

Guidance document for questionnaire for survey to identify the microbiome research landscape

- The survey is conducted in the frame of MicrobiomeSupport Task 1.2 global mapping.
- The survey will identify research & innovation policies, research programs, research projects, and experts in Microbiome research.
- This questionnaire investigates the research landscape at the national and regional level.
- Please, submit the answers to the questionnaire before the **10th of August 2019**.

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Introduction and background

Microorganisms and microbial communities are very important for food systems (Fig. 1). However, research in this emerging field of microbiome research is still fragmented. Therefore, there is a need to build a common vision, research agenda and network of experts, stakeholders, including funders and programme managers.

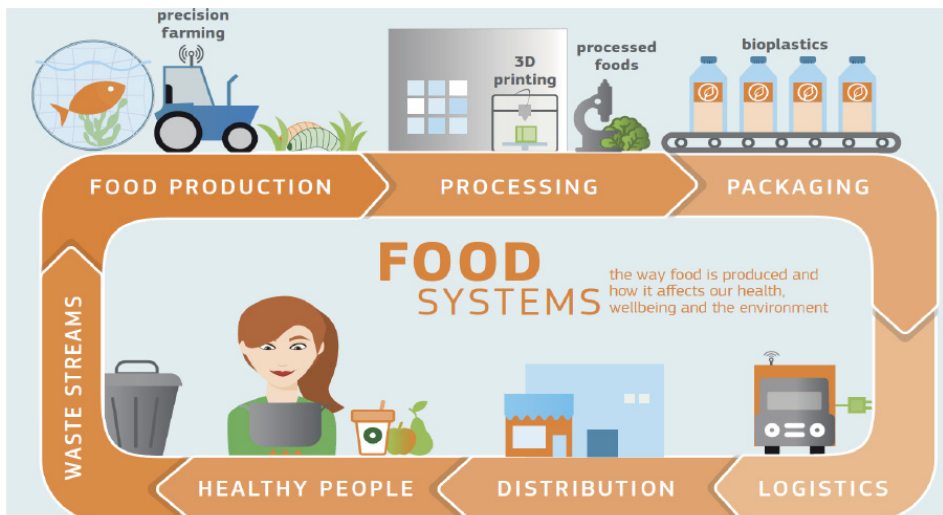


Fig. 1 European research and innovation for future food and nutrition security (source: European Commission¹)

¹ <http://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=food2030>

A food system approach moves away from the conventional agriculture system to sustainable farming and embraces all elements and activities that relate to the production, processing, packaging, logistics, distributions, preparation and consumption of food as well as its waste streams (Fig.1). So, a food systems approach moves towards a circular economy of food production. Microbiomes play a role in each step of the food system (Fig. 1).

MicrobiomeSupport (<https://www.microbiomesupport.eu/>) is a Coordination and Support action that involves 20 European partners and 9 international partners. MicrobiomeSupport supports the International Bioeconomy Forum (IBF) in particular the working group 'Food Microbiomes'. The members of the IBF consist of Canada, European Commission, New Zealand, United States of America, Argentina, China, India and South Africa.

The overall objective of MicrobiomeSupport is *'to establish an international network of experts and stakeholders in the field of microbiome food systems research, elaborating microbiomes from various environments, such as terrestrial, plant, aquatic, food and human/animal and their impact and applicability in the food system'*.

Microbiome definition

MicrobiomeSupport identified the following definition of a microbiome during the definition workshop on 6 March 2019: "A microbiome 'may be defined as a characteristic microbial community occupying a reasonably well defined habitat which has distinct physio-chemical properties. The term thus not only refers to the microorganisms involved but also encompasses their theatre of activity.'" (Whipps et al. 1988²).

The groups of microorganisms studied within microbiome research can belong to bacteria, archaea, fungi and/or protists. As microbiomes involve different group of microbes, their activities and ecosystems, a diverse range of keywords is recommended to be able to identify microbiome related research in your country. Please, use the following **keywords** when searching in country specific databases: Microbiome, Microbiology, Microflora, Microbiota, Microorganism(s), Microbe(s), Microbial, Bacteria, Fungi, Protists, Protozoa, Archaea, Prokaryote(s), Microbial Communities, Microbial Interactions, Bacteriophages, Bacterioplankton.

