

The global microbiome research landscape: mapping of research, infrastructures, policies and institutions in 2021





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Preface

Herewith, the Coordination & Support Action (CSA) MicrobiomeSupport (www.microbiomesupport.eu) presents the output of a major mapping exercise to identify how the global microbiome research landscape in food systems and beyond evolved from 2019 to 2021 by collecting information via desk study and a survey. This report provides baseline information for the further gap analysis and recommendations to the policy sector and to develop strategic research and innovation agendas. The mapping reveals that microbiome research is performed in many ecosystems (e.g., soils, plants, humans and animals), but research is fragmented within ecosystems with little connectedness between disciplines. However, the research landscape seems to be slowly evolving as a larger fraction of R&I strategies addressed microbiome in 2021 compared with 2019. The report recommends that this needs to be translated in multi-disciplinary research activities in food systems, connecting different areas of microbiome research with other disciplines. Such projects are highly needed to secure sustainable food production, to enable bioeconomy innovations and to combat major crisis, as the Ukraine war, the climate and biodiversity crisis.

Mapping current activities, stakeholders and infrastructures is an important activity of the MicrobiomeSupport Consortium, in which EU and international experts and stakeholders in the field of microbiome research in food systems and beyond cooperate. The CSA receives funding from the H2020 programme of the European Union and supports the working group 'Food Systems Microbiomes' of the International Bioeconomy Forum. The CSA started in November 2018 and has as major objectives to identify microbiome R&I activities, develop strategic research and innovation agendas, provide a platform for different stakeholders in the field, address technical challenges and support an international, sustainable bioeconomy.

I sincerely thank all persons who have contributed to this report. In particular, I thank Dr. Annelein Meisner and Dr. Christine Bunthof from Wageningen University & Research, The Netherlands, who developed the questionnaire, coordinated the collection of information presented in this report and who finally wrote the report. I thank Martine Vernooij for the layout of the report and the data analysis. I further thank Dr. Tanja Kostic from AIT, Austria, for contributing to the approach to collect all the data and the data validation. I also sincerely thank the 24 country contact points representing the different European and international countries, for collecting information about national microbiome research and innovation activities.

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Executive Summary

Global challenges, such as the Ukraine war, COVID-19 pandemic, climate crisis, energy crisis and biodiversity loss, threaten the food system that is essential to support the growing human population. The food systems approach considers all elements and activities related to production, processing, packaging, logistics, distributions, preparations, consumption, waste streams, as well as human health and the environment. Microbiomes are present throughout the food systems and are important to ensure sustainable future food production.

Microbiomes are defined as the community of microorganisms, including bacteria, fungi and protists, in a given environment and the role that individual microorganisms play within the ecosystem they live in. Earth contains more microbial species than humans, and microbiomes are everywhere around and within us and play a key role in human, animal, and environmental health. In addition, microbiomes can influence human and animal health indirectly by modifying the quality of food and feed crops and products. Further, microbiomes play an important role in crop production systems, as they improve soil health, provide nutrients to crops and suppress plant diseases. Therefore, microbiomes are important to consider when moving towards sustainable food production systems.

In this report, the H2020 project MicrobiomeSupport presents the current state of play of the microbiome research landscape that was identified via a mapping activity.

In 2019, information on research funders, projects, infrastructures and policies was collected to map the global microbiome research landscape throughout the food system and beyond. The main finding was that microbiomes are studied in different fields (e.g. soil, plant, humans, animals, food), but research projects are fragmented within and between fields. Two reasons were identified: research projects often support one junior researcher, and study designs often describe microbiomes in one ecosystem. Further, microbiome research was not sufficiently considered in R&I strategies. The **aim of the current survey** was to “map the global state of microbiome-related research throughout the food system and beyond in 2021 with emphasis on how the research landscape is evolving”. Thereto, the following information was collected:

- existing policies and strategies with relevance to food systems and microbiomes;
- microbiome R&I activities supported by national funders or supra-national activities;
- infrastructures that support microbiome R&I activities;
- network platforms that support the exchange of information about microbiomes.

The main findings of the mapping exercise are:

- A larger fraction of R&I strategies collected in 2021 addresses microbiomes to a moderate or great extent than the R&I strategies in 2019. However, most R&I strategies still do not address microbiomes or address them only to a small extent.
- Microbiome research in the food systems and beyond involves studies in primary production systems, food production, human, waste streams and the environment.
- The research landscape of projects is still fragmented within different microbiome ecosystems (e.g., soils, humans, gut, plants or animals). Reasons for this are unchanged and include budget limitations (often, only one early career scientist is supported) and study designs often describe microbiomes in one ecosystem.
- There are some indications that microbiome research evolves slightly towards a systems approach within the food system, because of the establishment of some specific research programmes and a broader inclusion of microbiomes in new R&I strategies.
- Many countries have microbiome research infrastructures and network platforms supporting knowledge exchange. There are also many relevant supra-national infrastructures and network platforms available.

Conclusions and recommendations

The global mapping exercise revealed that microbiome research is performed in many science fields, but research projects are fragmented within ecosystems, such as soils, plants, humans, and animals. This suggests that a systems approach connecting microbiomes research across science fields is still not fully implemented. However, the research landscape seems to slowly evolve as microbiomes are addressed in a larger fraction of the R&I strategies collected in 2021. Further, there are currently some calls where microbiome research along the food system chain are addressed.

We recommend in this report to:

- Follow a holistic systems approach connecting different science fields that study microbiomes along the food system chain;
- Increase inter-disciplinary research by funding larger research projects supporting scientists from multiple science fields and establishing research teams that differ in expertise and research areas;
- Use a mechanistic, hypothesis-driven approach;
- Further develop future R&I strategies to include microbiomes and enable coordination of research directions and collaborations via specific calls and joint actions of, for example, the European partnerships;
- Increase microbiome literacy among relevant stakeholders to increase acceptance of future microbiome-based solutions.

1. Introduction

1.1 Importance of microbiomes

The world faces major challenges, such as the Ukraine war, the COVID-19 pandemic as well as the climate crisis, the energy crisis and the loss of biodiversity. These challenges threaten food systems that need to provide healthy and nutritious foods for a growing human population while maintaining environmental health [1-3]. Major institutions and recent policies have recognized that microbiomes play important roles in combatting many societal challenges [4, 5]. Microbiomes are all around us in natural and cultivated ecosystems, such as soils, plants and our own body (Fig. 1). For example, our body contains as many microbial cells as human cells [6]. In addition, there are more microbial species than humans on Earth [7]. As microbiomes provide key environmental services, they have been recognized as a key priority research area for the transformation toward a sustainable food system that is resilient to climate change, prevents biodiversity loss and is climate neutral in its energy use [5, 8-11].

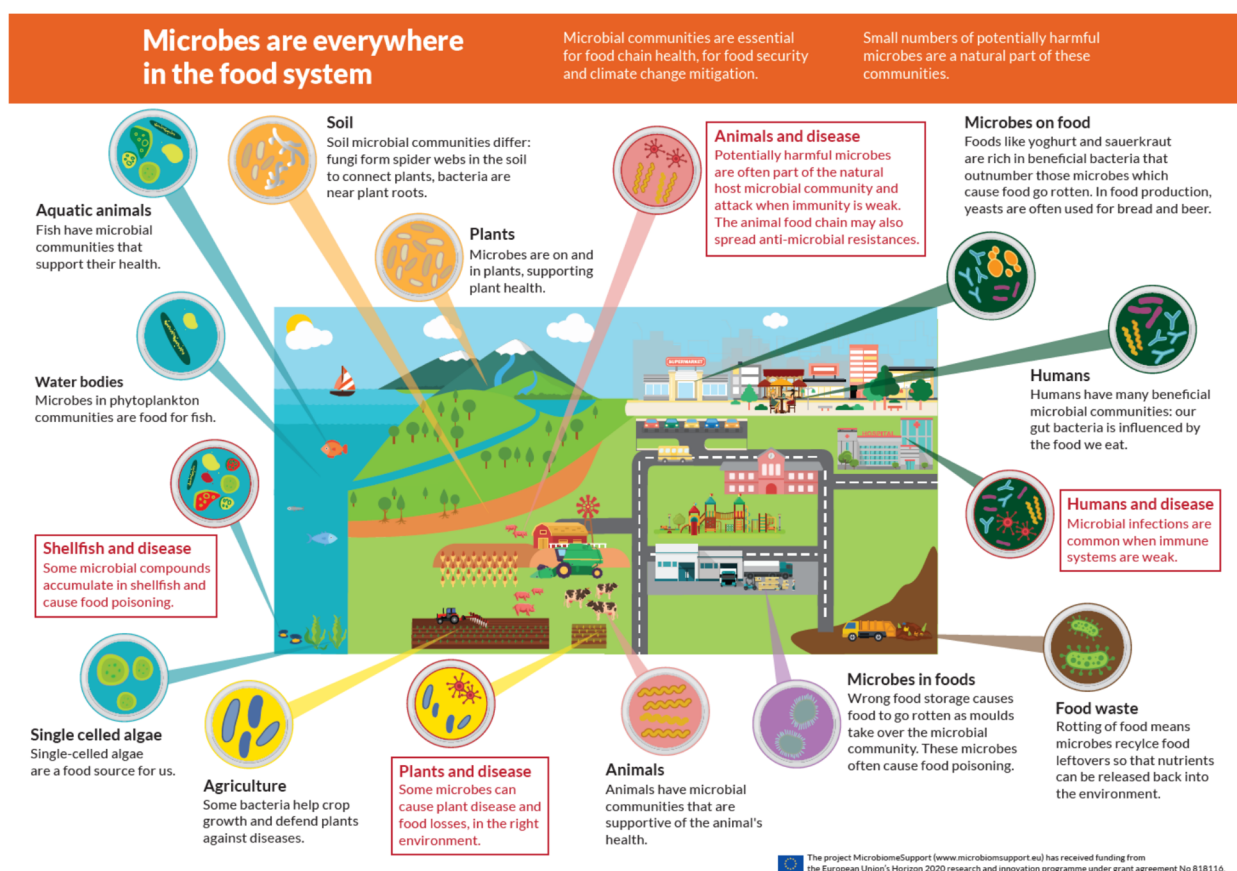


Fig. 1.1 Microbes are everywhere in the food system. Infographic developed in the frame of MicrobiomeSupport.

Microbiome research has already been performed for centuries [12] and is a booming research field with a growing number of publications and projects [13]. However, the field has only recently started to study microbial interactions and the relationship between microbial diversity and consequences for ecosystem functions or host health [14]. Most research has been of descriptive nature, describing the microorganisms present in one given environment [15, 16]. However, microbiomes do not only influence the ecosystem or host they are living in, but also connected ecosystems [13]. For example, soil microbiomes influence plants and crops [17]. Therefore, these microbiomes form the basis for producing crops sustainably. Furthermore, microbiome functions can be used to produce healthy and nutritious foods that are beneficial for human health [2, 18]. However, the importance of these microbial connections has only recently been recognised, and more comprehensive research is needed to elucidate them. However, microbiome research is currently fragmented within science fields [13]. Therefore, there is a need to build common visions, Research & Innovation (R&I) agendas, and multidisciplinary networks with experts from different stakeholder groups beyond academia to address microbiomes in the food system leading to microbiome-based solutions for sustainable food production.

1.2 Food systems approach

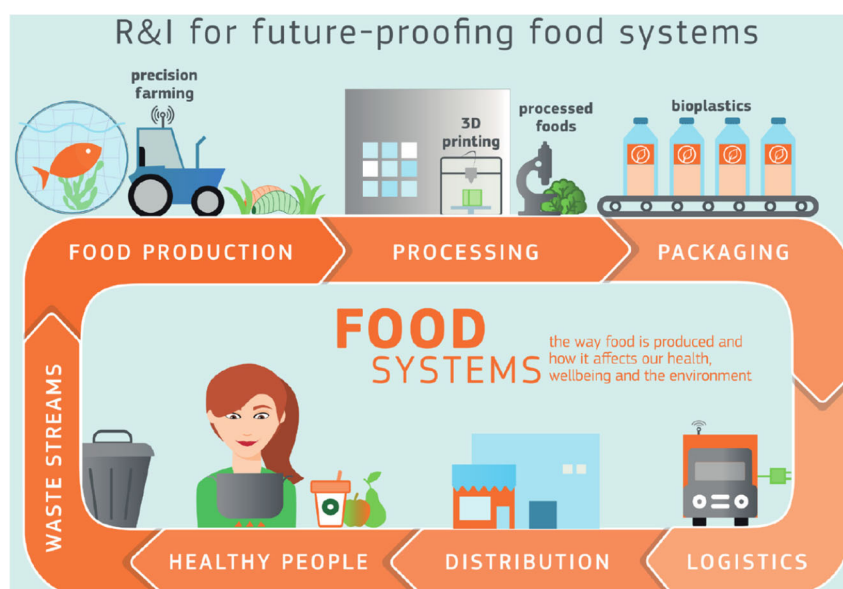


Fig. 1.2 European Research and Innovation for future-proof food systems (source: European Commission [9])

Within Food2030, a vision and policy narrative have been developed to enable a more systemic R&I. The aim is to develop solutions to the urgent, complex and interconnected challenges faced by food systems and enable transformation towards sustainability. These challenges include respecting planetary boundaries, providing healthy, safe and nutritious foods and diets, and building a sustainable, fair and inclusive food economy [9]. In addition, Food2030 considers a

food systems approach, which includes all elements and activities that relate to the production, processing, packaging, logistics, distribution, preparation, and consumption of food as well as its waste streams (Fig. 1.2). A food system approach does not only consider food production or food processing, but also addresses how activities within the food system affect animal, human and environmental health. A food systems approach thus aims to produce food within the context of a sustainable bioeconomy. Microbiomes play an important role in the food systems (Figs. 1.1 and 1.3), affecting primary production, environmental and host health.

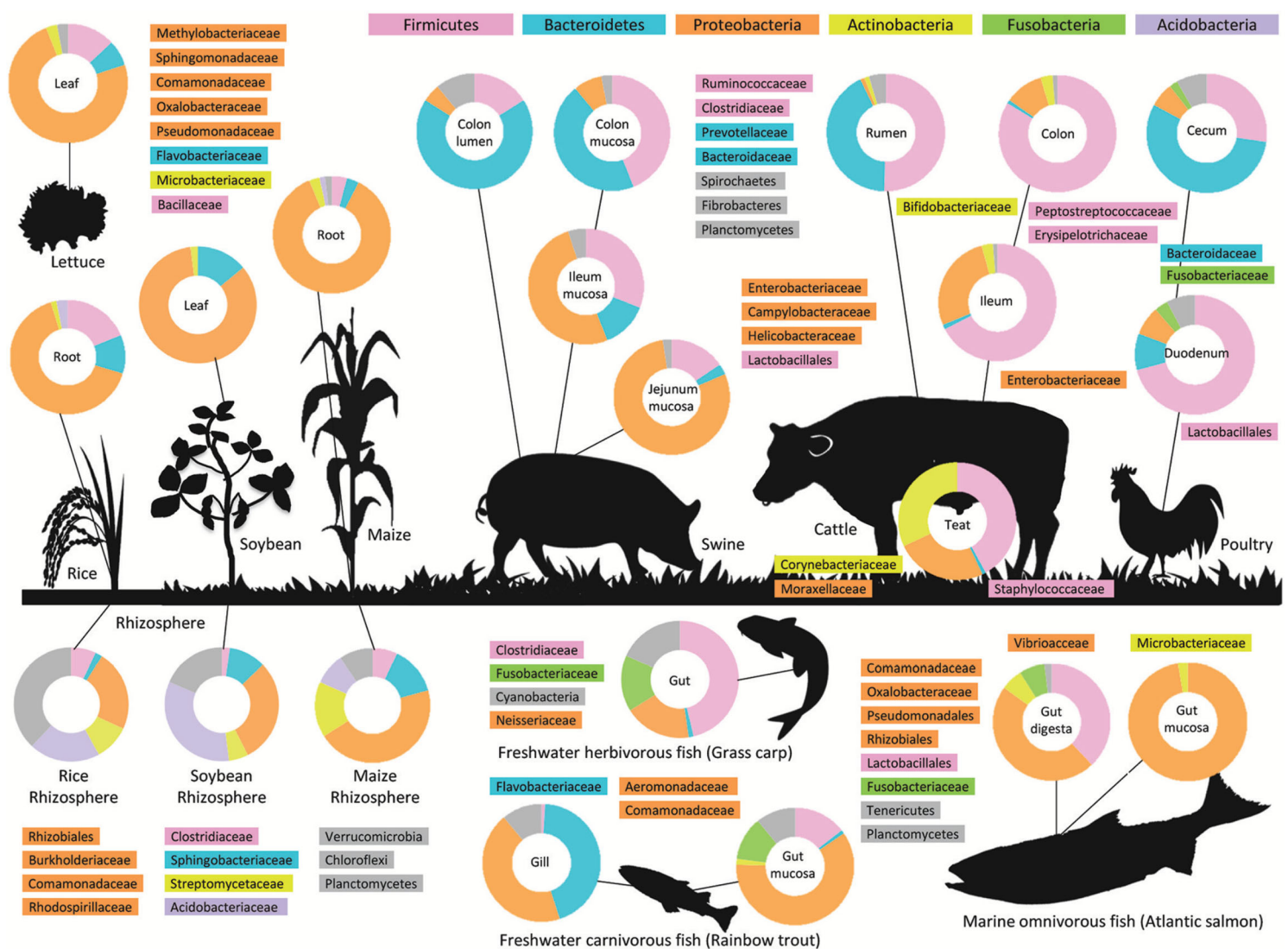


Fig. 1.3 Microbiomes in primary production systems. The figures present an overview of the bacterial composition of different parts of livestock animals, fish, plants at the phylum level and lower taxonomic levels. (from: [19]).

1.3 The MicrobiomeSupport project

MicrobiomeSupport¹ is a Coordination & Support Action (CSA) supported by the H2020 programme (H2020) of the European Commission. The project has 6 defined objectives²:

- “Identification and mapping of microbiome activities in the EU and worldwide, including programmes and facilities along the food chain and beyond.
- Creation of a platform for scientists, regulatory experts, industry, funding and policy organizations as well as support of the International Bioeconomy Forum (IBF)³ to implement the “Food Systems Microbiome” workgroup.
- Improve use of existing data to allow comparability and improved mining of microbiome data, including microbiome standards and best practices.
- Define strategic agendas to enable joint international microbiome applications in the food sector and beyond.
- Collaboration and coordination in support of a sustainable bioeconomy in Europe and beyond, in line with the FOOD 2030 policy goal to support the global food system.
- Raising awareness and exchange of knowledge across scientific and political communities, including the International Bioeconomy Forum (IBF), and the general public.”

The consortium involves 20 European partners and nine international partners. MicrobiomeSupport supports IBF, particularly the working group “Food Systems Microbiomes”. IBF members are Canada, the European Commission, New Zealand, the United States of America, Argentina, China, India, and South Africa.

1.4 Microbiome definition

The term microbiome has often been used differently by different scientists and research fields. This is problematic when discussing results or projects across different scientific fields. Therefore, MicrobiomeSupport organized a definition workshop on 6 March 2019. During this workshop, the following definition has been agreed upon: the microbiome is “a characteristic microbial community occupying a reasonable well-defined habitat which has distinct physio-chemical properties. The microbiome does not only refer to the microorganisms involved but also encompass their theatre of activity, which results in the formation of specific ecological niches” [14]. The groups of microorganisms belonging to the microbiome include bacteria, archaea, fungi and protists. The theatre of activity involves the whole spectrum of molecules produced by the microorganisms and coexisting hosts. This implies that microbiome research

¹ www.microbiomesupport.eu

² <https://www.microbiomesupport.eu/about/aims-and-objectives/>

³ www.bioeconomy-forum.org

requires approaches beyond DNA-based analyses of microbial composition, and it should address functionalities using methods based on RNA, proteins, metabolites, or microbial activities.

1.5 Overall objective of the mapping exercise

One objective of MicrobiomeSupport was to “map the state of play in the field of microbiome-related research, throughout the food system and beyond”. In 2019, information on research funding programmes, projects, infrastructures, institutions, and policies was collected. The main finding was that microbiomes are studied in different fields (e.g. soil, plant, humans, animals, food), but research projects are fragmented within and across fields [13]. Two reasons were identified, the research projects often support one junior researcher and studies often describe the microbiome present in one ecosystem. Further, microbiomes research was often not addressed or addressed to a small extent only in R&I strategies.

The **aim of the current survey** was to map the global state of microbiome-related research throughout the food system and beyond in 2021 with emphasis on how the research landscape is evolving.

2. Methods

The data was collected in 2019 and 2021 to identify the global state of the microbiome research landscape using the following approaches:

- Collection of national data via Country Contact Points (CCPs), which were usually partners from the MicrobiomeSupport consortium
- Desk study to collect information from supra-national initiatives

2.1 Survey to collect national data

In 2021, information collection on national microbiome research and innovation landscapes involved a survey similar to one performed in 2019. In this survey, the CCP of each country was asked to identify all **new** research and innovation strategies, white papers, policies, main programmes, projects, support facilities and networks involved in microbiome research. Pre-filled excel sheets with material submitted in 2019 have been prepared.

The survey consisted of the following steps:

- Analysing how to improve the questionnaire sent out in 2019
- Contact the CCPs to identify if they are the contact persons for the 2021 update
- Questionnaire preparation by updating questions and pre-filling existing data in Microsoft Excel sheets
- Sending the questionnaire to the CCPs
- Collection and consolidation of questionnaire responses
- If needed, clarification on outstanding queries via one-to-one emails or phone
- Revision and amending of submitted data

2.1.1 Questionnaire preparations

A questionnaire was prepared requesting the CCP of each country to identify policies, white papers, R&I strategies, main funding bodies, programmes that support funding, projects, facilities involved in microbiome research in his/her country and relevant networks (see Appendix 1 for specific questions asked). The CCP of each country was contacted to inform them of the new request (see 2.1.3). A guidance document was also prepared to provide instructions for correctly filling the questionnaire. In the guidance document, a range of keywords to identify research activities was recommended including: microbiome, microbiology, microflora, microbiota, microorganism(s), microbe(s), microbial, bacteria, fungi, protists, protozoa, archaea, prokaryote(s), microbial communities, microbial interactions, bacteriophages, bacterioplankton. Each CCP was provided with prefilled Microsoft Excel template with sheets containing information collected in 2019.

2.1.2 Target areas

Within the questionnaire, CCPs were asked to assign funders, research programmes, projects, or research networks to a target area to be able to identify their research field. The target areas were defined based on the Food2030 strategy and the current state of knowledge in the field that was elaborated from relevant literature (see Appendix 1 for an overview of target areas).

2.1.3 Role of Country contact points (CCPs)

The CCPs were expected to identify all new major national activities and initiatives (between 2019 and 2021) pertinent to microbiome research in the food system and beyond. The CCPs were responsible for collecting relevant information and completing all questionnaire sections. The CCPs also acted as a contact in the consolidation steps of the collected information. CCPs were contacted ca. six weeks before the questionnaire was sent out to inform them about the task and timeline. All countries represented in the MicrobiomeSupport consortium appointed a CCP in 2019, and nearly all countries updated the questionnaire in 2021. In addition, Slovakia and Hungary participated in the survey by appointing CCP.

2.1.4 Data validation

The provided data was checked and, if necessary, further clarified with the CCP using email or telephone communication. The approaches used for collecting information are described for each country in Appendix 2. Projects related to viral diseases, the development of new antibiotics or other medicines, only human cells (and not about microbiomes) or topics not related to microbiomes (e.g., physics of cell membranes) were removed from the database. Only projects starting in 2013 or later were considered. The project were assigned to target areas (see 2.1.2) and microbial groups by the CCPs. Several projects did not have a specified microbial group in the abstract and/or title. These were classified as “Not Specified”.

2.2 Desk study to collect supra-national activities

Supra-national activities relate to R&I activities implemented in multiple countries. Funding agencies supporting multi-national activities were identified by the authors of this report as well as CCPs. Wageningen University & Research performed desk studies to select relevant R&I strategies, white papers, policies, projects, research infrastructures and organizations providing network activities.

2.2.1 Research Programmes funded by the European Union

The Cordis database⁴ contains projects funded by the European Commission (EC). The EC programmes fund R&I projects that strengthen the European industry and its international

⁴ <https://cordis.europa.eu/>

competitiveness. This includes projects funded via the European Research Council (ERC), Marie Skłodowska-Curie Actions, Research and Innovation Actions, Innovation Actions, Coordination and Support Actions, SME Instruments and “Fast Track to Innovation”. The FP7 programme ran from 2007-2013 and the H2020 programme from 2014-2020, and these were thus considered in our mapping. The Cordis database was accessed on 20 June 2019 and 28 July 2021 to perform a search with the keywords defined in section 2.1.1. After this search, data on the identified projects starting in 2013 or later was downloaded. Titles and abstracts were screened to identify relevant projects (see section 2.1.4), resulting in 685 projects collected in 2019 and 285 projects collected in 2021.

2.2.2 ERA-NETs, Article 185 initiatives and Joint Programming initiatives

The database⁵ with projects funded through ERA-NETs, Article 185 initiatives and Joint Programming initiatives was searched on 17 September 2019. In 2021, the Era-Learn⁶ database was searched on 25 October, 27 October and 5 November 2021. ERA-NETs are public-to-public partnerships that pool resources for transnational calls. Joint Programming initiatives were set up in 2008 with the aim of consolidating research efforts across Europe. Article 185 initiatives are public-public partnerships with long-term funding from EU member states and EC that address common challenges in specific research areas and require a Dedicated Implementation Structure (DIS). A search was performed using the keywords defined in section 2.2.1. Furthermore, recently funded research projects were searched via the websites of the following initiatives and calls: the EJP SOIL programme⁷, ERANET FOSC⁸, Joint call ERANET FOSC and SUSFOOD2⁹, as well as the joint call of ERANET FACCE ERAGAS, ICT-AGRI-FOOD, ERANET SusAn and ERANET SusCrop¹⁰. 95 relevant projects were identified in 2019 and 64 in 2021.

2.2.3 European Molecular Biology Organization (EMBO)

EMBO¹¹ aims to promote excellence in life science in Europe and beyond by supporting talented researchers at all career stages. In addition, EMBO organizes activities to stimulate knowledge exchange and help build a research environment where scientists can excel. The EMBO website was searched on 27 June 2019, 31 October 2019 and 22 October 2021 with the above-mentioned keywords (see 2.2.1). There were 13 projects collected in 2019 and 12 in 2021. The postdoctoral fellowships information is unavailable online, and EMBO did not respond to the request for more information.

⁵ https://library.wur.nl/WebQuery/platform/find?q=*

⁶ <https://www.era-learn.eu/>

⁷ <https://ejpsoil.eu/>

⁸ <https://www.foscera.net/en/foscera/about-fosc.htm>

⁹ <https://www.foscera.net/en/foscera/2021-Call.htm>

¹⁰ <https://www.eragas.eu/en/eragas/2021-call.htm>

¹¹ <https://www.embo.org/>

2.2.4 Horizon Frontier Science Program (HFSP)

HFSP¹² is a programme providing funding for frontier research in life sciences. The Horizon Frontier Science Program database¹³ was accessed on 23 July 2019 and 22 October 2021 using established search and selection criteria, resulting in the identification of 51 relevant projects in 2019 and 6 projects in 2021.

2.2.5 Bill and Melinda Gates Foundation

The Bill and Melinda Gates Foundation¹⁴ is a trust guided by the belief that every life has equal value. Thereto, the trust supports activities to help all people lead healthy and productive lives. These activities include research and innovation projects that were searched via the Foundation Directory Online¹⁵ in 2019 and the Gates website¹⁶ in 2021. This resulted in 50 projects in 2019 and 24 in 2021.

2.2.6 Gordon and Betty Moore Foundation

The Gordon and Betty Moore Foundation¹⁷ was established by Gordon and Betty Moore in September 2000. It supports scientific discovery, environmental conservation, patient care improvement and preservation of the San Francisco Bay Area. The website of the Foundation was accessed on 11 September 2019 and 21 October 2021. Keyword search resulted in a few projects. Hence, the titles and project information of the projects supported by the Marine Microbiology Initiative¹⁸ and the Symbiotic in Aquatic Systems Initiative¹⁹ were screened. In addition, the CCP from USA also collected information from the Moore foundation, resulting in 105 relevant projects collected in 2019 and 15 projects in 2021.

2.3 Data visualization

Graphs were prepared in R version 4.0.2 using packages ggplot2 [20] and viridis [21]. In addition, pivot tables in Microsoft Excel and the table function in R were used to summarize the collected data. The collected information will be integrated into the online database²⁰.

¹² <https://www.hfsp.org/>

¹³ <https://www.hfsp.org/search/node>

¹⁴ <https://www.gatesfoundation.org/>

¹⁵ <https://fconline.foundationcenter.org/fdo-search/member-index/>

¹⁶ <https://www.gatesfoundation.org/about/committed-grants>

¹⁷ <https://www.moore.org/>

¹⁸ <https://www.moore.org/initiative-strategy-detail?initiativeId=marine-microbiology-initiative>

¹⁹ <https://www.moore.org/initiative-strategy-detail?initiativeId=symbiosis-in-aquatic-systems-initiative>

²⁰ <https://eera-data-platform.eu/platform/microbiomesupport/index.html>

3. Results

3.1 Collected information from different countries

Table 1 provides an overview of the information collected by the country contact points (CCPs) in the individual countries. Overall, 122 strategies, 40 white papers and 44 policies, 191 funding bodies of which 27 were regional funders, 452 research programmes, 9154 research projects, 373 support facilities and 66 organizations at the national level that organize activities for knowledge exchange were identified. Appendix 2 provides a detailed description of how the information within each country has been collected and summarizes country results.

Table 1: Information collected via country contact points in both 2019 and 2021. The numbers of collected strategies & policies, funders, research programmes, research projects, support facilities, and organizations that organize activities for knowledge exchange are presented for each country.

Country	Strategies	White papers	Policies	Funders	Programmes	Projects	Support facilities	Knowledge exchange
Argentina	0	0	0	1	0	6	4	0
Australia	1	1	2	10	0	0	7	2
Austria	16	1	3	13	10	157	10	7
Belgium	7	2	5	8	0	206	20	6
Brazil	1	6	1	7	18	756	167	2
Canada	3	4	1	12	61	1115	11	1
China	1	1	1	1	1	6	1	2
Denmark	2	0	0	14	7	131	3	1
Estonia	5	3	7	4	8	16	2	0
France	8	2	0	16	7	244	14	3
Germany	27	2	3	7	33	345	7	2
Greece	2	1	3	6	4	19	6	4
India	1	1	4	3**	10	339	9	5
Ireland	6	5	4	11	42	249	10	2
Italy	10	0	0	15	12	27	11	2
Netherlands	5	4	0	5	30	234	12	13
New Zealand	0	0	0	9	2	27	6	1
Poland	3	0	2	5	26	780	25	2
South Africa	1	0	1	6	6	12	6	0
Spain	2	3	0	4	4	410	5	4
U.K.	6	1	2	19	26	108	25	2
USA	5	1	5	6	135	3873	3	2
Hungary ¹	7	2	0	4	5	25	4	1
Slovakia ¹	3	0	0	5	5	69	5	2

¹no MicrobiomeSupport partner; **Funding by "Central Government" that support various funding agencies.

Countries differ in how they organize R&I activities, including microbiome research activities, infrastructures, and platforms. Funding resources range from mostly public resources in some countries (e.g., Belgium) to funding resources from both public and private funding organizations in other countries (e.g., Denmark). Further, funding bodies organize research activities at the national level (e.g., the Netherlands, United Kingdom) or both national and regional levels (e.g., Germany, Belgium). Within countries with regional funding agencies, policies, white papers, and R&I strategies are often also available at the regional level and complement policies, white papers, and strategies at the national level. Countries with a more decentralized structure of organizing their research activities may have more difficulties collecting the majority of microbiome-related research activities than countries with a more centralized structure. As such, the way a country organizes its research activities may have biased the completeness of the information collected.

Furthermore, the access to information in the different countries varied greatly. Therefore, we have estimated the completeness of submitted data per country based on feedback from CCPs and the information collected (Fig. 3.1). In some countries, like Spain and Austria, databases with research projects are available at the central level as well as information on relevant policies, infrastructures, and networks. In other countries, like Italy and South Africa, it was harder to obtain relevant information on research projects, as centralized databases are missing. For most countries, it was difficult to obtain information on the budget of projects, research programmes or funders, as not all funders provide budget information. Further, in some countries, General Data Protection Regulations (GDPR) limited the availability of data. In addition, some countries did not update the data collected in 2019, whereas other countries, such as Ireland and the Netherlands, updated information. As such, the collected information has some inherent bias, with some countries being more complete than others.

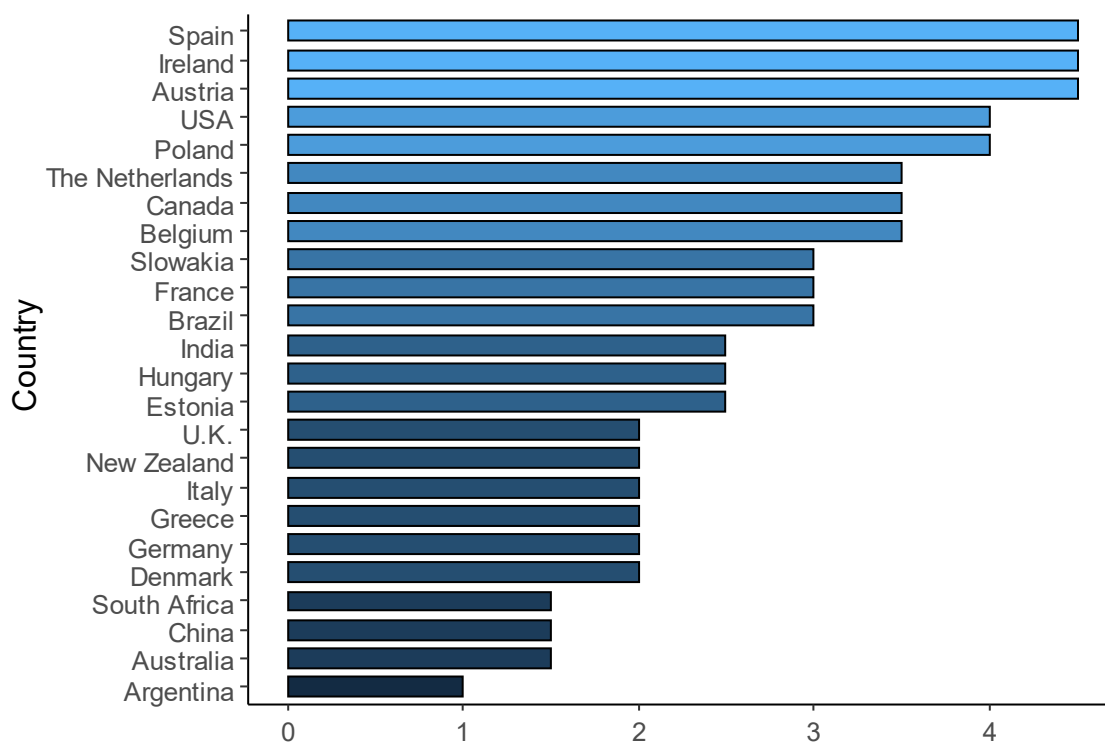


Fig. 3.1 Completeness of collected information by countries. The estimate is based on the assessment of collected information and the feedback from the country contact point. The estimate is on a 0-5 scale, with 0 indicating that no data is available and 5 that all data has been collected.

3.2 Supra-national activities

The performed desk study resulted in 34 strategies, six white papers and three policies (see Appendix 3). In addition, we identified five funders, 29 ERA-NETs and five Joint Programming Initiatives, one European joint programme and two article 185 initiatives that supported 1412 microbiome research projects (see Appendix 3). The funders include organisations that support global microbiome R&I activities, such as the Bill and Melinda Gates Foundation, the Human Frontier Science Program and the Gordon and Betty Moore Foundation. In addition, the European Commission and the European Molecular Biology Organization (EMBO) provide support for microbiome research in EU member states and affiliated countries. There were 13 research infrastructures identified and 32 research networks.

The identified policies, white papers, strategies, platforms, and infrastructures include activities organized at a centralized and global level that are implemented in R&I policies and R&I support activities at a local level. For example, the European Infrastructure for Biological Information (ELIXIR) coordinates and develops life science resources across Europe. This infrastructure provides support in Europe for bioinformatic data analysis by establishing local nodes that support and oversee the work at the local level in Europe. Similarly, the global soil partnership has members organized per continent and then by country. The Common Agriculture Policy (CAP) in Europe is a centralized European policy, but each European member state has its own policy based on the European CAP. As such, the supra-national activities often support global policies, strategies, infrastructures or networks important for microbiome R&I activities that are implemented in national activities.

3.2.1 Centralized funding bodies for research activities in Europe

The European Commission is a major funder of R&I activities within Europe by providing funding for projects via FP7 and H2020 programmes. Besides direct support for research projects, the European Commission is also involved in several initiatives supporting and coordinating European R&I activities, like Joint Programming Initiatives and ERA-NETs. Within these initiatives, national research funders and the EC pool funds to ensure better use of available resources. Under Horizon Europe, European joint programming activities are coordinated under partnerships. In addition, article 185 initiatives are supported by member states.

3.2.1.1 Joint Programming Initiatives

Joint Programming Initiatives (JPIs) were set up in 2008 with the aim to consolidate national research efforts across Europe to make better use of resources for R&I activities and to tackle societal challenges that Europe is facing. JPIs were supported by the FP7 and H2020 programmes. JPIs address major challenges, such as climate change and ensuring energy and food supplies. The basis of each JPI is a structured and strategic process where European

countries agree voluntarily on a common vision and strategic research agendas. The following joint programming initiatives include microbiome R&I activities:

- FACCE-JPI²¹: Agriculture, Food Security & Climate Change
- JPI HDHL²²: A healthy diet for a healthy life
- JPI Climate²³: Connecting Climate Knowledge for Europe
- Water JPI²⁴: Water challenges for a changing world
- JPI AMR²⁵: Joint Programming Initiative on Antimicrobial Resistance

3.2.1.2 European Joint Program

The European Joint Programme Cofund (EJP) is an instrument under H2020 that supports coordinated R&I programmes that pool together a critical mass of resources from national and H2020 programmes. EJPs bring together resources for funding projects, capacity building, networking, demonstration, and dissemination. Projects involving microbiome research have been identified within EJP SOIL²⁶: Towards climate-smart sustainable management of agricultural soils.

3.2.1.3 ERA-NETs

ERA-NETs are public-public partnerships that pool resources for transnational calls. Thereby, ERA-NETs help to overcome the fragmentation of research in Europe. H2020 often provides a top-up co-funding for single joint calls of transnational R&I activities. However, national and regional authorities can also provide funding for calls without support from EC. There were 29 ERA-NETs identified that have funded microbiome research and innovation activities (Table 2).

3.2.1.4 Article 185 initiatives

Article 185 initiatives are public-public partnerships with long-term funding. Article 185 initiatives are established by EU member states and receive funding from the FP7 and H2020 programmes. They address common challenges in specific research areas and require a Dedicated Implementation Structure (DIS). Two article 185 initiatives have been identified that supported funding for microbiome research:

- EDCTP2²⁷: European & Developing Countries Clinical Trials Partnership
- PRIMA²⁸: Partnership for Research and Innovation in the Mediterranean Area

²¹ <https://www.faccejpi.net/en/faccejpi.htm>

²² <https://www.healthydietforhealthylife.eu/>

²³ <https://jpi-climate.eu/>

²⁴ <http://www.waterjpi.eu/>

²⁵ <https://www.jpiamr.eu/>

²⁶ <https://ejpsoil.eu/>

²⁷ <https://www.edctp.org/>

²⁸ <https://prima-med.org/>

Table 2: ERA-NETs that have a research programme, which includes microbiome research

ERA-NET	Name
ANIHWA	Animal health and welfare ERA-NET
ARIMNET	ERA-NET for Coordination of Agricultural Research in the Mediterranean
ARIMNet2	Coordination of Agricultural Research in the Mediterranean
BESTF3	ERA-NET Bioenergy Sustaining the Future
BiodivERSA	The network promoting pan-European research on biodiversity, ecosystem services and Nature-based solutions
BlueBio	ERA-NET Cofund on the Blue Bioeconomy
BONUS	Science for a better future of the Baltic Sea region
C-IPM	Integrated Pest management (IPM) ERA-NET
CoBioTech	Cofund on Biotechnologies
COFASP	Strengthening cooperation in European research on sustainable exploitation of marine resources in the seafood chains
CORE Organic PLUS	Coordination of European Transnational Research in Organic Food and Farming Systems Plus
EMIDA	Coordination of European research in the area of animal health, including emerging threats, infectious diseases and surveillance
ERA-CAPS	European Research Area Network for Coordinating Action in Plant Sciences
ERA-HDHL	Biomarkers for Nutrition and Health
ERA-IB-2	Deepened and enlarged European cooperation in the area of Industrial Biotechnology - ERA-NET
ERA-MBT	Marine biotechnology ERA-NET
ERA-MIN	ERA-NET Confund on Raw Materials
ERA-NET Bioenergy	ERA-NET Bioenergy - Pulling bioenergy research together
ERA-NET NEURON	Network of European funding for neuroscience research
ERASysAPP	ERA-NET for Applied Systems Biology
ETB-PRO	EUROpean programme for TRANS-national R&D&I. Cooperations of BIOtech SMEs
EUPHRESKO	European Phytosanitary Research Coordination
EUPHRESKO 2	Deepened and enlarged cooperation between phytosanitary (statutory plant health) research programmes - ERA-NET
FACCE ERA-GAS	Monitoring & Mitigation of Greenhouse Gases from Agri- and Silviculture
FACCE SURPLUS	Sustainable and Resilient Agriculture for Food and Non-Food Systems
FACCE-ERA-NET+	Climate Smart Agriculture: adaptation of agricultural systems in Europe ERA-NET Plus
FOSC	ERA-NET on Food Systems and Climate
ICRAD	ERANET International Coordination Of Research On Infectious Animal Diseases
SusAn	European Research Area on Sustainable Animal Production Systems
SusCrop- ERA-NET	ERANET Cofund on sustainable Crop Production

3.2.1.5 European Institute of Technology

The European Institute of Technology (EIT) is an independent body of the European Union created in 2008. EIT aims to deliver innovation in Europe. EIT's vision is to “become the leading European initiative that empowers innovators and entrepreneurs to develop world-class solutions to societal challenges and creates growth and skilled jobs.” EIT received a budget of 2.4 billion EURO from the H2020 programme of the European Union for the period 2014-2020 to perform R&I activities, including support for microbiome R&I activities. Under Horizon Europe, EIT will receive ca. 3 billion EURO to organize R&I activities for the period 2021-2027. For their activities, EIT should also attract 75% of the additional budget from private or other public funds. EIT organizes R&I activities through EIT communities, cross-border partnerships of leading businesses, education, and research organizations. Each EIT community is an independent legal entity with its own Management Board and organizational structure. Relevant EIT communities for microbiome research in food systems are:

- EIT Climate-KIC
- EIT Food
- EIT Health

The EIT communities will continue under Horizon Europe as European Partnerships (Table 3).

