministry of Environment
- [ ] Ministry of Health
- [ ] Ministry of Agriculture
- [ ] Ministry, other
- [ ] Governmental institute (environmental domain / environmental protection agency)
- [ ] Governmental institute (human / public health domain)
- [ ] Governmental institute (animal health domain)
- [ ] Governmental institute (other)
- [ ] Research Institution / Academia / University
- [ ] Healthcare institution
- [ ] NGO / non-profit organisation
- [ ] Waterboard / water sector
- [ ] Other
- [ ] National Reference Laboratory

5.2.1.4 Please specify 'other':

50 character(s) maximum

* 5.2.1.5 Who is financing this surveillance? Please select all that apply.

between 1 and 14 choices

- [ ] Ministry of Environment
- [ ] Ministry of Health
- [ ] Ministry of Agriculture
- [ ] Ministry, other
- [ ] Governmental institute (environmental domain / environmental protection agency)
- [ ] Governmental institute (human / public health domain)
- [ ] Governmental institute (animal health domain)
- [ ] Governmental institute (other)

- [ ] Research grants to Research institution / Academia / University
- [ ] Healthcare institution
- [ ] NGO / non-profit organisation
- [ ] Waterboard / water sector
- [ ] Other
- [ ] National Reference Laboratory

5.2.1.6 Please specify 'other':

50 character(s) maximum

5.2.1.7 Are any experimental research sites, public health observatories or living labs at national/regional level involved?

100 character(s) maximum

5.2.2 Objectives

5.2.2.1 What is the main purpose of this surveillance system?

- [ ] Provide information about patterns and trends in AMR (including identification of emission sources)
- [ ] Support and inform risk analysis of AMR in the environment
- [ ] Alert on emergence and evolution of AMR
- [ ] Assess the effectiveness of interventions
- [ ] Wastewater-based epidemiology: provide data on AMR in the human population
- [ ] Other

5.2.2.2 What 'other' purpose:

100 character(s) maximum

5.2.3 Design of sampling

5.2.3.1 Please tick below the wastewater subcompartment you are assessing within this surveillance system:

- [ ] Municipal WasteWater (WW)
- [ ] Hospital WW
- [ ] LTCF (long-term care facility) WW
- [ ] Animal husbandry WW
- [ ] Aquaculture WW
- [ ] Industrial effluents
- [ ] Reused water
- [ ] Urban water runoff
- [ ] Other

5.2.3.2 Please specify which 'other' compartment or sub-compartment is addressed in the surveillance:

50 character(s) maximum

5.2.3.3 Please tick below the surface water subcompartment you are assessing within this surveillance system:

- ☐ Inland water at river basins, including streams, rivers and lakes
- ☐ Transitional water, including river mouths, estuaries and deltas
- ☐ Snow, glacier, permafrost
- ☐ Coastal water, including wetlands, swamps and marshes but excluding marine/oceanic water
- ☐ Storm water
- ☐ Drinking water
- ☐ Recreational water
- ☐ Groundwater
- ☐ Other

5.2.3.4 Please specify which 'other' compartment or sub-compartment is addressed in the surveillance:

50 character(s) maximum

5.2.3.5 Please tick below the soil you are assessing according to the land cover and land use terminology and hierarchy system as per the Copernicus nomenclature within this surveillance system:

- ☐ Agricultural soils
- ☐ Wetlands
- ☐ Urban soils
- ☐ Artificial soils
- ☐ Forest and seminatural areas
- ☐ Other
- ☐ None of the above

5.2.3.6 Please specify which 'other' compartment or sub-compartment is addressed in the surveillance:

50 character(s) maximum

5.2.3.7 For wastewater experts: In your country is hospital wastewater being emitted into the general urban sewer system or is hospital wastewater treated prior to discharge to the sewer system?

500 character(s) maximum

5.2.3.8 Please tick below soil interventions / manipulations (if any) that are monitored within this surveillance system:

- ☐ Irrigation
- ☐ Irrigation with re-used wastewater

- [ ] Fertilisation with manure
- [ ] Fertilisation with sludge
- [ ] Other
- [ ] None of the above

5.2.3.9 Please describe the 'other' manipulation:

5.2.3.10 Please provide the type of sample (material, location etc) if you are responding to the "Other" surveillance system.

5.2.3.11 You can provide further explanation on the compartments / subcompartments of this surveillance here if necessary

5.2.3.12 In what year did the first sampling take place?

(use 01/01/20xx as format)

5.2.3.13 Is there already an end date set for the sampling?

- ( ) Yes
- ( ) No, it will continue (with an unknown end date)
- ( ) I don't know

5.2.3.14 In what year will the last sampling take place?

(use 01/01/20xx as format)

5.2.3.15 How often are samples collected?

- ( ) Daily
- ( ) More than one day per week
- ( ) Weekly
- ( ) Monthly
- ( ) Every 3 (2-4) months
- ( ) Every 6 (or 5-11) months
- ( ) Once per year
- ( ) It varies per sampling site and/or target
- ( ) Other frequency

