



International Microbiota Observatory Second edition – 2024 Main findings

The microbiome is a community made up of trillions of microorganisms (bacteria, viruses, fungi, etc.) that live in our gut, mouth, nose, and skin, and even in our lungs. These organisms are essential to our wellbeing, facilitating digestion, stimulating our immune system, and protecting against infectious diseases. Beyond these functions, the microbiome also influences our mood, our metabolism, and even our longevity. Alterations to this delicate balance, often due to factors such as diet, lifestyle, or medication, can lead to major health problems, ranging from gastrointestinal disease to cardiovascular disorders and depression. Maintaining a healthy microbiome throughout our body is thus essential to our general health and wellbeing.

For the **second year running**, the Biocodex Microbiota Institute commissioned Ipsos to carry out a major international survey on this subject: the **International Microbiota Observatory**. After setting up the Observatory last year, this year's aim is to continue questioning, refining the themes addressed, and measuring changes in people's knowledge, perceptions, and behavior around the world. Some of last year's questions have thus been asked identically, so as to **observe changes in the main indicators relating to the microbiomes**, i.e. does the public know more about their microbiomes this year? Do they have a better understanding of their role and functions? New questions have been added to the Observatory, aimed in particular at **enriching data relating to healthcare professionals**: what role do they play in passing on information about the microbiome to their patients?

This second edition of the International Microbiota Observatory was conducted by Ipsos on **7,500 individuals** across **11 countries** (France, Spain, Portugal, Poland, Finland, Morocco, the USA, Brazil, Mexico, China, and Vietnam). Four new countries were included in this second edition: Poland, Finland, Morocco, and Vietnam. For each country, the sample is **representative of the population aged 18 and over** in terms of gender, age, profession, and region. The survey was conducted over the Internet between January 26 and February 26, 2024.

Representativeness was ensured via quota sampling, the most commonly used sampling method for obtaining a representative sample of the population studied. The quota variables for each country were gender, age, region, and socio-professional category. The data were adjusted (1) within each country, again to ensure that each population is representative, and (2) globally, so that each country has the same weight. Statistical



analyses were carried out using Cosis software (M.L.I., France, 1994), with a significance level of 95%.

The survey population was 48% male and 52% female. The average age was 46.1 years. The sample of 7,500 individuals made it possible to carry out a detailed analysis by age group: 18-24 years, 25-34 years, 35-44 years, 45-59 years, 60 years and over.

Changes from one year to the next have been measured on a like-for-like basis, i.e. calculated taking into account only those countries present in both the first and second editions of the survey. While we do have results for the new countries included in this second edition (Poland, Finland, Morocco, and Vietnam), they have not been taken into account when calculating trends, since they were not included in the first edition of the survey.

The questionnaire includes 27 questions on: (1) socio-demographic data, (2) the level of knowledge about microbiomes, (3) the level of and desire for information from healthcare professionals, (4) the identification and adoption of behaviors designed to combat microbiome imbalances, (5) the level of knowledge, information, and behaviors of women about the vulvo-vaginal microbiome, and (6) health data.

The questionnaire lasted ten minutes and the 7,500 individuals had to complete the entire questionnaire in order to be included in the survey. The terms used in the questionnaire to talk about the microbiome have been translated and adapted to the terms used in each country.



1. Despite some progress, the microbiome remains little-known

A. Knowledge of the microbiome improved this year, even if it remains too low

Knowledge of the term “microbiome” is up on last year (7 in 10 have heard of it, +7 points) but remains low. In fact, 1 in 5 believe they know exactly what the microbiome is (23%), a significantly higher level of awareness than last year (+3 points vs. 2023¹). Nearly half (47%) now say they are familiar with the term, although they do not know its precise meaning (+4 points vs. 2023). The proportion of those who say they have “never heard about it” fell significantly (30%, -7 points vs. 2023).