3.2.1.6 Joint programming under Horizon Europe

Under Horizon Europe, the funding landscape for joint programming activities will change and be coordinated via European Partnerships. In European Partnerships, public or private resources at regional, national, or interactional levels are pooled to support research and innovation activities to work towards a common vision by preparing roadmaps and coordinated implementation activities. A broad set of activities can be organized under partnerships, such as funding research projects or aligning outcomes to uptake by society, regulatory agencies, and the market. Further, European Partnerships aim to develop synergies with national and regional programmes to ensure the deployment and upscaling of the solutions and new technologies. A list of candidate Partnerships can be found on the website of the European Commission²⁹. Relevant candidate Partnerships for microbiome research along the food system and beyond are summarized in Table 3.

²⁹ https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe_en

Table 3: Candidate Partnerships under Horizon Europe that are relevant for microbiome research

Name	area	aim*
European Partnership for One Health/AMR Antimicrobial Resistance (AMR)	health	"The main goal is to contribute to achieving the objectives of the European One Health Action Plan against AMR and the WHO Global Action Plan on AMR, by reducing the threat of AMR."
European Partnership accelerating farming systems transition: agroecology living labs and research infrastructures	food, bioeconomy, natural resources, agriculture and environment	"The partnership aims to accelerate the transition towards sustainable (economic, environmental and social), climate- and ecosystem-friendly farming practices."
European Partnership for Animal Health and Welfare (PAHW)	food, bioeconomy, natural resources, agriculture and environment	"The partnership aims to deliver key knowledge, services and products to significantly improve the control of animal infectious diseases and animal welfare in a coordinated way which will sustain animal production and protect public health."
European Partnership for agriculture of data	food, bioeconomy, natural resources, agriculture and environment	"This partnership aims to enhance climate, environmental and socio-economic sustainability and productivity of agriculture and to strengthen policy monitoring and evaluation capacities, through exploiting the potential of Earth Observations, other environmental and agricultural data, in combination with data technologies".
European Partnership for rescuing biodiversity to safeguard life on Earth	food, bioeconomy, natural resources, agriculture and environment	"The objective of the initiative is to provide an overarching platform connecting national, local and European research and innovation programmes and combining in-cash and in-kind resources in support of one goal - by 2030 biodiversity in Europe is back on a path of recovery."
European Partnership for a climate neutral, sustainable and productive Blue Economy	food, bioeconomy, natural resources, agriculture and environment	"The objective of the initiative is to target the objectives of the Clean Planet for All, the Green Deal and EU blue policies towards a climate-neutral, sustainable and productive Blue Economy that preserves biodiversity by 2030."
European Partnership for sustainable food systems for people, planet and climate	food, bioeconomy, natural resources, agriculture and environment	"The objective of the partnership is "to collectively develop and implement an EU-wide committed research and innovation partnership to accelerate the transition towards healthy diets that are safe and sustainably produced and consumed in resilient EU and global food systems."
European Partnership for a circular bio-based Europe	food, bioeconomy, natural resources, agriculture and environment	"The objective of the initiative is to produce major contributions to the climate targets by 2030, pave the way for climate neutrality by 2050, and increase sustainability and circularity of production and consumption systems in line with the European Green Deal."
EIT Climate-KIC	across themes	"The partnership aims to deploy and consolidate by 2030 an open, trusted virtual environment to enable the

Name	area	aim*
EIT Health-KIC	across themes	estimated 2 million European researchers to store, share and reuse research data across borders and disciplines. “EIT Health will be delivering solutions to enable European citizens to live longer, healthier lives by promoting innovation.”
EIT Food-KIC	across themes	“EIT Food will be delivering solutions to develop a highly skilled food sector and collaborate with consumers for products, services and new technologies delivering a healthier lifestyle for all European citizens.”

*main aims were taken from: https://ec.europa.eu/info/research-and-innovation/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe_en

3.3 Strategies, white papers, and policies

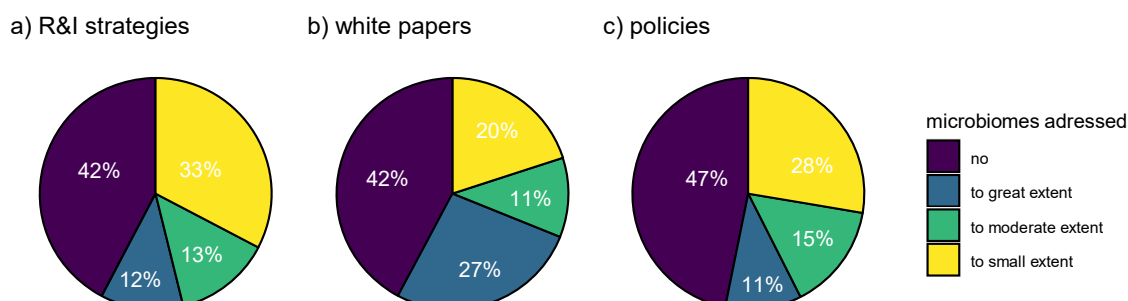


Fig. 3.2 Microbiomes addressed in the collected R&I strategies (a), white papers (b) and policies (c). The CCPs were asked to assign to what extent microbiomes were addressed within the policy, strategy or white paper. This could be not at all (no), to a small extent, to a moderate extent, to a great extent.

A total of 156 R&I strategies, 46 white papers and 47 policies were collected. These include 26 R&I strategies, five white papers and eight policies collected in 2021 and the rest in 2019. At the national and regional level, there were 122 R&I strategies, 40 white papers and 44 policies were identified (Table 1). In addition, at the international level, there were 34 strategies, 6 white papers and 3 policies identified (see Appendix 3). Some R&I strategies, white papers and policies are involved in two categories. For example, Food Vision 2030 from Ireland, the Innovation 2020 from Ireland, and the Agriculture Policy: vision 2020 from India involve both a key R&I strategy and a key policy.

Most R&I strategies, white papers or policies do not address microbiomes or address them only to a small extent (Fig. 3.2). Microbiomes are addressed to a great extent in ca. 12% of R&I strategies, 11% of policies and 27% of white papers. These were developed in Belgium, Brazil, Canada, Germany, France, Hungary, Ireland, India, Italy, the United Kingdom and the United States. For example, Canada has a microbiome initiative³⁰, USA has an intra-agency strategic plan for microbiome research [22] and Italy has the Italian Microbiome Initiative for Improved Human Health and Agri-Food Production³¹. There are also strategies on microbiome research in connection to food safety or antimicrobial resistance, such as the Strategic Research and Innovation Agenda on Antimicrobial Resistance from JPI AMR and the EJP ONE Health Strategic Research Agenda.

Microbiomes have received increasing attention in R&I strategies published in the period 2019-2021. This is reflected in a percentual increase of strategies that address microbiome to a moderate or great extent (Fig. 3.3). These include national R&I strategies, such as the

³⁰ <https://cihr-irsc.gc.ca/e/51498.html>

³¹ <http://cnbbsv.palazzochigi.it/media/1712/microbioma-2019.pdf>

microbiome strategic roadmap from the UK³², Acceleration Strategy for Sustainable and Healthy Food from France³³, or the NIST Microbiome Program from the USA³⁴. Furthermore, microbiomes were included in soil biodiversity, an important area in the EU Soil Strategy for 2030. Further, the microbiome world is one of the ten Food2030 pathways for action[23]. Although microbiomes are not addressed in all sections of these strategies, they are suggested to play an important role in the food system.

R&I strategies

a) 2019

b) 2021

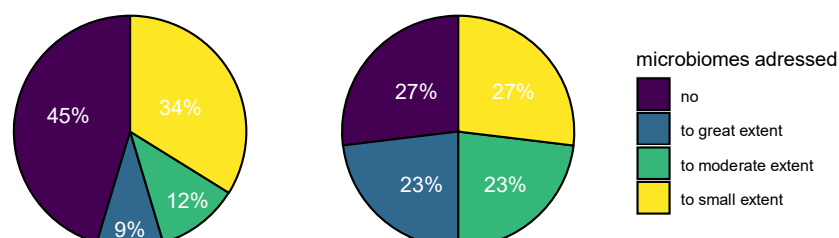


Fig. 3.3 Microbiomes addressed in R&I strategies collected in 2019 (a) and 2021 (b). The R&I strategies addressed microbiomes not at all (no), to a small extent, to moderate extent, to great extent. There were 130 R&I strategies collected in 2019 and 26 R&I strategies in 2021

³² https://ktn-uk.org/wp-content/uploads/2021/02/Microbiome_Strategic_Roadmap_FINAL.pdf

³³ https://www.gouvernement.fr/sites/default/files/contenu/piece-jointe/2021/11/dp_stragies_alimentation_agriculture_pia4_vdef_05112021.pdf

³⁴ <https://www.nist.gov/mml/bbd/primary-focus-areas/microbiome>

3.4 Research funding

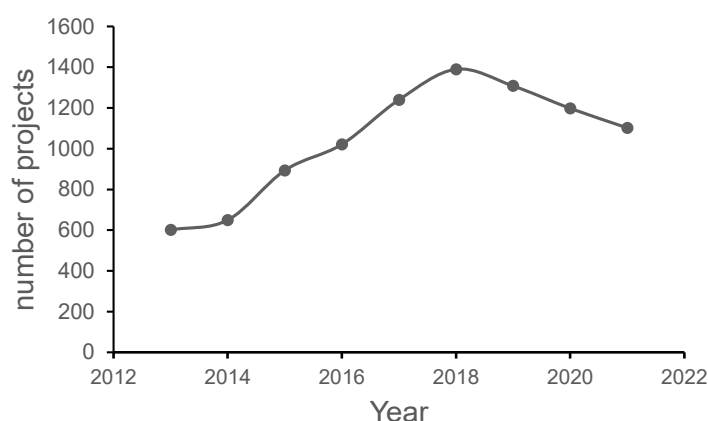


Fig. 3.4 The total number of projects that start per year for the period 2013-2021.

A total of 10,566 projects were identified (6,230 in 2019 and 4,336 in 2021). The number of projects is increasing over time, with a peak of projects starting in 2018 (Fig. 3.4). Budget information was available for ca. 84% of the projects. Most research projects are supported by general research programmes. However, there are also a few programmes addressing microbiome research specifically, such as the Canadian Microbiome Initiative funded by Canadian Institute of Health Research; Meta-Omics and Microbial Ecosystems funded by National Research Institute for Agriculture, Food and Environment in France; Priority Programme: Deconstruction and Reconstruction of the Plant Microbiota funded by German Research Foundation. In addition, Netherlands Organization for Scientific Research launched a Microbiome: Healthy from soil to gut and back programme in 2022.

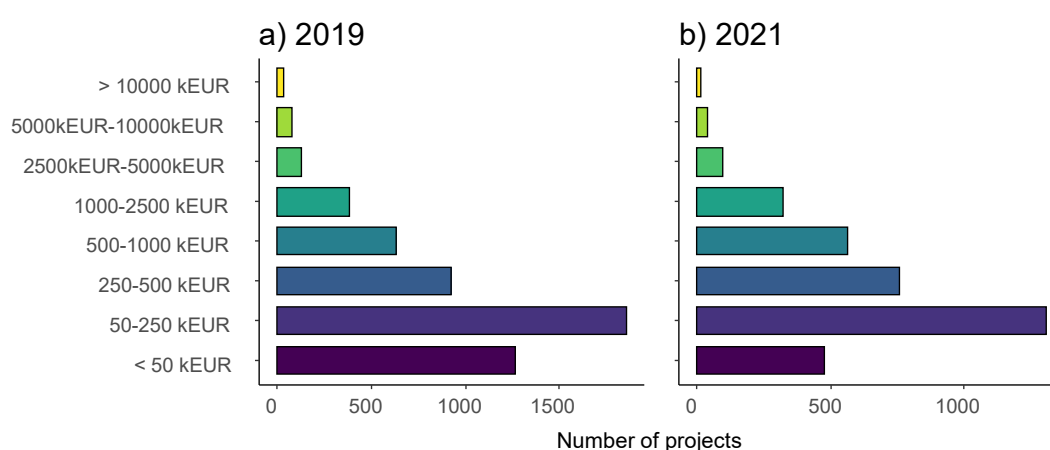


Fig. 3.5 Budget categories of research projects collected in 2019 (A) and 2021 (B).

In 2019, 59% of the collected projects were in the budget categories <50 kEUR and 50-250 kEUR (Fig. 3.5). In 2021, ca. 40% of all projects collected were in these budget categories. This indicates that most projects support(ed) one early career scientist. App. 12% of the projects collected in 2019 and 2021 had a budget higher than 1000 kEUR.

Projects funded by supra-national activities also were more evenly split, with 40% of the projects in the budget category 50-250 kEUR and 43% of projects with a budget larger than 1000 kEUR (Fig. 3.6).

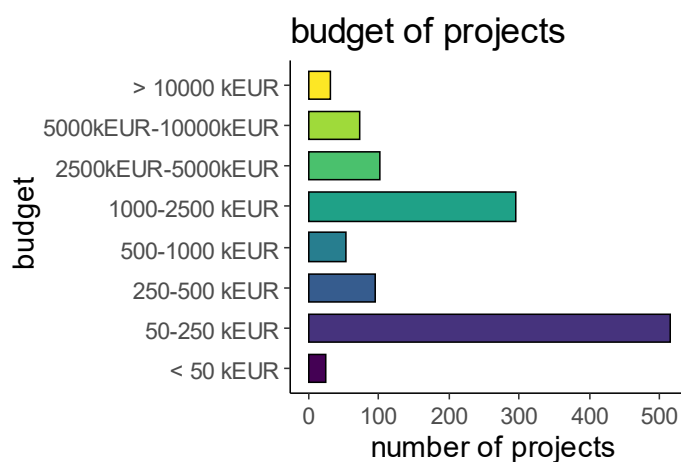


Fig. 3.6 Budget categories of projects funded by supra-national activities.

3.5 Topics of research projects

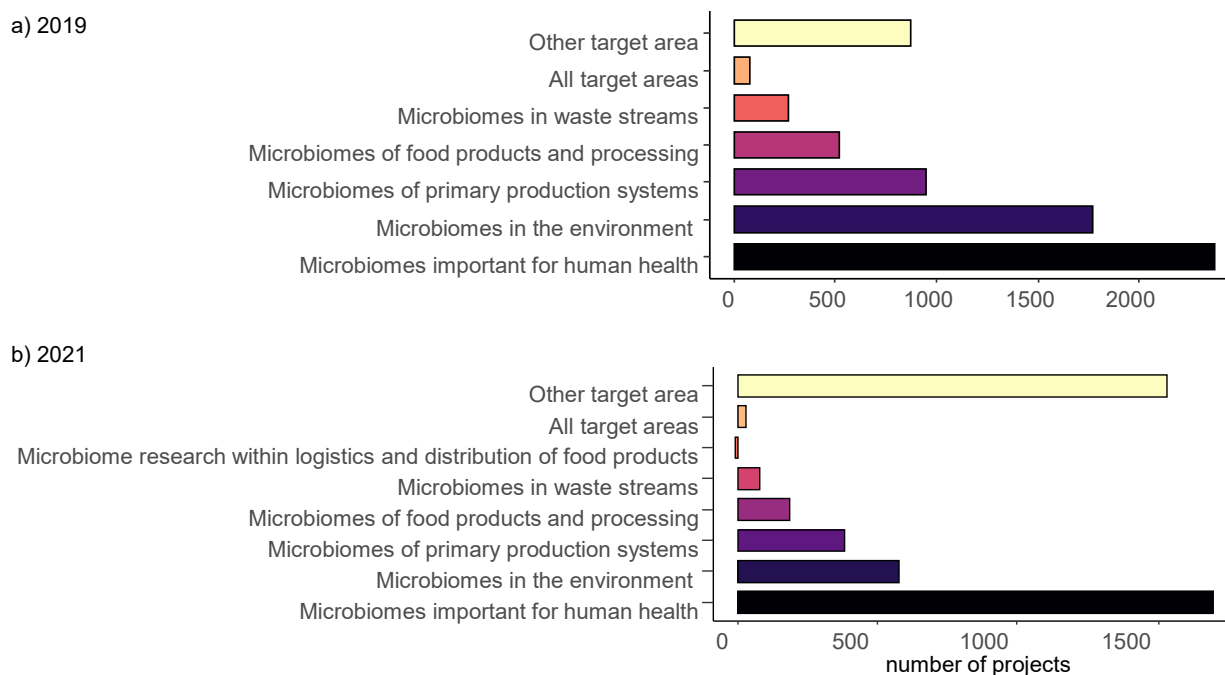


Fig. 3.7 Target area of research projects collected in 2019 (a) and 2021 (b). Research projects can be involved in more than one target area.

In both 2019 and 2021, ca. 39% of the projects collected were assigned to the target area “Microbiomes important for human health” (Fig. 3.7). Within this category, most research is about gut microbiomes or other human microbiomes (Fig. 3.8). “Microbiomes in the environment” are the second largest group of projects with ca. 28% of projects collected in 2019 and ca. 13% of the projects collected in 2021. Within this category, studies on soil microbiomes and marine ecosystems dominate. Research on the “Microbiomes of primary production systems” account for 15% of the projects in 2019 and 9% in 2021 (Fig. 3.7). Within this category, most projects address microbiomes in agricultural environments and livestock farming (Fig. 3.8). The number of projects in the category “Microbiomes of food products and processing” is even lower with ca. 8% of the project in 2019 and ca. 4% in 2021. Most projects in this category study health additives and supplements (Fig. 3.8), including probiotics and prebiotics. The least represented target area is “Microbiomes in waste streams”, where microbiomes are primarily studied in municipal waste streams (Figs. 3.7 and 3.8). In 2019 ca. 14% of the collected projected involved other categories and in 2021, ca. 35% of the projects involved other categories, such as biotechnology, biology of microorganisms and microbial interactions as well as unspecified

projects. A large fraction of the projects from the United States and Canada was assigned to the category “other target area” due to the difficulty of assigning target areas with search functions in Microsoft Excel (See Appendix 2).

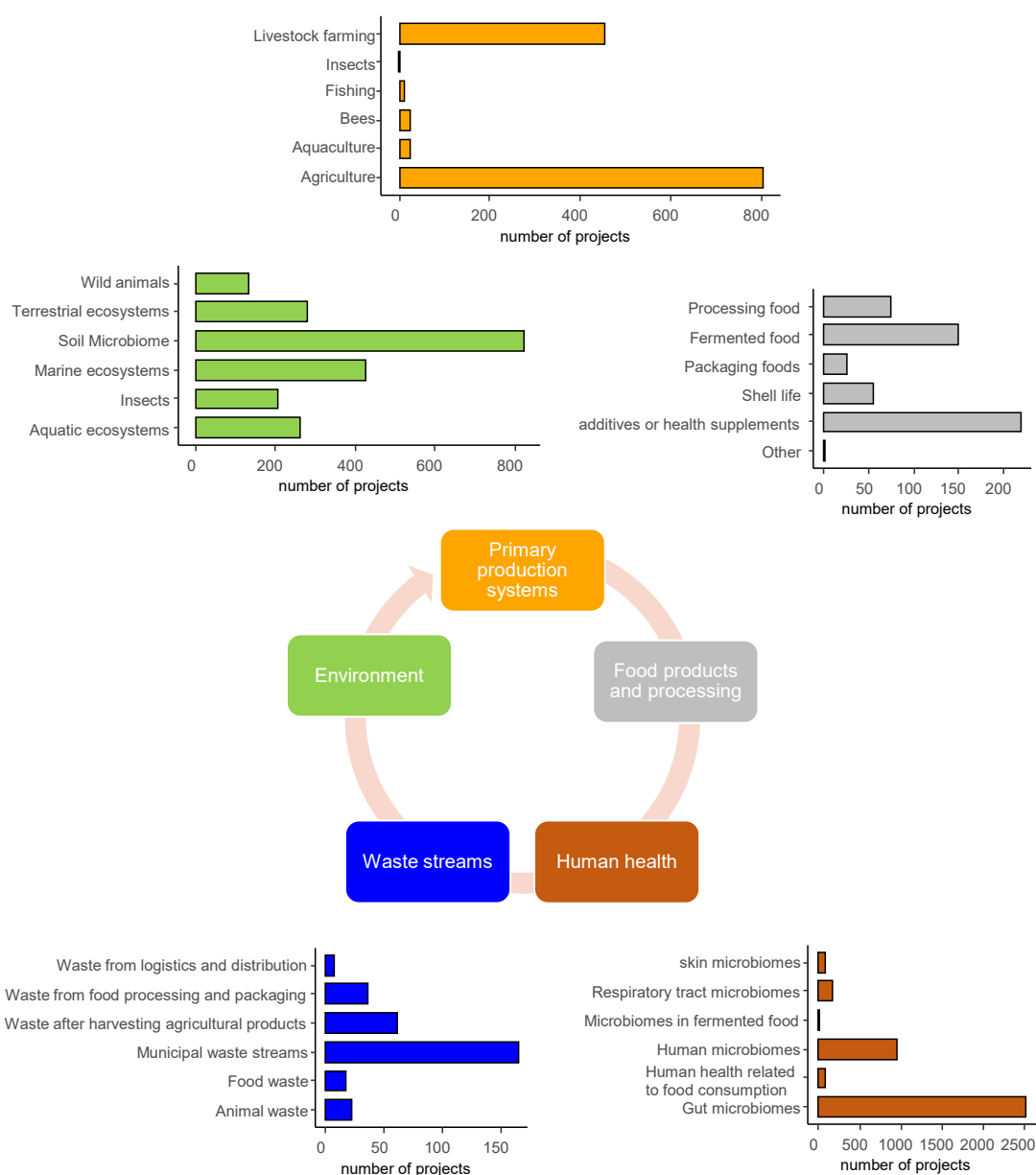


Fig. 3.8 Target areas per sub-category for all project collected in 2019 and 2021. Research project can be involved in more than one sub-category. Figure is adapted to fit current data from Meisner et. al. 2022 [13].

Less than 8% of the projects are involved in more than one target area: ca. 1% of the projects is involved in all target areas; 0.1% in four target areas, 0.4% in three target areas and 6% in two target areas. Ca. 10% of the projects identified in 2019 are involved in more than one target area whereas Ca. 5% of the projects identified in 2021 are involved in more than one target area. Projects involved in all target areas focus on methodological aspects, bioinformatic analysis of microbiomes or scientific networks, such as the project Europlanet³⁵ from Austria; the project “Linking next generation sequencing facilities across the Dalhousie Faculties from Canada”; the IS_MIRRI21 infrastructure from the EC; or the microbiome@wur project that supports a network of microbiome researchers at Wageningen University & Research. Projects involved in four target areas deal with a One Health approach to study the presence of antibiotic resistance genes or pathogens in different target areas. In addition, The New Zealand project “Microbiomes: from soils to plate” studies microbiomes in different ecosystems along the food chain. About 44% of the projects involved in two target areas study microbiomes in primary production systems and microbiomes in the environment.

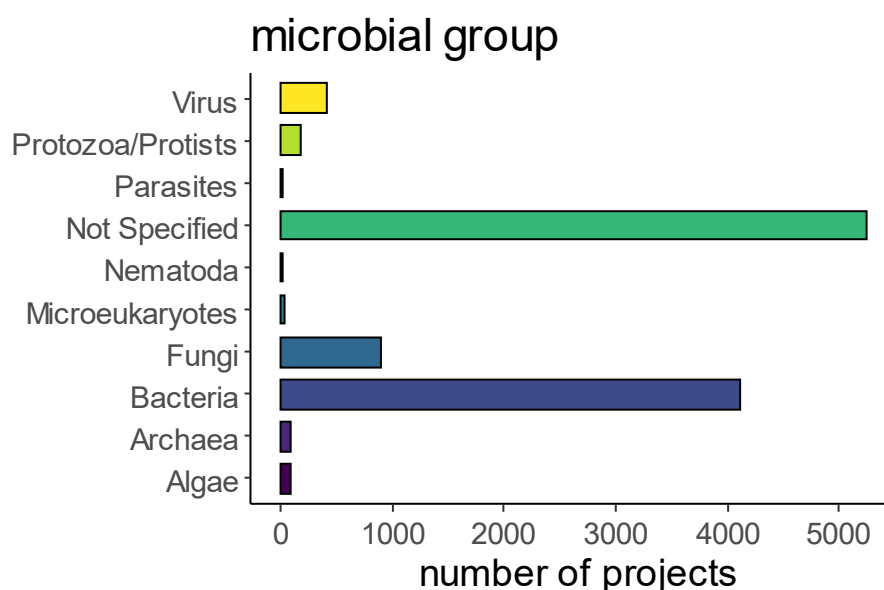


Fig. 3.9 Groups of microorganisms studied within research projects collected in 2019 and 2021. One research project can study multiple groups of microorganisms. Not specified indicates that the title or abstract of the research project did not specify any microbial group.

³⁵ <https://www.medunigraz.at/center-for-microbiome-research/ag-moissl-eichinger/projects/europlanet/>

Almost half of the projects collected in 2019 and 2021 did not specify the microbial group studied in their abstract or title (Fig. 3.9). Bacteria (40%) and fungi (8%) were the primary investigated groups of microorganisms.

In summary, most projects were classified into one main target area. The topic best covered by funded research projects is “Microbiomes important for human health”. Most projects do not specify the group of microorganisms studied (in title and abstract), but when they do, the projects focus on bacteria dominates. A subset of projects is involved in more than one main target area suggesting that the interconnectedness between research fields seems limited to this subset of projects.

3.6 Institutions

The top 20 institutions coordinating the identified research projects are presented in Table 4. They coordinate ca. 18% of the projects. However, the top institutions are different when only the supra-national activities are considered. The top five coordinating institutes of supra-national activities are:

- University of Copenhagen - Københavns Universitet, Denmark: 36 projects
- CSIC - Consejo Superior de Investigaciones Científicas, Spain: 35 projects
- Centre National de la Recherche Scientifique, France: 29 projects
- Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement, France: 28 projects
- Wageningen University & Research, the Netherlands: 24 projects

Table 4: Top 20 of global research and educational institutions that are involved in microbiome research projects

Institute	Country	Number of Projects
Universidade de Sao Paulo	Brazil	261
Universidade Estadual Paulista	Brazil	143
Wageningen University & Research	the Netherlands	142
CSIC - Consejo Superior de Investigaciones Científicas/Higher Council for Scientific Research	Spain	115
Katholieke Universiteit Leuven	Belgium	112
University of Toronto	Canada	107
McMaster University	Canada	102
University of British Columbia	Canada	97
University of Copenhagen - Københavns Universitet	Denmark	95
University College Cork, National University of Ireland, Cork	Ireland	89
University of California, San Diego	United States	87
Baylor College of Medicine	United States	69
Universidade Estadual de Campinas	Brazil	69
University of Warsaw / Uniwersytet Warszawski	Poland	68
Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement	France	66
Jagiellonian University (Uniwersytet Jagiellonski)	Poland	63
Stanford University	United States	63
University of Alberta	Canada	61
University of Calgary	Canada	61
University of Guelph (uoguelph)	Canada	60

3.7 Infrastructures

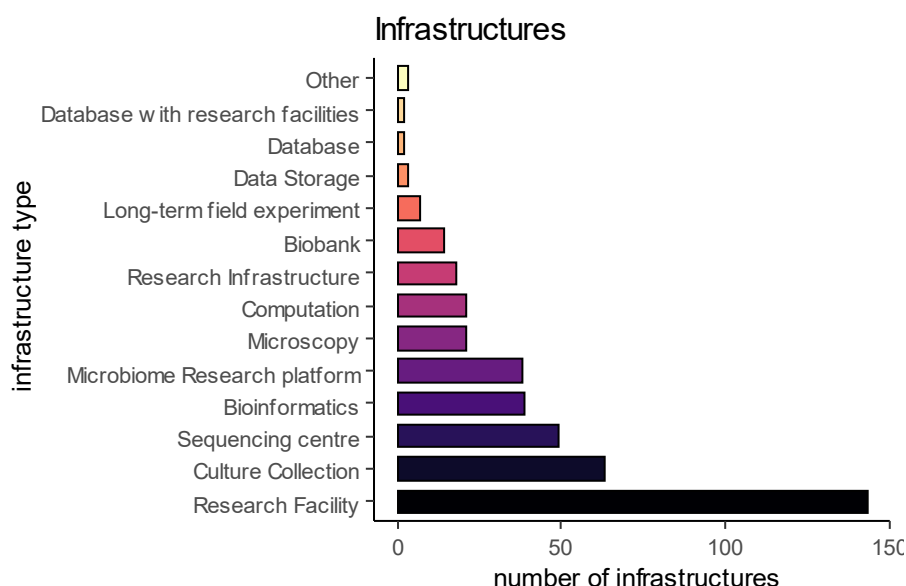


Fig 3.10. Type of infrastructures. One infrastructure can be involved in multiple support activities.

In total, 387 infrastructures were identified, of which 373 infrastructures were identified by CCPs and 13 by the desk study on supranational initiatives. In addition, the country contact point from Argentina identified the Microbiome Research Platform “Biome Acuity” in Chile. CA. 36% of the infrastructures are research facilities used for microbiome research (Fig. 3.10), such as metabolomics laboratories, cellular biology laboratories and proteomic facilities. In addition, 16% of the identified infrastructures are culture collections (Fig. 3.10).

Thirteen infrastructures were identified at the supra-national level (Table 5). Some of these infrastructures have local branches. For example, the European Infrastructure for Biological Information (ELIXIR) has local nodes in 23 European countries. In addition, the Microbial Resource Research Infrastructure (MIRRI) brings together microbiome resource centers from ten European countries and one associated country. The European Culture Collection provides a list of culture collection facilities from 22 European countries.

The EC considers F.A.I.R. data principles (findability, accessibility, interoperability, and reusability) essential for funded research activities. In addition, all research results from projects funded by EC must be published in open access journals. An open access publishing platform Open Research Europe has been launched by the EC in 2021³⁶ where research funded by EC can

³⁶ https://ec.europa.eu/info/research-and-innovation/strategy/strategy-2020-2024/our-digital-future/open-science/open-access_en

be published. For publishing scientific data, scientific projects with funding from the EC can also use the European Open Science Cloud³⁷ which allows researchers in Europe access to a web of F.A.I.R. data and related services. For soil data, the European Soil Observatory is incorporating the European soil data centre where soil data can be stored³⁸.

Table 5: List of international infrastructures relevant for microbiome research

Infrastructure name	Infrastructure type(s)	Website
European culture collection	Culture Collection	https://www.eccosite.org/
European infrastructure for biological information (ELIXIR)	Computation Bioinformatics Microbiome Research platform Research Infrastructure	https://elixir-europe.org/
European Marine Biological Research Infrastructure Cluster	Research Infrastructure	https://www.embrc.eu/
European Molecular Biology Laboratory	Bioinformatics Microscopy Microbiome Research platform metabolomics	https://www.embl.de/
European Molecular Biology Organization (EMBO)	Research Infrastructure	https://www.embo.org/events
European Nucleotide database	database	https://www.ebi.ac.uk/ena
Industrial Biotechnology Innovation and Synthetic Biology Accelerator (ibisba)	Research Infrastructure	https://www.ibisba.eu/
Infrastructure for Analysis and Experimentation on Ecosystems	Research Infrastructure	https://www.anaee.eu/
Infrastructure for systems biology	Research Infrastructure	http://project.isbe.eu/
Long-Term Ecosystem Research (LTER)	Long-term field experiment	https://www.lter-europe.net/
Microbial resource research infrastructure (MIRRI)	Microbiome Research platform Research Infrastructure	https://www.mirri.org/home.html
World data center for microorganisms	Microbiome Research platform Culture Collection	http://www.wdcm.org/
Global fungi database	database database	https://globalfungi.com/

³⁷ <https://eosc-portal.eu/>

³⁸ https://joint-research-centre.ec.europa.eu/eu-soil-observatory-euso/eu-soil-observatory-data_en

3.8 Platforms for the exchange of information

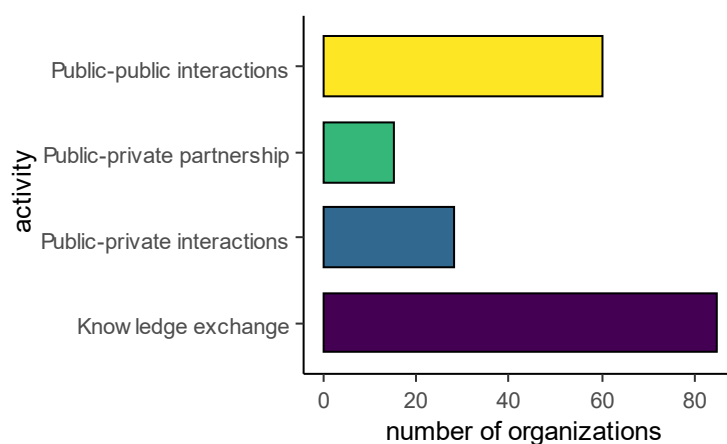


Fig. 3.11 Type of knowledge exchange activities organized by organizations that organize network activities. Organization can be involved in multiple types of activities.

A total of 98 organizations (66 national and 32 international) organizing network activities like conferences, symposia and workshops were identified. Ca. 87% of the organizations organize knowledge exchange activities (Fig. 3.11). These include activities with public and private partners (Fig. 3.11.), as ca. 15% of the organizations are involved in public-private partnerships and ca. 29% are involved in public-private interactions. Some organizations focus on the exchange of information about microbiomes, such as the Austrian Microbiome Initiative (AMICI), the Hungarian Society for Microbiology, APC Microbiome Ireland, the International Society of Microbial Ecology and Impact Microbiome Canada. Other organizations focus on the knowledge exchange for non-experts, such as the Micropia museum in the Netherlands. Further, organizations, such as the New Zealand Food Innovation network, the research cluster Animal Gut Health or the Global Soil Biodiversity Initiative organize activities on more general topics than microbiomes, but microbiomes are also considered in their work. Some organizations are also involved in knowledge exchange on microbiomes between scientists and policymakers, such as the Food Systems Microbiome working group of the International Bioeconomy Forum or the informal microbiome network of the Food and Agricultural Organisation (FAO).

Ca. 38% of the organizations such as the Polish Society of Microbiologists, Royal Dutch Society for Microbiology (KNVM) and The Danish Microbiological Society are involved in organizing activities on microbiome research in general (Fig. 3.12), but do not focus on the food systems as a whole. Twelve organizations organize activities for two target areas (Fig. 3.12). For example, APC microbiome Ireland organizes activities for “Microbiomes important for human health” as well as “Microbiomes of food products and processing”. In addition, the Walloon excellence in

Life Sciences and Biotechnology (WELBIO) organizes activities for “Microbiomes important for human health” and “Microbiomes in the environment”. The “SOURDOugh Biotechnology Network towards novel, healthier and sustainable food and bloproCesseS” organizes activities within three target areas, namely “Microbiome research within logistics and distribution of food products”, “Microbiomes of food products and processing”, and “Microbiomes of primary production systems”. The Spanish network RedBal organizes activities for four target areas, namely “Microbiomes important for human health”, “Microbiomes in the environment”, “Microbiomes of food products and processing” and “Microbiomes of primary production systems”.

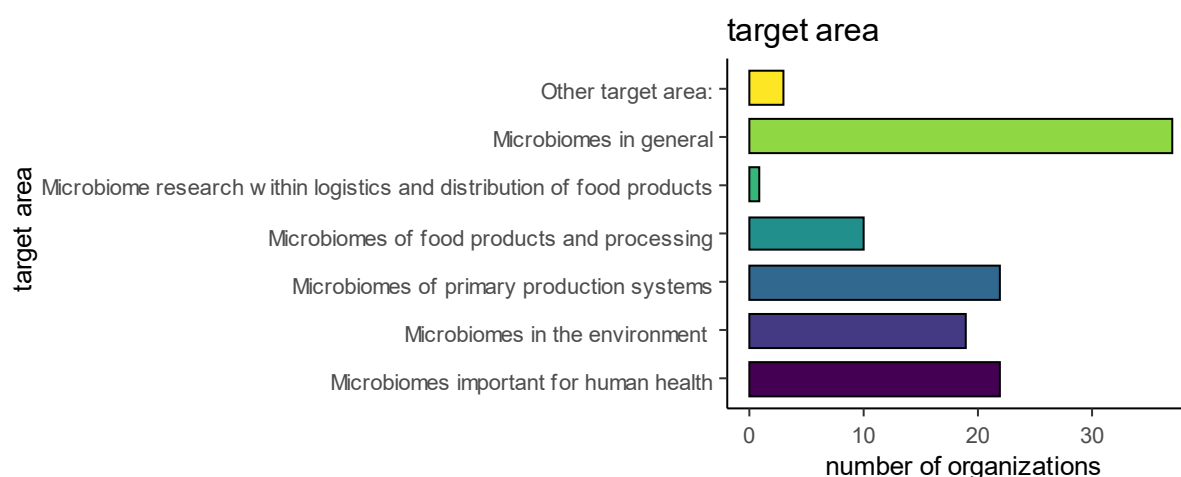


Fig. 3.12 Target area where organizations that organize network activities and activities for knowledge exchange are involved in. Organizations can be involved in multiple target areas.

4. Observations regarding the collected data

Extensive information has been collected about microbiome R&I activities in the food systems and beyond by the CCPs and the authors of this report. Information collected comprised information from 24 countries and supra-national activities. However, there are some data limitations that need to be considered.

Countries differed in access to information and time available to collect relevant information. For example, some countries had difficulties obtaining information as institutions did not respond to information requests and databases with information were not available (see Appendix 2 for country responses). Furthermore, some countries only provided relevant information in 2019 and not in 2021. In addition, USA, Canada, and Ireland assigned projects to the target area and microbial group using search functions in Microsoft Excel, which may be less precise than reading abstracts. Therefore, the completeness and level of detail of the collected information differed from country to country (see also section 3.1).

The collected information is limited to the countries and databases mentioned in this report. For example, major institutions from other countries were only revealed by the supra-national initiatives. These institutes include ETH Zurich, the Swedish Agricultural University, and the Weizmann Institute of Science, which likely also receive national resources to perform relevant R&I activities. These countries were not consulted as they are not a member of the MicrobiomeSupport consortium or the IBF. The databases were only accessed once in 2019 and once in 2021.

5. Conclusions and recommendations

The survey confirmed that microbiome research and innovation activities are performed in a wide range of science fields all along the food system, such as human health, the environment, primary production systems, food products and waste streams. However, the connectedness between science fields is limited to a minority of the identified research projects. In addition, there is no indication of an increase in projects that perform research across science fields in projects collected in 2021. Although the research landscape of research projects is still fragmented within science fields, there are some indications that microbiome research is slightly evolving towards a systems approach along the food systems chain. For example, the survey identified that a larger fraction of R&I strategies collected in 2021 addressed microbiomes to a moderate or great extent compared to the R&I strategies collected in 2019. In addition, some funding bodies established research programmes focussing on microbiome research along the

food system chain, but there are not yet projects funded from these calls. Furthermore, many countries have microbiome research infrastructures and network platforms supporting knowledge exchange to support all microbiome researchers.

Reasons for fragmentation of research projects have been identified before [13] and are still relevant. They include: (1) that the majority of **research projects** analysed has a budget of <250 kEUR (Fig. 3. 5), that **support only one early career scientist**; (2) many past **projects focus on describing microorganisms** within the ecosystem of interest instead of studying causal relationships and functions [15, 16]; (3) the **decentralization of research organizations** in some countries makes it difficult to develop research projects across science fields; (4) microbiomes are only starting to come in the focus of R&I strategies.