5.2.3.16 Please shortly describe the frequency:

500 character(s) maximum

5.2.3.17 How often are samples collected?

400 character(s) maximum

5.2.3.18 How many sampling sites are included in the surveillance system?

Text of 1 to 4 characters will be accepted

5.2.3.19 Are samples taken specifically for this surveillance, or are they obtained in the course of another activity?

- ○ Specifically sampled for this surveillance system
- ○ Obtained in another sampling activity
- ○ Both
- ○ I don't know

5.2.3.20 Please specify the 'other' activity, if applicable:

100 character(s) maximum

5.2.3.21 Is a Standard Operational Procedure for sampling applied?

- ○ Yes
- ○ No
- ○ I don't know

5.2.4 Surveillance Indicators

5.2.4.1 Which AMR or AMR-related indicator are you monitoring in this surveillance system?

between 1 and 7 choices

- ☐ Antibiotic-resistant bacteria
- ☐ Antibiotic resistance genes (including the metagenome)
- ☐ Antimycotic-resistant fungi
- ☐ Microbiological fecal indicators
- ☐ Other microorganisms / genetic information (e.g. MGE)
- ☐ Antimicrobials/ Antimicrobial residues
- ☐ Other AMR related indicators

5.2.4.2 **Surveillance Indicators - resistant bacteria**

Are specific antibiotic-resistant bacteria being monitored through selective isolation?

between 1 and 9 choices

- ☐ *Acinetobacter baumannii*, carbapenem-resistant
- ☐

E. coli / Enterobacterales, carbapenem-resistant
- [ ] *E. coli* / Enterobacterales, 3rd and/or 4th generation cephalosporin-resistant
- [ ] *E. coli* / Enterobacterales, 1st and 2nd generation cephalosporin-resistant
- [ ] *Enterococcus faecium,* vancomycin-resistant
- [ ] Non-typhoidal Salmonella, fluoroquinolone-resistant
- [ ] *Pseudomonas aeruginosa*, carbapenem-resistant
- [ ] *Staphylococcus aureus*, methicillin-resistant
- [ ] Other

5.2.4.3 Which other antibiotic-resistant bacteria are monitored?

100 character(s) maximum

5.2.4.4 How are the isolated bacteria further characterised?
- [ ] tested for phenotypic resistance (MIC)
- [ ] resistance genes by PCR
- [ ] WGS (part of the isolates)
- [ ] WGS (all isolates)

5.2.4.5 Are specific bacteria being monitored through isolation followed by characterisation of their resistance profile?

between 1 and 9 choices
- [ ] *Acinetobacter baumannii*
- [ ] *E. coli*
- [ ] *Klebsiella pneumoniae*
- [ ] Enterobacterales
- [ ] *Enterococcus faecium* and/or *faecalis*
- [ ] Non-typhoidal Salmonella
- [ ] *Pseudomonas aeruginosa*
- [ ] *Staphylococcus aureus*
- [ ] Other

5.2.4.6 Which other bacteria are monitored?

100 character(s) maximum

5.2.4.7 **Surveillance Indicators - resistant fungi**

Which antimycotic-resistant fungi are monitored?

between 1 and 4 choices
- [ ] *Aspergillus fumigatus*
- [ ] *Candida albicans*
- [ ] *Candida auris*
- [ ] Other

5.2.4.8 Which other antimycotic-resistant fungi are monitored?

100 character(s) maximum

5.2.4.9 Which antimycotic resistance genes are monitored in relation to the antimycotic families shown below?

- ☐ Azoles
- ☐ Amphotericin B
- ☐ Echinocandins
- ☐ Terbinafine
- ☐ Others

5.2.4.10 Which other antimycotic resistance genes are monitored?

100 character(s) maximum

5.2.4.11 **Surveillance Indicators - Genes**

Are antibiotic resistance genes for the gene families below monitored?

- ☐ Aminoglycosides
- ☐ Amphenicols
- ☐ Carbapenems and monobactams
- ☐ First- and second-generation cephalosporins
- ☐ Fluoroquinolones
- ☐ Glycopeptides
- ☐ Imidazole derivatives
- ☐ Lincosamides and Streptogramins
- ☐ Macrolides
- ☐ Penicillins
- ☐ Polymyxins
- ☐ Tetracyclines
- ☐ Third- and/or fourth-generation cephalosporins
- ☐ Trimethoprim/sulphonamides
- ☐ Metagenome/resistome
- ☐ Other antibiotic resistance genes

5.2.4.12 Which other antibiotic resistance gene families are monitored?

100 character(s) maximum

5.2.4.13 **Surveillance Indicators - Fecal indicators**

Which fecal indicators are monitored?

- ☐ *E. coli*

- [ ] Coliforms
- [ ] Enterococci
- [ ] Phages
- [ ] Viruses
- [ ] Other fecal indicators

5.2.4.14 Which other fecal indicators are monitored?

100 character(s) maximum

5.2.4.15 Which other microorganisms / genetic information (e.g. MGE) are monitored?

100 character(s) maximum

5.2.4.16 Which other AMR related indicators are monitored?

100 character(s) maximum

5.2.4.17 **Surveillance Indicators - Antimicrobials and residues**

Which antibiotics / antibiotic residues are monitored?