The group of microorganisms includes the study of a specialist group of microorganisms involved in a certain function, like nitrogen-fixing bacteria, methanotrophs or ammonia oxidizers. There are many techniques used to study microbiomes, which include state-of-the-art molecular tools and multi-omics approaches. However, the above-mentioned definition also includes classical approaches like measurements of phospholipid fatty acids (PLFAs).

² Whipps, et al., 1988. Fungi in Biological Control Systems. Manchester University Press.

The theatre of microbial activity includes not only studies that actively measure microbial activities, such as growth rates or microbial interactions, but also the functions where the microbial communities are involved in. These functions include host responses, nutrient cycling, degradation of waste streams or greenhouse gas emissions.

Objective and approach of global mapping activity

Within MicrobiomeSupport, Work Package (WP)1 has as objective to ‘map the state of play in the field of microbiome-related research, throughout the food system and beyond’ in all countries of the members of IBF. The preliminary survey, which was presented during the MicrobiomeSupports’ Common Ground Workshop in Vienna on the 4th of March, already provided some preliminary information on research and funding strategies, facilities and research activities. The current survey for Task 1.2 asks for more detail than the preliminary survey and will identify the current state of play.

The **aim of the current survey** is to ‘map the global state of the field of microbiome-related research throughout the food system and beyond’. In this survey, the contact point of each country should identify all main programmes, projects, experts and support facilities involved in microbiome research in your country. The result will be used to **identify future research agenda’s and priorities** for microbiome-related research in food systems around the globe.

The survey consists of the following steps:

1. Identification of country contact points
2. Questionnaire preparation
3. Send the questionnaire to the country contact points
4. Collecting the questionnaires
5. Desk study to identify international activities
6. Back and forward communication between Task leader and Country Contact Points if needed for clarifications.

The result of **your country is important** as it will put the current state of microbiome research in your country on the global map. Experts and institutes may be contacted in case of expert needs within future research and innovation activities or grant application activities.

The data collected by the survey will be used for the following deliverables:

- A report with the results of the mapping and a critical analysis of the existing research as well as strategic R&I agenda’s.
- A database with information on funders, programs, project, institutes and experts involved in microbiome research.

- A trans-sectorial workshop to elaborate on microbiome-related strategic research agenda's.
- A report on foresight analysis for future microbiome activities

Role of country contact point

The country contact point (CCP) is expected to identify all major activities within the country on microbiome research in the food system and beyond. The CCP is responsible for collecting all information and completing all sections of the questionnaire. The CCP should further have (direct or indirect) access to national and regional databases with programs and projects that fund microbiome research. It will take ca. 4-6 work days to fill in the full questionnaire for most of the countries. The contact point also acts as contact for the Task leader in the consolidation steps of the questionnaire.

Guidance for answering the questionnaire

The questionnaire is divided in the following sections:

- Section 1: Information about the country contact point
- Section 2: National research and innovation (R&I) agenda's and policies
- Section 3: Funders
- Section 4: National research programmes
- Section 5: National research projects
- Section 6: Infrastructures for microbiome research
- Section 7: Experts in microbiome research

It is important to use a wide range of **keywords**. Recommended keywords are: Microbiome, Microbiology, Microflora, Microbiota, Microorganism(s), Microbe(s), Microbial, Bacteria, Fungi, Protists, Protozoa, Archaea, Prokaryote(s), Microbial Communities, Microbial Interactions, Bacteriophages, Bacterioplankton.

Specific guidance per section of questionnaire

Section 1: Information about the Country Contact Point

Please provide information about the contact details for the person who has been appointed as person responsible for filling in this questionnaire.

Please read annex 2 with the policy statement.

Please also provide information of the organization(s) and other sources used to collect all information to answer the questions in this questionnaire.

Section 2: National research and Innovation (R&I) agenda's, policies and future strategies

For this section it is important to identify all major research and innovation agenda's in your country that addresses microbiome research. For question 2.2, we ask for key white papers and strategies at national level. For question 2.3, please provide key policies for your country. The policy does not have to include microbiome.

Section 3: Funders

Section 3a: National and regional funders

An excel file is prepared to list all national and regional funders. In this section, the main funders that have budget available for microbiome research should be listed. This includes funders that fund microbiome research via open programmes or that have no topic selected.