Microbiomes are now considered a key research priority for the transformation towards sustainable food systems [9, 11] and are considered in a larger fraction of R&I strategies in 2021 (see section 3.3). However, this should be translated into R&I activities supporting microbiome research along the food production chain. Currently, a large fraction of research projects is addressing microbiome within one ecosystem at a time (e.g., soil, animals or humans). Research addressing how, for example, different farming management practices influence human health is limited [13], whereas we now understand that the plant and gut microbiomes are connected via the food we eat (Fig. 5.1). **Future projects are recommended to use a holistic approach connecting multiple science fields within the food system [5, 13], like the One Health approach.** However, this approach requires **larger budgets** supporting multiple scientists from different disciplines using a cross-sectorial approach to link different microbiome environments. Examples of such large projects are the H2020 Innovation Actions CIRCLES³⁹, HOLOFOOD⁴⁰, MASTER⁴¹ and SIMBA⁴². The organization of research activities via R&I strategies could help to provide larger budget for research projects to work across science fields of the food system and use a systems approach.

Funding for these larger projects could be developed under R&I activities within the European partnerships. However, the different candidate partnerships (Table 3) study different areas of the food system chain. For example, the “European Partnership for sustainable food systems for people, planet and climate” focuses on activities from food processing to human health. In addition, the “European Partnership accelerating farming systems transition: agroecology living labs and research infrastructures” focuses on primary production systems in agriculture. Further,

³⁹ <https://circlesproject.eu/>

⁴⁰ <https://www.holofood.eu/>

⁴¹ <https://www.master-h2020.eu/>

⁴² <https://simbaproject.eu/>

the “European Partnership for Animal Health and Welfare (PAHW)” focuses on the primary production system for livestock breeding. **MicrobiomeSupport recommends organizing joint R&I activities to address pending questions about connections between ecosystems and effects of microbiome modulatinos along the food chain.**

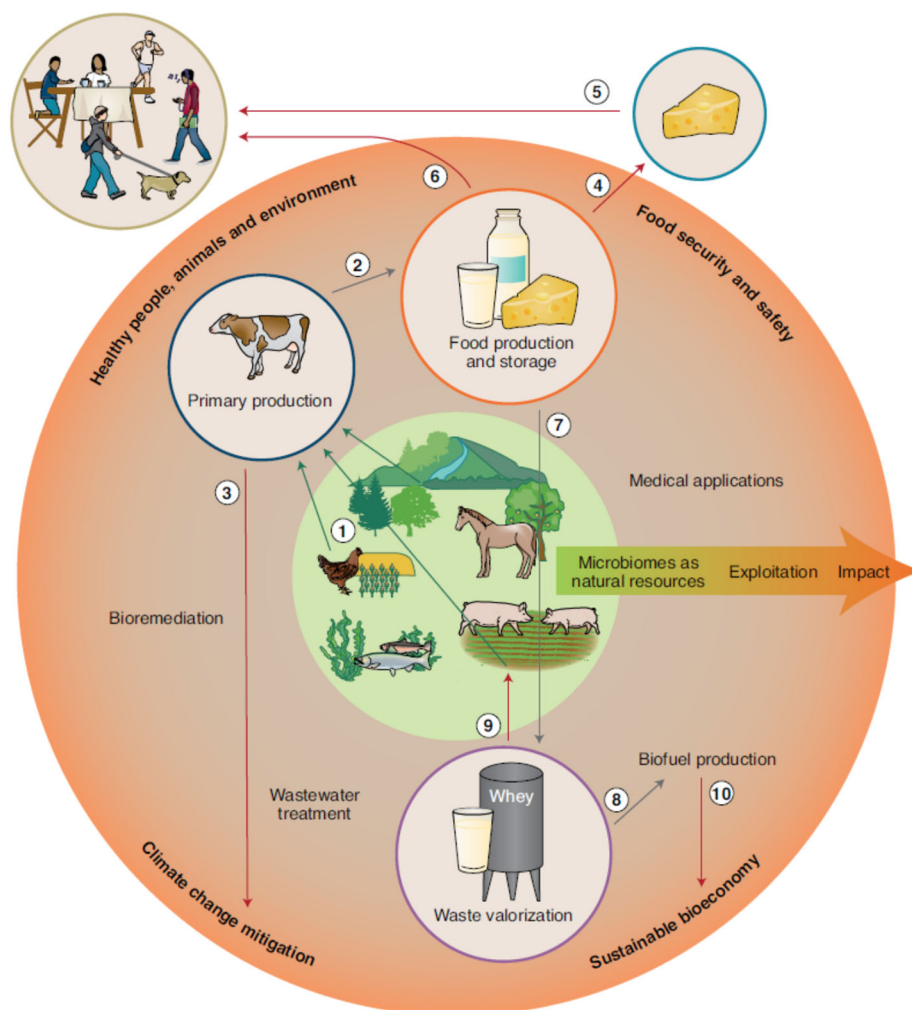


Fig. 5.1 Connectivity is highly important in microbiome research. Microbiome connectivity using dairy as an example. Green arrows show microbiome exploitation opportunities; grey arrows show links between exploitation chains; and red arrows show the impact on societal challenges and policy goals (source: D’Hondt et al. [5])

Future microbiome initiatives should not only focus on technical research, but also increase microbiome literacy in the society via relevant stakeholder interactions. Increased awareness of the benefits and potential of microbiomes for food system transformations among different

stakeholder groups, such as farmers, citizens and politicians [24, 25], is essential for the acceptance and implementation. Furthermore, it will also increase the focus on the microbiome in R&I strategies. Stakeholders often consider microbiomes as disease-causing agents [26] because pathogenic microorganisms can cause emergent diseases in humans, crops or animals [27-29]. However, most microbiomes provide beneficial services to humans, crops or animals [26], such as suppression of microbial diseases [30, 31]. In addition, microbiomes can improve nutrients available to plants and animals [32, 33]. Potential microbiome-based solutions that increase disease suppression and improve nutrient availability reduce the need to use chemical fertilizers or pesticides and thus contribute to the development of sustainable food systems. However, stakeholders need to be educated on how to use the newly developed product(s) that provide beneficial services via microbiome modulations [26, 34]. Future research directions that use a systems approach could be coordinated via R&I strategies [35] or roadmaps developed under the partnerships. In this way, multi-disciplinary research projects could be developed that answer questions related to how microbiome research contributes to solve major societal challenges, such as the biodiversity crisis, climate crisis and the sustainable food production for a growing human population for current and future generations.

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Appendix 1: Questionnaire used for survey to identify the microbiome research landscape

Section 1: The contact point for your country

1.1 Please provide the following information:

- a. Name
- b. Organization
- c. Position in the organization
- d. Email
- e. Telephone number

Privacy notice: please read and accept the privacy policy of WUR (see Annex 2).

- ☐ *I have read and consent to the abovementioned privacy policy. Yes*

1.2 For which country do you fill in the questionnaire?

1.3 Which organization(s) did you consult to answer the questions in the questionnaire?

1.4 Which sources of information did you use?

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

2.1 What are your countries current key R&I strategies at national and regional level?

Please provide for each new key strategy not mentioned in 2019

- a. Region (if relevant)
- b. Name of strategy national language (if available)
- c. Name of strategy in English (mandatory)
- d. Publication year
- e. Website about strategy/ link to pdf-document
- f. Summary of the strategy
- g. Does the national research strategy address microbiome research?
 - ☐ Yes, to great extent
 - ☐ Yes, to moderate extent
 - ☐ Yes, to small extent
 - ☐ No

2.2 What are key white papers and (future) strategies for food and/or agriculture in your country?

Please, provide for each new key white paper or policy that is not mentioned in the list:

- a. Region (if relevant)
- b. Name of white paper or future strategy national language (if available)
- c. Name of white paper or future strategy in English (mandatory)
- d. Publication year
- e. Website about white paper or future strategy/ link to pdf-document
- f. Summary of the white paper or the future strategy
- g. To what extend does the white paper or future strategy address microbiomes?
 - ☐ Yes, to great extent
 - ☐ Yes, to moderate extent
 - ☐ Yes, to small extent
 - ☐ No

2.3 What are the key policies for food and/or agriculture in your country?

Please, provide for each new key policy that is not mentioned in the list:

- a. Region
- b. Name of policy in national language (if available)

- c. Name of policy in English (mandatory)
- d. Publication year
- e. Website about policy/ link to pdf-document
- f. Summary of the policy
- g. Does the policy address microbiomes?
 - Yes, to great extent
 - Yes, to moderate extent
 - Yes, to small extent
 - No

Section 3: national and regional research funders

In this questionnaire, there is no need to provide information on international funders, programmes and projects, as the task leaders will perform further desk studies on these programmes, projects or funders⁴³.

3.1 What are the main national and regional funders that support microbiome R&I activities in your country?

For each new funder not mentioned in the list of 2019:

- a. name of funder
- b. short name, acronym or abbreviation often used
- c. Is it a national or regional funder? With a regional funder, we mean financiers in autonomous regions that also support large research projects or programs (e.g. autonomous regions in Spain or Bundesländer in Germany)
- d. If it is a regional funder, describe for which region the funder support R&I projects?
- e. What is the total funding budget in Euro that was available in 2017?
- f. What is the total funding budget in Euro that was available in 2018?
- g. What is the total funding budget in Euro that was available in 2019?
- h. What is the total funding budget that was available in Euros in 2020?
- i. What is the total budget available in Euro in 2021
- j. What is the website of the funder

⁴³ The task leaders will collect information on research funders, programmes and projects from the European Framework programmes FP7, H2020 and Horizon Europe, joint programming initiatives, ERA-NET cofunds, European Innovation communities, Bill and Melinda Gates Foundation, EMBO, Human Frontiers Programm and Belmont Forum.

Section 4: National research programmes

4.1 Which programmes are funding microbiome-related research in your country? The mentioned programmes should run in between the period 2013-2027.

For each new programme not yet mentioned in the list:

- a. Name of programme
- b. Short name or acronym
- c. Which funders in your country are involved in the programme?
- d. Start date of the programme? Year and Month and date
- e. End date of the programme? Year and Month and date
- f. Duration of the programme? (In months)
- g. Total budget of the programme in Euros?
- h. Please, provide webpage to programme if available?

4.3 If your country is the lead organization of the multilateral programme, please answer the following questions⁴⁴:

For each programme:

- a. Name of programme
- b. Short name or acronym
- c. Which funders are involved in the programme?
- d. Start date of the programme? Year and Month and date
- e. End date of the programme? Year and Month and date
- f. Duration of the programme? (In months)
- g. Total budget of the programme in Euros?
- h. Please, provide webpage to programme if available?

Section 5: National research projects

It is important to use a wide range of **keywords** to identify projects. 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.

⁴⁴ The ERA-NET cofunds will be identified via a desk study.

5.1 Which projects that involve microbiome research are funded by the programmes mentioned under section 4? The projects should run in between 2013-2027.

For projects from multi-lateral programmes (two or more countries see 4.2 and 4.3), only the lead country of the programme needs to provide project information from that programme.

Describe for each new project. We also ask you to specify the funder (question e) that provided the resources to the project. This question was not part of the 2019 questionnaire:

- a. Name of project in English
- b. Name of project in national language (if relevant)
- c. Short name or acronym in English
- d. Short name or acronym in national language (if relevant)
- e. Which funder finance(s) the project (please select from list)?
- f. Which programme(s) finance(s) the project?
- g. What is the name of the coordinating organization (please select from list)?
- h. What is the link to the coordinator website?
- i. What is the www link to personal page of the coordinator? (GDPR prevents publishing names in the database)
- j. What are the collaborating institutes (if any)?
- k. What is the start date of the project? Year and Month and day
- l. What is the end date of the project? Year and Month and day
- m. What is the total budget of the project?
 - ☐ <50 kEUR
 - ☐ 50-250 kEUR
 - ☐ 250-500 kEUR
 - ☐ 500-1000 kEUR
 - ☐ 1000-2500 kEUR
 - ☐ 2500 kEUR-5000 kEUR
 - ☐ 5000-10000 kEUR
 - ☐ ≥10000 kEUR
 - ☐ Or specify the amount in euros
- n. What is the status of the project? Running/closed/future
- o. What is the abstract of the project? (please mention source)
- p. please provide link to the project website (if available)
- q. What is the target area (see Annex 1) for microbiomes of the project?
- r. Which groups of microorganisms are studied in the project?
 - ☐ Fungi

- ☐ Bacteria
- ☐ Archaea
- ☐ Protozoa/Protists
- ☐ Not specified
- ☐ Other: specify

5.2 Which projects that involve microbiome research are funded by basic funding that comes directly from an institute/university (basic funding, hard money funding, primary funding)? The projects should run in between 2013-2027.

Describe for each project:

- a. Name of project in English
- b. Name of project in national language (if relevant)
- c. Short name or acronym in English
- d. Short name or acronym in national language (if relevant)
- e. Which funder finance(s) the project?
- f. Which programme finances the project?
- g. What is the name of the coordinating institute?
- h. Who is the coordinator of the project? Please, provide a link to personal page of the coordinator.
- i. What are the collaborating institutes (if relevant)?
- j. What is the start date of the project? Year and Month
- k. What is the end date of the project? Year and Month
- l. What is the total budget of the project?
 - ☐ <50 kEUR
 - ☐ 50-250 kEUR
 - ☐ 250-500 kEUR
 - ☐ 500-1000 kEUR
 - ☐ 1000-2500 kEUR
 - ☐ 2500 kEUR-5000 kEUR
 - ☐ 5000-10000 kEUR
 - ☐ ≥10000 kEUR
- m. What is the status of the project? Running/closed/future
- n. What is the abstract of the project? (please mention source)
 - a. If closed, please paste the scientific abstract of the end project, if available.
 - b. If open/running, please paste the scientific abstract of the funded project, if available
- o. please provide link to the project website (if available)

- p. What is the target area (see Annex 1) for microbiomes of the project?
- q. Which groups of microorganisms are studied in the project?
- ☐ Fungi
 - ☐ Bacteria
 - ☐ Archaea
 - ☐ Protozoa/Protists
 - ☐ Not Specified
 - ☐ Other: specify

Section 6: Infrastructures for microbiome research

6.1 What are the major support facilities for microbiome research in your country?

(e.g. climate rooms; sequencing centres, databanks, microbiome centres, computation facilities, phenotyping platforms, bioinformatic support platforms)

For each facility, please provide:

- a. Name in English
- b. Name in national language if relevant
- c. Website
- d. Contact email address/ General email address
- e. Type of infrastructure
 - a. Computation
 - b. Bioinformatics
 - c. Data storage
 - d. Microscopy
 - e. Long-term field experiments
 - f. Microbiome research platform
 - g. Sequencing centre
 - h. Biobank
 - i. Culture collection
 - j. Other
- f. If listed in the 2019 survey, is the facility still active in 2021?

6.2 What are the most important platforms for network activities related to microbiome research in your country?

For each platform

- a. Name of network platform in English
- b. What type of activity does the platform support?

- ☐ Knowledge exchange
 - ☐ Public-public interactions
 - ☐ Public-private interactions
 - ☐ Public-private partnership
- c. What is the target area for microbiomes (see Annex 1) in the platform or network?
- d. Website
- e. Contact-email address/general email address/website with contact information
- f. If listed in the 2019 survey, is the network platform still active in 2021?

Annex 1: Target areas

- All mentioned target areas
- Microbiomes important for human health
 - Human microbiomes
 - Gut microbiomes
 - Respiratory tract microbiomes
 - Skin microbiomes
 - Human health related to food consumption
- Microbiomes of food products and processing
 - Microbiomes in fermented foods
 - Microbiome additives or health supplements for humans or animals
 - Microbiomes when processing foods
 - Microbiomes for packaging foods
 - Microbiomes and shelf life of food
- Microbiomes of primary production systems
 - Livestock farming = food production
 - Agriculture = food production
 - Aquaculture = food production
 - Bees (in apiculture)
 - Fishing industry
- Microbiomes in the environment
 - Microbiomes in terrestrial ecosystems
 - Soil microbiomes
 - Microbiomes in aquatic ecosystems
 - Microbiomes in marine ecosystems (e.g., corals; fish)
 - Microbiomes in wild animals
 - Microbiomes in insects
- Microbiomes in waste streams
 - Animal waste
 - Food waste
 - Waste after harvesting agricultural products
 - Waste from food processing and packaging (e.g., plastics)
 - Waste from logistics and distribution
 - Municipal waste streams
- Microbiome research within logistics and distribution of food products
- Other target area

Annex 2: Privacy statement for the MicrobiomeSupport mapping

This survey is hosted by Wageningen University & Research (WUR) in the Netherlands.

Survey data

The survey will collect data about research and innovation activities that do not contain any personal information. These data will be analyzed by WUR and will be made available to all consortium partners. The results of the data analysis are published in a report that will be publicly available, in an online database and used for foresight analysis. Results of the data analysis are only published in aggregated form, so that there is no direct link to you or your organization.

Contact data

In the survey, you are asked to provide us with your contact data, which are only used for the execution of the MicrobiomeSupport project (<https://www.microbiomesupport.eu/project-partners/>). This concerns your name, surname, work e-mail address and work telephone number. Wageningen University & Research processes this contact data in accordance with the General Data Protection Regulation and the WUR Personal Data Protection Regulation that is available on: <https://www.wur.nl/en/About-Wageningen/Integrity-and-privacy.htm>. WUR may share your personal data with the consortium partners of the MicrobiomeSupport project.

The contact data collected through the survey will be treated responsibly and confidentially and will be kept until the completion of the project. After this period, the data will be stored on a secure server until the applicable expiry period for research data storage has elapsed. The personal data you provide will be stored by WUR separately from the survey data.

For further information on this privacy statement you may contact the Data Protection Officer of WUR through: privacy@wur.nl.

Appendix 2: Country-specific approaches & results

Argentina

Country specific approach

The following institutes were contacted: Technological Scientific Centre in Rosario (INDEAR), The National Scientific and Technical Research Council (CONICET), National Agricultural Technology Institute (INTA), and Heritas S.A. In addition, websites from different institutions and personal contacts were contacted. There was a limited response from different institutions and persons.

Key strategies, white papers and policies

Not available

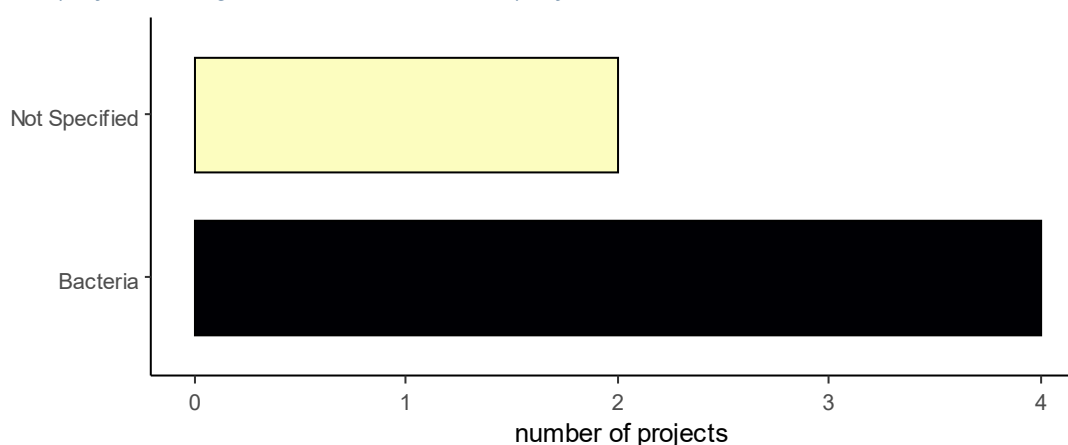
Major national funding agencies that support microbiome research activities

Funders	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Fondo Tecnológico Argentino	NA	NA	NA	NA	NA

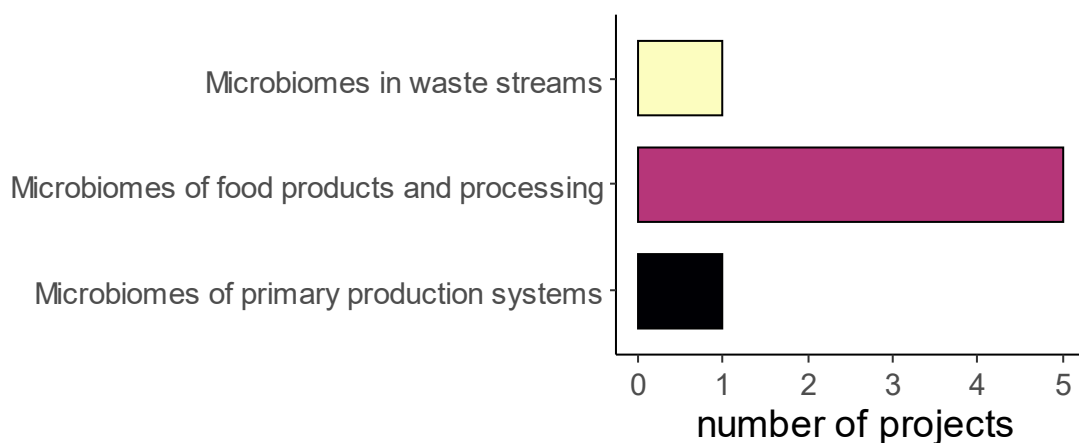
Budget of microbiome research projects supported by national funding organizations

Not available

Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Infrastructure	Website	infrastructure type
Sequencing Centre: INDEAR	https://www.indear.com/en/sequencing-platform/	Sequencing centre
Sequencing Centre: Heritas S.A.	https://heritas.com.ar/plataformas-tecnologicas/	Sequencing centre
Sequencing centres, computation facilities	https://inta.gob.ar/instdepatobiologia/sobre-233000	Sequencing centre

Network platforms

No network platforms for microbiome research are available in Argentina

Australia

Country specific approach

In 2019, the country contact point for Australia contacted multiple organizations. However, the response was limited. Information about research projects is limited at a coarse level. In addition, several web pages, reports and publications were checked for relevant information regarding policies, funders and infrastructures. In 2021, the information was updated using a similar approach as in 2019.

Key strategies

Name	publication year	Website	Microbiomes addressed
Australian National Innovation and Science Agenda	2015	https://www.industry.gov.au/data-and-publications/national-innovation-and-science-agenda-report	to small extent

White papers

Name	publication year	Website	Microbiomes addressed
Agriculture Competitiveness white paper	2015	https://www.agriculture.gov.au/ag-farm-food/agriculture-white-paper	no

Policies

Name	publication year	Website	Microbiomes addressed
Agriculture and food security initiatives	ongoing	https://dfat.gov.au/aid/topics/investment-priorities/agriculture-fisheries-water/agriculture-food-security/Pages/agriculture-food-security-initiatives.aspx	to small extent
Agricultural Policy	ongoing	https://www.directory.gov.au/portfolios/agriculture/department-agriculture/agricultural-policy	to small extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Australian Centre for Agriculture Research	NA	NA	NA	NA	NA
Australian Research Council	NA	NA	NA	NA	NA
Cotton Research and Development Corporation	NA	NA	NA	NA	NA
Dairy Australia	NA	NA	NA	NA	NA

Department of Industry, Science, Energy and Resources	NA	NA	NA	NA	NA
Grain Research and Development Corporation	NA	NA	NA	NA	NA
Horticulture Innovation Australia	NA	NA	NA	NA	NA
Meat and Livestock Authority	NA	NA	NA	NA	NA
National Health and Medical Council	NA	NA	NA	NA	NA
Sugar Research Australia	NA	NA	NA	NA	NA

Research projects

It was difficult to get any significant data on funding. The CCP has discussed this with multiple people in Australia and this information does not seem to be publicly available.

Major infrastructures

Infrastructure	Website	infrastructure type
Bioplatforms Australia Infrastructure	https://www.bioplatforms.com/	Bioinformatics
Global Centre for Land-based Innovation	https://www.westernsydney.edu.au/gclbi	Global research Center
Microbiome Research Centre	https://microbiome.org.au/	Microbiome Research Platform
National Computation infrastructure	https://nci.org.au/	Computation Data Storage
The Australian Centre for Ecogenomics	https://ecogenomic.org/	Sequencing Centre
The Australian Biocommons	https://www.biocommons.org.au/microbiomeanalysis	Bioinformatics
The Translational Research Institute	https://www.tri.edu.au/	Microbiome Research Platform

Network platforms

Network	Website
Australian Microbiome Initiative	https://www.australianmicrobiome.com/consortium/
The Australasian Human Microbiome Research Network	https://www.microbiome-research.net/home

Austria

Country specific approach

The approach for 2019 and 2021 was similar. The contact person for Austria contacted the following institutions and funding bodies to collect information: Austrian Competence Centre for Feed and Food Quality Safety and Innovation (FFoQSI), Vienna University of Veterinary Medicine, Austrian Microbiome Initiative (AMICI), Division of Microbial Ecology, University of Vienna (DOME), Graz University of Technology, Forschung und Bildung Lower Austria (NFB), Austrian Research Promotion Agency (FFG), Austrian Science Fund (FWF) and Christian Doppler Research Association (CDG). The research projects in the databases of FFG and FWF were also searched with relevant keywords. There were also several websites consulted.

Key strategies

Name	Year	Website	Microbiome addressed
Bioeconomy RTI strategy	2018	https://nachhaltigwirtschaften.at/resources/nw_pdf/biooekonomie-fti-strategie-ag2-2018.pdf	no
Economic Strategy Styria 2025	NA	https://www.verwaltung.steiermark.at/cms/dokumente/11685083_74838386/473a5387/Wirtschaftsstrategie2025_EN.pdf	no
FFG multi-annual programme 2018 - 2020	2018	https://www.ffg.at/sites/default/files/allgemeine_downloads/ffg%20allgemein/publikationen/ffg_mjp-18-20.pdf	no
Future strategy for Austria as a location for life sciences and pharmaceuticals	NA	https://www.bmbwf.gv.at/Themen/Forschung/Forschung-in-%C3%96sterreich/Strategische-Ausrichtung-und-beratende-Gremien/Strategien/Zukunftsstrategie-Life-Science-und-Pharmastandort.html	no
FWF multi-annual programme 2019 - 2021	2019	https://m.fwf.ac.at/fileadmin/files/Dokumente/Ueber_den_FWF/Publikationen/FWF-relevante_Publikationen/fwf-mehrjahresprogramm-2019-2021.pdf	no
FWF strategy 2017 - 2020	2016	https://www.fwf.ac.at/fileadmin/files/Dokumente/Ueber_den_FWF/Publikationen/FWF-relevante_Publikationen/fwf_strategiepapier-2017-2020.pdf	no
IP strategy for Austria	2017	https://www.patentamt.at/fileadmin/root_oepa/Dateien/Presse/20170214_iP_Barrierefrei_.pdf	no
National Strategy and environmental framework in the fruit and vegetables sector	NA	https://info.bmlrt.gv.at/en/topics/agriculture/agriculture-in-austria/plant-production-in-austria/production-of-fruit-vegetables-and-special-crops-in-austria.html	to a small extent
Open Innovation strategy for Austria	2015	http://openinnovation.gv.at/wp-content/uploads/2015/08/OI_Barrierefrei_Englisch.pdf	no
Program for Research and Development at the Federal Ministry for Sustainable	NA	https://www.bmnt.gv.at/forst/forst-bbf/Forschung/pfeil20.html	no

Name	Year	Website	Microbiome addressed
Development and Tourism (BMNT) 2016 - 2020 (PFEIL20)			
Research strategy of the University of Veterinary Medicine (Vienna)	2019	https://www.vetmeduni.ac.at/en/research/research-strategy/	to moderate extent
RTI Strategy of Lower Austria 2027	2020	https://www.noe.gv.at/fti-strategie	no
RTI-strategy 2030	2020	https://www.bmbwf.gv.at/Themen/Forschung/Forschung-in-%C3%96sterreich/Strategische-Ausrichtung-und-beratende-Gremien/Strategien/FTI-Strategie-der-Bundesregierung-.html	no
Strategy 2020 - Research, Technology and Innovation for Austria	2020	https://www.forschungsstrategie.at/sites/forschungsstrategie.at/files/090824_FINALE%20VERSION_FTI-Strategie2020.pdf	no
Strategy for Sustainable Development of the Federal Government and Federal Provinces (ÖSTRAT)	2010	https://www.bmk.gv.at/themen/klima_umwelt/nachhaltigkeit/strategien/oestrat.html	no
The Strategy of the Province of Styria for the Promotion of Science and Research	2013	http://www.wissenschaft.steiermark.at/cms/dokumente/11806970_96572397/3d1be919/Forschungsstrategie%20EnglishA4-slow.pdf	no

White papers

Name	Year	Website	Microbiome addressed
Food Safety Report 2018	2018	https://www.verbrauchergesundheit.gv.at/lebensmittel/lebensmittelkontrolle/LMSB_2018_Version_2019_06_27_ENG.pdf?71nlf	no

Policies

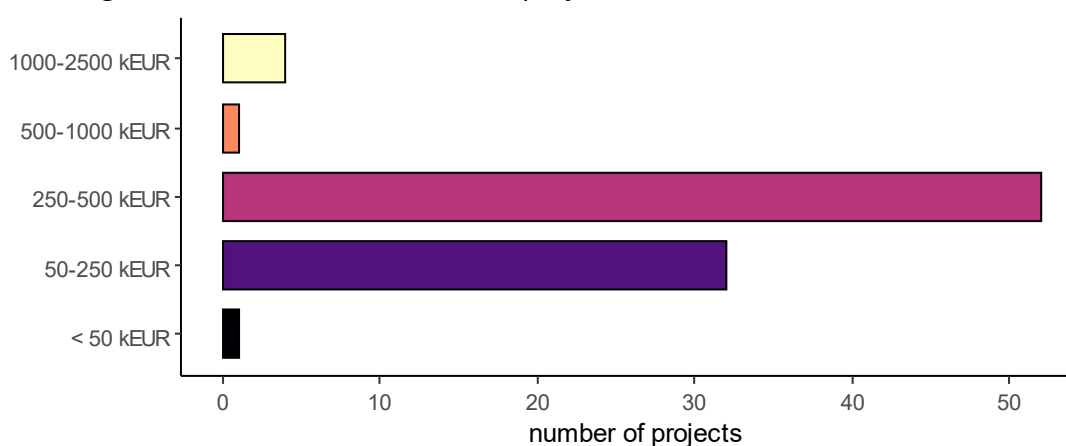
Name	Year	Website	Microbiome addressed
National strategy in the fruit and vegetables sector	2019	https://info.bmlrt.gv.at/dam/jcr:686489d8-1aad-4057-a05f-b51dbdc257de/Anpassung_Nationale_Strategie_ObstundGem%C3%BCse_2019.pdf	no
National Action Plan on Sustainable Use of Plant Protection Products 2017-2021	2017	http://www.noe.gv.at/noe/Landwirtschaft/Nationaler_Aktionsplan_NOe.pdf	no
Regional Food Initiative	NA	https://info.bmlrt.gv.at/themen/lebensmittel/regionale-lebensmittel-initiativen.html	no

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

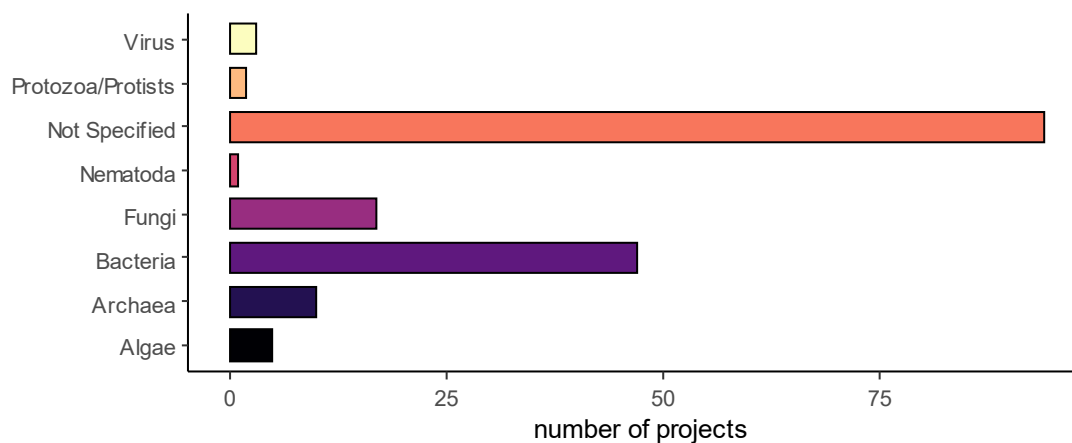
Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Austrian Climate Research Program	NA	NA	NA	NA	NA
Austrian Federal Ministry of Sustainability and Tourism	NA	NA	NA	NA	NA
Austrian promotional bank	NA	NA	NA	NA	NA
Austrian Research Promotion Agency	685,000	NA	NA	NA	NA
Austrian Science Fund	225,000	247,000	247,000	247,000	NA
Christian Doppler Forschungsgesellschaft	NA	NA	NA	NA	NA
Karl Landsteiner Society	NA	NA	NA	NA	NA
Life Science Austria	NA	NA	NA	NA	NA
MEFOgraz – Medizinische Forschungsförderung	153	NA	NA	NA	NA
NÖ Forschungs- und Bildung	4,400	4,400	4,585	NA	NA
Oesterreichische Nationalbank	NA	NA	NA	NA	NA
Steirische Wirtschaftsförderungsgesellschaft mbH	NA	NA	NA	NA	NA
Vienna Science and Technology Fund	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

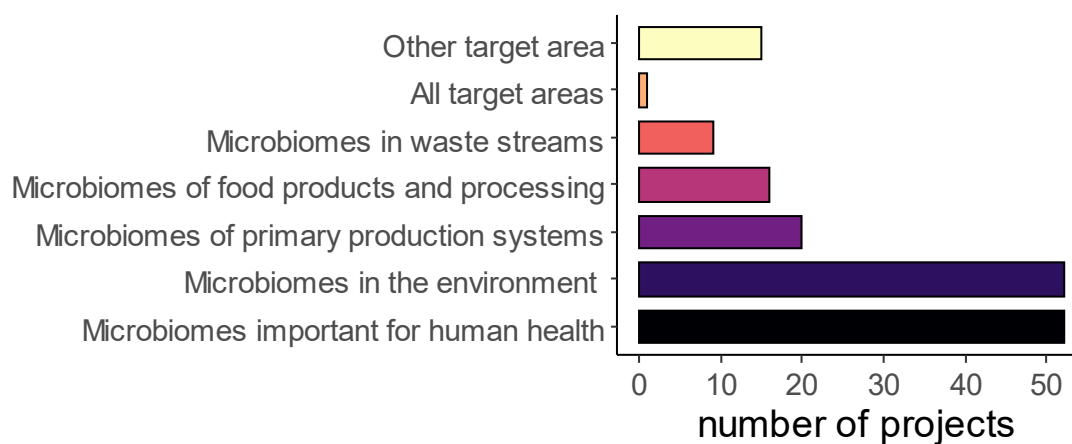
The budget was available for 57% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Infrastructure	Website	
Bioactive Microbial Metabolites (BiMM) Facility	https://www.bimm-research.at/en/	Research Facility
BioBank Graz	https://biobank.medunigraz.at/en/	Biobank
Biobanking and BioMolecular resources Research Infrastructure (BBMRI) Austria	http://bbmri.at/home	Biobank
Joint Microbiome Facility (JMF) @ Medical University of Vienna	https://jmf.csb.univie.ac.at/	Microbiome Research platform
Life Science Compute Cluster @ Division of Computational Systems Biology (University of Vienna)	http://cube.univie.ac.at/ https://cube.csb.univie.ac.at/lisc	Bioinformatics
Microbiome and Health Initiative Graz	https://www.medunigraz.at/center-for-microbiome-research/microbiome-and-health-initiative/	Microbiome Research platform
Research Infrastructures in Austria (database operated by Federal Ministry of education, science and research)	https://forschungsinfrastruktur.bmbwf.gv.at/en	Database with research facilities
Vienna BioCenter core facilities	https://www.viennabiocenter.org/facilities/	Bioinformatics Sequencing centre Computation Research Facility
Vienna Scientific Cluster	http://vsc.ac.at/home	Computation
ZMF core facilities	https://zmf.medunigraz.at/core-facilities/	Research Facility

Network platforms

Network	Website
Austrian Association of Molecular Life Sciences and Biotechnology (ÖGMBT)	https://www.oegmbt.at
Austrian Bioinformatics Platform	http://bioinformatik.at/en
Austrian Microbiome Initiative (AMICI)	http://www.microbiome.at/
Austrian Society for Hygiene, Microbiology and Preventive Medicine (ÖGHMP)	https://www.oeghmp.at/
BioTechMed-Graz	http://biotechmedgraz.at/en/about/
Microbiome and Health Initiative Graz	https://www.medunigraz.at/center-for-microbiome-research/microbiome-and-health-initiative/
MIGRobeZ: Microbiome initiative Graz	https://www.medunigraz.at/center-for-microbiome-research/migrobez/

Belgium

Country specific approach

The CCP from Belgium obtained information from the following institutions: Service public Wallonia, Research Institute for Agriculture, Fisheries and Food (ILVO), Fris research portal, the Belgium Science Policy Office, the governmental website of Flanders and the governmental website of Wallonia as well as a personal contact.