- [ ] Aminoglycosides
- [ ] Amphenicols
- [ ] Carbapenems and monobactams
- [ ] First- and second-generation cephalosporins
- [ ] Fluoroquinolones
- [ ] Glycopeptides
- [ ] Imidazole derivatives
- [ ] Lincosamides and Streptogramins
- [ ] Macrolides
- [ ] Penicillins
- [ ] Polymyxins
- [ ] Tetracyclines
- [ ] Third- and/or fourth-generation cephalosporins
- [ ] Trimethoprim/sulphonamides
- [ ] Other antibiotics

5.2.4.18 Please specify 'other':

100 character(s) maximum

5.2.4.19 Are you also monitoring the following chemical agents in this surveillance system?

- [ ] Pesticides

- [ ] Fungicides
- [ ] Biocides
- [ ] None of the above
- [ ] I don't know

5.2.4.20 Are disinfectant/preservative resistance genes of the families shown below monitored?

- [ ] Triclosan
- [ ] Quaternary ammonium compounds QACs
- [ ] Chlorhexidine
- [ ] Chlorine-releasing compounds
- [ ] Aldehyde-based compounds
- [ ] Alcohols
- [ ] Hydrogen peroxide
- [ ] Peracetic acid
- [ ] Weak organic acids
- [ ] Others

5.2.4.21 Which other disinfectant/preservative resistance genes are monitored?

100 character(s) maximum

5.2.4.22 Which antimycotics / antimycotic residues are monitored?

- [ ] Azoles
- [ ] Amphotericin B
- [ ] Echinocandins
- [ ] Terbinafine
- [ ] Others

5.2.4.23 Please specify 'other':

100 character(s) maximum

5.2.4.24 From the WHO’s AWaRe classification list of antibiotics shown in the annex, please indicate which are your national limit values (ng/L), if any. Please use number units, commas for decimals and dots for thousandths and avoid using spaces.

	Antibiotic	Antibiotic class	National limit values (ng/L)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

5.2.4.25 Please specify if the wastewater surveillance, including DNA sequencing, is centralised or decentralised in your country.

500 character(s) maximum

5.2.4.26 Is a Standard Operational Procedure for sample analysis applied?

- Yes
- No
- I don't know

5.2.5 Laws and regulations

5.2.5.1 Are any elements of the previously mentioned indicators mandatory (regulated by law)?

	Yes	No	I don't know
Antibiotic-resistant bacteria			
Antibiotic resistance genes (including the metagenome)			
Antimycotic-resistant fungi			
Fecal indicators			
Other microorganisms / genetic information (e.g. MGE)			
Antimicrobials / Antimicrobial residues			
Other AMR related indicators			

5.2.5.2 Please specify the name and add the links (website, report) of any related legal instrument (legislation, regulation, policy, guidelines, etc) covering this monitoring:

500 character(s) maximum

5.2.6 Representativeness

5.2.6.1 For wastewater-based surveillance: What is the population under surveillance?

- General population
- Other (e.g. single institutions)
- If the general population is targeted: does the surveillance cover <15% of the population?
- If the general population is targeted: does the surveillance cover 15-30% of the population?
- If the general population is targeted: does the surveillance cover 30-60% of the population?
- If the general population is targeted: does the surveillance cover >60% of the population?
- Not applicable for this/my surveillance system

5.2.6.2 What is the geographical coverage of the surveillance system?

- [ ] International
- [ ] National
- [ ] Regional
- [ ] Other

5.2.6.3 Please describe other geographical coverage

50 character(s) maximum

5.2.6.4 Please specify the corresponding NUTS scale applied to this surveillance system in your country:

(NUTS): a hierarchical classification of statistical regions which subdivides the economic territory into regions of three different levels:

- NUTS 1: major socio-economic regions
- NUTS 2: basic regions for the application of regional policies
- NUTS 3: small regions for specific diagnoses

An additional country level (NUTS 0) is also available for countries where the nation at statistical level does not coincide with the administrative boundaries.

For more information on NUTS legislations and datasets and maps of NUTS of your country, please visit https://ec.europa.eu/eurostat/web/nuts/maps.

- ( ) NUTS 0
- ( ) NUTS 1
- ( ) NUTS 2
- ( ) NUTS 3

5.2.6.5 Do you consider the system to be representative for the whole country?

- ( ) Very
- ( ) Medium
- ( ) Low
- ( ) Other
- ( ) I don't know

5.2.6.6 Please describe 'other' representativeness:

50 character(s) maximum

5.2.7 Data reporting / data use

5.2.7.1 Is a Standard Operational Procedure for data reporting and data analysis applied?

- ( ) Yes
- ( ) No
- ( ) I don't know

5.2.7.2 How is the surveillance data communicated?

- [ ] Internal reports
- [ ] Public report
- [ ] Scientific publication
- [ ] (Social) media
- [ ] Other

5.2.7.3 What other ways are used for communication on the data / results?

100 character(s) maximum

5.2.7.4 Which actors use the data generated from surveillance according to your opinion?

- [ ] Environmental protection agency (national or regional)
- [ ] Government and/or regulatory organization
- [ ] Healthcare
- [ ] Ministry of Agriculture
- [ ] Ministry of Environment
- [ ] Ministry of Health
- [ ] National Reference Laboratory
- [ ] NGO/Non-profit organisation
- [ ] Other
- [ ] Public health institution (national or regional)
- [ ] Research institution/Academia/University
- [ ] Water board
- [ ] Other