3.1 c. For the question 'Is it a national or regional funder?'. In the frame of this questionnaire, a regional funder is a financier in an autonomous regions that support large research projects or programs (e.g. autonomous regions in Spain or Bundesländer in Germany)

3.1 e multiple answers may be selected from drop-down list in excel file

3.1 f multiple answers may be selected from drop-down list in excel file

3.1 l multiple answers may be selected from drop-down list in excel file

3.1- g, h, i, j. Please let the task leaders know if currency is not in EUR.

Section 3b: International funders

Please note, desk studies will be performed by the task leaders on the major international funders and programmes:

- At European level:
 - The European Framework Programmes (FP7; H2020)
 - Joint programming initiatives (JPI)
 - European Research Area Networks (ERA-Nets)
 - Joint technology initiatives (JTI)
 - European Innovation communities
- At global level
 - Bill and Melinda Gates Foundation
 - EMBO
 - Human Frontiers Program

Therefore, no further information is required at this moment about programmes in which your country may participate from these funders and programmes.

Please provide information about other international funders to the task leaders.

Section 4: National research programmes

The timeframe covered by the survey is from 2013-2027. An excel template is prepared to list all programmes. The information may also be sent to the task leaders in your own excel file if the information to our questions is already readily available.

Mentioned programmes may include funding for personal scholarships if these programs can be involved in microbiome related research.

4.1 f multiple answers may be selected from drop-down list

4.1 o multiple answers may be selected from drop-down list

4.1 i clearly state the currency of the budget if different from EUR.

4.1 k. an example of person-year calculation. e.g. a programme that funds 10 full-time staff for 4 years, 10 full time staff for one year and 4 part-time staff (0.5 FTE) for 4 years is funding $40+10+2 = 52$ person-years.

4.2 multi-lateral programmes are programmes organized by multiple national or regional funding bodies. For example, D-A-CH collaboration promotes multi-lateral cooperation between Germany, Austria and Swiss. Multi-lateral programmes should involve at least two countries.

Section 5: National research projects

The timeframe covered by the survey is from 2013-2027. An excel template is prepared to list all projects. The information may also be sent to the task leaders in your own excel file if the information to our questions is already readily available.

To identify projects, it is important to use a wide range of **keywords**. Recommended keywords are: Microbiome, Microbiology, Microflora, Microbiota, Microorganism(s), Microbe(s), Microbial, Bacteria, Fungi, Protists, Protozoa, Archaea, Prokaryote(s), Microbial Communities, Microbial Interactions, Bacteriophages, Bacterioplankton.

5.1 please, provide projects that are funded via the funders and programmes mentioned under section 4. Under this question, the projects have a contract with a funder. These project can have one or multiple persons working on the project.

5.1 k you may either select the size category from the list or specify the exact amount.

5.1 l if known, please specify the total person-year spent on the project. E.g. if the project involves one full-time PhD position of 3-years (1 fte), one part-time postdoc position for 3 years (0.8 fte) and one part-time technician for 24 months (0.5 fte) than 6.4 person-years are spent on the project.

5.1 n please provide an English abstract, if available.

5.2 please, provide major projects funded directly by resources available from an institute. This type of funding may also be referred to as basic funding, hard money, primary funding, first money stream.

Section 6: Infrastructures for microbiome research

6.1. Please, provide the major support facilities for performing microbiome research in your country. These facilities include climate chambers, greenhouses, common gardens, field sites, as well as laboratories for stable isotope analysis, radioisotope analysis, sequencing facilities, etc. In addition, facilities include support platforms for analysis of microbiome data, such as microbiome centres, computation centres, bioinformatic support platforms, education platforms, data-storage platforms. In addition, databanks with specific strains present in your country will also be useful to know.

6.2. Platforms for network activities can be scientific platforms, such as the national microbiology society (e.g. American Society for Microbiology) in your country or the ecological society in your country (e.g. British Ecological Society, Netherlands Ecology Research Network). In addition, platforms can also be involved in activities that provide interactions between public and private sector.

Section 7: Experts in microbiome research

This section has as aim to identify the size of the community in your country involved in microbiome research. Please, provide an estimate of the group size of each expert group.

Senior researchers include permanent scientific staff, such as assistant professors, associate professors, researchers, senior scientists and lecturers that work at a university or a public funded research institute.

Scientists involved in microbiome research at R&D departments involve all scientist that work at companies, but should exclude PhD students and Postdocs affiliated to universities.

<p>In another email, MicrobiomeSupport will announce the opportunity for experts to register in a database. The aim of that expert database is to increase visibility of experts.</p>