Key strategies

Name	Year	Website	Microbiome addressed
Flemish policy memorandum 2014-2019: Work, Economy, Science and Innovation	2014	https://www.werk.be/sites/default/files/beleidsnota_2014_2019_werk_economie_wetenschap_en_innovatie.pdf	no
Flemish policy memorandum 2019-2024: Economy, Science policy and Innovation	2019	https://publicaties.vlaanderen.be/view-file/32221	no
Flemish resilience	2020	https://www.vlaanderen.be/vlaamse-regering/vlaamse-veerkracht	to moderate extent
Flemish Science Agenda 2018	2018	https://cdn.kangacoders.com/direct/particify/da_files/items/000/000/643/original/vlaamsewetenschapsagenda-eindrapport.pdf?1544773492	to moderate extent
Regional policy statement 2019-2024	2019	https://www.wallonie.be/sites/default/files/2019-09/declaration_politique_regionale_2019-2024.pdf	no
Sustainable Development - 2nd Walloon Strategy	2019	http://developpementdurable.wallonie.be/sites/default/files/2019-06/Strat%C3%A9gie%20wallonne%20de%20d%C3%A9veloppement%20durable_0%281%29.pdf	no
Walloon Research Strategy 2011-2015	2011	http://enseignement.be/download.php?do_id=9497	to small extent

White papers

Name	Year	Website	Microbiome addressed
Issues paper on “The microbiome, diet and health: assessing gaps in science and innovation”	2016	https://www.ewi-vlaanderen.be/sites/default/files/microbiome_issues_paper_may_2016_kathleen_dhondt.pdf	to great extent

Organisation of 2 OECD-EWI workshops 2016-2017	2016	https://www.ewi-vlaanderen.be/wat-doet-ewi/excellerend-onderzoek/internationale-samenwerking/oeso/workshop-personalised-nutrition ; https://www.ewi-vlaanderen.be/nieuws/microbioom-stelt-onderzoek-en-beleid-voor-enorme-uitdagingen	to great extent
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Policies

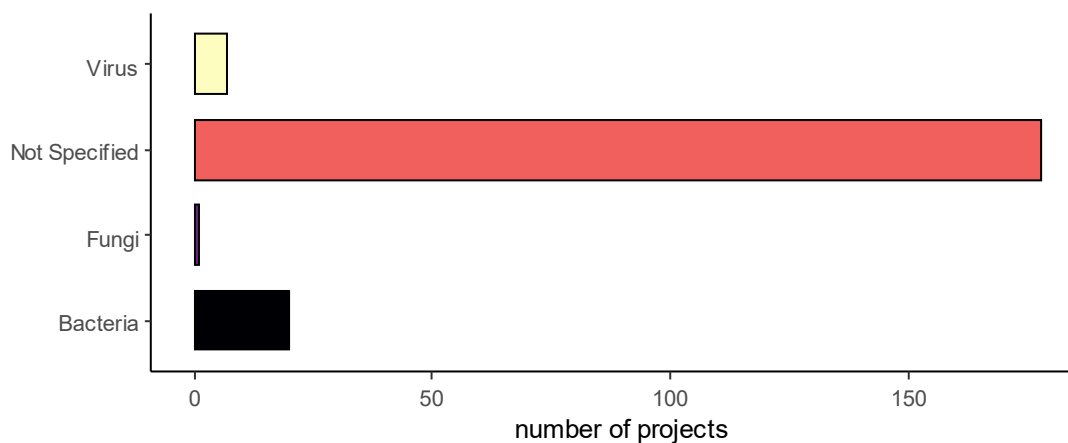
Name	Year	Website	Microbiome addressed
SSD – Balance of a multidisciplinary and thematic research program	2015	http://www.belspo.be/belspo/SSD/publ/broch_SSD_nl.pdf	to moderate extent
Food for Thought	2016	https://lv.vlaanderen.be/sites/default/files/attachments/lara2016_sam_eng-website_def.pdf	no
Walloon Rural Development Program 2014 - 2020	2018	https://agriculture.wallonie.be/documents/20182/21864/PwDR_version+23+mars+2017+-+approuv%C3%A9+11+avril+2017.pdf/cea93a98-0898-4879-b2cf-fcc754ab6840	to small extent
Walloon Code of Agriculture	2014	http://environnement.wallonie.be/legis/agriculture/code/code001.html	no
ILVO vision of the future: to 2020 and beyond	2017	https://ilvo.vlaanderen.be/uploads/documents/Toekomstvisie_ILVO_2017.pdf	to moderate extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

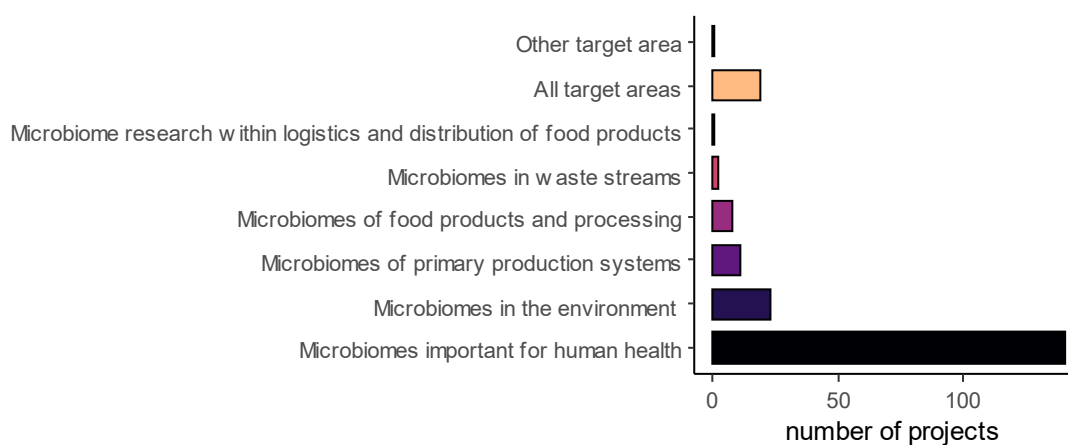
Funders	Total Budget (kEUR)			2020	2021
	2017	2018	2019		
BRAIN-be (Belgian Research Action through Interdisciplinary Networks)	NA	NA	6,504	4,702	NA
Federal government (other than BRAIN)	NA	NA	17,999	27,213	6,060
Flanders Innovation & Entrepreneurship	NA	NA	296,188	70,740	67,124
Flemish government (other than FWO, VLAIO, BOF & IOF)	NA	NA	37,483	34,793	22298
Fund for Scientific Research	179,780	NA	NA	NA	NA
Research Foundation - Flanders	NA	345,200	339,850	181,816	219,168
Special Research Fund	NA	117,800	220,250	95,738	138,925

Budget of microbiome research projects supported by national funding organizations
Not available

Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	website	Infrastructure type
Belgian Co-ordinated collections of micro-organisms (BCCM)	http://bccm.belspo.be/	Culture Collection
Biobanking and Biomolecular Resources Research Infrastructure of Belgium (BBMRI)	https://www.bbmri.be/	Biobank
BioVille Center of Health & Care	https://bioville.be/en/research/	Research Infrastructure
Brussels South Charleroi Biopark	https://biopark.be/en	Research Infrastructure
Center for Dynamical Systems, Signal Processing, and Data Analytics (STADIUS)	https://www.esat.kuleuven.be/stadius/	Computation
Centre for Human Genetics Leuven (CME)	https://gbiomed.kuleuven.be/nl/cme	Sequencing centre
Centre for Medical Genetics Antwerp	https://www.genetica-antwerpen.be/	Sequencing centre
Centre for Medical Genetics Ghent	https://www.cmgg.be/en/	Sequencing centre
Centre for Medical Genetics UH Brussels	http://www.brusselsgenetics.be/default.aspx	Sequencing centre
Flexport Liège airport	https://www.liegeairport.com/flexport/en/case-studies/transport-of-medicines-and-pharmaceutical-products/	Other
ILVO diagnostic centre for plants	https://www.ilvodiagnosecentrumvoorplanten.be/en/	Research Infrastructure
ILVO research infrastructure	https://ilvo.vlaanderen.be/en/research-infrastructure	Long-term field experiment
imec R&D hub	https://www.imec-int.com/en	Research Infrastructure
Leuven Bio-incubator	https://www.bio-incubator.be/	Research Infrastructure
Science parks of Wallonia (SpoW)	http://www.investinwallonia.be/secteurs-cles/sciences-du-vivant	Research Infrastructure
TERRA Teaching and Research Centre	https://www.terra.uliege.be/cms/c_4095714/en/terra-thematics	Research Infrastructure
The molecular research and clinic (MIRACLE)	https://gbiomed.kuleuven.be/english/corefacilities/miracle	Research Facility
University Biobank Limburg (UBiLim)	https://www.ubilim.be/	Biobank
University of Liège GIGA research institute	https://www.giga.uliege.be/cms/c_4113263/nl/portail-giga	Microbiome Research platform
VIB Core Facilities	https://vib.be/science-meets-technology#core_facilities	Research Facility

Network platforms

Name	Website
BioWin	https://www.biowin.org/fr
BrusselsLifeTech	http://lifetechbrussels.com/
Flanders Research Institute for Agriculture, Fisheries and Food (ILVO)	https://ilvo.vlaanderen.be/en/organization
FlandersBio	https://www.flanders.bio/en/what-we-do/
Walloon Agricultural Research Centre	https://www.cra.wallonie.be/en
Walloon excellence in life sciences and biotechnology (WELBIO)	https://welbio.org/cms/c_11740011/en/welbio

Brazil

Country specific approach

In 2019, the country contact point from Brazil contacted the following organizations: São Paulo Research Foundation (FAPESP), Brazilian Agricultural Research Corporation (EMBRAPA), National Council for Scientific and Technological Development (CNPq) and Coordination for the Improvement of Higher Education Personnel (CAPES). FAPESP was the only funder that provided information about research projects, as they have an online platform with information on research projects. FAPESP is the main funding agency of the state of São Paulo and has the largest economy and budget for R&D in Brazil. There was no budget information about projects and programmes available from FAPESP. The other funding agencies were also contacted, but none replied to the request for information. Information was also obtained from websites and reports. In 2021, there was no input from Brazil.

Key strategies

Name	Year	Website	Microbiome addressed
<i>National Science, Technology and Innovation strategy Brasil</i>	2016	http://www.finep.gov.br/images/a-finep/Politica/16_03_2018_Estrategia_Nacional_de_Ciencia_Tecnologia_e_Inovacao_2016_2022.pdf	<i>to moderate extent</i>

White papers

Name	Year	Website	Microbiome addressed
Food: Action Plan on Science, Technology, and Innovation for Food	2016	http://www.finep.gov.br/images/a-finep/Politica/16_03_2018_Estrategia_Nacional_de_Ciencia_Tecnologia_e_Inovacao_2016_2022.pdf	to moderate extent
Food: RD&I in new agricultural, agroindustrial and agroforest products	2016	http://www.finep.gov.br/images/a-finep/Politica/16_03_2018_Estrategia_Nacional_de_Ciencia_Tecnologia_e_Inovacao_2016_2022.pdf	to great extent
Food: Strengthen research to productivity increase, climate change and agricultural defense	2016	http://www.finep.gov.br/images/a-finep/Politica/16_03_2018_Estrategia_Nacional_de_Ciencia_Tecnologia_e_Inovacao_2016_2022.pdf	to great extent
NUTRISSAN	2006	https://nutrissan.rnp.br/inicio	to moderate extent

Latin American Network of Food and Nutrition Sovereignty and Security	not available	http://redelassan.com.br/	to moderate extent
The National Education and Research Network (RNP)	1989	https://www.rnp.br/	to small extent

Policy

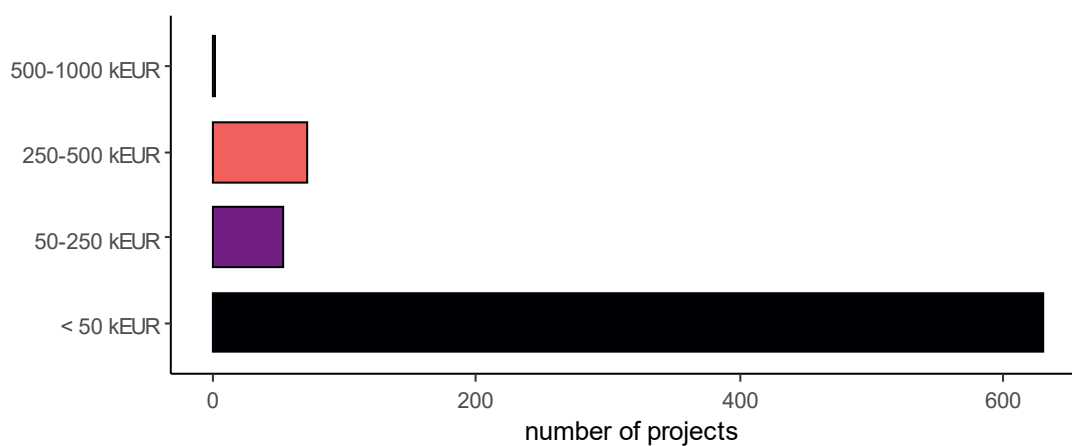
Name	Year	Website	Microbiome addressed
National Policy for Food and Nutrition Security – PNSAN	2010	http://www.planalto.gov.br/ccivil_03/_Ato2007-2010/2010/Decreto/D7272.htm	to small extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

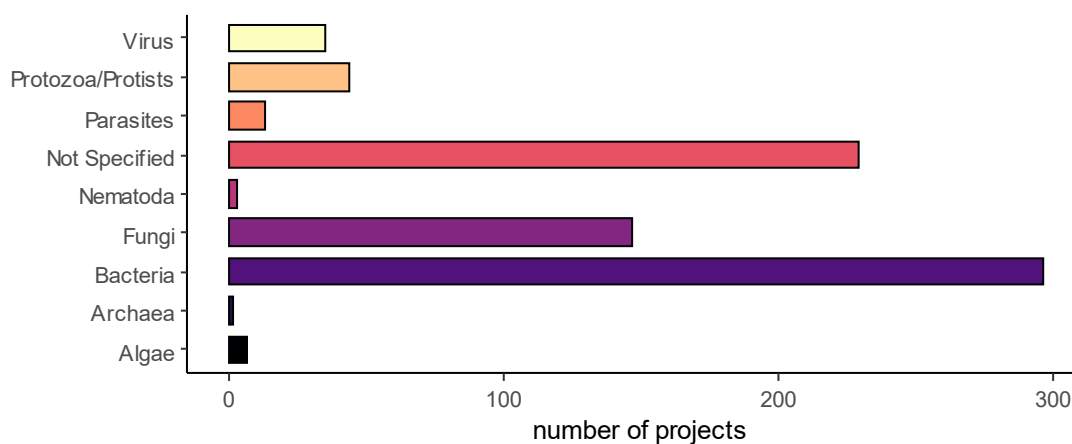
Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Brazilian Company for Research and Industrial Innovation	209714	100976	65581	34746	NA
National Council for Scientific and Technological Development	432131	353682	201154	235,350	192188
Coordination for the Improvement of Higher Education Personnel	1337753	935927	988790	600,381	470350
Financier of Studies and Projects	928715	642380	985608	829103	NA
Brazilian Development Bank	6571423	536585	279070	317288	NA
Research Supporting Foundations	NA	NA	NA	NA	NA
São Paulo State Research Support Foundation	382570	334214	384182	244287	181033

Budget of microbiome research projects supported by national funding organizations

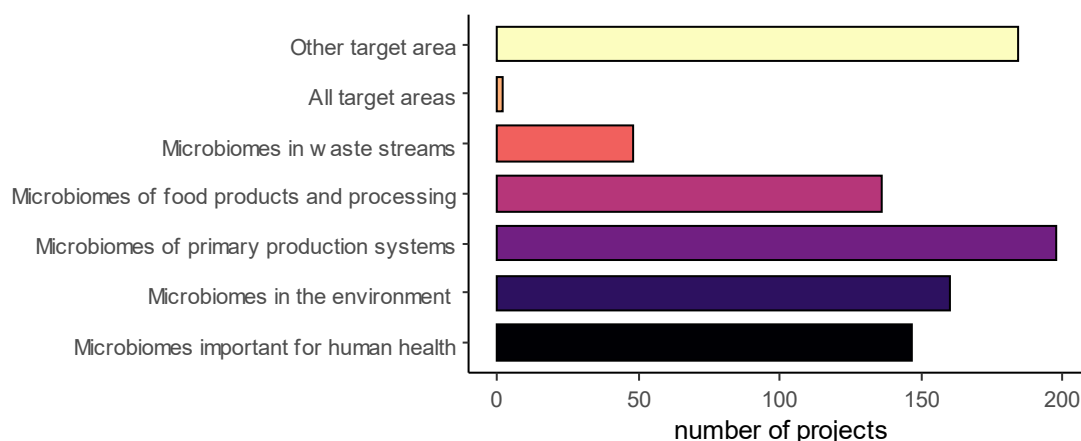
The budget was available for all projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name of Infrastructure (in English)	Website	Infrastructure type
Federal University of Minas Gerais Multi-user Equipment	https://www2.icb.ufmg.br/multiusuarios/login.php	Research Facility
Adaptations of Amazonian Aquatic Biota	http://adapta.inpa.gov.br	Biobank
Advanced Microscopy Hub	https://www.embrapa.br/en/agrobiologia/nucleo-de-microscopia-avancada	Microscopy
Agricultural Microbiology Culture Collection	http://www.ccma.dbi.ufla.br/pt/	Culture Collection
Agricultural-industrial Interest Microorganisms Collection	https://www.embrapa.br/uva-e-vinho	Culture Collection
Agronomic Institute of Campinas Multiuser Equipment	http://www.iac.sp.gov.br/equipamentosp/multiusuariosfapesp.php	Research Facility
Algae, Cyanobacteria and Fungi Culture Collection of the Institute of Botany	https://www.infraestruturameioambiente.sp.gov.br/institutodebotanica/colecao-de-culturas/	Culture Collection
Amazon Bacteria Collection	http://cbam.fiocruz.br/index	Culture Collection
Amazon Fungi Collection	http://cfam.fiocruz.br/	Culture Collection
Antibiotic Department Microorganism Culture Collection	https://www.ufpe.br/colecao_ufpeda	Culture Collection
Applied Electron Microscopy Research Center	http://www.esalq.usp.br/napmepa/	Research Facility
Bacillus Genus and Related Genera Culture Collection	http://ccgb.fiocruz.br/	Culture Collection

Name of Infrastructure (in English)	Website	Infrastructure type
Bauru College of Dentistry Multi-user Equipment	https://www1.fob.usp.br/pesquisa/equipamentos-multiusuarios/	Research Facility
Bioinformatics Intermediate Laboratory in Transcriptomics and Functional Genomics	https://www.biof.ufrj.br/pt-br/laborat%C3%B3rio-intermedi%C3%A1rio-de-bioinform%C3%A1tica-na-transcript%C3%B4mica-e-gen%C3%B4mica-funcional-bitfun	Bioinformatics
Bioinformatics Laboratory	https://www.embrapa.br/informatica-agropecuaria/lmb	Bioinformatics
Bioinformatics Multidisciplinary Environment (BioME)	https://bioinfo.imd.ufrn.br/	Bioinformatics
Bioinformatics Multi-user Laboratory Equipment	https://www.embrapa.br/en/informatica-agropecuaria/lmb/infraestrutura	Research Facility
Bioinformatics Multi-user Unit	http://www.biologico.sp.gov.br/page/equipamento-multiusuario	Microscopy
Biomolecular Analysis Multi-User Laboratory	http://labiom.ufes.br/	Research Facility
Biomolecular Innovation Multi-User Center	https://www.ibilce.unesp.br/#!/departamentos/fisica/multiusuario/equipe/	Sequencing center Bioinformatics
Biomolecule Mass Spectrometry Center	http://cembio.biof.ufrj.br/	Metabolomics
Bioprocess Laboratory Collection (LB-L1B2P; LB-Hort; LB-Manj)	https://www.fea.unicamp.br	Culture Collection
Biotechnology and Genetics Center	http://www.uesc.br/centros/	Bioinformatics
Biotechnology Protein Expression and Purification Platform	https://www.biof.ufrj.br/pt-br/laborat%C3%B3rios	Computation
Brazilian Collection of Environment and Industry Microorganisms	https://cbmai.cpqba.unicamp.br/	Culture Collection
Brazilian Cyanobacteria Collection (BCCUSP)	http://www.esalq.usp.br	Culture Collection
Brazilian Nanotechnology National Laboratory	https://innano.cnpem.br/laboratories/Ime/	Research Facility
Butantan Institute Multi-user Equipment	http://butantan.gov.br/pesquisa/equipamentos-multiusuarios	Microbiome Research platform
Campylobacter Collection	http://ccamp.fiocruz.br/	Culture Collection
Catholic University of Pernambuco Collection	http://www.unicap.br/home/	Culture Collection
Cellular and Molecular Biology and Pathogenic Bioagents Department	http://rbp.fmrp.usp.br/laboratorios/laboratorios-multiusuarios/	Microscopy
Central Laboratory of High Performance Life Sciences Technologies	https://www.lactad.unicamp.br/br	Sequencing centre Bioinformatics

Name of Infrastructure (in English)	Website	Infrastructure type
Collection of phytopathogenic fungi from the Biological Institute - Micoteca "Mário Barreto Figueiredo"	http://www.biologico.agricultura.sp.gov.br/page/colecoes/fungos-fitopatogenicos	Culture Collection
Cpac-Embrapa Collection	http://www.cpac.embrapa.br/	Culture Collection
Culture Collection of Diazotrophic and Plant Growth Promoting Bacteria of Embrapa Soja (CNPSo)	http://alelomicro.cenargen.embrapa.br	Culture Collection
Culture Collection of Lactic Acid Bacteria (CCLAB-UNESP)	https://www.ibilce.unesp.br/	Culture Collection
Culture Collection of Microbiology Laboratory	https://www.fcav.unesp.br/	Culture Collection
Cyanobacteria and Phytotoxin Laboratory	www.cianobacteria.furg.br	Culture Collection
Darcy Fontoura de Almeida Computational Genomics Unit	https://www.labinfo.incc.br/	Microscopy
Darcy Fontoura de Almeida Multidisciplinary Genomics Unit	https://www.biof.ufrj.br/pt-br/unidade-multidisciplinar-de-gen%C3%B4mica-darcy-fontoura-de-almeida	Research Facility
Department of Soil Science	http://www.solos.esalq.usp.br/servicos?key=LSO	Research Facility
Digital Microscopy Multi-user Unit	http://www.biologico.sp.gov.br/page/equipamento-multiusuario	Research Facility
Drug Innovation and Novel Drug Targets	http://inct-inovamed.cienp.org.br/	Research Facility
Electron Microscopy and Atomic Force Laboratory	http://www.pmt.usp.br/labmicro/	Research Facility
Electron Microscopy and Ultrastructural Analysis Laboratory	http://www.dfp.ufla.br/index.php/pt-BR/laboratorios/lmeau	Metabolomics
Electron Microscopy Laboratory of the University of São Paulo	http://www.lfn.esalq.usp.br/NAP	Microscopy
Endophyte Microorganisms Collection of the University of Ribeirão Preto (EMCURP)	https://www.unaerp.br/	Culture Collection
Environment and Materials Multi-user Laboratory	https://multilab-uerj.com.br/	Bioinformatics
Environmental Analysis Multi-user Unit	https://www.ccs.ufrj.br/conteudos/umaaplatform	Microbiome Research platform
Environmental and Health Bacteria Collection	http://cbas.fiocruz.br/	Culture Collection
Environmental Microbiology Laboratory	https://www.embrapa.br/en/meio-ambiente/equipamento-multiusuario	Bioinformatics
Environmental Research and Training Center	http://www.cepema.usp.br	Research Facility
ESALQ Microorganism Collection	http://www.esalq.usp.br/	Culture Collection

Name of Infrastructure (in English)	Website	Infrastructure type
Faculty of Agronomic Sciences Central Laboratory	https://www.fca.unesp.br/#!/pesquisa/laboratorio-central/	Research Facility
FCE Multi-User Equipment	https://www.tupa.unesp.br/#!/pesquisa/equipamentos-multiusuarios/	Research Facility
Federal University of ABC Multi-user Experimental Centers	http://propes.ufabc.edu.br/cem/agendas.html	Research Facility
Fernando Garcia de Mello Biological Models Multi-user Laboratory	https://www.biof.ufrj.br/pt-br/laborat%C3%B3rios	Research Facility
Filamentous Fungus Culture Collection	http://ccff.fiocruz.br/	Culture Collection
Fiocruz Microbiological Collections	https://portal.fiocruz.br/colecoes-microbiologicas	Culture Collection
Flora and Fungi Virtual Herbarium	http://inct.florabrasil.net/sobre-o-inct-hvff/	Research Facility
Flow Cytometry Platform - Cell Purification Core	http://www.fiocruz.br/ioc/cgi/cgilua.exe/sys/start.htm?sid=358	Research Facility
Food Research Center (FoRC)	http://www.usp.br/forc/	Research Facility
Freshwater Microalgae Collection Cultures	https://ccmd.furg.br/	Culture Collection
Genomic Analysis Hub	http://www.uenf.br/portal/index.php/br/servicos/identificacao-de-contaminantes.html	Research Facility
Genomics and Bioinformatics Center	http://www.cegenbio.ufc.br/	Research Facility
Genomics Laboratory	http://www.unirio.br/ppgbmc/lg/area-de-interesse	Microbiome Research platform
High performance computing cluster	https://www.inca.gov.br/pesquisa/plataformas-multiusuario/bioinformatica	Computation
Institute of Biosciences Multi-User Equipment Park	https://www2.ibb.unesp.br/paginas/fapesp/pesquisa.php?id=5366	Microscopy
Institute of Biotechnology Applied to Farming	http://www.bioagro.ufv.br/	Research Facility
Institute of Botany Ecology Laboratory	https://www.infraestruturameioambiente.sp.gov.br/institutodebotanica/ecologia/	Research Facility
Institute of Chemistry Multi-user Laboratory	https://iqm.unicamp.br/pesquisa/laborat%C3%B3rios-multiusu%C3%A1rios-emu-fapesp	Research Facility
Institute of Science and Technology Equipment Park of UNIFESP	https://www.unifesp.br/campus/sjc/napc/em-equipamentos.html	Research Facility
Instrumental Chemical Analysis Center	http://caqi.iqsc.usp.br/	Research Facility
InterSCity - INCT of the Future Internet for Smart Cities	http://interscity.org/	Research Facility
Johanna Döbereiner Biological Resources Center	https://www.embrapa.br/agrobiologia/crb-jd	Culture Collection

Name of Infrastructure (in English)	Website	Infrastructure type
Lab Max Feffer Multi-User of Proteomics, Metabolomics and Lipidomics	https://sites.usp.br/multiomicas/	Research Facility
Lactic Yeast Bank	http://www.ital.sp.gov.br/	Culture Collection
Large-Scale DNA Sequencing and Gene Expression Analysis Centralized Multi-User Laboratory	https://www.fcav.unesp.br/#!/servicos/facilities/sequenciamento/pagina-inicial/	Microscopy
Mass Spectroscopy Centralized Multi-User Laboratory	http://www.ltpna.fcf.usp.br/	Metabolomics
Medical Mycology Laboratory of Microbiology and Nutrition Division	http://portal.inpa.gov.br/	Culture Collection
Microbial Resource Center of Biosciences Institute	https://www.rc.unesp.br/	Culture Collection
Microbiology and Parasitology Multi-user Laboratory	http://lmpmp.sites.uff.br/	Microbiome Research platform
Microorganism Collection Nucleus Adolfo Lutz Institute	http://www.ial.sp.gov.br	Culture Collection
Microorganisms Culture Collection of Biotechnology Grouping	http://www.ipt.br	Culture Collection
Microorganisms Culture Collection of the Food Science Department	http://www.dca.ufla.br/dca/	Culture Collection
Microorganisms for Control of Plant Pathogens and Weeds (MCPWP)	https://www.embrapa.br/en/recursos-geneticos-e-biotecnologia	Culture Collection
Microorganisms Genetics Laboratory	https://ww2.icb.usp.br/icb/	Culture Collection
Microscopy and Microanalysis Center	http://www.ufrgs.br/cme/	Microscopy
Milk and Derivatives Section	http://www.ital.sp.gov.br/	Culture Collection
Molecular Biology Multi-user Laboratory	https://www.embrapa.br/en/agrobiologia/laboratorio-multiusuario-de-biologia-molecular	Microscopy
Molecular Genetics and Bioinformatics Laboratory	http://lgmb.fmrp.usp.br/bit/	Computation
Molecular Histology and Immunohistochemistry Laboratory	http://ccs.ufes.br/laboratorios-multiusuarios	Microscopy
Multicenter Graduate Program in Biochemistry and Molecular Biology	http://www.ufjf.br/pmbqbm/inicial-2/infraestrutura/laboratorios-e-equipamentos/	Research Facility
Multifunctional Microorganisms and Plant Pathogens Collection	http://alelomicro.cenargen.embrapa.br/	Culture Collection
Multi-user Data Analysis Server	https://www.fcav.unesp.br/#!/servicos/equipamentos-multiusuarios/servidor-multiusuario-para-analise-da-dados/	Microscopy
Multi-user Equipment Network Program	http://premium.fm.usp.br/	Research Facility

Name of Infrastructure (in English)	Website	Infrastructure type
Multi-user equipment of Department of Parasitology	http://microbiologia.icb.usp.br/pesquisa/	Research Facility
Multi-User Laboratory Center	https://www2.icb.ufmg.br/celam/	Microscopy
Multi-User Laboratory for Three-dimensional Biological Tissue Image Analysis	https://www.forp.usp.br/?page_id=4201	Research Facility
Multi-user Research Laboratories and Equipment	http://www.uftm.edu.br/comitesecomissoes/cglemp/composicao	Computation
Mycology Department Micoteca	http://www.ufpe.br/micoteca	Research Facility
Nanobiotechnology Laboratory	www.nanos.ufu.br	Bioinformatics
Nanotechnology Characterization Center	http://www.int.gov.br/nanotecnologia	Research Facility
National Institute of Antarctic Science and Technology for Environmental Research	http://inct.cnpq.br/web/inct-apa/home/	Research Facility
National Institute of Antarctic Science and Technology of Tropical Marine Environments	http://www.inctambtropic.org/	Research Facility
National Institute of Photonics Applied to Cell Biology	http://inct-infabric.net.br/	Microscopy
National Institute of Science and Technology - Integrated Oceanography and Multiple Uses of Continental Platform and Adjacent Ocean	http://inct.cnpq.br/web/inct-mar-coi/home/	Research Facility
National Institute of Science and Technology Biotechnology Applied to Plant Stresses	https://www.inctplantstress.com/	Research Facility
National Institute of Science and Technology de Energia e Ambiente	http://inct.cnpq.br/web/inct-e-a/home/	Research Facility
National Institute of Science and Technology for Climate Change	http://inct.cnpq.br/web/inct-mc/home/	Research Facility
National Institute of Science and Technology for Cooperative Autonomous Systems	http://www2.eesc.usp.br/insac/o-programa-inct/	Research Facility
National Institute of Science and Technology for Environmental Risk Integrated Analysis	http://inct.cnpq.br/web/inct-inaira/home/	Research Facility
National Institute of Science and Technology for Pest Insects Biorational Control	http://www.cbip.ufscar.br/	Research Facility
National Institute of Science and Technology for Plant Intoxication Control	http://inct.cnpq.br/web/inct-cip/home/	Research Facility

Name of Infrastructure (in English)	Website	Infrastructure type
National Institute of Science and Technology for Software Engineering	https://ines.org.br/	Research Facility
National Institute of Science and Technology in Biodiversity and Natural Products	http://inct-bionat.iq.unesp.br/	Research Facility
National Institute of Science and Technology in Biofabrication	https://biofabris.com.br/pt/	Research Facility
National Institute of Science and Technology in Marine Sciences for Integrated Oceanographic Process Studies from the Platform to the Slope	https://www.marinha.mil.br/ieapm/	Research Facility
National Institute of Science and Technology in Plant-Pest Interactions	http://www.inctipp.ufv.br	Research Facility
National Institute of Science and Technology in Public Health	http://www.icc.fiocruz.br/	Research Facility
National Institute of Science and Technology in Salinity	http://inct.cnpq.br/web/inct-sal	Research Facility
National Institute of Science and Technology in Salinity	http://www.ufrgs.br/inctcriosfera/micro.html	Research Facility
National Institute of Science and Technology in Wetlands	http://www.inau.org.br/	Research Facility
National Institute of Science and Technology of Amazon Biodiversity Integrated Studies Center	http://inct.cnpq.br/web/inct-cenbam/home/	Research Facility
National Institute of Science and Technology of Aquatic Toxicology	http://www.inct-ta.furg.br/	Research Facility
National Institute of Science and Technology of Bioethanol Science	http://www.inctdobioetanol.com.br/	Research Facility
National Institute of Science and Technology of Brazilian Semiarid Biomedicine	http://inct.cnpq.br/web/inct-ibisab/home/	Research Facility
National Institute of Science and Technology of Catalysis in Molecular and Nanostructured Systems	http://www.inct-catalise.com.br/	Research Facility
National Institute of Science and Technology of Cryosphere	http://etes-sustentaveis.org/	Research Facility
National Institute of Science and Technology of Genetic-Sanitary Information of the Brazilian Livestock	http://www.inctpecuaria.com.br	Research Facility
National Institute of Science and Technology of Molecular Medicine	http://inct.cnpq.br/web/inct-mm/home/	Research Facility

Name of Infrastructure (in English)	Website	Infrastructure type
National Institute of Science and Technology of NanoBioNanoStructures and Simulation NanoBioMolecular	http://www.nanobiosimes.ufc.br/	Research Facility
National Institute of Science and Technology of Nanobiopharmaceuticals	http://www.inct-nanobiofar.com/	Research Facility
National Institute of Science and Technology of Nanobiotechnology	http://inct.cnpq.br/web/inct-nanobiotecnologia/home/	Culture Collection
National Institute of Science and Technology of Ocean-Continent Material Transfer	http://inct.cnpq.br/web/inct-tmcocean/home/	Research Facility
National Institute of Science and Technology of Oil and Gas	http://inct.cnpq.br/web/inct-inog/home/	Research Facility
National Institute of Science and Technology of Redox Processes in Biomedicine	http://www.iq.usp.br/redoxoma/	Research Facility
National Institute of Science and Technology of Rehabilitation of the Hillside-Plain System	http://www.inct-reageo.ufrj.br/	Computation
National Institute of Science and Technology of Synthetic Biology	https://www.inctbiosyn.com/	Research Facility
National Institute of Science and Technology of Translational Research on Amazon Region Health and Environment	http://inct.cnpq.br/web/inct-inpetam/home/	Research Facility
National Institute of Science and Technology of Tropical Fruits	http://www.frutostropicaais.com.br/index.html	Research Facility
National Institute of Science and Technology on Mineral Resources, Water, and Biodiversity	http://acqua-inct.org/	Research Facility
National Institute of Science and Technology on Toxins	http://inct.cnpq.br/web/inct-tox/home/	Research Facility
National Network of Computational Biology	http://renabic.imd.ufrn.br/	Bioinformatics
Natural Products Chemistry Multi-user Laboratory	https://www.embrapa.br/en/agroindustria-tropical/infraestrutura/lmqpn	Research Facility
Nuclear Energy in Agriculture of University of São Paulo Center	http://www.cena.usp.br/pesquisa/meu	Research Facility
Obesity and Comorbidity Research Center	https://www.ocrc.org.br/pesquisa/equipamentos-multiusuario/laboratorio-multiusuario-de-biologia-celular-e-molecular/	Research Facility
Octávio de Almeida Drumond Collection	https://www.ufv.br/	Culture Collection
Paulo de Góes Institute of Microbiology	http://www.bioinovar.ufrj.br/	Microscopy
Phytopathogenic Fungi Culture Collection Prof. Maria Menezes	http://www.pgfitopat.ufrpe.br/cmm.html	Culture Collection

Name of Infrastructure (in English)	Website	Infrastructure type
Phytosanitary Clinic	http://www.uenf.br/portal/index.php/br/servicos/clinica-fitossanitaria.html	Research Facility
Plant Bacteriology Laboratory Culture Collection	http://www.biologico.agricultura.sp.gov.br/page/colecoes/fitobacterias	Culture Collection
Poços de Caldas Laboratory	http://www.cnen.gov.br/	Culture Collection
Pro Equipment	http://posgraduacao.ufrj.br/pr2/proEquipamentosResultado	Research Facility
PROGEMULTI Multi-User Laboratory	http://www.ibrag.uerj.br/index.php/laboratorios-multiusuarios-progemulti.html	Computation Bioinformatics
Recycling, Waste Treatment and Extraction Laboratory	http://www.larex.poli.usp.br/	Sequencing centre
Research Facility Center	http://cefap.icb.usp.br/	Research Facility
Rhizobium Culture Collection (SEMIA)	http://www.fepagro.rs.gov.br/	Culture Collection
Sanitary Surveillance Reference Bacteria Collection	http://cbrvs.fiocruz.br/	Culture Collection
School of Agricultural and Veterinary Sciences Electron Microscopy Laboratory	https://www.fcav.unesp.br/#!/laboratorios/microscopia-eletronica/parque-de-equipamentos/	Microscopy
Structural Characterization Laboratory	http://www.lce-dema.ufscar.br/	Research Facility
Sylvio Moreira Citrus Center Multi-user Equipment	http://ccsm.br/produtos-e-servicos-equipamento-multiusuarios-fapesp/equipamento-multiusuarios-fapesp/	Microscopy
Taxonomic Collection Center	http://web.icb.ufmg.br/cmufmg/	Culture Collection
Technological Characterization Laboratory	http://www.lct.poli.usp.br/	Research Facility
The Federal University of Paraná Culture Collection, Biotechnology Division (LPPII-UFPR)	http://www.bioprocessos.net.br/	Culture Collection
Tropical Culture Collection	http://fat.org.br/	Culture Collection
Tropical Medicine of São Paulo Micoteca	http://www.imt.usp.br/	Culture Collection

Network platforms

Network	Website
Brazilian Microbiome Project	https://www.brmicrobiome.org/
São Paulo Advanced Research Center for Biological Control (SPARCBio)	http://www.sparcbio.com.br/?lang=en

Canada

Country specific approach

In 2019, the contact person from Canada contacted the following organization to obtain information: Natural Sciences and Engineering Research Council (NSERC), Ontario Genomics, Canadian Institutes of Health Research (CIHR), Agriculture and Agri-Food Canada (AAFC). These organizations provided information about research projects, as they have access to databases with projects. In 2021, the projects were updated by searching the Canadian database with the keywords microbiome and microbial communities. Projects were assigned to target areas and microbiome groups using Microsoft Excel search functions.

Key strategies

Name	Year	Website	Microbiomes addressed
Canadian Microbiome Initiative	2015	http://www.cihr-irsc.gc.ca/e/51498.html	to great extent
Canadian Microbiome Initiative 2	2019	http://www.cihr-irsc.gc.ca/e/51499.html	to great extent
Economic Strategy Tables	2018	https://www.ic.gc.ca/eic/site/098.nsf/eng/home	no

White papers

Name	Year	Website	Microbiomes addressed
Economic Strategy Tables (agri-food sector)	2018	https://www.ic.gc.ca/eic/site/098.nsf/eng/home	no
"The Barton Report" (Key Sectors)	2016	https://www.budget.gc.ca/aceg-ccce/home-accueil-en.html	no
Growing Canada's value-added food sector	2019	https://sencanada.ca/en/info-page/parl-42-1/agfo-made-in-canada/	no
A study on the status of antimicrobial resistance in Canada and related recommendations	2018	https://www.ourcommons.ca/DocumentViewer/en/42-1/HESA/report-16/	no

Policies

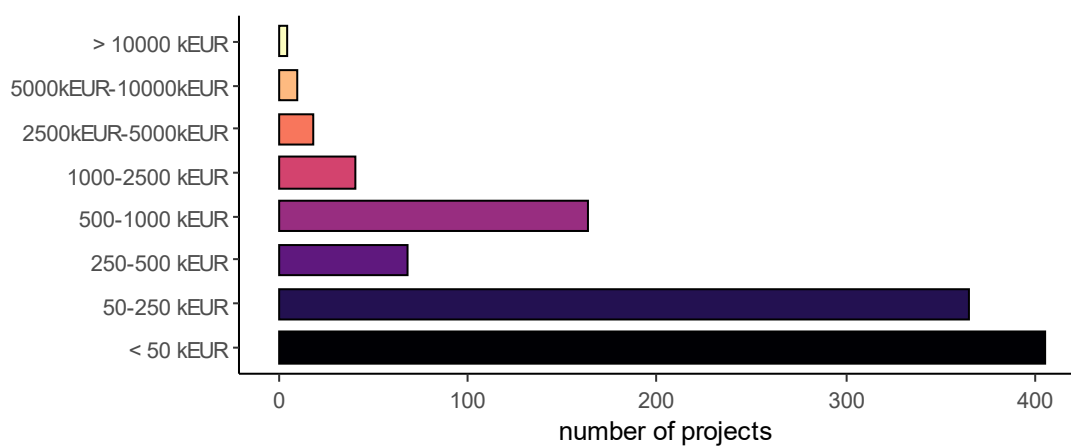
Name	Year	Website	Microbiomes addressed
Food Policy for Canada (Everyone at the table)	NA	https://www.canada.ca/en/campaign/food-policy.html	no

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

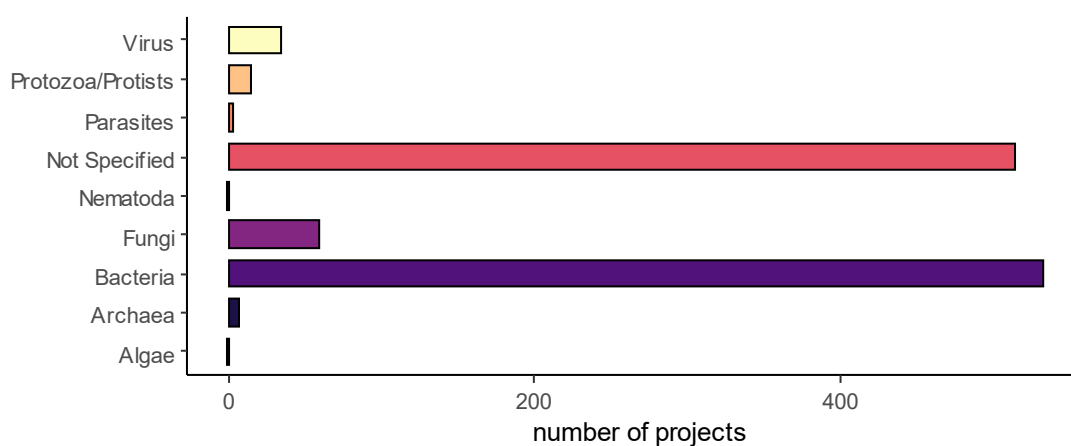
Funders	Total Budget (kEUR)			2020	2021
	2017	2018	2019		
Agriculture and Agri-Food Canada	1357942	NA	NA	NA	NA
Canada First Research Excellence Fund	NA	NA	NA	NA	NA
Canadian Food Inspection Agency	NA	NA	NA	NA	NA
Canadian Institutes of Health Research	746868	NA	NA	NA	NA
Environment and Climate Change Canada	NA	NA	NA	NA	NA
Fonds de recherche du Quebec Santé	NA	NA	NA	NA	NA
Genome Canada	NA	95056	71292	NA	NA
Innovation, Science and Economic Development	1629530	NA	NA	NA	NA
National Research Council Canada		NA	NA	NA	NA
Natural Sciences and Engineering Research Council of Canada	814765	NA	NA	NA	NA
New Frontiers in Research Fund, Canada	NA	NA	NA	NA	NA
Social Sciences and Humanities Research Council	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

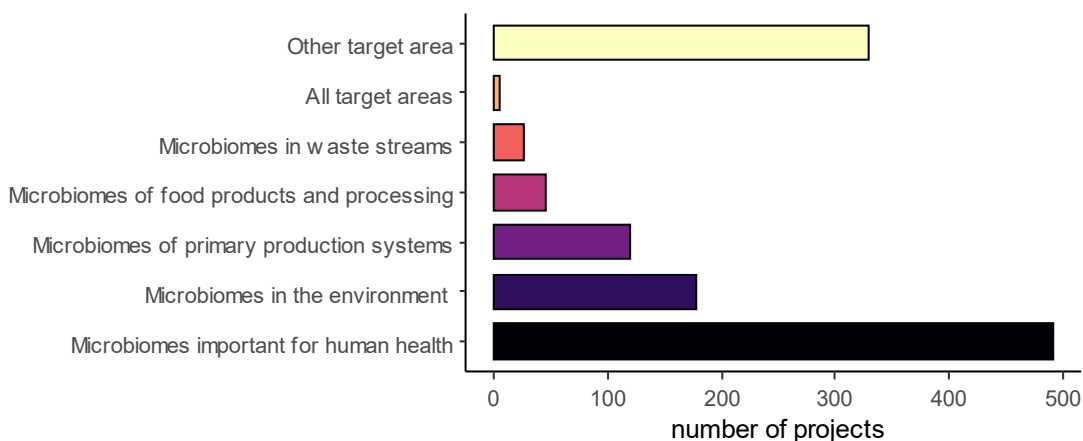
The budget was available for 97% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure type
Canadian Centre for DNA Barcoding	http://ccdb.ca/	Sequencing centre
Canadian Centre for Human Microbiome and Probiotic Research	https://www.lawsonresearch.ca/research-theme/microbiome-and-probiotics	Microbiome Research platform
Centre for Microbial Chemical Biology	http://iidr.mcmaster.ca/cmcb/	Microbiome Research platform Bioinformatics
Host-Microbiome Research Network	https://navigator.innovation.ca/en/facility/university-toronto/host-microbiome-research-network	Microbiome Research platform
Integrated Microbiome Resource	https://imr.bio/	Bioinformatics Sequencing Center
Meat Safety & Processing Research Unit	https://afdp.ualberta.ca/major-platforms/meat-safety-and-processing/	Research Facility
Metabolomics Laboratory	https://www.icm-mhi.org/en/research/labs/fundamental-laboratories/metabolomics	Research Facility
National Centre for Livestock and the Environment (NCLE)	https://umanitoba.ca/faculties/afs/ncle/what_is_ncle/what_is_ncle.html	Research Facility
The Centre for the Analysis of Genome Evolution and Function (CAGEF)	https://www.cagef.utoronto.ca/	Sequencing center Bioinformatics
The International Microbiome Centre	https://imc.ucalgary.ca/	Microbiome Research platform
University of British Columbia Bioreactor Technology Group	https://navigator.innovation.ca/en/facility/university-british-columbia/ubc-bioreactor-technology-group	Research Facility

Network platforms

Network	Website
IMPACTT: A Microbiome Research Core based on Integrated Microbiome Platforms for Advancing Causation Testing and Translation	https://www.impactt-microbiome.ca/

China

Country specific approach

In both 2019 and 2021, the contact person from China contacted the Institute of Microbiology of the Chinese Academy of Sciences. In addition, information was obtained from websites, reports, and a meeting.