5.2.7.5 Please specify other:

5.2.7.6 How useful for public health decision-making do you consider the system to be according to your opinion?

- ( ) Very
- ( ) Medium
- ( ) Low
- ( ) Other
- ( ) I don't know

5.2.7.7 Please describe 'other':

100 character(s) maximum

5.2.8 One Health: linkage with other surveillance systems

5.2.8.1 Please specify which of the following sectors the surveillance system is linked to (select all that apply - at national or regional / local level):

- [ ] Human
- [ ] Animal
- [ ] Environment
- [ ] Other

5.2.8.2 Please specify 'other':

50 character(s) maximum

5.2.8.3 Is there an intersectoral body (such as a One Health coordination group or technical group, or an interdepartmental group) in which the results of this surveillance are discussed and related to surveillance in other sectors?

- [ ] There is such a group with regular meetings, and the findings of this surveillance are discussed there
- [ ] There is such a group with regular meetings, but the findings of this surveillance are not discussed there
- [ ] There are irregular intersectoral meetings, in which the results of this surveillance are discussed
- [ ] There are irregular intersectoral meetings, but the results of this surveillance are not discussed there
- [ ] There is no such body to my knowledge
- [ ] I don't know

5.2.8.4 Please specify if there is any linkage with registrations of release and of consumption data for pesticides or biocides *(see ? for more info)*:

500 character(s) maximum

*Please indicate any linkage with national or local pollutant transfer registers (e.g. to comply with Regulation (EC) No 166/2006 on the establishment of a European Pollutant Release and Transfer Register,), and with systems for collection of sales data or usage data (e.g. sales data on pesticides according to Regulation (EC) No 1185/2009, or national or local systems for collection of usage data of biocides or pharmaceuticals).

5.2.9 Current surveillance general questions

5.2.9.1 Is there a form of structural evaluation of the overall surveillance system? If yes, by what criteria and by whom?

- ( ) Yes
- ( ) No
- ( ) Other
- ( ) I don't know

5.2.9.2 By whom and what criteria?

100 character(s) maximum

5.2.9.3 Please describe 'other':

500 character(s) maximum

5.2.9.4 Please describe any significant major change(s) in the surveillance system since its start:

500 character(s) maximum

5.2.9.5 In your country, please briefly describe the level of deployment (material and human resources) of DNA sequencing capacity for AMR surveillance and what are your near future development plans, if any (e.g. procurement of NGS services, outsourcing, European grant applications for capacity building):

500 character(s) maximum

5.2.9.6 Please describe the stakeholders in your country performing DNA sequencing of surveillance samples (e.g. accredited private laboratories, universities, national reference centres):

500 character(s) maximum

* 5.2.9.7 **Do you want to describe another surveillance system, in the same or other environmental compartment?**

- Yes *(a new section with the same set of questions will open)*
- No

5.3 Existing environmental surveillance system 3

Please answer the following questions for **one single environmental surveillance system** of which you have expert knowledge.

More surveillance systems:
If you are aware / are an expert of multiple surveillance systems that differ with respect to their environmental compartment or geographical range or if the surveillance system you would like to describe changed significantly over time (or differ in an other way), please enter them in additional subsections.

- Because of software issues the description of 3 systems is the maximum of 1 survey submission, therefore we ask you to start and submit another survey after finalizing this one.

* 5.3.1 In which environmental compartment is the surveillance taking place that you want to describe with this survey? *(questions will appear after selection)*

- Wastewater
- Surface water (and/or ground water)
- Soil environment (including manure and sludge)
- Other (e.g. air)

5.3.2 What is the name of the surveillance system?

Text of 1 to 120 characters will be accepted

5.3.3 The authority or institution in charge is:

- ○ Governmental
- ○ Non-governmental (ie academic)
- ○ Other

5.3.4 Please specify 'other':

50 character(s) maximum

5.3.5 Please name the corresponding authority, institution and or expert group in charge of this surveillance.

100 character(s) maximum

5.3.6 Does the National Action Plan of your country contain activities in the environmental domain?

- ☐ yes, including for environmental surveillance
- ☐ yes, for other activities
- ☐ no
- ☐ I don't know

5.3.7 Is this surveillance executed as an activity within the National Action Plan of your country?

- ○ Yes
- ○ No
- ○ I don't know

5.3.8 Please share links to any publicly available information (i.e. webpage, scientific paper, databases, data warehouse, open repositories, dashboards, etc):

800 character(s) maximum

5.3.1 Sectors and actors implementing the surveillance

* 5.3.1.1 Which institution is responsible for carrying out the sampling? Please select all that apply.

between 1 and 14 choices

- ☐ Ministry of Environment
- ☐ Ministry of Health
- ☐ Ministry of Agriculture
- ☐ Ministry, other
- ☐ Governmental institute (environmental domain / environmental protection agency)

- [ ] Governmental institute (human / public health domain)
- [ ] Governmental institute (animal health domain)
- [ ] Governmental institute (other)
- [ ] Research Institution / Academia / University
- [ ] Healthcare institution
- [ ] NGO / non-profit organisation
- [ ] Waterboard / water sector
- [ ] Other
- [ ] National Reference Laboratory

5.3.1.2 Please specify 'other':

50 character(s) maximum

* 5.3.1.3 Who is carrying out the sample analysis and data analysis? Please select all that apply.

between 1 and 14 choices

- [ ] Ministry of Environment
- [ ] Ministry of Health
- [ ] Ministry of Agriculture
- [ ] Ministry, other
- [ ] Governmental institute (environmental domain / environmental protection agency)
- [ ] Governmental institute (human / public health domain)
- [ ] Governmental institute (animal health domain)
- [ ] Governmental institute (other)
- [ ] Research Institution / Academia / University
- [ ] Healthcare institution
- [ ] NGO / non-profit organisation
- [ ] Waterboard / water sector
- [ ] Other
- [ ] National Reference Laboratory

5.3.1.4 Please specify 'other':

50 character(s) maximum

* 5.3.1.5 Who is financing this surveillance? Please select all that apply.

between 1 and 14 choices

- [ ] Ministry of Environment
- [ ] Ministry of Health
- [ ] Ministry of Agriculture
- [ ] Ministry, other
- [ ] Governmental institute (environmental domain / environmental protection agency)
- [ ] Governmental institute (human / public health domain)
- [ ] Governmental institute (animal health domain)
- [ ] Governmental institute (other)

- [ ] Research grants to Research institution / Academia / University
- [ ] Healthcare institution
- [ ] NGO / non-profit organisation
- [ ] Waterboard / water sector
- [ ] Other
- [ ] National Reference Laboratory

5.3.1.6 Please specify 'other':

50 character(s) maximum

5.3.1.7 Are any experimental research sites, public health observatories or living labs at national/regional level involved?

100 character(s) maximum

5.3.2 Objectives

5.3.2.1 What is the main purpose of this surveillance system?

- [ ] Provide information about patterns and trends in AMR (including identification of emission sources)
- [ ] Support and inform risk analysis of AMR in the environment
- [ ] Alert on emergence and evolution of AMR
- [ ] Assess the effectiveness of interventions
- [ ] Wastewater-based epidemiology: provide data on AMR in the human population
- [ ] Other

5.3.2.2 What 'other' purpose:

100 character(s) maximum

5.3.3 Design of sampling

5.3.3.1 Please tick below the wastewater subcompartment you are assessing within this surveillance system:

- [ ] Municipal WasteWater (WW)
- [ ] Hospital WW
- [ ] LTCF (long-term care facility) WW
- [ ] Animal husbandry WW
- [ ] Aquaculture WW
- [ ] Industrial effluents
- [ ] Reused water
- [ ] Urban water runoff
- [ ] Other

5.3.3.2 Please specify which 'other' compartment or sub-compartment is addressed in the surveillance:

50 character(s) maximum

5.3.3.3 Please tick below the surface water subcompartment you are assessing within this surveillance system:

- ☐ Inland water at river basins, including streams, rivers and lakes
- ☐ Transitional water, including river mouths, estuaries and deltas
- ☐ Snow, glacier, permafrost
- ☐ Coastal water, including wetlands, swamps and marshes but excluding marine/oceanic water
- ☐ Storm water
- ☐ Drinking water
- ☐ Recreational water
- ☐ Groundwater
- ☐ Other

5.3.3.4 Please specify which 'other' compartment or sub-compartment is addressed in the surveillance:

50 character(s) maximum

5.3.3.5 Please tick below the soil you are assessing according to the land cover and land use terminology and hierarchy system Copernicus nomenclature within this surveillance system:

- ☐ Agricultural soils
- ☐ Wetlands
- ☐ Urban soils
- ☐ Artificial soils
- ☐ Forest and seminatural areas
- ☐ Other
- ☐ None of the above

5.3.3.6 If applicable, please specify which 'other' compartment or sub-compartment is addressed in the surveillance:

50 character(s) maximum

5.3.3.7 For wastewater experts: In your country is hospital wastewater being emitted into the general urban sewer system or is hospital wastewater treated prior to discharge to the sewer system?

500 character(s) maximum

5.3.3.8 Please tick below soil interventions / manipulations (if any) that are monitored within this surveillance system:

- ☐ Irrigation

- [ ] Irrigation with re-used wastewater
- [ ] Fertilisation with manure
- [ ] Fertilisation with sludge
- [ ] Other
- [ ] None of the above

5.3.3.9 Please describe the 'other' manipulation:

50 character(s) maximum

5.3.3.10 Please provide the type of sample (material, location etc) if you are responding to the "Other" surveillance system.