Key strategies

Name	year	Website	Microbiomes addressed
innovation-driven development strategy	2016	http://www.gov.cn/xinwen/2016-05/19/content_5074812.htm	no

White papers

Name	year	Website	Microbiomes addressed
Report on the development of China's agricultural industry 2020	2019	not available	to small extent

Policies

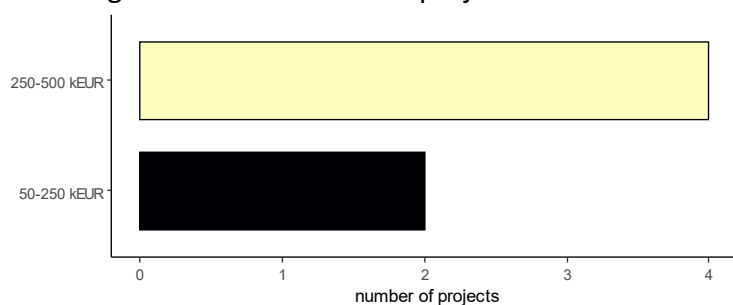
Name	year	Website	Microbiomes addressed
13th five-year national food safety plan	2017	http://www.gov.cn/zhengce/content/2017-02/21/content_5169755.htm	to moderate extent

Major national funding agencies that support microbiome research activities

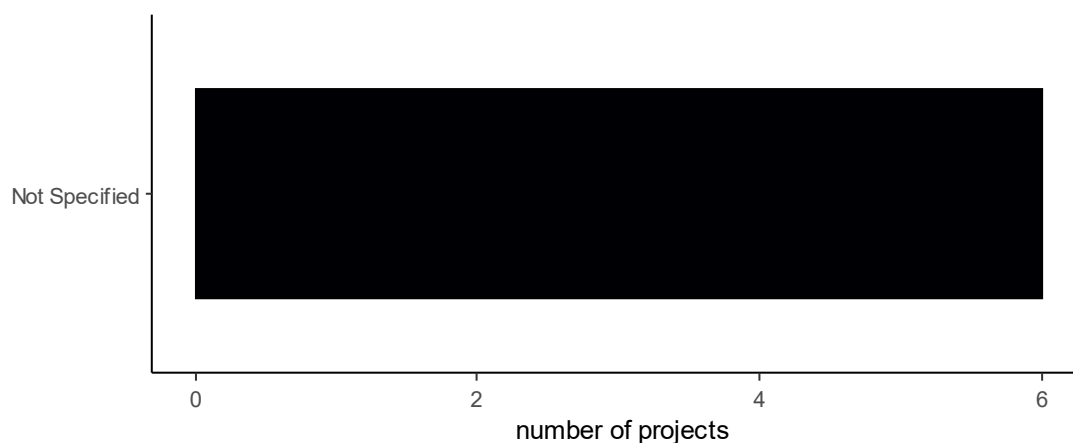
Funders	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
National natural science foundation	379360	481550	380310	380310	388661

Budget of microbiome research projects supported by national funding organizations

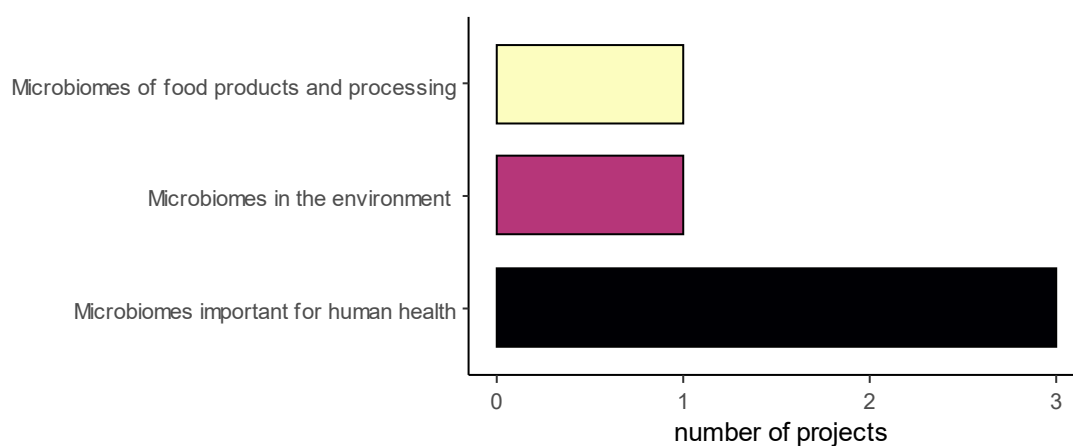
The budget was available for all projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Infrastructure	Website	Infrastructure Type
Institute of Microbiology, Chinese Academy of Sciences	http://www.im.cas.cn/	Microbiome Research platform

Network platforms

Network	Website
Global Catalogue of Microorganisms	http://gcm.wfcc.info/overview/
National Microbial Data Center (NMDC)	http://english.im.cas.cn/ns/es/201906/t20190617_211663.html

Denmark

Country specific approach

The approach in 2019 and 2021 was similar. The contact point contacted the Danish Ministry of Research and Education for input. As there is no central database with research activities, members of the Bio-Reference group in Denmark were contacted to provide information on research activities in Denmark. The BIO-Reference group consists of 73 key persons that represent all Danish universities, relevant research institutes, and key industries.

Key strategies

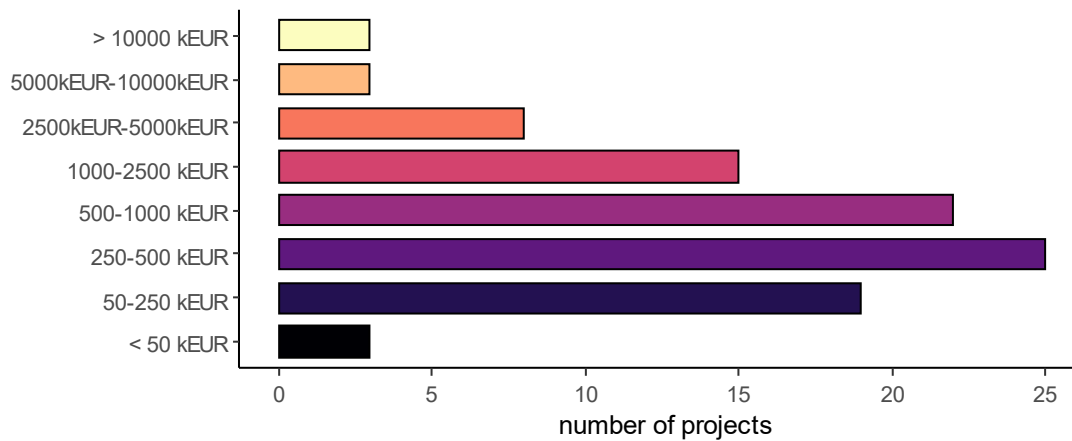
Name	year	Website	Microbiomes addressed
Green solutions of the future - Strategy for investments in green research, technology, and innovation	2020	https://ufm.dk/en/publications/2020/green-solutions-of-the-future-strategy-for-investments-in-green-research-technology-and-innovation .	no
Research 2025, Denmark	2017	https://ufm.dk/publikationer/2017/filer/for-sk2025.pdf	to small extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

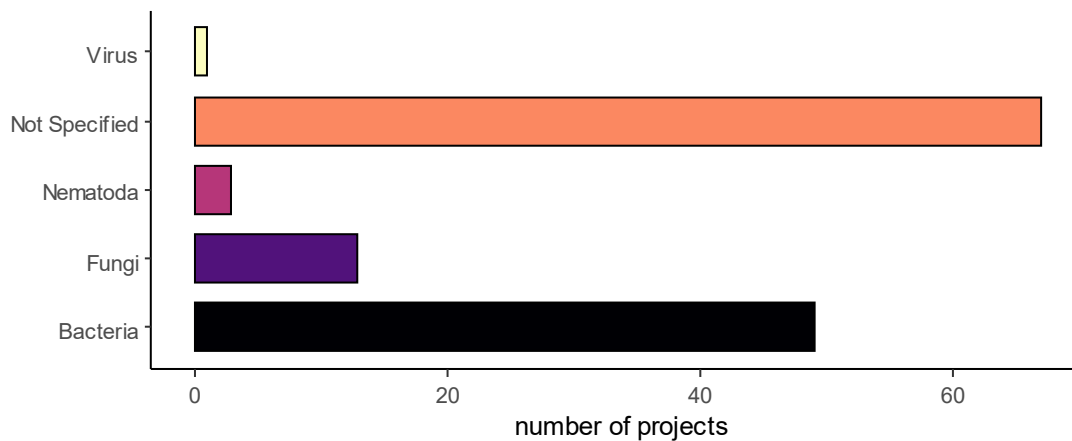
Funders	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Arla Food for Health	NA	NA	NA	NA	NA
Arla Foods Ingredients	NA	NA	NA	NA	NA
Carlsberg foundation	NA	NA	NA	NA	NA
Danish Dairy Research Foundation	NA	NA	NA	NA	NA
Danish Ministry of Higher Education and Science	NA	NA	NA	NA	NA
Danish National Research Foundation	NA	NA	NA	NA	NA
Independent Research Fund Denmark	NA	NA	NA	NA	NA
Innovation Fund Denmark	NA	NA	NA	NA	NA
Lundbeck Foundation	NA	NA	NA	NA	NA
Novo Nordisk Foundation	NA	NA	NA	NA	NA
Poul Due Jensen Foundation	NA	NA	NA	NA	NA
Poultry Production Levy Fund	NA	NA	NA	NA	NA
The Danish Agency for Agriculture	NA	NA	NA	NA	NA
Velux/Villum foundation	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

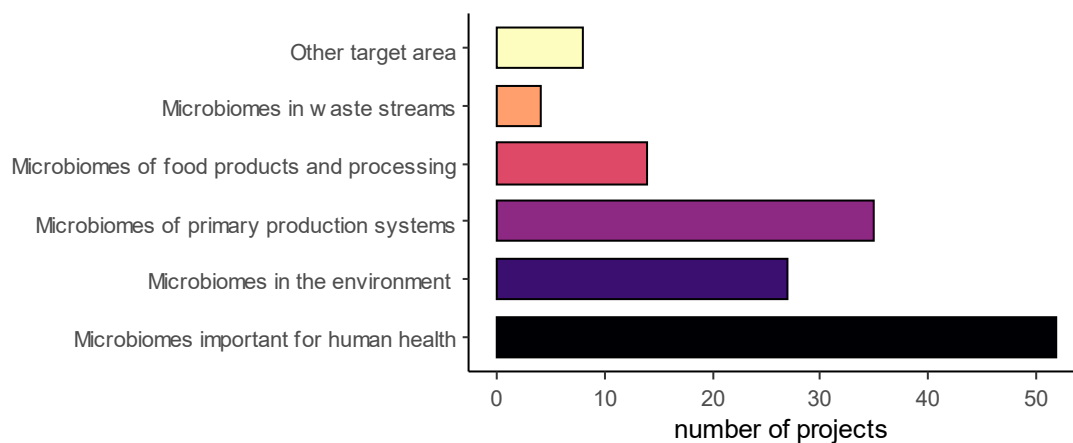
The budget was available for 79% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
Centre for DNA Analysis (CoDoN)	https://www1.bio.ku.dk/english/research/microbiology/	Sequencing centre
Computerome	http://www.computerome.dtu.dk/	Computation
MiDAS - wastewater and bioenergy systems	http://www.midasfieldguide.org	Microbiome Research platform

Network platforms

Network	Website
The Danish Microbiological Society	https://dmselskab.dk/

Estonia

Country specific approach

In 2019, the contact person contacted the Estonian Research Council. In addition, information was obtained from the following sources: Estonian Research Information System and Estonian Research Infrastructure Roadmap 2019, Research funding in Estonia, Estonian Research 2019 and several websites. No new input was provided in 2021.

Key strategies

Name	year	Website	Microbiomes addressed
Estonian dairy strategy 2012-2020	2012	http://www.piimaliit.ee/en/estonian-dairy-strategy-2012-2020/	no
Estonian Environmental Strategy 2030	2007	https://www.envir.ee/sites/default/files/keskkonnastrateegia_inglisek.pdf	no
Estonian Fisheries Strategy (EFS) for 2014–2020	2014	https://www.agri.ee/en/objectives-activities/european-maritime-and-fisheries-fund-emff-2014-2020	no
Knowledge-based Estonia 2014–2020	2014	https://www.hm.ee/sites/default/files/estonian_rdi_strategy_2014-2020.pdf	no
Sustainable Estonia 21	2005	https://www.envir.ee/sites/default/files/elfinder/article_files/se21_eng_web.pdf	no
Plant production	NA	https://www.agri.ee/en/objectives-activities/plant-production	no

White papers

name	year	Website	Microbiomes addressed
Estonian Rural Development Plan (ERDP) for 2014–2020	2014	https://www.agri.ee/en/objectives-activities/estonian-rural-development-plan-erdp-2014-2020	no
Estonian Agricultural, Food and Fisheries Science and Knowledge Transfer Development Plan for 2015–2021	2015	https://www.agri.ee/en/estonian-agricultural-food-and-fisheries-science-and-knowledge-transfer-development-plan-2015-2021	no
Collection and Conservation of Plant Genetic Resources for Food and Agriculture in 2014–2020	2014	https://www.agri.ee/sites/default/files/content/arengukavad/program-genetic-resources-2014-2020.pdf	no

Policies

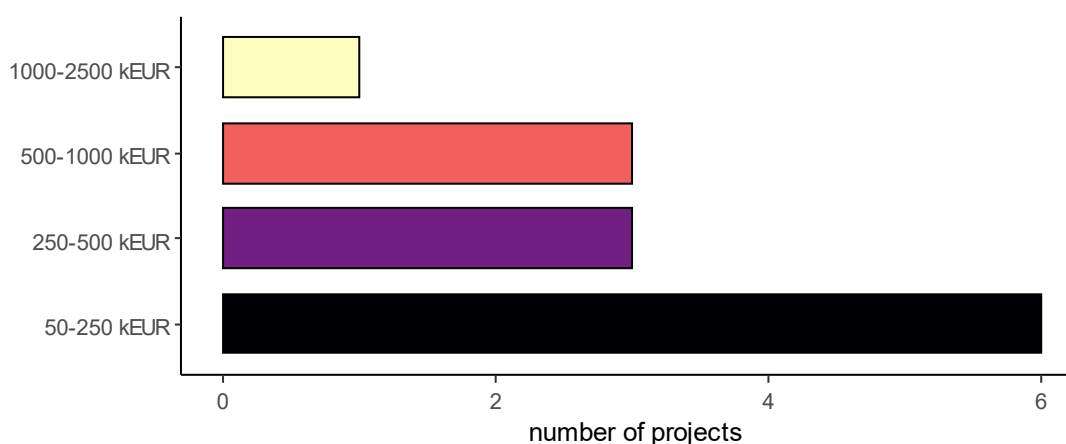
Name	Year	Website	Microbiomes addressed
Agriculture and food market	2015	https://www.agri.ee/en/objectives-activities/agriculture-and-food-market	no
Animal health, welfare and breeding	2015	https://www.agri.ee/en/objectives-activities/animal-health-welfare-and-breeding	to small extent
Bioeconomy	2017	https://www.agri.ee/en/objectives-activities/bioeconomy	no
Fishing industry and commercial fishing	2018	https://www.agri.ee/en/objectives-activities/fishing-industry-and-commercial-fishing	no
Food safety	2015	https://www.agri.ee/en/objectives-activities/food-safety	no
Organic farming	2015	https://www.agri.ee/en/objectives-activities/organic-farming	no
Plant production	2015	https://www.agri.ee/en/objectives-activities/plant-production	no

Major national funding agencies that support microbiome research activities

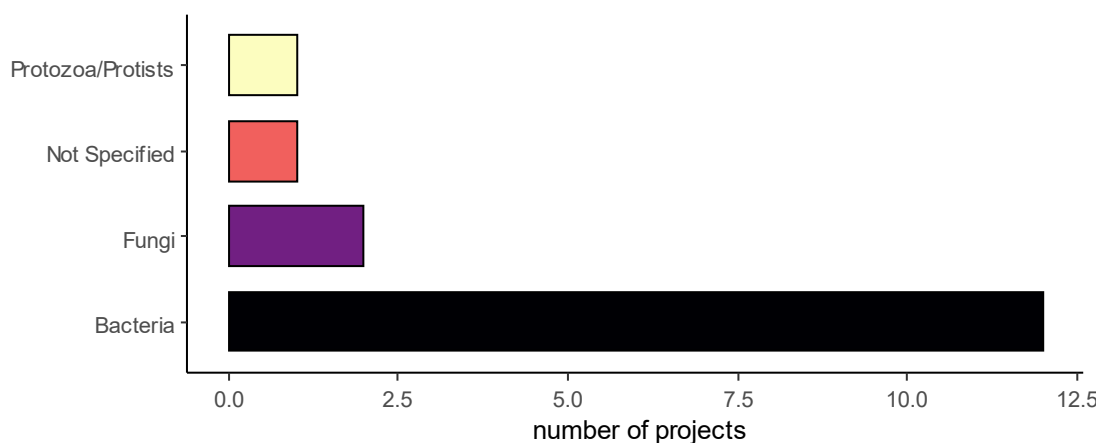
Funders	Total Budget (kEUR)		
	2017	2018	2019
Estonian Research Council	22737	26650	40247
Archimedes Foundation	101143	105517	111053
Enterprise Estonia	154460	214914	81300

Budget of microbiome research projects supported by national funding organizations

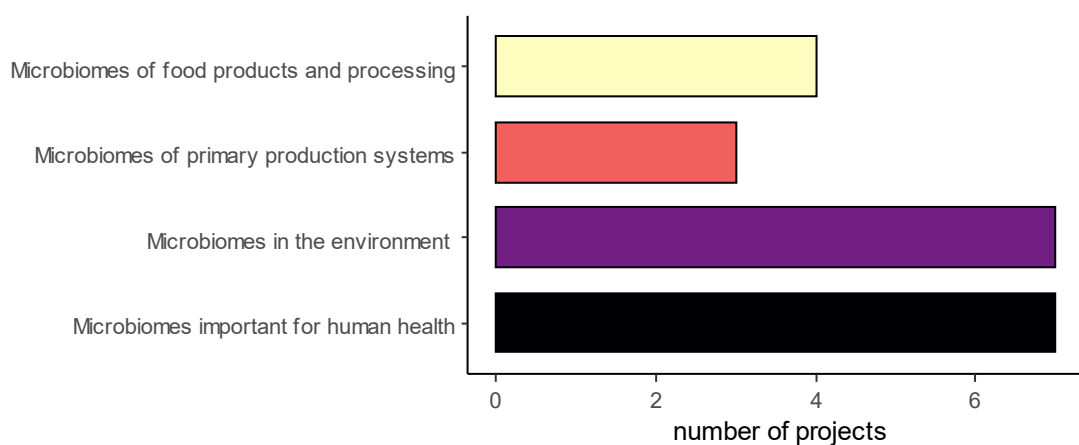
The budget was available for all projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Infrastructure	Website	infrastructure type
Institute of Genomics, Tartu University	https://www.geenivaramu.ee/en	Research Facility
Plant Biology Infrastructure	www.taimebioloogia.ee	Research Facility

Network platforms

There are no network platforms

France

Country specific approach

In 2019, the CCP contacted the National Institute of Agricultural Research (INRA), Institut Pasteur, Assistance Publique Hopitaux Paris (AP-HP), Research Institute for Development (IRD) and French National Institute of Health and Medical Research (INSERM) to collect information. In addition, the annual reports from the National Agency for Research (ANR) and the French Ministry of Research reports were consulted. Further, the websites of IRD and the regional Department for Research and Technology from the region Auvergne-Rhône-Alpes were considered. A search was performed in the database from ANR to obtain relevant projects. In 2021, a similar approach was used to search for research and innovation activities.

Key strategies

Name	Year	website	Microbiome addressed
Acceleration strategy "Sustainable agricultural systems and equipment contributing to the ecological transition"	2021	dp_stragies_alimentation_agriculture_pia4_vdef_05112021.pdf (gouvernement.fr)	to great extent
Acceleration Strategy for Sustainable and Healthy Food	2021	dp_stragies_alimentation_agriculture_pia4_vdef_05112021.pdf (gouvernement.fr)	to great extent
French National Alliance for Life Sciences and Health (Aviesan)	2009	https://aviesan.fr/en/aviesan/home/header-menu/objectives-and-missions	to small extent
French National Research Strategy (2015-2020)	2015	http://cache.media.enseignementsup-recherche.gouv.fr/file/Strategie_Recherche/26/9/strategie_nationale_recherche_397269.pdf	to small extent
INRAE 2030: INRAE's strategic priorities for the next 10 years	2021	https://www.inrae.fr/sites/default/files/pdf/INRAE2030-FR.pdf	to small extent
Inserm Strategic Plan	2015	https://www.inserm.fr/sites/default/files/2017-11/Inserm_PlanStrategique_2016-2020_EN.pdf	to small extent
Inserm Strategic Plan 2025	2019	https://fr.calameo.com/read/0051544502cc32797220e	to small extent
Regional Plan for Higher Education, Research and Innovation 2014-2020. Pays de la Loire	2013	https://www.paysdelaloire.fr/sites/default/files/2020-02/schema-esri.pdf	no

White papers

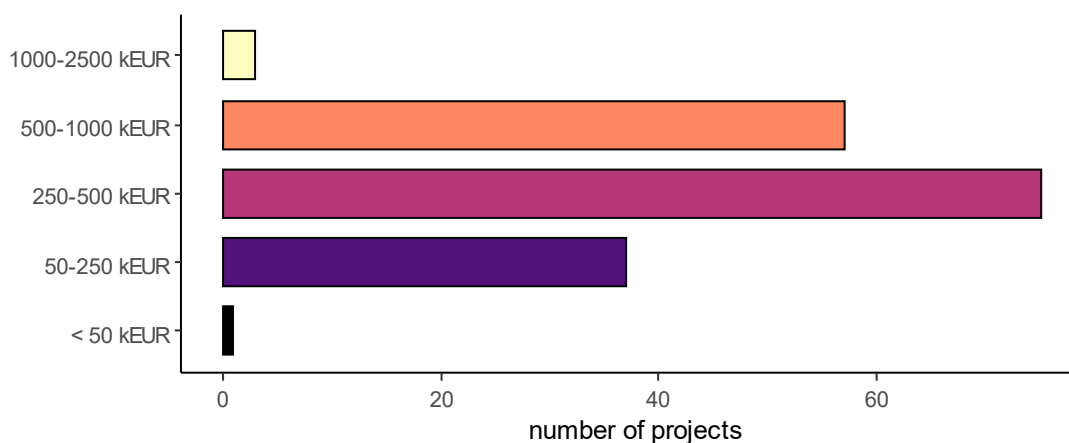
Name	Year	Website	Microbiome addressed
"Food and Nutrition" Strategic note	2013	https://www.allenvi.fr/content/download/4363/33025/version/2/file/Strategie+scientifique_Aliments+et+alimentation-AllEnvi.pdf	NA
An introduction to the skin microbiome	2020	https://www.labskin.co.uk/wp-content/uploads/2021/01/an-introduction-to-the-skin-microbiome-innovenn-labskin.pdf	to great extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

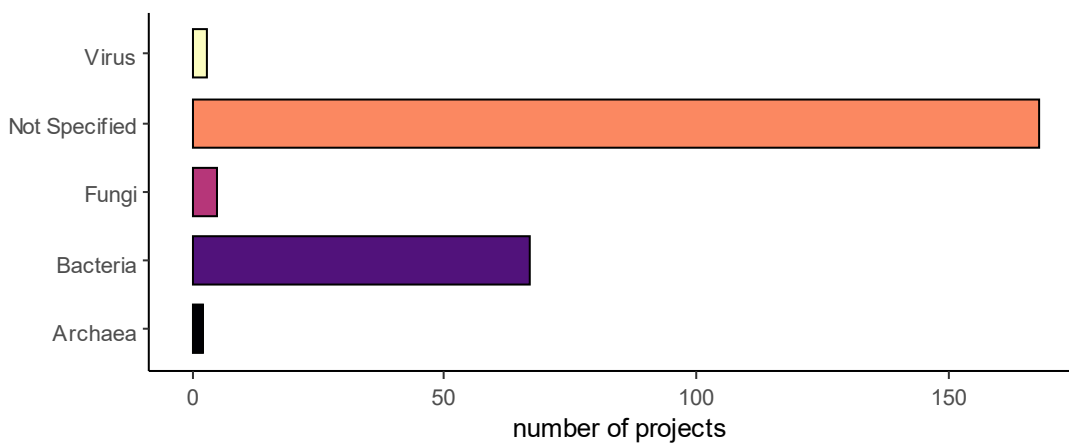
Funders	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Agricultural Technical Institutes	NA	NA	NA	NA	NA
Banque Publique d'Investissement	937000	931000	727000	NA	NA
Fondation de l'AP-HP pour la Recherche	NA	NA	NA	NA	NA
French Agency for Research on AIDS and Viral Hepatitis	NA	NA	NA	NA	NA
French Defense Advanced Research Projects Agency	NA	NA	NA	NA	NA
French Ministry of Agriculture and Food	NA	NA	NA	NA	NA
French Ministry of Higher Education, Research and Innovation	NA	NA	NA	NA	NA
French National Cancer Institute	NA	NA	NA	NA	NA
French National Research Agency	496500	518000	NA	NA	NA
Institut Pasteur	NA	NA	NA	NA	NA
National Institute for Health and Medical Research	NA	484	500	516	
National Research Institute for Agriculture, Food and Environment	NA	643	356	357	358
Region Auvergne-Rhone-Alpes	NA	NA	NA	NA	NA
Region Bourgogne-Franche-Comté	NA	NA	NA	NA	NA
Region île-de-France	NA	NA	NA	NA	NA
Region Pays de la Loire	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

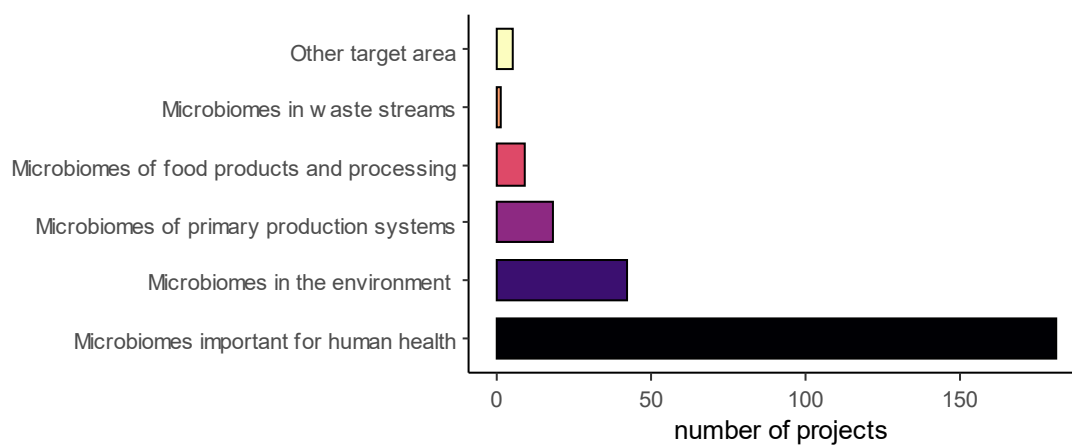
The budget was available for 71% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure type
Bioaster	https://www.bioaster.org	Culture Collection
CALIS infrastructure - consumer, food, health	https://www6.inrae.fr/calis	Bioinformatics Biobank
France Cohortes	https://www.inserm.fr/actualite/france-cohortes-comment-perenniser-outil-recherche-exceptionnel/	Culture Collection
French Clinical Research Infrastructure Network (F-CRIN)	https://www.fcrin.org/	Culture Collection
French Institute of Bioinformatics (IFB)	https://www.france-bioinformatique.fr/	Bioinformatics
Genopole Toulouse (Genotoul)	https://www.genotoul.fr/en/	Bioinformatics
Genoscope - French national sequencing centre	https://www.cea.fr/drf/ifrancoisjacob/Pages/Departements/Genoscope.aspx	Sequencing centre
Human Nutrition Research Center of Auvergne (CRNH)	http://www1.clermont.inra.fr/crn/	Research Facility
LyonBiopole	https://lyonbiopole.com/en/	Research Facility
Metabohub. National infrastructure in metabolomics and fluxomics	https://www.metabohub.fr/home.html	Microscopy
Metagenopolis preindustrial demonstrator. Biobanking platform, NGS, Functional metagenomics platform, Informatic & biostatistics platform.	http://www.mgps.eu/index.php?id=accueil	Biobank
RARE - Biological Resources Centre in Agriculture	https://www.agrobrc-rare.org/agrobrc-rare_eng/Presentation/Micro-organism-pillar	Culture Collection
Rhône-Alpes Research Center for Human Nutrition (CRNH)	https://www.crn-rhone-alpes.fr/	Other, please provide in next column
Vegepolys Valley	https://www.vegepolys-valley.eu/	Microscopy

Network platforms

Name	Website
APRC Association Prevention of Cardiometabolic Risk	https://www.aprcmicrobiome.org/
Interacademic Group on Microbiome (IAG microbiome)	https://www.aprcmicrobiome.org/aprc-microbiome.html#database
Microbiome Foundation	https://microbiome-foundation.org/la-microbiome-foundation/

Germany

Country specific approach

In 2019, the CCP from Germany searched the websites of the following organizations: Federal Ministry of Education and Research (BMBF), German Research Foundation (DFG), research database Gepris and ResearchConnect. In addition, the following websites were checked for information: google, the Förderkatalog, research connect, university/research centre/institute pages and project pages. The database with projects in the Förderkatalog was also checked. The contact person was not allowed to share information about projects and research programmes funded by institutional funds. A general overview can be given as information was not provided in detail due to the enormous complexity of life science research/companies/infrastructures in Germany. In 2021, no new information was provided.

Key strategies

Name	Year	Website	Microbiomes addressed
Bavarian Research and Innovation Agency	NA	https://www.research-innovation-bavaria.de/	no
Bavarian State Ministry for Food, Agriculture and Forests	NA	https://www.stmelf.bayern.de/forschung_innovation/index.php	no
BayernFIT	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/bayernfit-%E2%80%93-research-innovation-and-technology-%E2%80%93-new-innovation-programme-bavarian-0; https://www.bayern.de/wp-content/uploads/2014/pdf/3296324.basis_	no
Bioeconomy 2030	2010	https://www.bmbf.de/pub/Nationale_Forschungsstrategie_Biooekonomie_2030.pdf	to small extent
Bioeconomy Baden-Württemberg	2013	https://www.biooekonomie-bw.de/en	to small extent
Bioeconomy Cluster	NA	https://www.bioeconomy.de/en/visionen-ziele/	to small extent
Blue Bioeconomy in Northern Germany: Bioeconomy at Marine Sites (BAMS)	2019	https://www.uni-kiel.de/en/details/news/109-biooekonomie-en/	to small extent
BMBF strategies	2019	https://www.research-in-germany.org/en/research-landscape/r-and-d-policy-framework.html	to small extent
CEPLAS Cluster of Excellence on Plant Sciences	NA	https://www.ceplas.eu/en/home/	to moderate extent

Name	Year	Website	Microbiomes addressed
Federal Report on Research and Innovation 2020	2020	https://www.bundesbericht-forschung-innovation.de/en/	No
German Sustainable Development Strategy	2019	https://www.bundesregierung.de/resource/blob/975274/1588964/1b24acbed2b731744c2ffa4ca9f3a6fc/2019-03-13-dns-aktualisierung-2018-englisch-data.pdf?download=1	No
Hamburg's Strategy for Smart Specialisation (RIS3)	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/regional-innovation-strategy-2020-free-and-hanseatic-city-hamburg	No
Health research framework program of the Federal Government	2018	https://www.bmbf.de/upload_filestore/pub/Rahmenprogramm_Gesundheitsforschung.pdf	to small extent
Hessian Innovation Strategy 2020	2013	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/hessian-innovation-strategy-2020	No
High-Tech Strategy 2025	2018	https://www.bmbf.de/en/high-tech-strategy-2025.html	No
Innovation Strategy for the Free State of Saxony	2013	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/innovation-strategy-free-state-saxony	No
Innovation Strategy for the Land of Schleswig-Holstein	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/innovation-strategy-land-schleswig-holstein	No
Innovation Strategy of North Rhine-Westphalia under the EU Structural Funds 2014-2020	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/innovation-strategy-north-rhine-westphalia-under-eu-structural-funds-2014-2020	No
Innovation Strategy of the State Brandenburg (innoBB plus)	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/innovation-strategy-state-brandenburg-innobb-plus ; https://mwae.brandenburg.de/media/bb1.a.3814.de/innoBB_plus_Endfassung.pdf	No
Innovation Strategy Rhineland-Palatinate	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/innovation-strategy-rhineland-palatinate ; https://mwvlw.rlp.de/fileadmin/mwkel/Abteilung_4/8401/Innovationsstrategie_Langfassung.pdf	No
InnoVision 2010	2010	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/innovation-programme-2020	No
Policy strategy bioeconomy	2020	https://www.bmbf.de/files/BioOekonomiestrategie.pdf	to moderate extent

Name	Year	Website	Microbiomes addressed
Regional Innovation Strategy 2020 for Mecklenburg-Western Pomerania	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/regional-innovation-strategy-2020-mecklenburg-western-pomerania	no
Regional Innovation Strategy for Lower Saxony	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/regional-and-structural-policy-eu-period-2014-2020-lower-saxony-regional-innovation	no
Regional Innovation Strategy Saxony-Anhalt 2014-2020	2014	https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/regional-innovation-strategy-saxony-anhalt-2014-2020	no
Regional research and innovation strategy for intelligent specialization for Thuringia.	2018	http://s3platform.jrc.ec.europa.eu/documents/20182/229963/DE_Thuringen_RIS3_Finale.pdf/c57f7f59-c18a-46ba-bf5e-a36e8ac65e63	no
Strategy for innovation and technology Saarland	2015	https://www.saarland.de/stk/DE/portale/wissenschaftforschungstechnologie/informationen/politik/innovationsstrategie/innovationsstrategie_node.html	no

White papers

Name	Year	Website	Microbiomes Addressed
Bioeconomy in Germany	2015	https://www.bmbf.de/upload_filestore/pub/Biooekonomie_in_Deutschland_Eng.pdf	to small extent
Food security - Strategic guideline for German development policy	2013	https://www.bmz.de/en/publications/archiv/type_of_publication/strategies/Strategiepapier340_11_2013.pdf	no

Policies

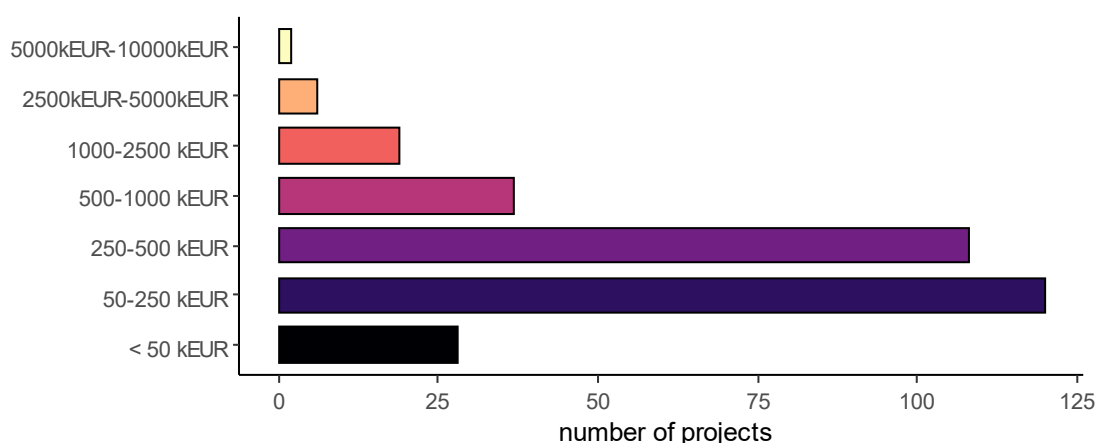
Name	Year	Website	Microbiomes Addressed
BMEI-Concept for Global Food Security and Nutrition	2015	https://www.bmel.de/SharedDocs/Downloads/EN/Publications/BMEIConceptGlobalFood.pdf?__blob=publicationFile	no
Food security - Strategic guideline for German development policy	2013	https://www.bmz.de/en/publications/archiv/type_of_publication/strategies/Strategiepapier340_11_2013.pdf	no
Microbial food cultures	2010	https://www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/2010/skl_m_mikrobielle_kulturen_101115_en.pdf	to great extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

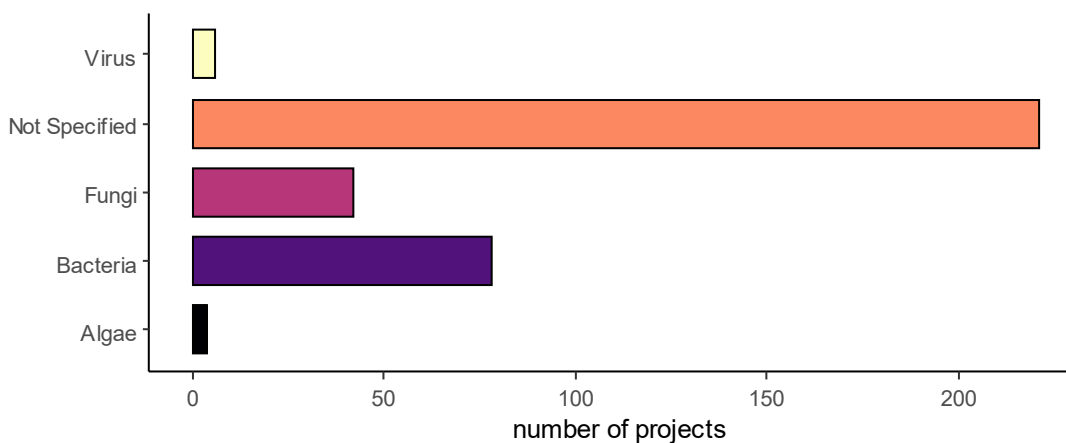
Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
BioEconomy Cluster	NA	NA	NA	NA	NA
Federal Office for Agriculture and Food	NA	NA	NA	NA	NA
German Federal Ministry of Education and Research	NA	NA	NA	NA	NA
German Federal Ministry of Food and Agriculture	NA	NA	NA	NA	NA
German Research Foundation	NA	NA	NA	NA	NA
Hessen State Ministry for Higher Education, Research and the Arts	NA	NA	NA	NA	NA
Research Association of the German Food Industry	NA	NA	NA	NA	NA
BioEconomy Cluster	NA	NA	NA	NA	NA
Federal Office for Agriculture and Food	NA	NA	NA	NA	NA
German Federal Ministry of Education and Research	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

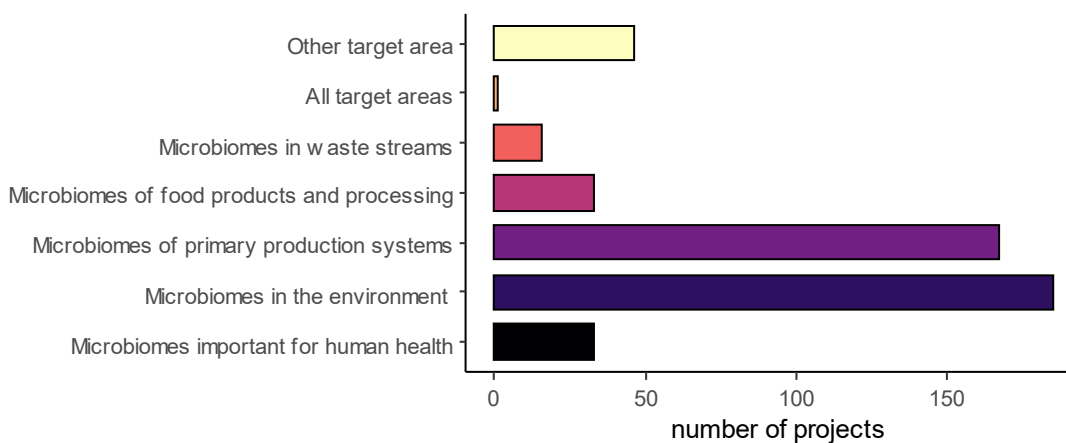
The budget was available for 93% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Infrastructure	Website	Infrastructure Type
Center of microbiome research	https://www.dzif.de/en/working-group/cegimir-centre-gi-microbiome-research	Microbiome Research platform
Deutsches Krebsforschungszentrum	https://www.dkfz.de/gpcf/home	Research Facility
enable cluster core facilities	https://www.enable-cluster.de/	Research Facility
German Collection of Microorganisms and Cell Cultures (DSMZ)	https://www.dsmz.de/	Culture Collection

Infrastructure	Website	Infrastructure Type
Helmholtz Centre Munich (HMGU) core facilities	https://www.helmholtz-muenchen.de/forschung/wissenschaftliche-services/core-facilities/core-facilities/index.html	Research Facility
MEGAN	http://ab.inf.uni-tuebingen.de/software/megan6/	Bioinformatics
ZIEL core facilities	https://www.ziel.tum.de/core-facilities/	Research Facility

Network platforms

Network	Website
VAAM Expert groups	https://vaam.de/die-vaam/fachgruppen/
Munich Sequencing Alliance	https://www.munich-sequencing-alliance.de/

Greece

Country specific approach

The CCP from Greece contacted the General Secretariat for Research and Technology and the Hellenic Foundation for Research and Innovation to obtain information. Several websites were consulted. In addition, several institutions were contacted, but their response was limited.

Key strategies

Name	Year	Website	Microbiomes addressed
National Strategy for food production (Ministry of Rural Development and Food)	2014	http://www.agrotikianaptixi.gr/el	to small extent
National Research and Innovation Strategy For Smart Specialization 2014-2020	2015	http://www.gsrt.gr/central.aspx?sld=120I466I1396I323I496367	to small extent

White papers

Name	Year	Website	Microbiomes addressed
National RIS3	2015	http://www.gsrt.gr/central.aspx?sld=120I466I1396I323I496367&olID=949&neID=824&neTa=20205&nclD=0&neHC=0&tbid=0&lrID=2&oldUIID=aI949I0I120I466I1396I0I2&actionID=load	to small extent

Policies

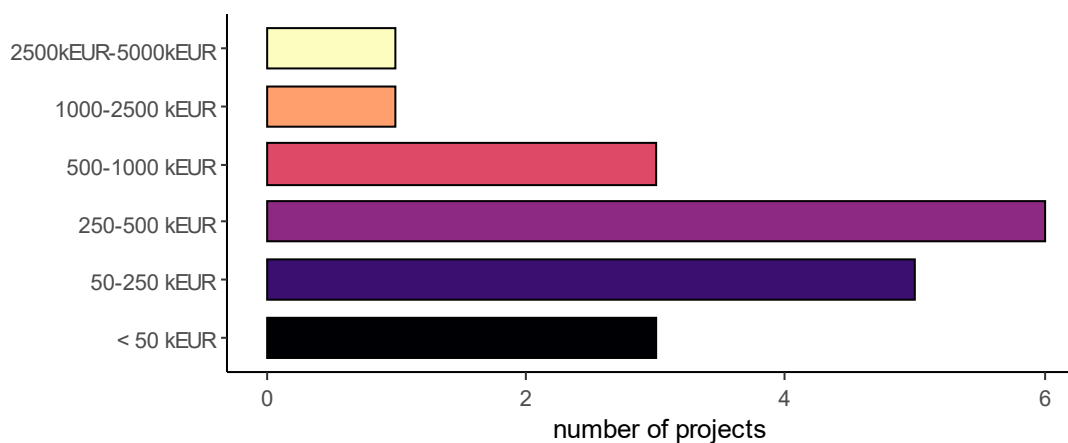
Name	Year	Website	Microbiomes addressed
Guide to Research and Innovation Strategies for Smart Specialisation (RIS 3)	2015	http://www.gsrt.gr/central.aspx?sld=120I466I1396I323I496367	to moderate extent
Enabling synergies between European Structural and Investment Funds, Horizon 2020 and other research, innovation and competitiveness-related Union programmes	2015	http://www.gsrt.gr/central.aspx?sld=120I466I1396I323I496367	to small extent
Regional policy for smart growth of SMEs	2015	http://www.gsrt.gr/central.aspx?sld=120I466I1396I323I496367	to small extent

Major national funding agencies that support microbiome research activities

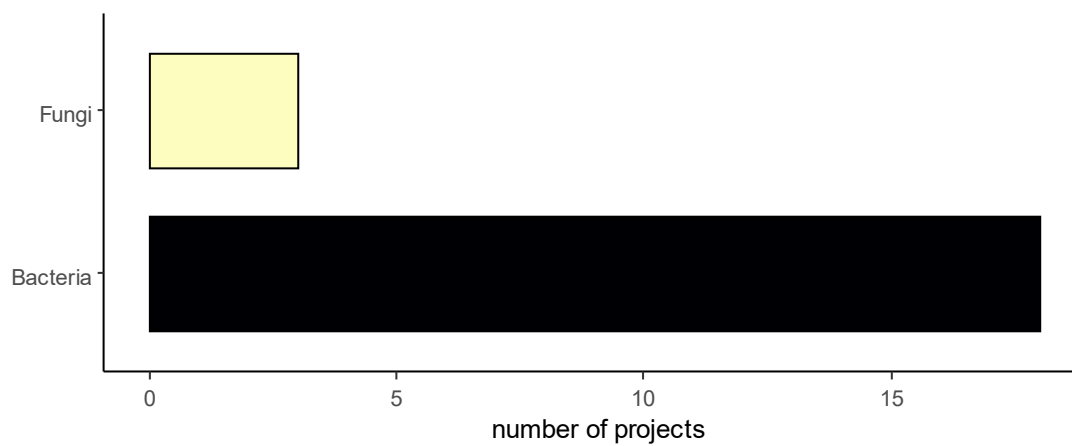
Funders	Total Budget (kEUR)			2020	2021
	2017	2018	2019		
General Secretariat for Research and Technology	150000	400000	250000	50000	NA
Hellenic Foundation for Research and Innovation	111000	66000	37000	NA	NA
John S. Latsis Public Benefit Foundation	NA	NA	NA	NA	NA
Ministry of Education	NA	NA	NA	NA	NA
Region of Central Greece.	NA	NA	NA	NA	NA
Region of Western Greece	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

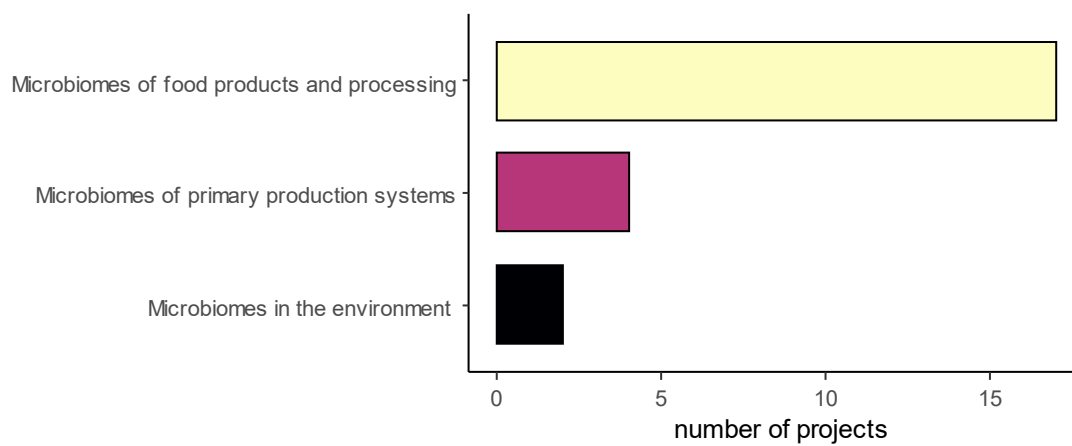
The budget was available for all projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
Agricultural University of Athens	https://www.aua.gr	Culture Collection
Biomedical Sciences Research Center "Alexander Fleming"	https://www.fleming.gr/	Bioinformatics
Centre for Research and Technology Hellas	https://www.certh.gr	Sequencing centre
Department of Biochemistry and Biotechnology, University of Thessaly	http://www.bio.uth.gr/index.php?lang=en	Culture Collection Sequencing
Hellenic Agricultural Organisation DIMITRA -Institute of Technology of Agricultural Products (ITAP)	https://itap.com.gr/en/home/	Culture Collection
National and Kapodistrian University of Athens, Section of Biochemistry and Molecular Biology	http://en.biol.uoa.gr/sections/section-of-biochemistry-molecular-biology.html	Microscopy

Network platforms

Name	Website
Greek Genome Center (Biomedical Research Foundation of the Academy of Athens)	http://genome.bioacademy.gr/
Greek Research and Technology Network (GRNET)	https://grnet.gr/en/
Hellenic Society for Computational Biology and Bioinformatics (HSCBB)	http://www.hscbb.gr/
MikroBioKosmos	http://www.mikrobiokosmos.org/
Hungarian Society for Microbiology	http://www.mmt.org.hu/index.php

Hungary

Country specific approach

In 2019, the CCP from Hungary contacted the National Research Development and Innovation Office (NKFIH) who filled in the section about funders and research programmes. The Hungarian researchers with publications about microbiome research were contacted to provide information about research projects they are involved in, but their response was limited. In addition, information was also obtained from the publications. The following websites were also consulted to obtain information: <https://kormany.hu/>; <https://nkfi.gov.hu/palyazoknak>; <http://kfib.hu/>; <https://mta.hu/>. In 2021, a similar approach was taken as in 2019, as universities were contacted, and the information was obtained from the above-mentioned websites.

Key strategies,

Name	Year	Website	Microbiomes addressed
Food Chain Safety Strategy 2013-2022	2014	https://portal.nebih.gov.hu/documents/10182/886114/Food+Chain+Safety+Strategy+2013-2022.pdf/aebbf0b3-fa3a-559e-06a4-2590c694ccc6	to great extent
National Landscape Strategy	2017	https://www.kormany.hu/download/f/8f/11000/Hungarian%20National%20Landscape%20Strategy_2017-2026_webre.pdf	no
National RDI Strategy	2021	https://nkfi.gov.hu/policy-and-strategy/national-strategies/national-rdi-strategy/2013-2020	no
National Reform Programme 2015 of Hungary	2015	http://kfib.hu/uploads/National_Reform_Programme_2015.PDF	no
National Smart Specialisation Strategy of Hungary	2021	http://www.nih.gov.hu/strategy/national-smart/national-smart-specialisation	to small extent
New National Forest Strategy	2016	https://www.kormany.hu/download/a/1a/d0000/Nemzeti_Erd%C5%91strat%C3%A9gia.pdf	no
Research Infrastructures in Hungary	2018	http://www.nih.gov.hu/strategy/research-infrastructures/research-infrastructures-in-hungary	to small extent

White papers

Name	Year	Website	Microbiomes addressed
New Hungary Rural Development Programme (NHRDP)	2015	https://umvp.kormany.hu/download/4/f6/31000/NHRDP_version_12_DG%20AGRI_Accepted_16_November_2015.pdf	no

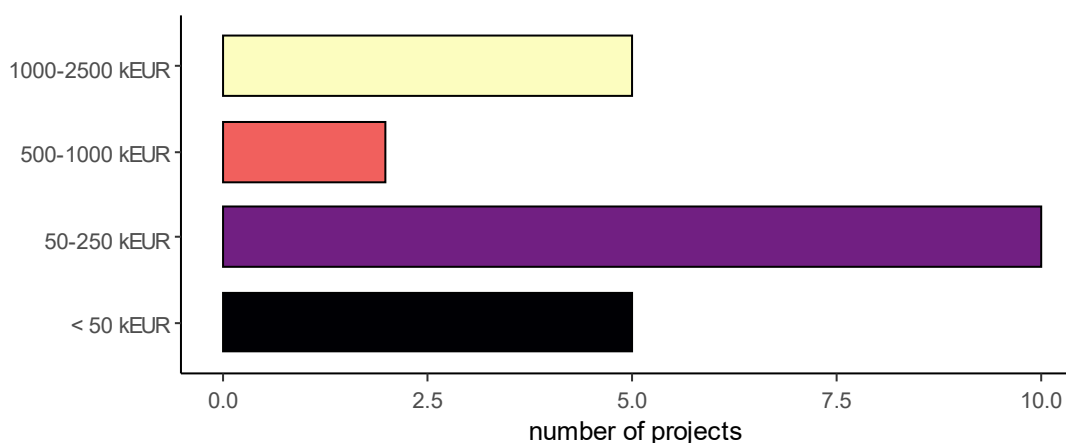
National Development 2030 - National Development and Territorial Development Concept	2014	https://regionalispolitika.kormany.hu/download/b/c9/e0000/OFTK_vegleges_EN.pdf	no
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Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

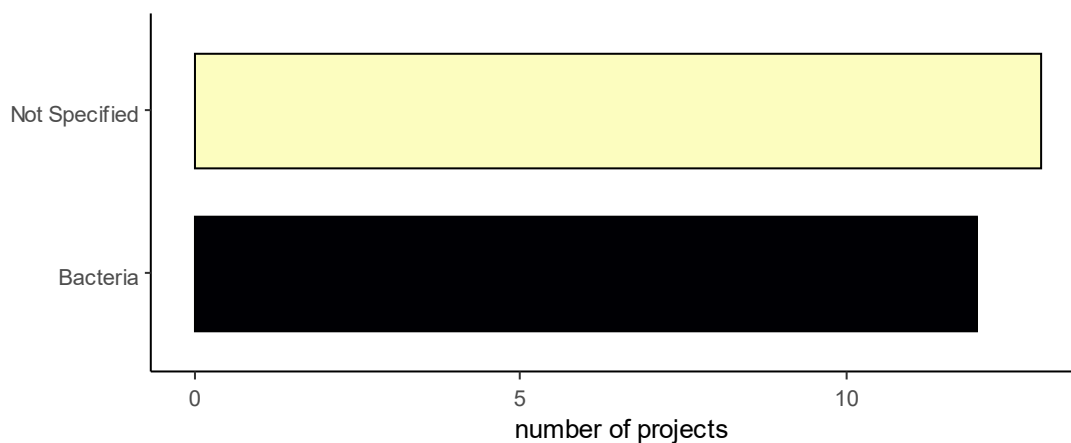
Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Hungarian Academy of Science	NA	NA	NA	NA	NA
Hungarian Ministry of Finance	NA	NA	NA	NA	NA
National Research, Development and Innovation Office	NA	NA	NA	NA	NA
The Government of the Republic of Hungary	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

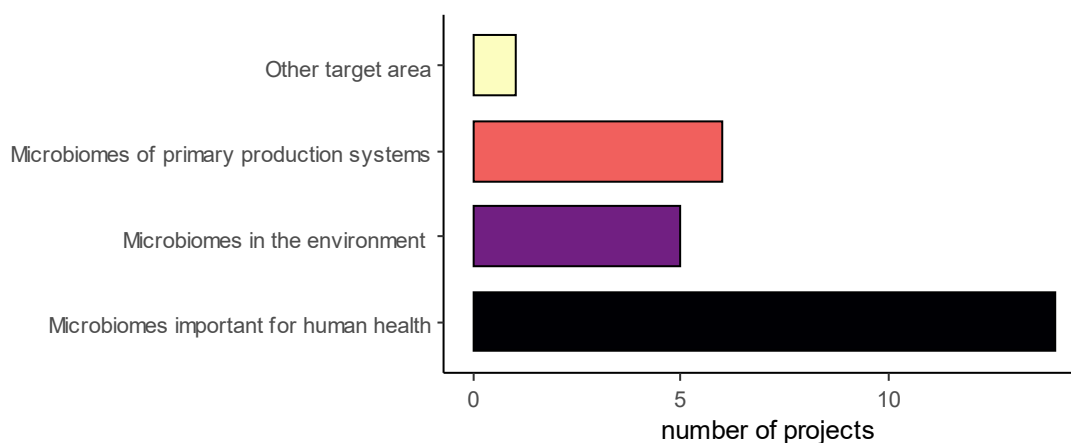
The budget was available for 88% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major Infrastructures

Infrastructure	Website	
Centre for Bioinformatics	https://univet.hu/en/about/units/centre-for-bioinformatics/	Computation
NGS Laboratory of University of Veterinary Medicine	https://univet.hu/en	Sequencing centre
Semmelweis University Microarray Core Facility	http://gsi.semmelweis.hu/index.php/en/research/microarray	Research Facility
University of Debrecen Clinicl Center	https://klinikaikozpont.unideb.hu/en/units-and-departments-medical-microbiology	Other

Network platforms

Infrastructure	Website
Hungarian Society for Microbiology	http://www.mmt.org.hu/index.php

India

Country specific approach

A similar approach was used in 2019 and 2021. The CCP from India contacted the Department of Biotechnology, Department of Science and Technology, Scheme for Promotion of Academic and Research Collaboration from the Ministry of Human Resource Development (MHRD-SPARC) and reports from other agencies. Several websites were also consulted.

Key strategy

Name	Year	Website	Microbiomes addressed
Science and technology policy 2013	2013	http://dst.gov.in/sites/default/files/STI%20Policy%202013-English.pdf	No

White papers

Name	Year	Website	Microbiomes addressed
Transformation of Indian agriculture: Growth, Inclusiveness and Sustainability	2018	http://www.indiaenvironmentportal.org.in/files/file/TRANSFORMATION%20OF%20INDIAN%20AGRICULTURE.pdf	No

Policies

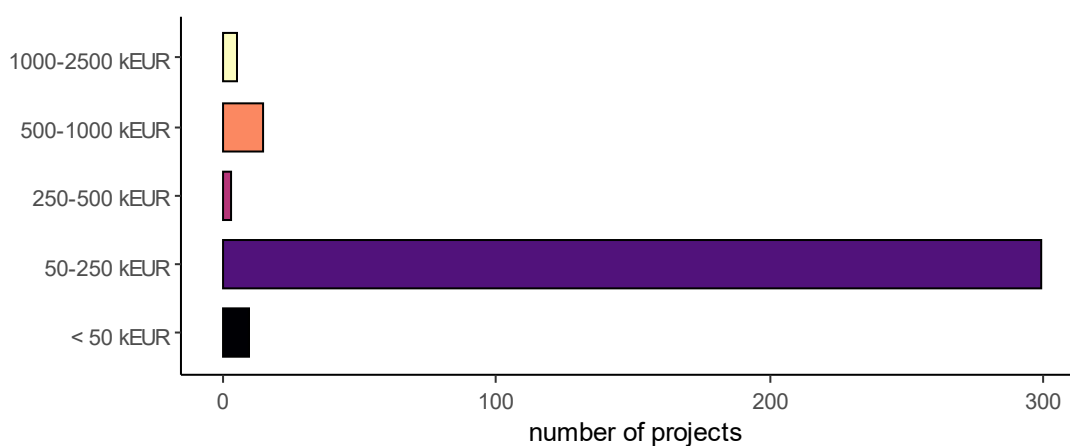
Name	Year	Website	Microbiomes addressed
Agriculture Policy: Vision 2020	2020	http://www.indiagri.in/admin/uploadpdf/991840Agrculture_Policy,_Vision_2020.pdf	no

Major national funding agencies that support microbiome research activities

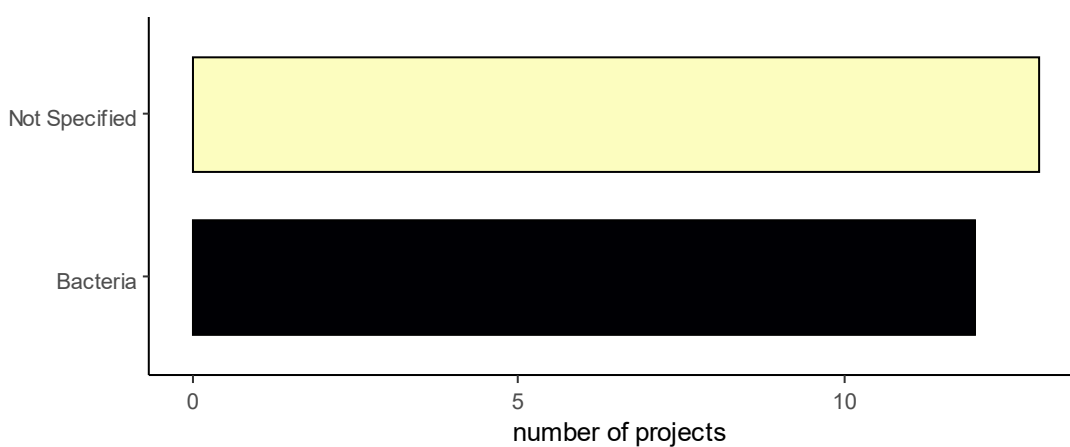
Fundes	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
"Central Government" funding*	1439943	1544883	1604312	NA	NA
Department of Science & Technology	NA	NA	NA	NA	NA
Ministry of Education (Government of India)	NA	NA	NA	NA	NA

* Funding by "Central Government" for various funding agencies

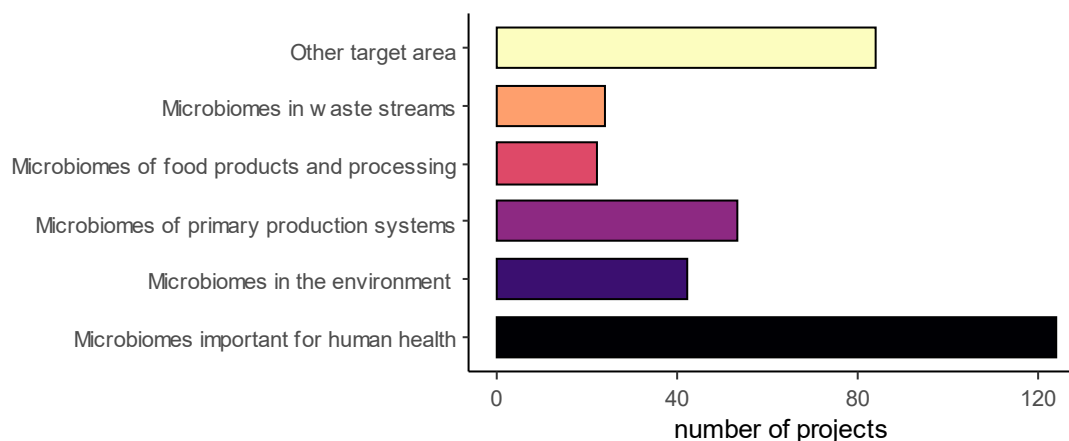
Budget of microbiome research projects supported by national funding organizations
The budget was available for 98% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
Bionest	https://birac.nic.in/bionest.php	Sequencing centre
Centre for Cellular and Molecular Platforms (C-CAMP)	www.ccamp.res.in	Sequencing centre
CSIR-Institute of Genomics and Integrative Biology	https://www.igib.res.in/	Sequencing centre
ICMR Institutes	https://www.icmr.gov.in/	Microbiome Research platform
Indian Soil Microbiome Project	www.indiamicrobiome.org.in	Microbiome Research platform
Institute of microbial technology -Databanks, computation facilities , Bioinformatics Centres under Department of Biotechnology	https://www.imtech.res.in	Biobank
National Centre for Cell Science	https://www.nccs.res.in/	Biobank
National Genomics Core	http://ngc.cdfd.org.in/	Sequencing centre
National Genomics Core	https://www.nibmg.ac.in/	Sequencing centre

Network platforms

Network	Website
Council of scientific and industrial research	https://csirhrdg.res.in
Department of Biotechnology	http://dbtindia.gov.in
Department of Science and technology	https://dst.gov.in/
Indian council of agricultural research	https://icar.org.in
Ministry of Earth science	https://moes.gov.in

Ireland

Country specific approach

In 2019, the CCP from Ireland contacted the Department of Agriculture, Food and the Marine (DAFM), Science Foundation Ireland (SFI), APC Microbiome Ireland (APC) and Teagasc for information. Furthermore, strategic documents were checked. In 2021, the CCP from Ireland again contacted the abovementioned organizations, as well as Enterprise Ireland (EI), the Health Research Board (HRB) and the SFI VistaMilk Research Centre. In addition, the Environmental Protection Agency (EPA) and the Irish Research Council (IRC) databases and websites were checked for projects. The projects were assigned to target areas and microbiome groups via search functions in Microsoft Excel.

Key strategies

Name	year	Website	Microbiome addressed
Food Harvest 2020, Department of Agriculture, Food and the Marine (DAFM)	2010	https://www.agriculture.gov.ie/publications/2011/annualreviewandoutlookforagriculturefisheriesandfood20102011/nationaldevelopments/foodharvest2020/	to small extent
Food Vision 2030 – A World Leader in Sustainable Food Systems, Department of Agriculture, Food and the Marine (DAFM)	2021	https://www.gov.ie/en/publication/c73a3-food-vision-2030-a-world-leader-in-sustainable-food-systems/	to moderate extent
Foodwise 2025, Department of Agriculture, Food and the Marine (DAFM)	2015	https://www.agriculture.gov.ie/foodwise2025/	to small extent
Research Priority Areas 2018 to 2023	2018	https://dbei.gov.ie/en/Publications/Publication-files/Research-Priority-Areas-2018-to-2023.pdf	to great extent
Teagasc Statement of Strategy 2017-2020	2017	https://www.teagasc.ie/media/website/publications/2017/Statement-of-Strategy-2017-2020.pdf	to moderate extent
Teagasc Statement of Strategy 2021-2024 (“Teagasc Together” Harnessing the power of research, advisory and education to create a sustainable food system)	2021	https://www.teagasc.ie/media/website/publications/2021/Teagasc-Statement-of-Strategy.pdf	to great extent

White papers

Name	Year	Website	Microbiome Addressed
APC Microbiome Ireland's White Paper: A vision for a European Microbiome Initiative (Sept 2016)	2016	not available	to great extent

Name	Year	Website	Microbiome Addressed
Teagasc Technology Foresight 2035	2016	https://www.teagasc.ie/media/website/publications/2016/Teagasc-Technology-Foresight-Report-2035.pdf	to great extent
Sustainable Healthy Agri-Food Research Plan (SHARP) through the National Research Prioritisation Strategy	2015	https://www.agriculture.gov.ie/media/migration/research/whatsnew/SustainableHealthyAgriFoodResearchPlan300315.pdf	to great extent
Innovation 2020, Department of Business, Enterprise and Innovation	2015	https://dbei.gov.ie/en/Publications/Publication-files/Innovation-2020.pdf	to small extent
Food Vision 2030 – A World Leader in Sustainable Food Systems, Department of Agriculture, Food and the Marine (DAFM)	2021	https://www.gov.ie/en/publication/c73a3-food-vision-2030-a-world-leader-in-sustainable-food-systems/	to moderate extent

Policies

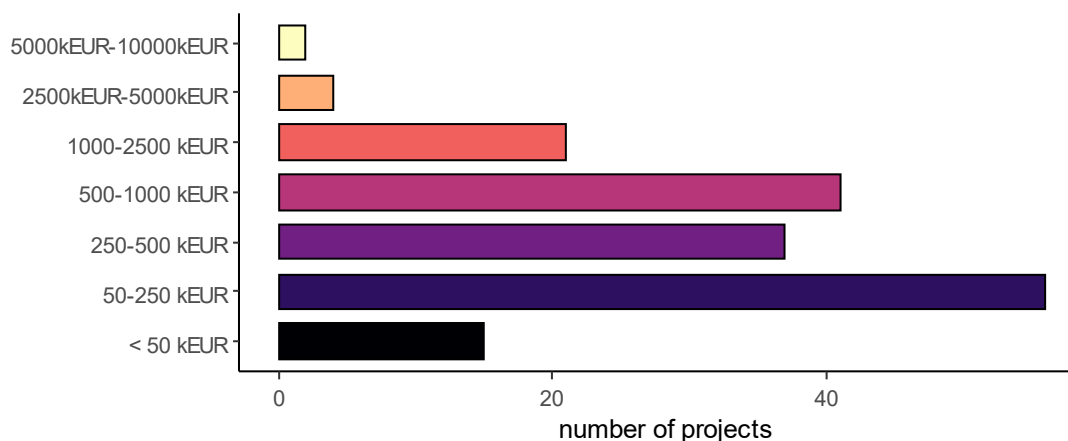
Name	Year	Website	Microbiome Addressed
Sustainable Healthy Agri-Food Research Plan (SHARP) through the National Research Prioritisation Strategy	2015	https://www.agriculture.gov.ie/media/migration/research/whatsnew/SustainableHealthyAgriFoodResearchPlan300315.pdf	to great extent
Innovation 2020, Department of Business, Enterprise and Innovation	2015	https://dbei.gov.ie/en/Publications/Publication-files/Innovation-2020.pdf	to small extent
Foodwise 2025	2015	https://www.agriculture.gov.ie/media/migration/foodindustrydevelopmenttrademarkets/agri-foodandtheeconomy/foodwise2025/report/FoodWise2025.pdf	to moderate extent
Research Priority Areas 2018 to 2023	2018	https://dbei.gov.ie/en/Publications/Publication-files/Research-Priority-Areas-2018-to-2023.pdf	to great extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

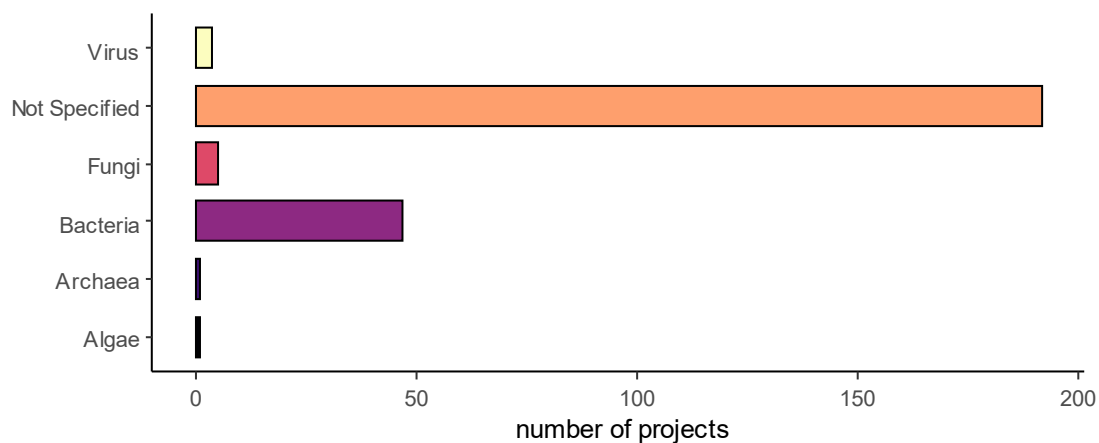
Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Department of Agriculture, Food and the Marine	NA	NA	NA	NA	NA
Enterprise Ireland	NA	NA	NA	NA	NA
Environmental Protection Agency	NA	NA	NA	NA	NA
ESTHER Ireland (part of ESTHER Alliance for Global Health Partnerships)	NA	NA	NA	NA	NA
Food Safety Authority of Ireland	NA	NA	NA	NA	NA
Health Research Board	NA	NA	NA	NA	NA
Higher Education Authority	NA	NA	NA	NA	NA
Irish Research Council	NA	NA	NA	NA	NA
Marine Institute	NA	NA	NA	NA	NA
Science Foundation Ireland	NA	NA	NA	NA	NA
Teagasc - the Agriculture and Food Development Authority	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

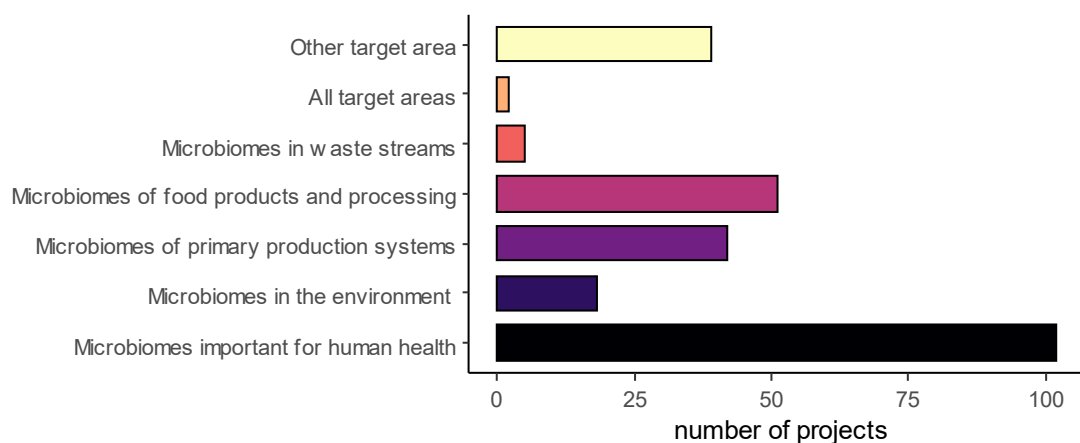
The budget was available for 71% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
APC Microbiome Ireland Culture Collection	https://apc.ucc.ie/	Culture Collection
APC Microbiome Ireland: Flow Cytometry Platform	http://apc.ucc.ie/research-2/apc-technology-platforms/flow-cytometry/	Research Facility
APC Microbiome Ireland: Germ-free mouse facility	http://apc.ucc.ie/research-2/apc-technology-platforms/germ-free-platform/	Research Facility
APC Microbiome Ireland: Metabolomics	http://apc.ucc.ie/research-2/apc-technology-platforms/q-tof/	Research Facility
Irish Centre for High End Computing (ICHEC)	www.ichec.ie	Computation
Moorepark Technology Ltd (MTL)	www.moorepark.ie	Research Facility
Teagasc Culture Collection	https://www.teagasc.ie/media/website/publications/2014/6312_and_6042_Technology_Update_Culture_Collections_Uploaded_Doc_Aug_20th_2014.pdf	Culture Collection
Teagasc Food Bio-test Facility	https://www.teagasc.ie/media/website/about/research-and-innovation/FoodBio-testCapabilities.pdf	Research Facility
Teagasc Sequencing Centre	www.teagasc.ie/food/research-and-innovation/research-areas/food-bioscience/dna-sequencing-facility	Sequencing centre
University College Dublin (UCD): Metabolomics	www.ucdnutrimarkers.com	Research Facility

Network platforms

Network	Website
APC Microbiome Ireland	http://apc.ucc.ie/
Teagasc	https://www.teagasc.ie/

Italy

Country specific approach

Italian CCP contacted the following organizations to obtain information: The Italian Society of Agro-Food and Environmental Microbiology (SIMTREA), National Research Council (CNR), Italian Society for General Microbiology and Microbial Biotechnology (SIMGBM), The Italian Phytopathological Society (SIPAV), the Italian Federation of Life Sciences (FISV), Italian Association of Agricultural Science Societies (AISSA). In addition, several websites were consulted. The concept paper “Italian microbiome initiative for improved human health and agri-food production” from the National Committee for Biosafety, Biotechnology and Life Sciences was also consulted for information. Italy does not have a national database of research funding. Therefore, the data about research projects was collected from individual institutes. A similar approach was taken in 2021.

Key strategies

Name	Year	Website	Microbiome addressed
Bioeconomy technology platform	2014	https://www.regione.piemonte.it/web/temi/fondi-progetti-europei/fondo-europeo-sviluppo-regionale-fesr/ricerca-sviluppo-tecnologico-innovazione/piattaforma-tecnologica-bioeconomia	to moderate extent
Cariplo Foundation scientific research programme	2014	http://www.fondazionecariplo.it/it/progetti/ricerca/index.html	to small extent
Enterprises and competitiveness	2014	https://www.mise.gov.it/index.php/it/incentivi/impresa/bando-grandi-progetti-r-s-pon-i-c-2014-20	no
Fund for sustainable growth	2012	https://www.mise.gov.it/index.php/it/incentivi/impresa/fondo-per-la-crescita-sostenibile	no
Health Research: Targeted research and Young researchers	2019	http://www.salute.gov.it/portale/temi/p2_5.jsp?area=Ricerca%20sanitaria&menu=finalizzata	to moderate extent
Italian microbiome initiative for improved human health and agri-food production	2019	http://cnbbsv.palazzochigi.it/media/1712/microbioma-2019.pdf	to great extent
National Agrifood Cluster (CLAN) Strategic Development Plan	2012	https://www.clusteragrifood.it/it/documenti/piano-di-sviluppo-strategico.html	to small extent
National Business Plan 4.0	2019	https://www.mise.gov.it/images/stories/documenti/investimenti_impresa_40_ita.pdf	to small extent
National Rural Network	2014	https://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/17032	to small extent

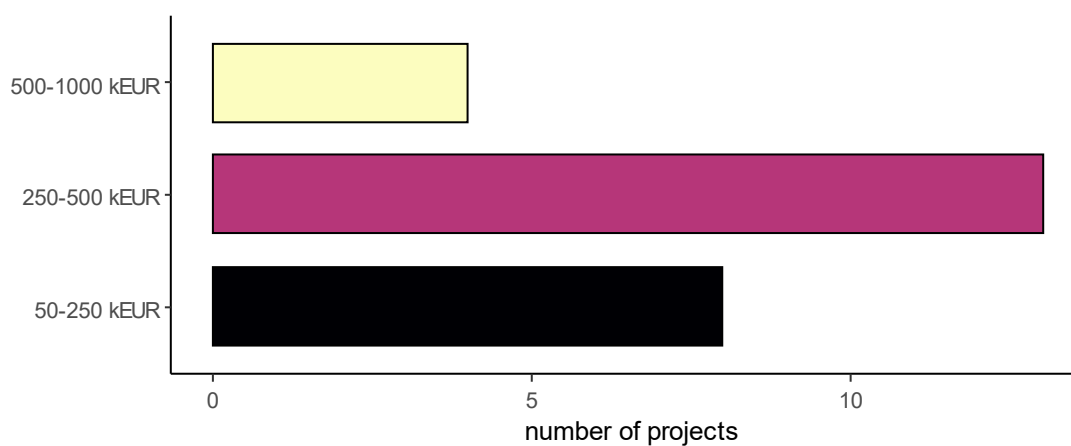
Name	Year	Website	Microbiome addressed
Strategic Agenda PRIMA	2017	https://first.aster.it/_aster_/viewNews?ID=40051	to moderate extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

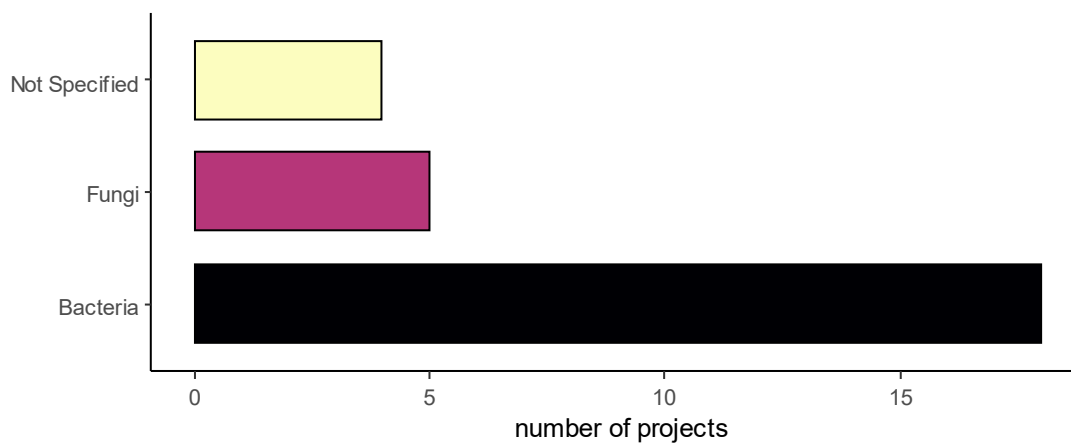
Funders	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Accademia Nazionale di Medicina	NA	NA	80	NA	NA
Agency for Agro-food Sector Services of the Marche Region	NA	NA	7	NA	NA
Comitato Interministeriale per la Programmazione Economica	NA	NA	NA	NA	NA
Fondazione Cariplo	NA	NA	NA	NA	NA
Fondazione CRC	NA	NA	NA	NA	NA
Fondazione CRT	NA	NA	NA	NA	NA
Italian Ministry of Agricultural, Food and Forestry Policies	NA	NA	NA	NA	NA
Italian Ministry of Economic Development	NA	NA	NA	NA	NA
Italian Ministry of Education, Universities and Research	NA	NA	228	228	NA
Italian Ministry of Foreign Affairs and International Cooperation	NA	35	35	NA	NA
Italian Ministry of Health	207	106	86	NA	NA
Piattaforma tecnologica Bioeconomia	50	50	50	NA	NA
Regione Marche	NA	NA	NA	NA	NA
Regione Piemonte	NA	NA	NA	NA	NA
Sardegna Ricerche	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

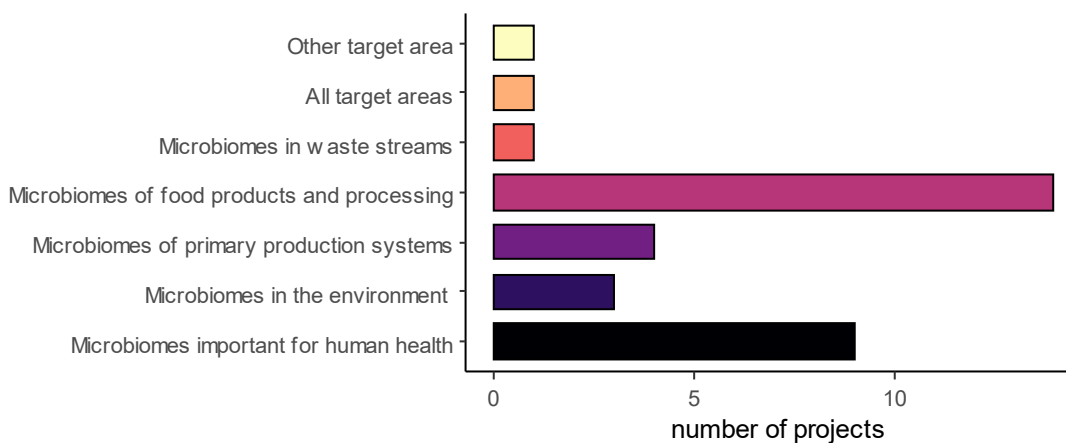
The budget was available for 93% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
Bio fab research	https://www.biofabresearch.it/	Biobank/DIAGNOSTIC CENTER
Biorep	https://www.biorep.it/en/	Culture Collection/Biobank
BMR genomics	https://www.bmr-genomics.it/	Sequencing centre
CBM Smart Health Cluster	https://www.cbm.fvg.it/	Other
Center for advanced studies, research and development in Sardinia (CRS4)	https://www.crs4.it/	Computation
Genomap	http://www.genomap.it/	Sequencing centre
Genomix4life	https://genomix4life.com/en/	Sequencing centre
Genomnia srl	http://www.genomnia.it/home_en.html	Bioinformatics
IGA Technology Services	https://igatechnology.com/	Long-term field experiment
Microbion	http://microbion.it/	Biobank
Microgenomics	https://www.microgenomics.it/?lang=en	Sequencing centre

Network platforms

Network	Website
Task Force on Microbiome Studies of the University of Naples Federico II	www.tfm.unina.it
Agris Sardegna, Settore Microbiologia	www.sardegnaagricoltura.it/innovazione/ricerca/agris/

The Netherlands

Country specific approach

The CCP contacted the Dutch Research Council (NWO), Topsectors and Wageningen University & Research (WUR) to obtain information. In addition, research projects were obtained from the databases of Narcis and Kennisonline. The websites of the different policies and R&I strategies as well as the Association of Universities in the Netherlands (VSNU) were consulted for information. In 2021, similar websites and agencies were contacted. In addition, the new project database of the Dutch Research Council (NWO) was searched for relevant projects. The projects were assigned to the target area and microbiome group by reading titles and abstracts.