100 character(s) maximum

5.3.3.11 You can provide further explanation on the compartments / subcompartments of this surveillance here if necessary

500 character(s) maximum

5.3.3.12 In what year did the first sampling take place?

(use 01/01/20xx as format)

5.3.3.13 Is there already an end date set for the sampling?

- ○ Yes
- ○ No, it will continue (with an unknown end date)
- ○ I don't know

5.3.3.14 In what year will the last sampling take place?

(use 01/01/20xx as format)

5.3.3.15 How often are samples collected?

- ○ Daily
- ○ More than one day per week
- ○ Weekly
- ○ Monthly
- ○ Every 3 (2-4) months
- ○ Every 6 (or 5-11) months
- ○ Once per year
- ○ It varies per sampling site and/or target
- ○ Other frequency

5.3.3.16 Please shortly describe the frequency:

500 character(s) maximum

5.3.3.17 How often are samples collected?

400 character(s) maximum

5.3.3.18 How many sampling sites are included in the surveillance system?

Text of 1 to 4 characters will be accepted

5.3.3.19 Are samples taken specifically for this surveillance, or are they obtained in the course of another activity?

- Specifically sampled for this surveillance system
- Obtained in another sampling activity
- Both
- I don't know

5.3.3.20 Please specify the 'other' activity, if applicable:

100 character(s) maximum

5.3.3.21 Is a Standard Operational Procedure for sampling applied?

- Yes
- No
- I don't know

5.3.4 Surveillance Indicators

5.3.4.1 Which AMR or AMR-related indicator are you monitoring in this surveillance system?

between 1 and 7 choices

- Antibiotic-resistant bacteria
- Antibiotic resistance genes (including the metagenome)
- Antimycotic-resistant fungi
- Microbiological fecal indicators
- Other microorganisms / genetic information (e.g. MGE)
- Antimicrobials/ Antimicrobial residues
- Other AMR related indicators

5.3.4.2 **Surveillance Indicators - resistant bacteria**

Are specific antibiotic-resistant bacteria being monitored through selective isolation?

between 1 and 9 choices

- ☐ *Acinetobacter baumannii*, carbapenem-resistant
- ☐ *E. coli* / Enterobacterales, carbapenem-resistant
- ☐ *E. coli* / Enterobacterales, 3rd and/or 4th generation cephalosporin-resistant
- ☐ *E. coli* / Enterobacterales, 1st and 2nd generation cephalosporin-resistant
- ☐ *Enterococcus faecium,* vancomycin-resistant
- ☐ Non-typhoidal Salmonella, fluoroquinolone-resistant
- ☐ *Pseudomonas aeruginosa*, carbapenem-resistant
- ☐ *Staphylococcus aureus*, methicillin-resistant
- ☐ Other

5.3.4.3 Which other antibiotic-resistant bacteria are monitored?

100 character(s) maximum

5.3.4.4 How are the isolated bacteria further characterised?

- ☐ Tested for phenotypic resistance (MIC)
- ☐ Resistance genes by PCR
- ☐ WGS (part of the isolates)
- ☐ WGS (all isolates)

5.3.4.5 Are specific bacteria being monitored through isolation followed by characterisation of their resistance profile?

between 1 and 9 choices

- ☐ *Acinetobacter baumannii*
- ☐ *E. coli*
- ☐ *Klebsiella pneumoniae*
- ☐ Enterobacterales
- ☐ *Enterococcus faecium* and/or *faecalis*
- ☐ Non-typhoidal Salmonella
- ☐ *Pseudomonas aeruginosa*
- ☐ *Staphylococcus aureus*
- ☐ Other

5.3.4.6 Which other bacteria are monitored?

100 character(s) maximum

5.3.4.7 **Surveillance Indicators - resistant fungi**

Which antimycotic-resistant fungi are monitored?

between 1 and 4 choices

- ☐ *Aspergillus fumigatus*
- ☐ *Candida albicans*
- ☐ *Candida auris*
- ☐ Other

5.3.4.8 Which other antimycotic-resistant fungi are monitored?

100 character(s) maximum

5.3.4.9 Which antimycotic resistance genes are monitored in relation to the antimycotic families shown below?

- ☐ Azoles
- ☐ Amphotericin B
- ☐ Echinocandins
- ☐ Terbinafine
- ☐ Others

5.3.4.10 Which other antimycotic resistance genes are monitored?

100 character(s) maximum

5.3.4.11 **Surveillance Indicators - Genes**

Are antibiotic resistance genes for the gene families below monitored?

- ☐ Aminoglycosides
- ☐ Amphenicols
- ☐ Carbapenems and monobactams
- ☐ First- and second-generation cephalosporins
- ☐ Fluoroquinolones
- ☐ Glycopeptides
- ☐ Imidazole derivatives
- ☐ Lincosamides and Streptogramins
- ☐ Macrolides
- ☐ Penicillins
- ☐ Polymyxins
- ☐ Tetracyclines
- ☐ Third- and/or fourth-generation cephalosporins
- ☐ Trimethoprim/sulphonamides
- ☐ Metagenome/resistome
- ☐ Other antibiotic resistance genes

5.3.4.12 Which other antibiotic resistance gene families are monitored?

100 character(s) maximum

5.3.4.13 **Surveillance Indicators - Fecal indicators**

Which fecal indicators are monitored?

- ☐ *E. coli*
- ☐ Coliforms
- ☐ Enterococci
- ☐ Phages
- ☐ Viruses
- ☐ Other fecal indicators

5.3.4.14 Which other fecal indicators are monitored?

100 character(s) maximum

5.3.4.15 Which other microorganisms / genetic information (e.g. MGE) are monitored?

100 character(s) maximum

5.3.4.16 Which other AMR related indicators are monitored?

100 character(s) maximum

5.3.4.17 **Surveillance Indicators - Antimicrobials and residues**

Which antibiotics / antibiotic residues are monitored?