Key strategies

Name	Year	Website	Microbiomes addressed
Dutch National Science Agenda	2021	https://wetenschapsagenda.nl/	to small extent
Innovation with a mission	2019	https://www.klimaatakkoord.nl/documenten/publicaties/2019/03/12/innoveren-met-een-missie	to small extent
Knowledge and Innovation Agenda 2018-2022 Topsector Agri Food	2018	https://topsectoragrifood.nl/wp-content/uploads/2018/04/Kennis-en-innovatieagenda-EN.pdf	to small extent
Knowledge and innovation agenda for agriculture, water and food 2020-2023	2019	http://kia-landbouwwatervoedsel.nl/	to small extent
Research Agenda Biobased Economy 2015 - 2027	2015	https://edepot.wur.nl/338385	no

White papers

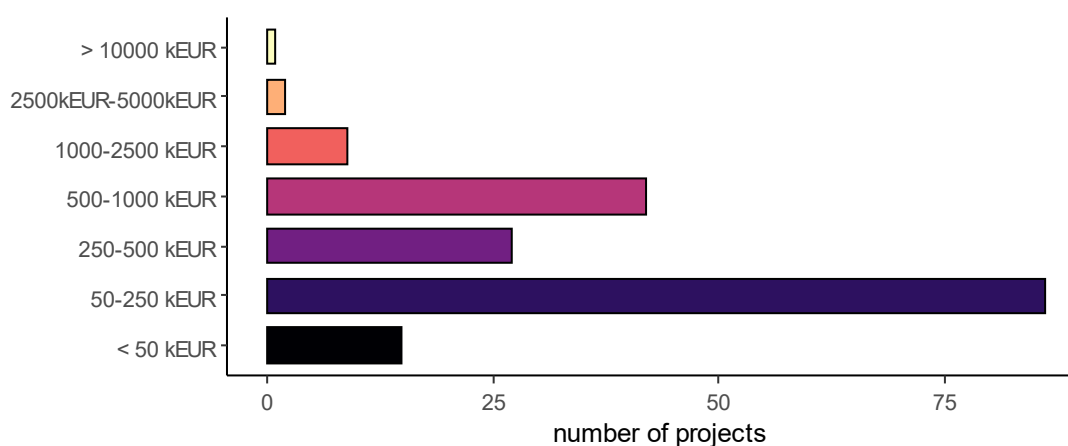
Name	Year	Website	Microbiomes addressed
Netherlands Circular in 2050	2019	https://www.rijksoverheid.nl/onderwerpen/circulaire-economie/nederland-circulair-in-2050	to small extent
Transition agenda biomass and food	2018	https://www.rijksoverheid.nl/documenten/rapporten/2018/01/15/bijlage-5-transitieagenda-biomassa-en-voedsel	to small extent
Dutch action agenda for biodiversity	2021	https://www.iucn.nl/app/uploads/2021/09/Rapport-De-Nederlandse-Actie-agenda-voor-biodiversiteit.pdf	no
Charter 'Netherlands Nature Inclusive'	2021	https://agendanatuurinclusief.nl/wp-content/uploads/handvest-agenda-natuurinclusief.pdf	no

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

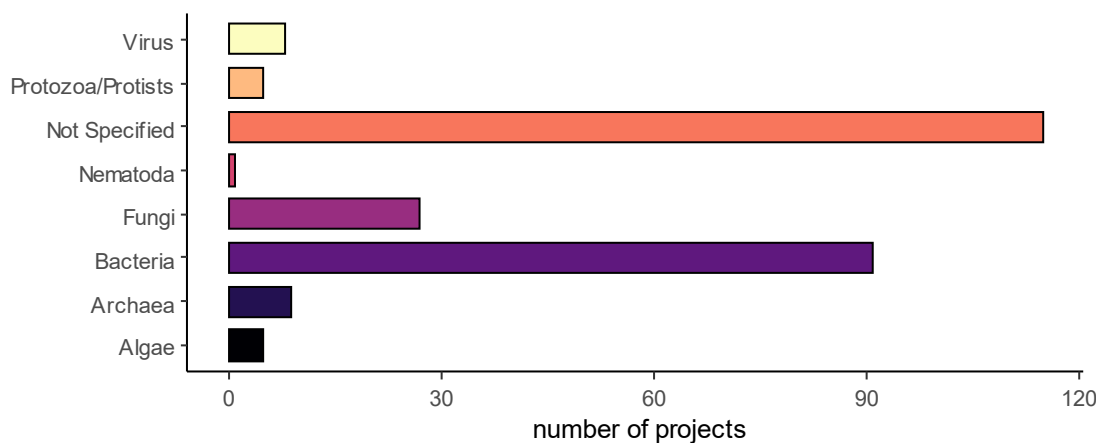
Funders	Total Budget (kEUR)			2020	2021
	2017	2018	2019		
Netherlands Organization for Scientific Research	873000	998000	964000	1053000	1263000
Dutch Diabetes Research Foundation	€ 3,167	€ 3,677	3525	3019	NA
Ministry of Agriculture, Nature and Food Quality	NA	NA	NA	NA	NA
Topsectoren (public funding part)	1021000	1002000	1011000	4897934	4865232
Alzheimer Nederland	€ 4,970	€ 4,300	5722	5755	585

Budget of microbiome research projects supported by national funding organizations

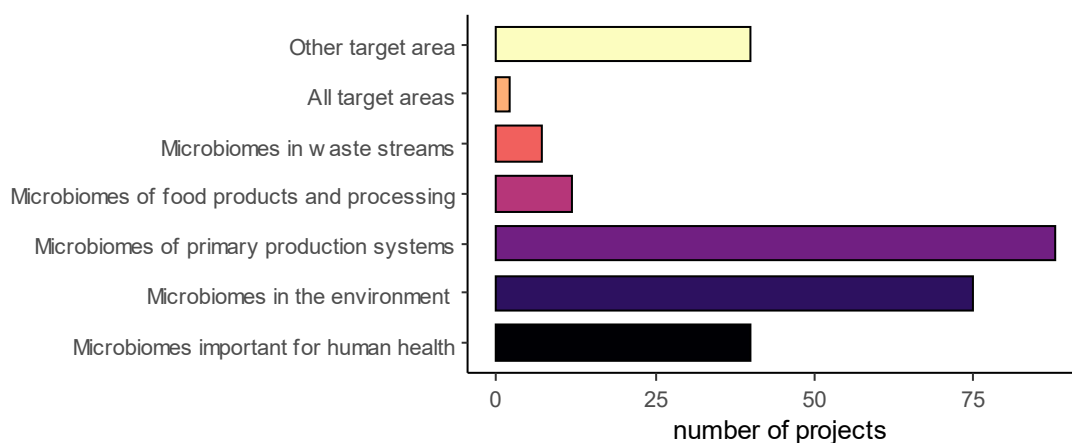
The budget was available for 78% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	website	Infrastructure type
Center for Microbiome Analyses and Therapeutics	https://www.lumc.nl/org/mm/research/bacteriology/CMAT/	Microbiome Research platform
Dutch Techcenter for Life Sciences	www.dtls.nl	Research Infrastructure
Euregional microbiome center	https://www.microbiomecenter.eu/	Microbiome Research platform
Fungal collection	http://www.wi.knaw.nl/Collections/contact.aspx	Culture Collection
Microbiome Center Utrecht	https://www.umcutrecht.nl/en/microbiome-center-utrecht	Microbiome Research platform

Name	website	Infrastructure type
Microbiota center Amsterdam	http://microbiotacenter.nl/	Microbiome Research platform
Microscopes in the Netherlands	https://microscopie.nl/	Microscopy
m-unlock	http://m-unlock.nl/contact	Microbiome Research platform/ research Infrastructure
National Health Research Infrastructure	https://www.health-ri.nl/	Research Infrastructure
Netherlands Plant-Ecophenotyping Centre	https://www.npec.nl/	Microbiome Research platform; research facility
Research Facilities in the Netherlands	https://onderzoeksfaciliteiten.nl/	Database with research facilities
SurfSara	https://userinfo.surfsara.nl/	Computation

Network platforms

Name	Website
Centre for wetland ecology	https://www.wetland-ecology.nl/en
Dutch Biotechnology Association	https://nbv.kncv.nl/en/
Dutch Society for medical microbiology (NVMM)	https://www.nvmm.nl/
Dutch Techcenter for Life Sciences	www.dtls.nl
Graduate School Experimental Plant Sciences	https://www.graduateschool-eps.info/
Graduate school of production ecology and nature conservation	https://www.pe-rc.nl/
Micropia	https://www.micropia.nl/en/
Netherlands Center for One Health	https://ncoh.nl/
Research School of the Socio-Economic and Natural Sciences of the Environment	http://www.sense.nl/
Royal Dutch Society for Microbiology (KNVM)	https://www.knvm.org/home
The Netherlands Ecological Research Network	https://www.nern.nl/
VLAG graduate school	https://www.vlaggraduateschool.nl/en.htm
Working group soil microbiology and pathogen	https://knpv.org/nl/menu/Over-de-KNPV/Werkgroepen/Werkgroep-Bodempathogenen

New Zealand

Country specific approach

In 2019, the CCP from New Zealand contacted the Deans of all the major universities, Science General Managers for the Crown Research Institutes, chief scientists of major companies, and leaders in National Science Challenges and Centres of Research Excellence. The New Zealand government (Ministry for Primary Industries) was also contacted to obtain information on policies. However, the level of response was very limited. In 2021, the CCP from New Zealand contacted several institutes and colleagues to obtain information regarding research projects.

Key strategies, white papers and policies

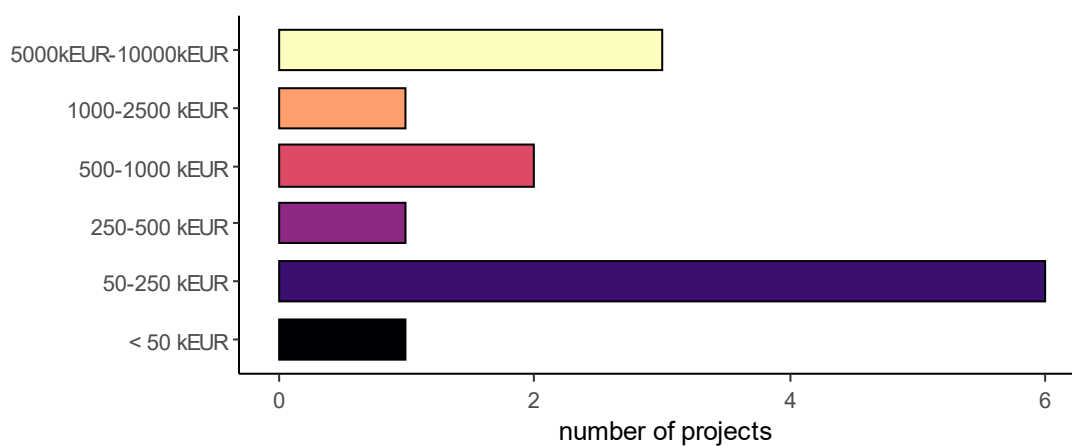
Not available, as the response to obtain this information from institutions was very low.

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

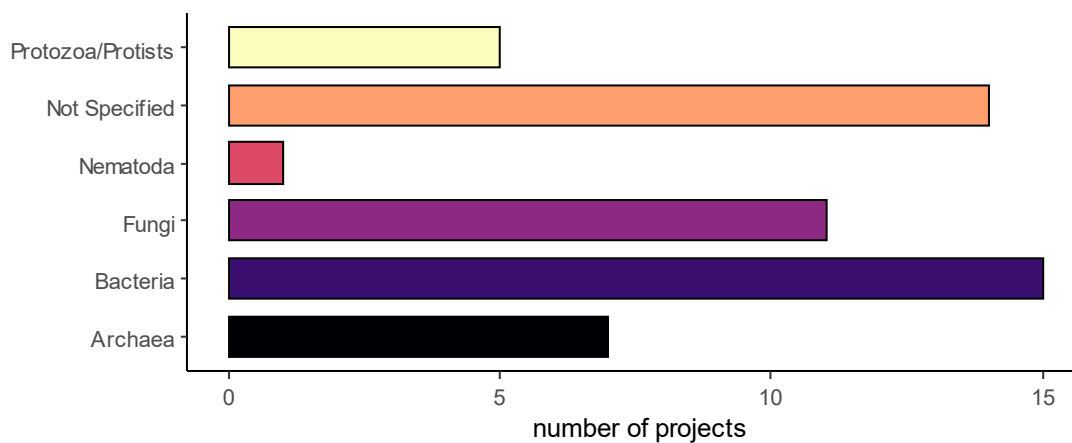
Fundors	Total Budget (kEUR)			2020	2021
	2017	2018	2019		
Auckland Regional Council	NA	NA	NA	NA	NA
Biological Heritage National Science Challenge	NA	NA	NA	NA	NA
Department of Conservation	NA	NA	NA	NA	NA
Forest Growers Levy Trust	NA	NA	NA	NA	NA
Genomics Aotearoa	NA	NA	NA	NA	NA
Health Research Council of New Zealand	NA	NA	NA	NA	NA
High-Value Nutrition National Science Challenge	NA	NA	NA	NA	NA
New Zealand Ministry of Business Innovation and Employment	NA	NA	NA	NA	NA
Philanthropy New Zealand	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

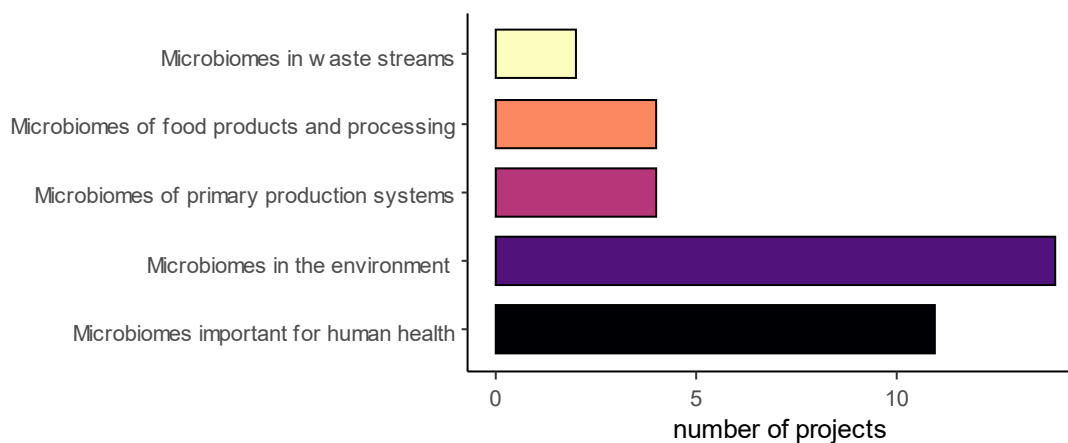
The budget was available for 52% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
Auckland Genomics	http://www.science.auckland.ac.nz/en/for/business-employers-and-community-2/analytical-services/genomics-core.html	Microbiome Research platform
Callaghan Innovation Fermentation facility	https://www.rd.callaghaninnovation.govt.nz/biotechnologies/bioprocessing-and-fermentation	Microbiome Research platform
FoodBowl	https://foodinnovationnetwork.co.nz/locations/foodbowl	Microbiome Research platform
Genomics Aotearoa	https://www.genomics-aotearoa.org.nz/	Bioinformatics
Massey University - NGS sequencing	https://www.massey.ac.nz/massey/learning/departments/centres-research/genome/next-generation-sequencing-services/next-generation-sequencing-services_home.cfm	Sequencing centre
Otago Genomics Facility	https://www.otago.ac.nz/genomics/index.html	Sequencing centre

Network platforms

Network	Website
New Zealand Food Innovation Network (NZFIN)	https://foodinnovationnetwork.co.nz/

Poland

Country specific approach

For Poland, the following institutes were contacted: the National Science Centre (NCN), The National Centre for Research and Development (NCBR), and Foundation for Polish Science (FNP). In addition, information was collected from the Ministry of Entrepreneurship and Technology and the Ministry of Investment and Development. The POL-on database, OPIBIP Nauka Polska database, and the NCN projects database were also consulted. In 2021, the approach was similar to 2019. The conversion from PLN to EUR was 4.6 PLN per EUR (based on the yearly average as mentioned by European Central Bank)

Key strategies

Name	year	Website	microbiomes addressed
National Smart Specialisation	2019	https://www.smart.gov.pl/en/ https://www.smart.gov.pl/images/pdf/Opis-KIS---ENG_FINAL-2019.pdf	to small extent
Strategy for Responsible Development for the period up to 2020 (including the perspective up to 2030) (SOR)	2017	https://www.gov.pl/documents/33377/436740/SOR_2017_streszczenie_en.pdf	No
Sustainable development strategy for rural areas, agriculture and fishing 2030	2019	https://www.gov.pl/documents/912055/913531/SZRWRiR_2030.pdf/4ec31a53-8722-1e91-bc45-5b39e5e3a60d in Polish, project from 20190529	No

Policies

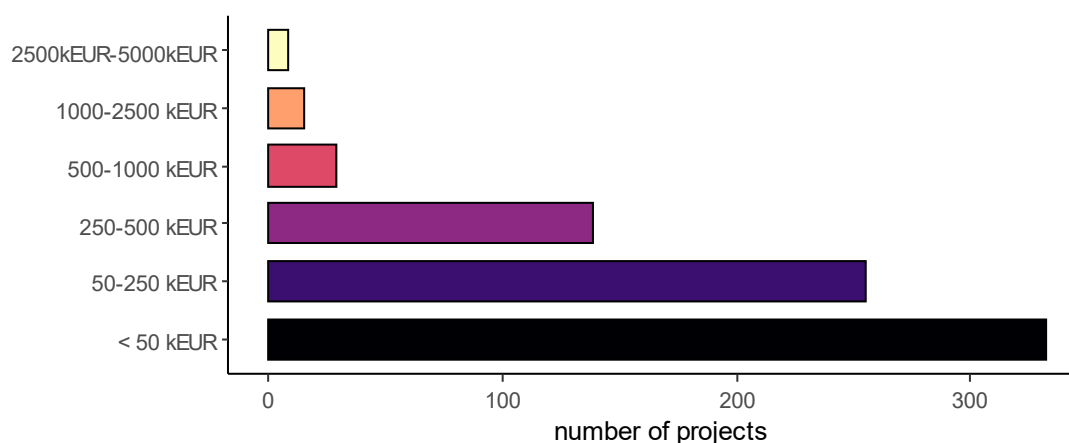
Name	Year	Website	Microbiomes addressed
Creating scientific basis for biological progress and protecting plant genetic resources as a source of innovation and support for sustainable agriculture and food security of the country	2015	https://www.gov.pl/attachment/77779573-bd5e-4d04-8c19-9826b921b687	no
Reconstruction and sustainable development of production and processing of natural fibrous raw materials for the needs of agriculture and the economy	2017	https://www.gov.pl/attachment/cd51b29-f8e4-4879-950b-21bc69a5c6be	no

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

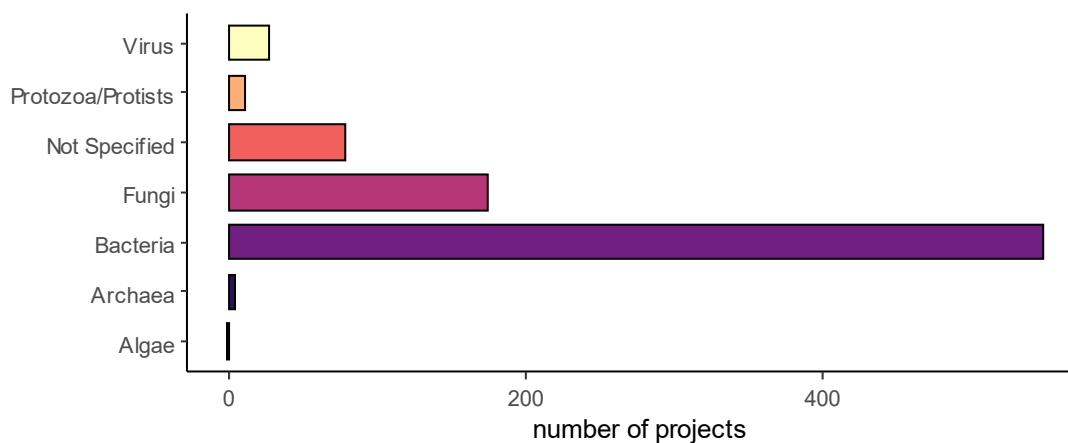
Funders	Total Budget (kEUR)			2020	2021
	2017	2018	2019		
Foundation for Polish Science	33865	20253	37826	56522	NA
National Fund for Environmental Protection and Water Management	NA	NA	NA	NA	NA
National Science Centre	273296	310556	302023	281155	296785
Polish Ministry of Investment and Economic Development	NA	NA	NA	NA	NA
The National Centre for Research and Development	710736	826602	301631	1194753	1599236

Budget of microbiome research projects supported by national funding organizations

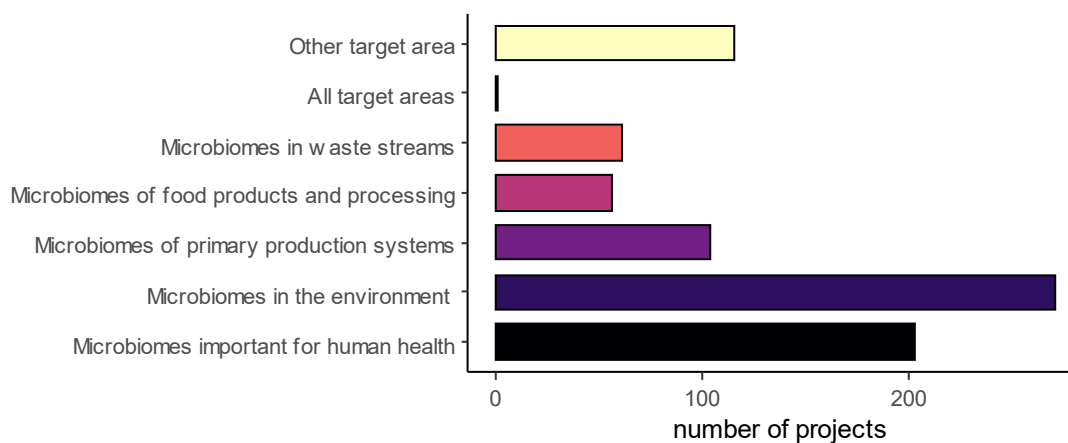
The budget was available for all projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
Ardigen S.A. Artificial Intelligence and Bioinformatics	https://ardigen.com/about/	Bioinformatics
Centre for Bioinformatics and data-analysis	https://www.umb.edu.pl/en/cbiad	Bioinformatics
Centre of New Technologies, University of Warsaw	https://cent.uw.edu.pl/en/laboratories/#Biology	Computation
Culture Collection of Industrial Microorganisms	https://kkp.ibprs.pl in polish	Culture Collection

Name	Website	Infrastructure Type
Forest Research Institute: Environmental Chemistry lab; Support for imaging analysis	https://www.ibles.pl/en/web/guest/home	Long-term field experiment
Gdansk University of Technology - Bridge of Data	https://pg.edu.pl/most/bridge-of-data/home-page	Data Storage
Genomed	http://www.genomed.pl/index.php/en/about-company	Sequencing centre
GenXOne	http://genxone.eu/en	Sequencing centre
Institute of Biochemistry and Biophysics PAS, Laboratory of DNA Sequencing and Oligonucleotide Synthesis	http://www.oligo.pl/English/	Sequencing centre
Institute of Bioorganic Chemistry PAS: Laboratory of genomics	https://www.ibch.poznan.pl/laboratory-of-molecular-and-systems-biology/laboratory-of-genomics/	Research Facility
Institute of Biotechnology and Antibiotics: laboratory facilities for microbiological analysis	http://www.iba.waw.pl/en/index.html	Microbiome Research platform
Institute of Botany PAS: molecular laboratory, algae lab, mycology laboratory.	https://botany.pl/index.php/pl/	Research Facility
Institute of Genetics and Animal Breeding PAS: sequencing laboratory	http://www.ighz.edu.pl/en/	Sequencing centre
Institute of Soil Science and Plant Cultivation: chemical laboratory; Agricultural research Stations	http://www.iung.pulawy.pl/	Long-term field experiment
Interdisciplinary Centre for Mathematical and Computational Modelling	https://icm.edu.pl/en/	Computation
International Institute of Molecular and Cell Biology: several core facilities including support for structural biology, bioinformatics, molecular and cell biology	https://www.iimcb.gov.pl/en/	Research Facility
Lukasiewicz - Polish Center for Technology Development	https://biobank.port.org.pl www.bbmri.pl	Biobank
MCB institute: Genomics centre, structural biology core facility and core facility for proteomics and mass spectrometry	https://mcb.uj.edu.pl/en_GB/start	Research Facility

Name	Website	Infrastructure Type
Molecular Biology Core Facility	http://pan.olsztyn.pl/research-dissemination/core-facilities/molecular-biology/	Research Facility
Nencki Institute of Experimental Biology PAS: several core facilities including bioinformatics and electron microscopy	http://en.nencki.edu.pl/core-facility-neurobiology-center	Sequencing centre
Polish Centre for Technology: DNA analysis laboratory	https://www.port.org.pl/en/laboratorium/dna-analysis-laboratory/	Research Facility
Polish Collection of Microorganisms	https://www.pcm.org.pl/pcm/about	Culture Collection
Poznan Science and Technology Park, Genomic Laboratory	https://ziwt.pl/offer/research-services/genomic-laboratory/	Research Facility
Poznan Supercomputing and Networking Center	http://www.man.poznan.pl/online/en/	Computation
The molecular genetics laboratory	http://lgm.izoo.krakow.pl/	Research Facility

Network platforms

Network	Website
Polish Society of Microbiologists	http://www.microbiology.pl
Society for Clinical Microbiology	http://tmk.org.pl/o-nas/

Slovakia

Country specific approach

In 2019 and 2021, the Slovak Centre of Scientific and Technical Information was contacted to provide information. The contact point has further searched for information on websites, in reports and databases.

Key strategies

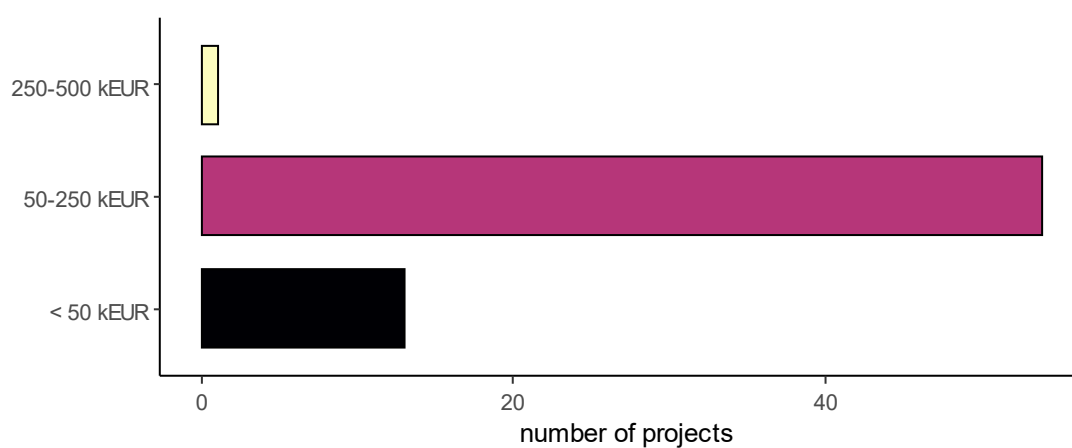
Name	Year	Website	Microbiome addressed
The Implementation Plan of the Research and Innovation Strategy for Smart Specialisation of the Slovak Republic (RIS3 IP)	2014	https://www.opvai.sk/media/98686/implementation-plan_eng_final_ec.pdf	to small extent
The Operational Programme Research and Innovation (2014-2020)	2014	https://www.minv.sk/?operational-programme-research-and-innovation-2014-2020	to small extent
Through knowledge towards prosperity - Research and Innovation Strategy for Smart Specialisation of the Slovak Republic (RIS3 SK)	2013	https://www.opvai.sk/media/57255/through-knowledge-towards-prosperity-research-and-innovation-strategy-for-smart-specialisation-of-the-slovak-republic.pdf	to small extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

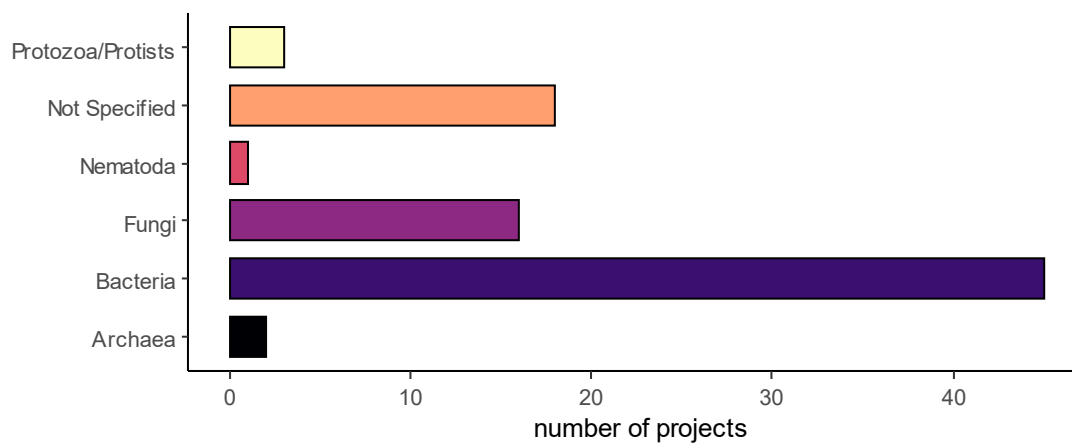
Funders	Total Budget (kEUR)				
	2017	2018	2019		
Ministry of Education, Science, Research and Sport of the Slovak Republic	NA	NA	24700	38500	35000
Ministry of Health of the Slovak Republic	NA	644	1694	1694	1050
Research Agency	88100	409500	409500	409500	409500
Scientific Grant Agency of the Ministry of Education, Science, Research and Sport of the Slovak Republic and the Slovak Academy of Sciences	15000	17500	19000	24000	24000
Slovak Research and Development Agency	29337	41369	41556	51000	50000

Budget of microbiome research projects supported by national funding organizations

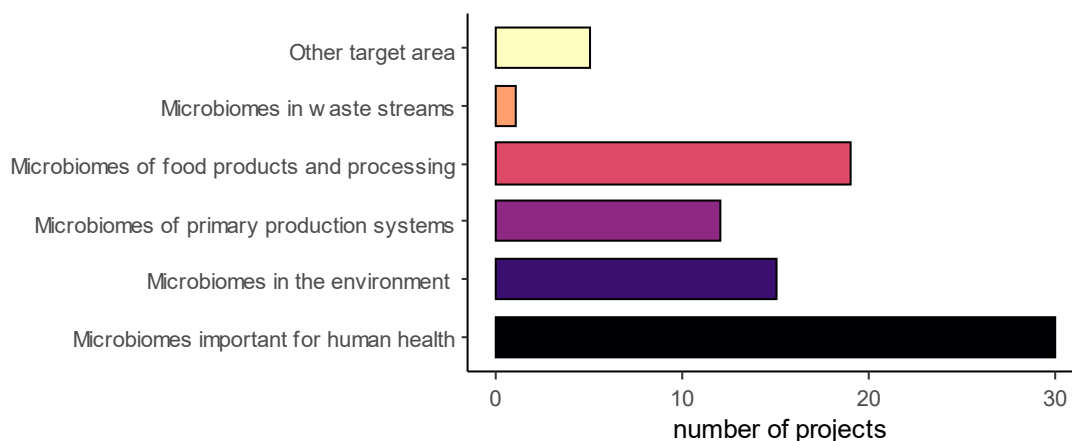
The budget was available for 99% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Name	Website	Infrastructure Type
Comenius University Science Park	https://cusp.uniba.sk	Sequencing centre; Bioinformatics, Microbiome Research platform
Department of Microbiology, Molecular Biology and Biotechnology, National agricultural and food centre	http://www.vup.sk/index.php?navID=7&department=6	Microbiome Research platform
Faculty of Natural Sciences, Comenius University in Bratislava, Department of Molecular Biology	https://fns.uniba.sk/	Sequencing centre, Microbiome Research platform
Institute of Molecular Biology, Slovak Academy of Science	http://www.imb.savba.sk/	Microbiome Research platform, Bioinformatics
Slovak Centre of Scientific and Technical Information	https://www.cvtisr.sk	Bioinformatics, Data Storage, Computation

Network platforms

Network	Website
Slovak Centre of Scientific and Technical Information	https://www.cvtisr.sk
Comenius University Science Park	https://cusp.uniba.sk

South Africa

Country specific approach

In 2019, information was obtained from the National Research Foundation (NRF) website and other websites. There is no central database with research project information. Therefore, the contact point further contacted colleagues from universities to obtain information about research projects, but their response was very limited. In 2021, colleagues from universities were contacted again to obtain information about research projects, which resulted in some additional projects. However, the response was again limited.

Key strategies

Name	Year	Website	Microbiome addressed
South African Bioeconomy Strategy	2013	https://www.gov.za/sites/default/files/gcis_document/201409/bioeconomy-strategya.pdf	to small extent

Policies

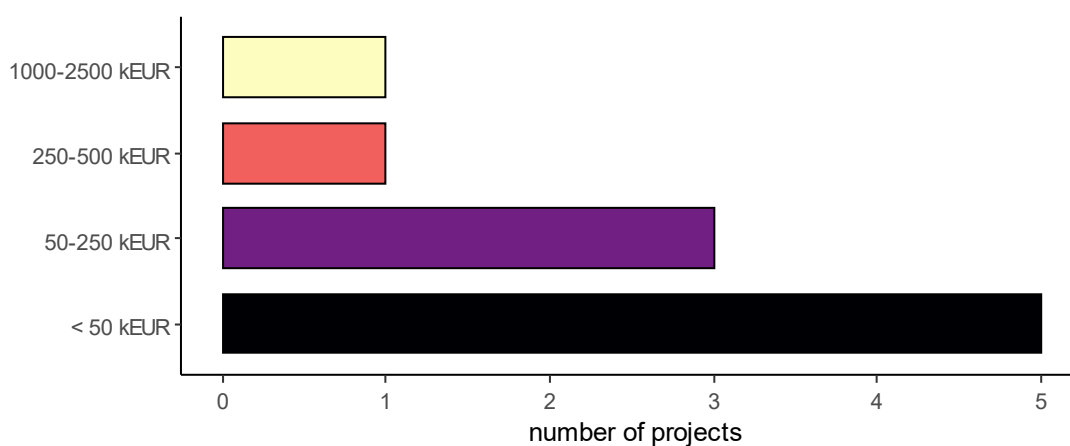
Name	Year	Website	Microbiome addressed
National Policy on Food and Nutritional Security	2013	https://www.nda.agric.za/docs/media/NATIONAL%20POLICYon%20food%20and%20nutrition%20security.pdf	to small extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

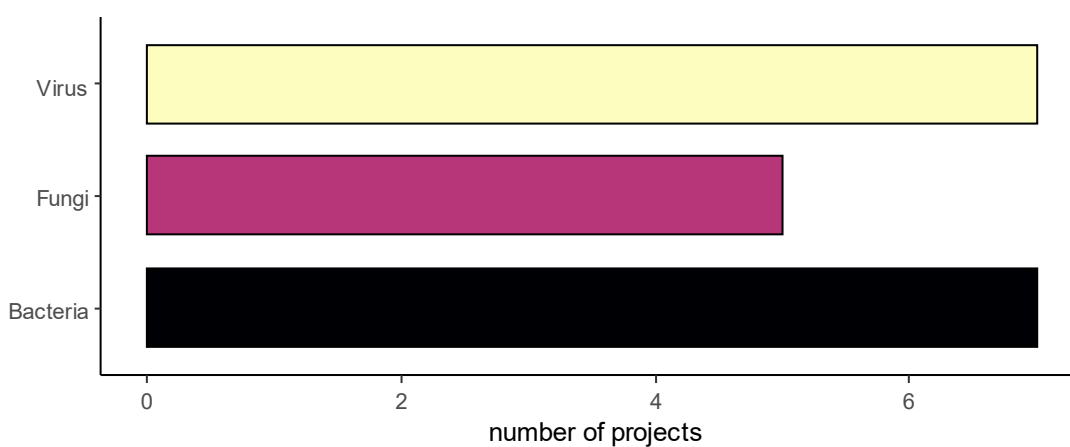
Funders	Total Budget (kEUR)				
	2017	2018	2019		
National Research Foundation	13000	15000	15000	15000	NA
Wine Industry Network for Expertise and Technology	2600	2500	2000	2000	NA
Water Research Commission	NA	NA	NA	NA	NA
Rand Water Foundation	NA	NA	NA	NA	NA
SABDI-TIA	NA	NA	NA	NA	NA
Technology Innovation Academy	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

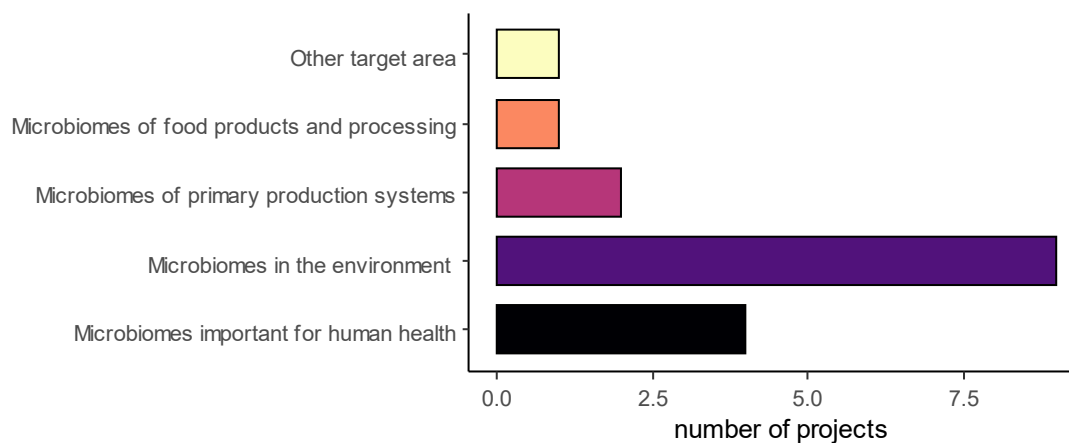
The budget was available for 92% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

name	website	infrastructure type
Central Analytical Facility at Stellenbosch University	www.sun.ac.za/english/faculty/science/CAF	Research Facility
Centre for Proteomic & Genomic Research	www.cpgr.org.za/	Sequencing centre Research Facility
Inqababiotec	https://www.inqababiotec.co.za/	Sequencing centre
KwaZulu-Natal research and innovation sequencing platform (KRISP)	http://www.krisp.org.za	Sequencing centre
The Africa Genomics Centre	https://tagccglobal.org/	Sequencing centre
University of Cape Town's Division of Information and Communication Technology Services (ICTS) High Performance Computing Facility	http://hpc.uct.ac.za	Computation

Network platforms

Not available

Spain

Country specific approach

The CCP contacted The Ministry of Science, Innovation and Universities to obtain information. In addition, the following websites were consulted: the website of the Ministry of Science, Innovation and Universities, the website of Carlos III Health Institute and the website of the Centre for the Development of Industrial Technology (CDTI). In 2021, a similar approach was taken as in 2019.