- ☐ Aminoglycosides
- ☐ Amphenicols
- ☐ Carbapenems and monobactams
- ☐ First- and second-generation cephalosporins
- ☐ Fluoroquinolones
- ☐ Glycopeptides
- ☐ Imidazole derivatives
- ☐ Lincosamides and Streptogramins
- ☐ Macrolides
- ☐ Penicillins
- ☐ Polymyxins
- ☐ Tetracyclines
- ☐ Third- and fourth-generation cephalosporins
- ☐ Trimethoprim/sulphonamides
- ☐ Other antibiotics

5.3.4.18 Please specify 'other':

100 character(s) maximum

5.3.4.19 Are you also monitoring the following chemical agents in this surveillance system?

- [ ] Pesticides
- [ ] Fungicides
- [ ] Biocides
- [ ] None of the above
- [ ] I don't know

5.3.4.20 Which antimycotics / antimycotic residues are monitored?

- [ ] Azoles
- [ ] Amphotericin B
- [ ] Echinocandins
- [ ] Terbinafine
- [ ] Others

5.3.4.21 Please specify 'other':

100 character(s) maximum

5.3.4.22 Are disinfectant/preservative resistance genes of the families shown below monitored?

- [ ] Triclosan
- [ ] Quaternary ammonium compounds QACs
- [ ] Chlorhexidine
- [ ] Chlorine-releasing compounds
- [ ] Aldehyde-based compounds
- [ ] Alcohols
- [ ] Hydrogen peroxide
- [ ] Peracetic acid
- [ ] Weak organic acids
- [ ] Others

5.3.4.23 Which other disinfectant/preservative resistance genes are monitored?

100 character(s) maximum

5.3.4.24 From the WHO’s AWaRe classification list of antibiotics shown in the annex, please indicate which are your national limit values (ng/L), if any. Please use number units, commas for decimals and dots for thousandths and avoid using spaces.

	Antibiotic	Antibiotic class	National limit values (ng/L)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

5.3.4.25 Please specify if the wastewater surveillance, including DNA sequencing, is centralised or decentralised in your country.

500 character(s) maximum

5.3.4.26 Is a Standard Operational Procedure for sample analysis applied?

- Yes
- No
- I don't know

5.3.5 Laws and regulations

5.3.5.1 Are any elements of the previously mentioned indicators mandatory (regulated by law)?

	Yes	No	I don't know
Antibiotic-resistant bacteria			
Antibiotic resistance genes (including the metagenome)			
Antimycotic-resistant fungi			
Fecal indicators			
Other microorganisms / genetic information (e.g. MGE)			
Antimicrobials / Antimicrobial residues			
Other AMR related indicators			

5.3.5.2 Please specify the name and add the links (website, report) of any related legal instrument (legislation, regulation, policy, guidelines, etc) covering this monitoring:

500 character(s) maximum

5.3.6 Representativeness

5.3.6.1 For wastewater-based surveillance: What is the population under surveillance?

- General population
- Other (e.g. single institutions)
- If the general population is targeted: does the surveillance cover <15% of the population?
- If the general population is targeted: does the surveillance cover 15-30% of the population?
- If the general population is targeted: does the surveillance cover 30-60% of the population?
- If the general population is targeted: does the surveillance cover >60% of the population?
- Not applicable for this/my surveillance system

5.3.6.2 What is the geographical coverage of the surveillance system?

- [ ] International
- [ ] National
- [ ] Regional
- [ ] Other

5.3.6.3 Please describe other geographical coverage

50 character(s) maximum

5.3.6.4 Please specify the corresponding NUTS scale applied to this surveillance system in your country:

(NUTS): a hierarchical classification of statistical regions which subdivides the economic territory into regions of three different levels:

- NUTS 1: major socio-economic regions
- NUTS 2: basic regions for the application of regional policies
- NUTS 3: small regions for specific diagnoses

An additional country level (NUTS 0) is also available for countries where the nation at statistical level does not coincide with the administrative boundaries.

For more information on NUTS legislations and datasets and maps of NUTS of your country, please visit https://ec.europa.eu/eurostat/web/nuts/maps.

- ( ) NUTS 0
- ( ) NUTS 1
- ( ) NUTS 2
- ( ) NUTS 3

5.3.6.5 Do you consider the system to be representative for the whole country?

- ( ) Very
- ( ) Medium
- ( ) Low
- ( ) Other
- ( ) I don't know

5.3.6.6 Please describe 'other' representativeness:

50 character(s) maximum

5.3.7 Data reporting / data use

5.3.7.1 Is a Standard Operational Procedure for data reporting and data analysis applied?

- ( ) Yes
- ( ) No
- ( ) I don't know

5.3.7.2 How is the surveillance data communicated?

- [ ] Internal reports
- [ ] Public report
- [ ] Scientific publication
- [ ] (Social) media
- [ ] Other

5.3.7.3 What other ways are used for communication on the data / results?

100 character(s) maximum

5.3.7.4 Which actors use the data generated from surveillance according to your opinion?

- [ ] Environmental protection agency (national or regional)
- [ ] Government and/or regulatory organization
- [ ] Healthcare
- [ ] Ministry of Agriculture
- [ ] Ministry of Environment
- [ ] Ministry of Health
- [ ] National Reference Laboratory
- [ ] NGO/Non-profit organisation
- [ ] Other
- [ ] Public health institution (national or regional)
- [ ] Research institution/Academia/University
- [ ] Water board
- [ ] Other