Key strategies

Name	Year	Website	Microbiome addressed
Digitalization Strategy of the Agroalimentary and Forestry Sector and the Rural Environment ("Estrategia de Digitalización del Sector Agroalimentario y Forestal y del Medio Rural")	2019	https://www.mapa.gob.es/images/es/estrategia_a_digitalizacion_sector_agroalimentario_forestal_medio_rural_ve_tcm30-509645.pdf	no
Spanish Strategy for Science and Technology and Innovation 2013-2020	2018	http://www.ciencia.gob.es/stfls/MICINN/Prensa/FICHEROS/2018/PlanEstatalIDI.pdf	to moderate extent

White papers

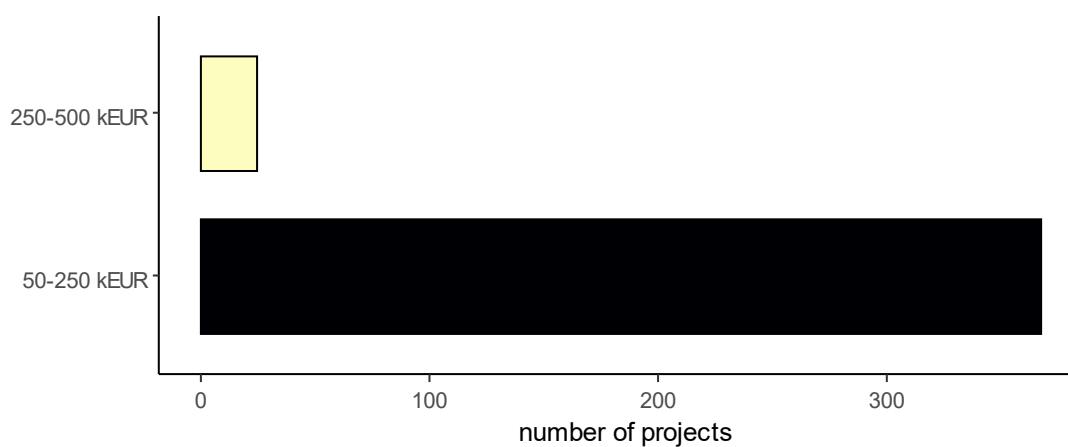
Name	Year	Website	Microbiome addressed
The Spanish National Plan of Control of the Food Chain 2016-2020 ("Plan Nacional de Control Oficial de la Cadena Alimentaria" (PNCOCA) 2016-2020")	2016	https://www.mapa.gob.es/es/ministerio/planes-estrategias/plan-nacional-de-control-de-la-cadena-alimentaria/pncoca_2016-2020_espana_v4-2019_tcm30-379397.pdf	no
National Plan for Associative Integration 2015-2020 ("Plan Estatal de Integración Asociativa 2015-2020")	2015	https://www.mapa.gob.es/es/alimentacion/temas/ley-de-fomento-de-la-integracion-cooperativa/planestatal2015-2020_tcm30-209732.pdf	no
Future strategic Plan of Spain for the post-2020 CAP	2018	https://www.mapa.gob.es/es/pac/post-2020/default.aspx	to small extent

Major national funding agencies that support microbiome research activities

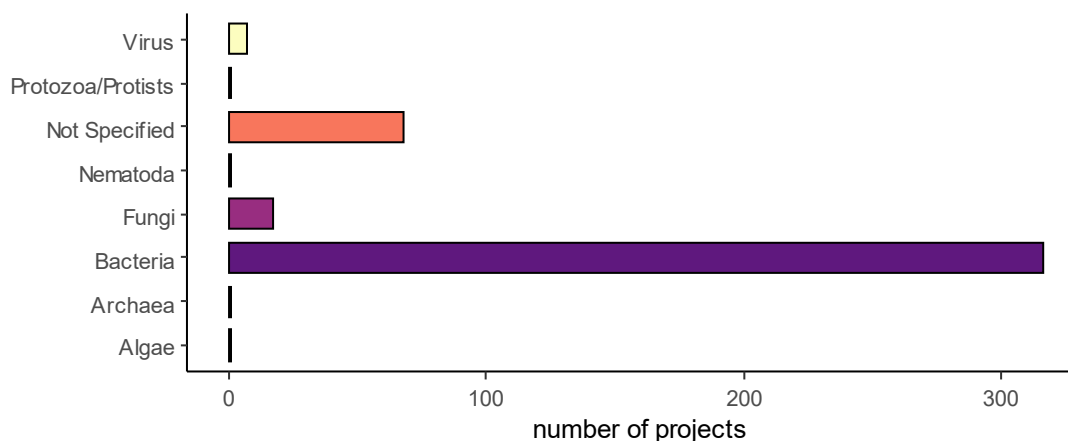
Funders	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Spanish State Research Agency ("Agencia Española de Investigación")	590000	609000	618000	640105	528730
Strategic Action in Health ("Acción Estratégica en Salud")	128000	115000	115000	271240	403200
Centre for the Development of Industrial Technology ("Centro para el Desarrollo Tecnológico Industrial")	1155000	1046000	1460000	105990	105490
Spanish Ministry of Economy and Business*	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

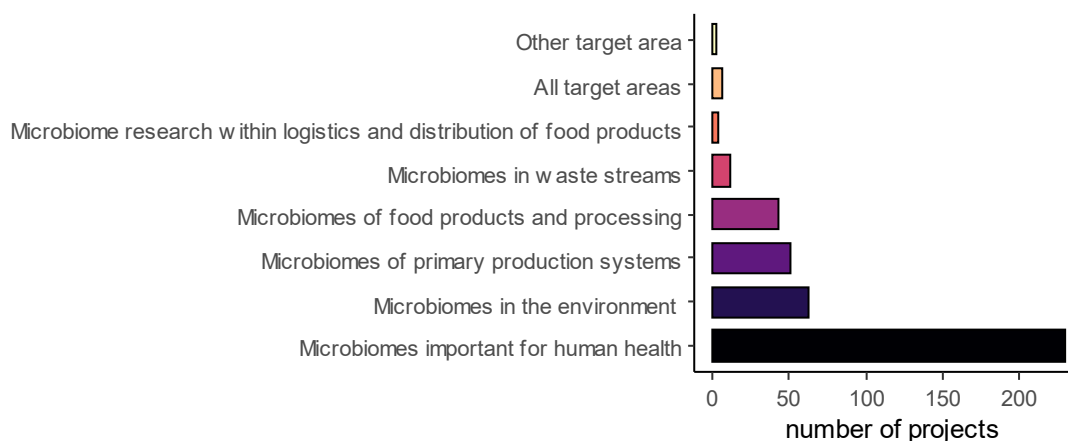
The budget was available for 96% of the projects that were collected.



Group of microorganisms studied within projects



Topics of Research Projects



Major infrastructures

Name	Website	Infrastructure Type
CSIC DNA Sequencing Service	https://www.csic.es/es/investigacion/catalogo-de-servicios-cientifico-tecnico/unidades-de-servicio/servicio-de-32	Bioinformatics
KIMITEC group	http://www.kimitec.es/proyectos/proyectos.html	Microbiome Research platform
Madrid Science Park	https://fpcm.es/	Bioinformatics
National Center for Genomic Analysis (CNAG)	https://www.cnag.crg.eu/	Bioinformatics
Spanish Type Culture Collection (CECT)	https://www.uv.es/uvweb/coleccion-espanola-cultivos-tipo/es/coleccion-espanola-cultivos-tipo-1285872233521.html	Culture Collection

Network platforms

Network	Website
MicroBioSpain/REDESMI	https://www.microbiospain.org/
RedBal	http://www.redbal.es/
ASAJA	http://www.asaja.com/
Spanish Society of Microbiota Probiotics and prebiotics (SEMiPyP)	https://semipyp.es/

United Kingdom

Country specific approach

The funding agency Biotechnology and Biological Sciences Research Council (BBSRC) was contacted to obtain information about research programmes and funders. In addition, several publicly available internet sources were checked. These included databases with projects funded by BBSRC, NERC, MRC and Innovate UK. It was not allowed to share the total budget of the funding agencies due to legislation within the United Kingdom, but project budget categories were shared. The project budgets were converted using a rate of 1.13 pounds per EUR to obtain the budget category.

Key strategies

Name	Year	Website	Microbiomes addressed
BBSRC Integrative microbiome research priority	NA	https://bbsrc.ukri.org/funding/grants/priorities/integrative-microbiome-research/	to great extent
KTN Special Interest Advisory Group on Microbiome	2019	https://ktn-uk.co.uk/interests/microbiomes	to great extent
Microbiome strategic roadmap	2021	https://ktn-uk.org/wp-content/uploads/2021/02/Microbiome_Strategic_Roadmap_FINAL.pdf	to great extent
MRC Microbiome and health science area	NA	https://mrc.ukri.org/funding/science-areas/population-systems-medicine/our-science-and-contacts-psmb/microbiome-and-health/	to great extent
NERC strategy	2019	https://nerc.ukri.org/about/whatwedo/strategy/	to small extent
UK Strategy for Agricultural Technologies	2013	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/227259/9643-BIS-UK_Agri_Tech_Strategy_Accessible.pdf	no

White papers

Name	Year	Website	Microbiomes addressed
Developing a national food strategy: independent review 2019 – terms of reference	2019	https://www.gov.uk/government/publications/developing-a-national-food-strategy-independent-review-2019/developing-a-national-food-strategy-independent-review-2019-terms-of-reference	no

Policies

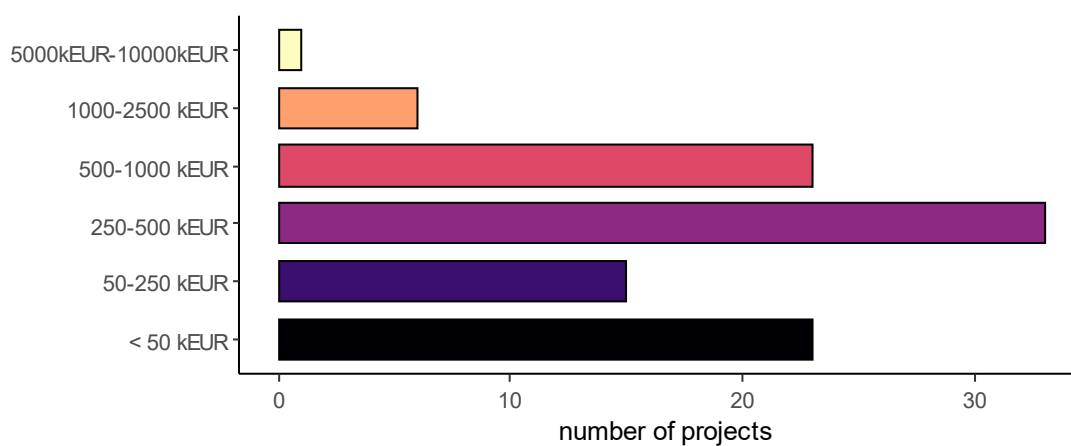
Name	Year	Website	Microbiomes addressed
Food and Farming	NA	https://www.gov.uk/environment/food-and-farming	no
Food standards	NA	https://www.food.gov.uk/topic/policy	no

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

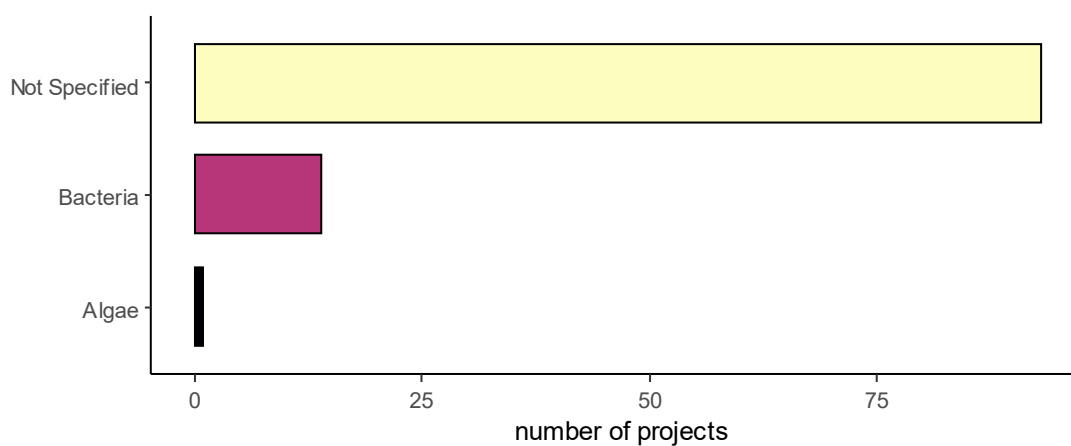
Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Biotechnology and Biological Sciences Research Council	NA	NA	NA	NA	NA
Cancer Research UK	NA	NA	NA	NA	NA
Department for Environment, Food & Rural Affairs	NA	NA	NA	NA	NA
Economic and Social Research Council	NA	NA	NA	NA	NA
Engineering and Physical Sciences Research Council	NA	NA	NA	NA	NA
Food Standards Agency	NA	NA	NA	NA	NA
Innovate UK	NA	NA	NA	NA	NA
Leverhulme Trust	NA	NA	NA	NA	NA
Medical Research Council	NA	NA	NA	NA	NA
Met Office	NA	NA	NA	NA	NA
Natural Environment Research Council	NA	NA	NA	NA	NA
Royal Society	NA	NA	NA	NA	NA
Science and Technology Facilities Council	NA	NA	NA	NA	NA
Scottish Environmental Protection Agency	NA	NA	NA	NA	NA
Scottish Government	NA	NA	NA	NA	NA
UK government	NA	NA	NA	NA	NA
UK Research and Innovation	NA	NA	NA	NA	NA
Versus Arthritis	NA	NA	NA	NA	NA
Welsh Government	NA	NA	NA	NA	NA

Budget of microbiome research projects supported by national funding organizations

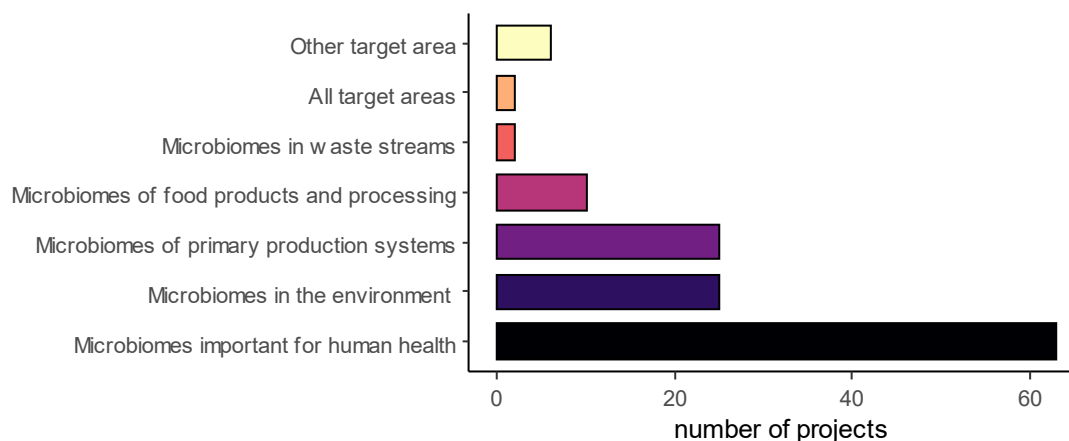
The budget was available for 94% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major Infrastructures

Name	Website	Infrastructure Type
Agricultural Engineering Precision Innovation Centre (Agri-EPI Centre)	https://www.agri-epicentre.com/	Research Facility
Agrimetrics	https://agrimetrics.co.uk/	Research Facility
Brahbam	https://www.babraham.com/	Bioinformatics, Sequencing centre Research Facility
British Antarctic Survey	https://www.bas.ac.uk/	Research Facility
CAB International	www.cabi.org	Research Infrastructure
Centre for Crop Health and Protection	https://chap-solutions.co.uk/	Research Facility
Centre for Innovation Excellence in Livestock (CIEL)	https://www.cielivestock.co.uk/	Research Facility
Centres for Ecology / Hydrology	https://www.ceh.ac.uk/	Research Facility
Earlham Institute National Capability in Genomics and Single Cell Analysis.	https://www.earlham.ac.uk/national-capability-genomics-and-single-cell-analysis	Microbiome Research platform
Edinburgh Genomics	http://genomics.ed.ac.uk/	Sequencing centre
FERA Science Ltd	https://www.fera.co.uk/	Research Facility

Name	Website	Infrastructure Type
Institute of Biological, Environmental and Rural Sciences	https://www.aber.ac.uk/en/ibers/	Bioinformatics, Sequencing centre Research Facility
James Hutton Institute	https://www.hutton.ac.uk/	Long-term field experiment, Experimental Farm Research Facility
John Innes Centre	https://www.jic.ac.uk/news/8194/	Research Facility
MicrobesNG University of Birmingham	https://microbesng.uk/	Sequencing centre
MRC Laboratory of Molecular Biology	https://mrc.ukri.org/about/institutes-units-centres/mrc-laboratory-of-molecular-biology/	Research Facility
MRC London Institute of Medical Sciences	https://mrc.ukri.org/about/institutes-units-centres/mrc-london-institute-of-medical-sciences/	Research Facility
Pirbright Institute	https://www.pirbright.ac.uk/	Research Facility
Quadram Institute	https://quadram.ac.uk/	Research Facility
Rothamsted Research	https://www.rothamsted.ac.uk/	Long-term field experiment, Research Facility
Sainsbury Laboratory	http://www.tsl.ac.uk/	Research Facility
The Francis Crick Institute (Biomedical)	https://mrc.ukri.org/about/institutes-units-centres/the-francis-crick-institute/	Research Facility
The Roslin Institute	https://www.ed.ac.uk/roslin	Bioinformatics, Sequencing centre Research Facility
UK National Capability - several centres that although they have capacity to support microbiome research	https://nerc.ukri.org/research/sites/	Research Facility
Wellcome Sanger Institute	https://www.sanger.ac.uk/	Research Facility

Network platforms

Network	Website
Society for Applied Microbiology (SFAM)	https://sfam.org.uk/about-us/our-work/priority-areas/microbiome.html
UK Plant Microbiome initiative	https://www.cabi.org/news-and-media/2017/cabi-and-rothamsted-research-launch-uk-plant-microbiome-initiative/

United States

Country specific approach

In 2019, the CCP from the United States contacted the following organizations: Department of Health and Human Services, Department of Energy, National Institutes of Health, Office of Science and Technology for the President, Department of Agriculture, National Academies of Science, and Food and Drug Administration. The contact point also checked the websites and databases with research projects from the above-mentioned organizations and obtained information from working group reports. The currencies were converted with the 3-yearly average conversion rate from Dollar to Euro of 1.14 Euro per Dollar. In 2021, a similar approach was taken as in 2019. For research projects, there were 3417 additional research projects obtained due to the use of a diverse range of keywords. These were assigned to the target area and microbiome group using search functions in Microsoft Excel.

Key strategies

Name	Year	Website	Microbiomes addressed
Earth Microbiome Project	2010	http://www.earthmicrobiome.org/	to great extent
Interagency Strategic Plan for Microbiome Research	2018	https://commonfund.nih.gov/sites/default/files/Interagency_Microbiome%20Strategic_Plan_Final_041918_508.pdf	to great extent
National Microbiome Data Collaborative	2019	https://microbiomedata.org/	to great extent
NIST Microbiome Program	2016	https://www.nist.gov/mml/bbd/primary-focus-areas/microbiome	to great extent
Office of Science and Technology Policy	2021	https://www.whitehouse.gov/ostp/	to moderate extent

White papers

Name	Year	Website	Microbiomes addressed
Science Breakthroughs to Advance Food and Agricultural Research by 2030	2019	https://www.nap.edu/catalog/25059/science-breakthroughs-to-advance-food-and-agricultural-research-by-2030	to moderate extent

Policies

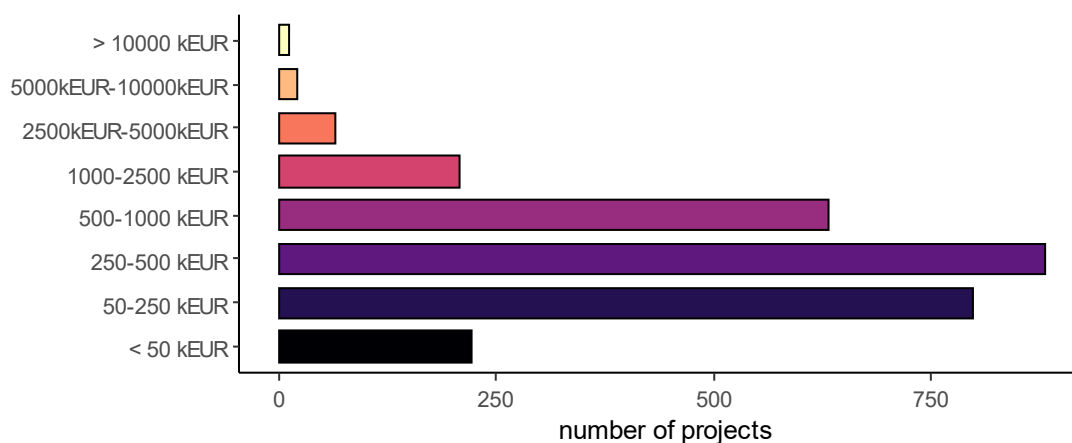
Name	Year	Website	Microbiomes addressed
The Agricultural Act of 2018	2018	https://www.ers.usda.gov/topics/farm-economy/farm-commodity-policy/	to moderate extent
NIFA Federal Assistance Policy Guide	updated in 2021	https://nifa.usda.gov/policy-guide	to moderate extent
FDA Agriculture and Food Policy	2007	https://www.fda.gov/media/72391/download	to small extent
State Dep. Office of Agricultural Policy	2018	https://www.state.gov/agricultural-policy/	to small extent
US DOA Farm and Commodity Policy	2021	https://www.ers.usda.gov/topics/farm-economy/farm-commodity-policy/	to small extent

Major national funding agencies that support microbiome research activities (NA indicates that budget information is not available)

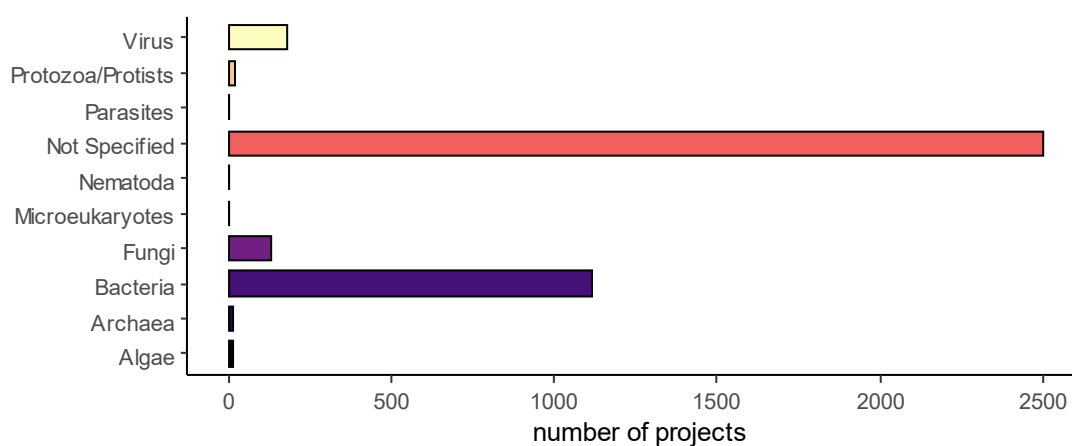
Fundors	Total Budget (kEUR)				
	2017	2018	2019	2020	2021
Alfred P. Sloan Foundation	NA	NA	NA	NA	NA
Department of Agriculture	17427675	20041826	20041826	16556291	16556291
Department of Energy	23527361	20913210	21784594	23527361	26141513
National Aeronautics and Space Agency	13070756	13942140	13942140	14813524	14813524
National Institutes of Health	25270129	27884280	28755664	30498432	28755664
National Science Foundation	5228303	5838271	6099686	6273963	5751133
Alfred P. Sloan Foundation	17427675	20041826	20041826	16556291	16556291

Budget of microbiome research projects supported by national funding organizations

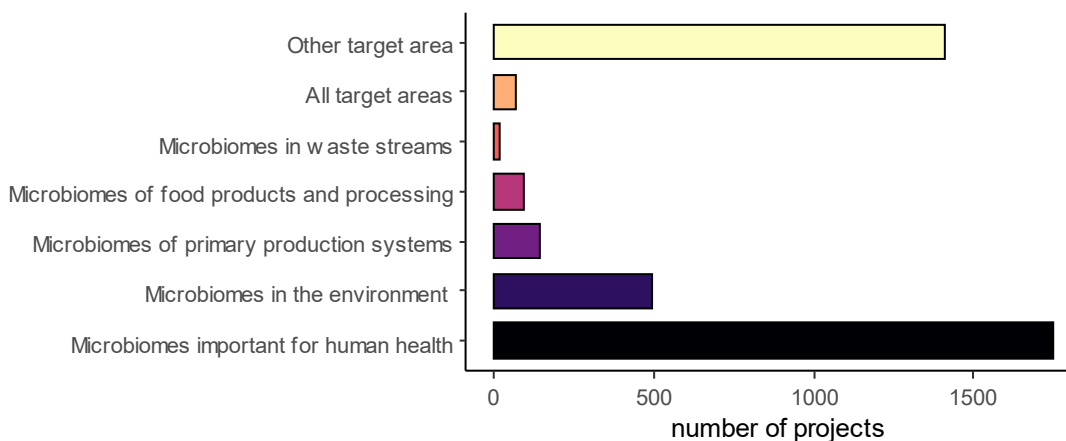
The budget was available for 73% of the projects that were collected.



Group of microorganisms studied within projects



Topics of research projects



Major infrastructures

Infrastructure	Website	Infrastructure Type
EMSL User facility	https://www.emsl.pnnl.gov/emslweb/	Microbiome Research platform
Joint Genome Institute	https://jgi.doe.gov/	Sequencing centre
KBase (Knowledge Base)	https://www.kbase.us/	Bioinformatics

Network platforms

Network	Website
National Microbiome Data Collaborative	https://jgi.doe.gov/join-national-microbiome-data-collaborative-trellis/
Interagency Working Group	

Appendix 3: Supranational activities

Key policies and strategies

Name	Website	Microbiomes addressed
The Bioeconomy Strategy	https://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=strategy ; https://ec.europa.eu/research/bioeconomy/pdf/ec_bioeconomy_strategy_2018.pdf#view=fit&pagemode=none	to small extent
Biodiversity Strategy	https://ec.europa.eu/environment/nature/biodiversity/strategy/index_en.htm	no
Food 2030 strategy	http://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=food2030	no
Horizon Europe	https://ec.europa.eu/research/pdf/horizon-europe/ec_rtd_orientations-towards-the-strategic-planning.pdf	to small extent
ARIMNet2 Integrated Strategic Research Agenda (ISRA)	http://www.arimnet2.net/files/events07122016/ISRA_ARIMNet2_LowRes_FINAL.pdf	no
The BiodivERsA Strategic Research and Innovation Agenda 2017-2020	https://www.biodiversa.org/968	to small extent
BONUS strategic research agenda	https://www.bonusportal.org/programme/strategic_research_agenda	no
C-IPM strategic research agenda	https://projects.au.dk/c-ipm/strategic-research-agenda/	no
ERA CoBioTech Strategic Agenda – a vision for biotechnology in Europe	https://www.cobiotech.eu/about-cobiotech/strategic-research-agenda	to moderate extent
StrAtegiC reSeArCh AgendA For Fisheries, Aquaculture and Seafood Processing	https://cordis.europa.eu/docs/results/321/321553/final1-cofasp-sra-for-web.pdf	to small extent
JPI HDHL Strategic Research Agenda	https://www.healthydietforhealthylife.eu/index.php/news-archive/468-the-jpi-hdhl-strategic-research-agenda-2019?jij=1575555778963	to moderate extent
Marine biotechnology strategic research and innovation roadmap	http://www.marinebiotech.eu/sites/marinebiotech.eu/files/public/ERA-MBT_Roadmap_FINAL.pdf	to moderate extent
ETIP Bioenergy - STRATEGIC RESEARCH AND INNOVATION AGENDA 2018	http://www.etipbioenergy.eu/about-ebtp/the-role-of-etip-bioenergy/strategic-research-innovation-agenda-sria	to small extent
Euphresco Strategic Research Agenda	https://www.euphresco.net/media/sra/euphresco_sra.pdf	to moderate extent

Name	Website	Microbiomes addressed
FACCE JPI Strategic Research Agenda	https://faccejpi.net/strateg/strategic-research-agenda	to small extent
JPI Climate's Strategic Research Agenda	http://www.jpi-climate.eu/jpi-strategy/research-agenda	to small extent
JPI water SRIA	http://www.waterjpi.eu/mapping-agenda/strategic-research-and-innovation-agenda-sria/strategic-research-and-innovation-agenda	to small extent
Strategic Research and Innovation Agenda on Antimicrobial Resistance from JPI AMR	https://www.jpiamr.eu/wp-content/uploads/2019/05/JPIAMR_SRIA_final.pdf	to great extent
JPI Oceans strategic research and innovation agenda	http://www.jpi-oceans.eu/introduction	to small extent
Strategic Research and Innovation Agenda 2.0 JPI Urban Europe	https://jpi-urbaneurope.eu/app/uploads/2019/02/SRIA2.0.pdf	no
Strategic research & innovation agenda for organics and agroecology	https://tporganics.eu/wp-content/uploads/2019/12/ifoam-sria-full-final.pdf	to moderate extent
Sustainable Development Goals	https://www.un.org/sustainabledevelopment/	to small extent
Common Agricultural Policy (CAP)	https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy_en	to small extent

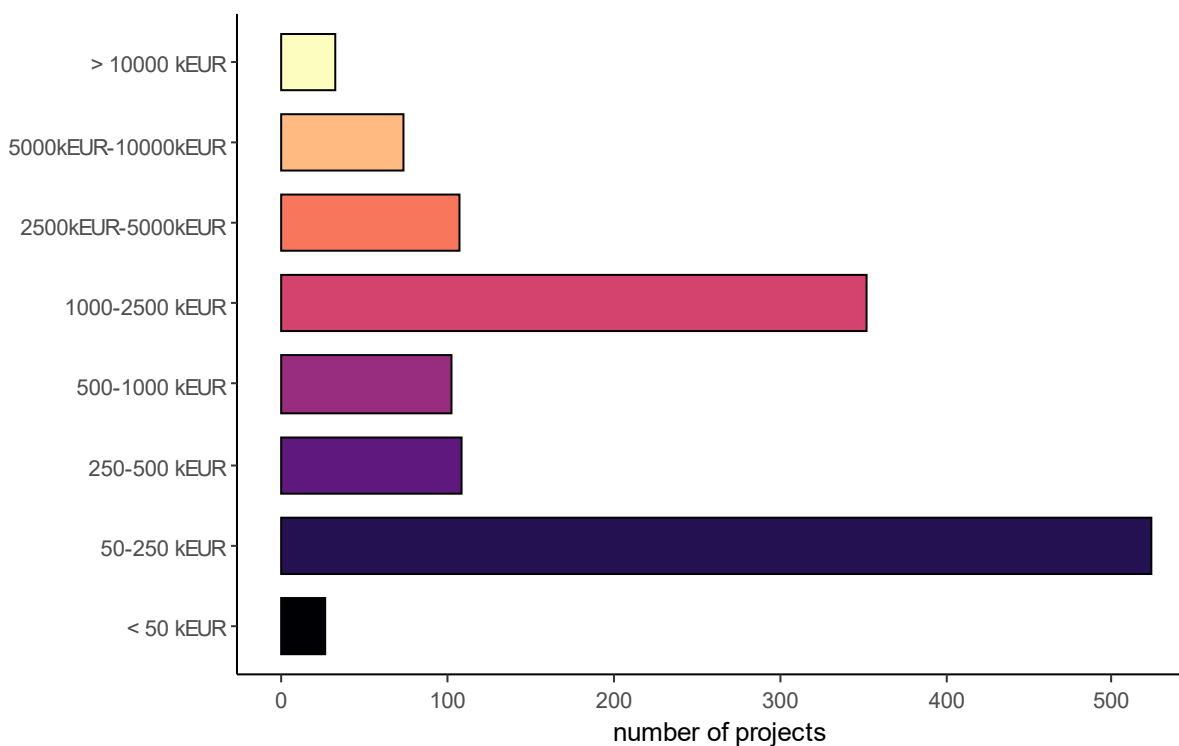
Budget Supra-national funders

	Total Budget (kEUR)			2020	2021
	2017	2018	2019		
European Commission	10863000	11319000	12391500	13183900	NA
Human Frontiers Science Progam (HFSP)	48644	50352	38514	46682	NA
European Molecular Biology Organization (EMBO)	20800	21310	21832	23174	NA
Gordon and Betty Moore Foundation	288317	298899	288556	199712	NA
Bill and Melinda Gates Foundation	4130000	4390000	4428596	5063489	NA

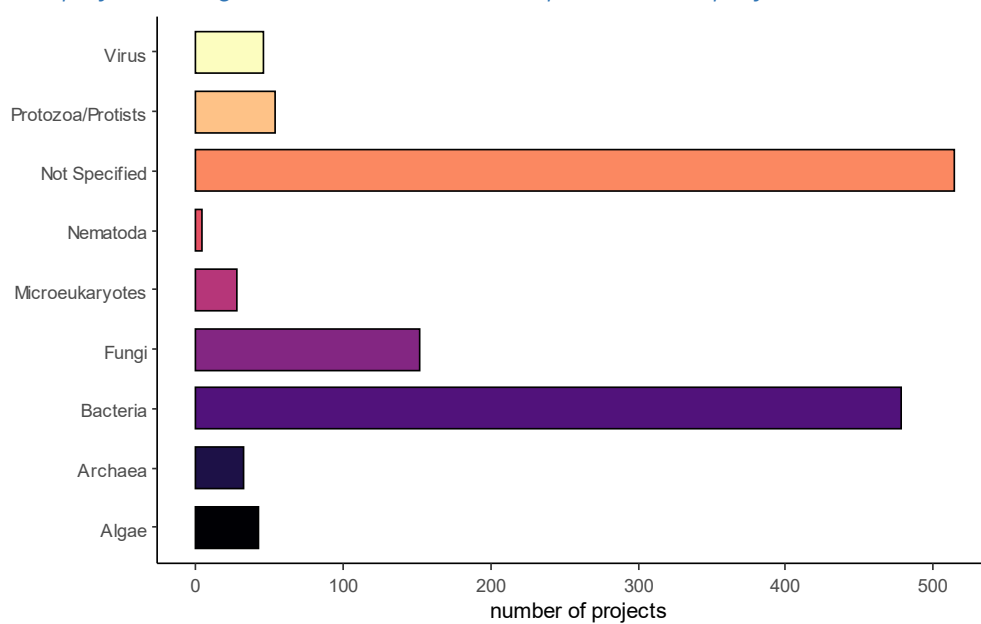
Research projects

Budget of research projects

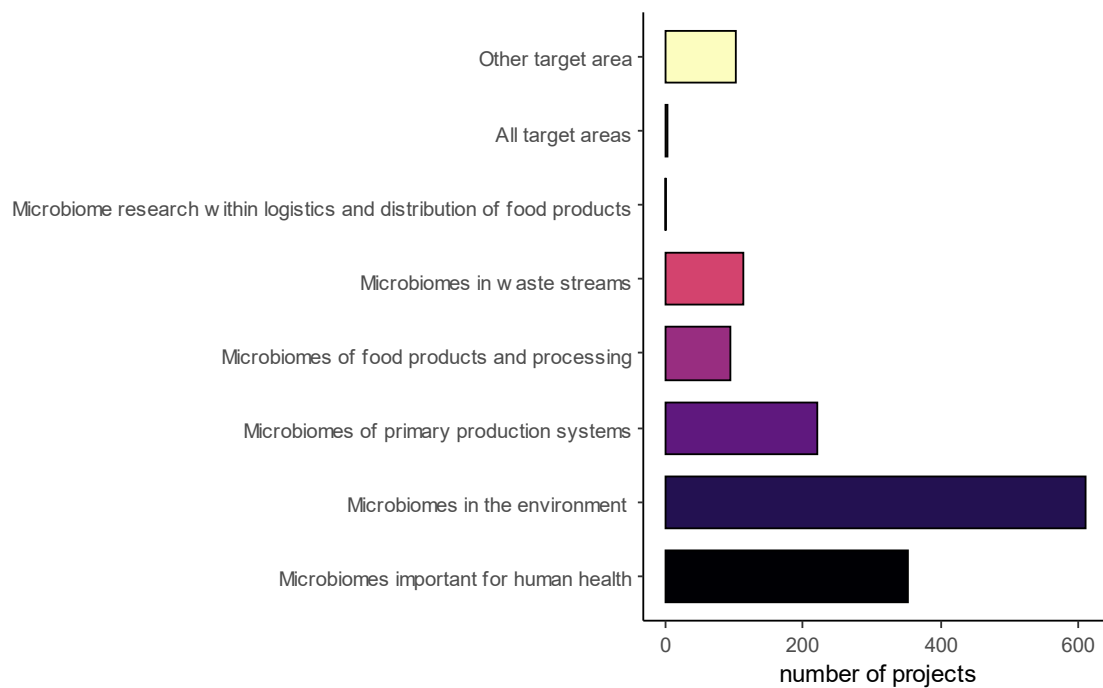
The budget was available for 98% of the projects that were collected.



Group of microorganisms studied within supra-national projects



Topics of research projects supra-national projects



Infrastructures

Infrastructure name	Infrastructure type(s)	Website
European culture collection	Culture Collection	https://www.eccosite.org/
European infrastructure for biological information (ELIXIR)	Computation Bioinformatics Microbiome Research platform Research Infrastructure	https://elixir-europe.org/
European Marine Biological Research Infrastructure Cluster	Research Infrastructure	https://www.embrc.eu/
European Molecular Biology Laboratory	Bioinformatics Microscopy Microbiome Research platform metabolomics	https://www.embl.de/
European Molecular Biology Organization (EMBO)	Research Infrastructure	https://www.embo.org/events
European Nucleotide database	Database	https://www.ebi.ac.uk/ena
Industrial Biotechnology Innovation and Synthetic Biology Accelerator (ibisba)	Research Infrastructure	https://www.ibisba.eu/
Infrastructure for Analysis and Experimentation on Ecosystems	Research Infrastructure	https://www.anaee.eu/

Infrastructure name	Infrastructure type(s)	Website
Infrastructure for systems biology	Research Infrastructure	http://project.isbe.eu/
Long-Term Ecosystem Research (LTER)	Long-term field experiment	https://www.lter-europe.net/
Microbial resource research infrastructure (MIRRI)	Microbiome Research platform Research Infrastructure	https://www.mirri.org/home.html
World data center for microorganisms	Microbiome Research platform Culture Collection database	http://www.wdcm.org/
Global fungi database	Database	https://globalfungi.com/

Network platforms active in the period from 2013 onwards

Network	Website
Global Soil Partnership	http://www.fao.org/global-soil-partnership/en/
International Society for Microbial Ecology	https://www.isme-microbes.org/
Global soil biodiversity initiative	https://www.globalsoilbiodiversity.org/
Federation of European Microbiological Societies	https://fems-microbiology.org/
European Confederation of Soil Science Societies (ECSSS)	https://soilscience.eu/
International association for ecology	http://intecol.org/
International Phytobiomes Alliance	http://www.phytobiomesalliance.org/
European Plant Science Organisation (EPSO)	https://epsoweb.org/
New and emerging challenges and opportunities in wastewater	http://www.nereus-cost.eu
Identifying Biomarkers Through Translational Research for Prevention and Stratification of Colorectal Cancer	https://www.transcoloncan.eu/
Integrated European Network on Chronic Graft Versus Host Disease (cGvHD)	https://gvhd.eu/
Statistical and machine learning techniques in human microbiome studies	https://www.cost.eu/actions/CA18131/#tabs Name:overview
Control of Human Pathogenic Micro-organisms in Plant Production Systems	http://plantcontrol.igzev.de/
European network on the factors affecting the gastro-intestinal microbial balance and the impact on the health status of pigs	http://www.pigutnet.eu/
SOURDOugh biotechnology network towards novel, healthier and sustainable food and bloproCesseS	https://www.cost.eu/actions/CA18101/#tabs Name:overview
Using three-way interactions between plants, microbes and arthropods to enhance crop protection and production	https://www.cost-camo.eu/
Endophytes in Biotechnology and Agriculture	www.endophytes.eu
Global Initiative of Crop Microbiome and Sustainable Agriculture	https://www.globalsustainableagriculture.org



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