5.3.7.5 Please specify other:

5.3.7.6 How useful for public health decision-making do you consider the system to be according to your opinion?

- ( ) Very
- ( ) Medium
- ( ) Low
- ( ) Other
- ( ) I don't know

5.3.7.7 Please describe 'other':

100 character(s) maximum

5.3.8 One Health: linkage with other surveillance systems

5.3.8.1 Please specify which of the following sectors the surveillance system is linked to (select all that apply - at national or regional / local level):

- [ ] Human
- [ ] Animal
- [ ] Environment
- [ ] Other

5.3.8.2 Please specify 'other':

50 character(s) maximum

5.3.8.3 Is there an intersectoral body (such as a One Health coordination group or technical group, or an interdepartmental group) in which the results of this surveillance are discussed and related to surveillance in other sectors?

- [ ] There is such a group with regular meetings, and the findings of this surveillance are discussed there
- [ ] There is such a group with regular meetings, but the findings of this surveillance are not discussed there
- [ ] There are irregular intersectoral meetings, in which the results of this surveillance are discussed
- [ ] There are irregular intersectoral meetings, but the results of this surveillance are not discussed there
- [ ] There is no such body to my knowledge
- [ ] I don't know

5.3.8.4 Please specify if there is any linkage with registrations of release and of consumption data for pesticides or biocides *(see ? for more info)*:

500 character(s) maximum

*Please indicate any linkage with national or local pollutant transfer registers (e.g. to comply with Regulation (EC) No 166/2006 on the establishment of a European Pollutant Release and Transfer Register,), and with systems for collection of sales data or usage data (e.g. sales data on pesticides according to Regulation (EC) No 1185/2009, or national or local systems for collection of usage data of biocides or pharmaceuticals).

5.3.9 Current surveillance general questions

5.3.9.1 Is there a form of structural evaluation of the overall surveillance system? If yes, by what criteria and by whom?

- ( ) Yes
- ( ) No
- ( ) Other
- ( ) I don't know

5.3.9.2 By whom and what criteria?

100 character(s) maximum

5.3.9.3 Please describe 'other':

500 character(s) maximum

5.3.9.4 Please describe any significant major change(s) in the surveillance system since its start:

500 character(s) maximum

5.3.9.5 In your country, please briefly describe the level of deployment (material and human resources) of DNA sequencing capacity for AMR surveillance and what are your near future development plans, if any (e.g. procurement of NGS services, outsourcing, European grant applications for capacity building):

500 character(s) maximum

5.3.9.6 Please describe the stakeholders in your country performing DNA sequencing of surveillance samples (e.g. accredited private laboratories, universities, national reference centres):

500 character(s) maximum

* 5.3.9.7 **Do you want to describe another surveillance system, in the same or other environmental compartment?**

- Yes *(please submit this survey and start a new one for the other systems)*
- No

6 Satisfaction

6.1 To what extent are you satisfied with the comprehensiveness of this survey on environmental surveillance of AMR?

6.2 To what extent are you satisfied with the usefulness of this survey on environmental surveillance of AMR?

6.3 Is there anything else you would like to share regarding environmental surveillance?

1000 character(s) maximum

7 Future environmental surveillance

7.1 Do you believe there is a need for a future (next 5 to 10 years) surveillance system for antimicrobial resistance or related pollutants (e.g. antimicrobials) in any of the following environmental compartments?

- ☐ yes, in wastewater
- ☐ yes, in inland water (including surface/ground water)
- ☐ yes, in soil and/or biosolids and/or irrigation water
- ☐ yes, in another environmental compartment (e.g. transport locations, air)
- ☐ no, there is no need for environmental surveillance

7.2 Please specify which 'other' environmental compartment:

50 character(s) maximum

7.3 Please explain:

500 character(s) maximum

If you believe there is a need for such a surveillance system, please use the web link (https://ec.europa.eu/eusurvey/runner/EU_JAMRAI2_future_environmental_surveillance)
for the survey about future environmental surveillance to let us know your ideas. Thank you very much.

8 References

- Krista Liguori et al, *Antimicrobial Resistance Monitoring of Water Environments: A Framework for Standardized Methods and Quality Control*, ACS Publications, 2022.
- Benedetti Guido, et al. *A survey of the representativeness and usefulness of wastewater-based surveillance systems in 10 countries across Europe in 2023*. Euro Surveill. 2024.
- Paracchini, V., Petrillo, M., Arcot Rajashekar, A. et al. *EU surveys insights: analytical tools, future directions, and the essential requirement for reference materials in wastewater monitoring of SARS-CoV-2, antimicrobial resistance and beyond*. Hum Genomics 18, 72 (2024)

Thank you so much for your contributions. If you have any questions, please contact your national contact point.
Please visit the website of EU-JAMRAI to learn more about the full project.

On behalf of the full team of EU-JAMRAI 2 work package 8.3 - Roosmarijn Luiken, Luis Lucena, Thibault Stalder, Christophe Dagot and Heike Schmitt.