Overall, knowledge of the diversity of microbiomes also improved this year, even if it remains limited. The gut microbiome was once again the most well-known (26% know exactly what it is, +2 points vs. 2023). Knowledge of other microbiomes remains more limited but is increasing: 20% know precisely about the vaginal microbiome (+3 points vs. 2023), 20% the oral microbiome (+2 points vs. 2023). This year again, little was known about some microbiomes, including the skin microbiome (17% know exactly what it is, +1 point vs. 2023), the urinary microbiome (16%, +2 points vs. 2023), the ENT microbiome (16%), and the lung microbiome (14%, +1 point vs. 2023).

The term “intestinal flora” is still more well-known than “microbiome”: 88% have heard of the intestinal flora (+6 points vs. 2023), including 56% who say they know exactly what it is (+9 points vs. 2023).

B. Knowledge of the microbiome’s role and functions is improving, but there’s still a long way to go

Knowledge of the role and functions of the microbiome also progressed slightly this year. More than 3 in 4 people are aware that their diet has an impact on the balance of their microbiome (78%, +2 points vs. 2023), that a microbiome imbalance can in some cases have significant health consequences (77%, +2 points vs. 2023), or that the microbiome plays an important role in immune defense mechanisms (74%, +1 point vs. 2023).

The impact of antibiotics on the microbiome is well known by a majority of people (70% of respondents), as is the important role played by the microbiome in women’s health

¹ For questions asked in editions 1 and 2, variations are indicated in percentage points. Please note that all trends are on a like-for-like basis, i.e. they include only the countries surveyed in both years (France, Spain, Portugal, the USA, Brazil, Mexico, and China).



(known by 68% of respondents, +2 points vs. 2023), and the existing links between the microbiome and diseases such as irritable bowel syndrome (IBS), obesity, or vaginosis (known by 64% of respondents).

On the other hand, knowledge of the diversity and composition of the microbiome is more limited. Only 46% know that the microbiome is not located exclusively in the gut, while a mere 28% know that the microbiome does not consist solely of bacteria. What's more, only half (53%) are aware that the microbiome enables the gut to deliver information essential to our health to the brain.

"Dysbiosis" remained a little-known term this year, with only 1 in 3 respondents having heard of it (34%). This was an improvement on 2023 (+3 points), but only 13% know exactly what it is.

2. To maintain a balanced microbiome, people are beginning to change their behavior

A. People have already adopted a range of behaviors to maintain a balanced microbiome

More than half of those surveyed (58%) say they have changed their behavior to better protect the balance and proper functioning of their microbiome. However, such changes in behavior should be put into perspective: only 17% do so "a lot", while 2 in 5 (41%) say they do so only "a little".

While the vast majority of those surveyed claim to have adopted appropriate behaviors, more often than not they admit to having done so only partially. A majority say they eat a balanced and varied diet (84%, but 51% do so only partially), engage in physical activity (78%, but only 35% say they do so regularly), abstain from smoking (76%), or avoid the consumption of processed foods (75%, but only 26% say they do so entirely).

On the other hand, behaviors more specific to the protection of one's microbiome are not properly adopted, probably due to a lack of awareness: 59% of those surveyed say they wash several times a day, which can lead to dysbiosis. As regards women, 42% apply vaginal douches (42%, -3 points vs. 2023), even though this practice is harmful to their vaginal microbiome. Furthermore, more than a third of women (37%) practiced self-medication, using over-the-counter antifungal drugs, for example, without the recommendations or diagnosis of healthcare professionals. This practice, which can also



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significantly impact microbiome imbalances, is particularly widespread among younger people (44% in the 25-34 and 35-44 age groups, versus only 24% in the 60+ age group).

B. Awareness of the terms “probiotics” and “prebiotics” on the rise

Awareness about probiotics increased this year and became more precise: almost 1 in 2 people know exactly what they are (48%), an increase of 7 points on last year. **Understanding of the term “prebiotics” is also on the rise,** with 3 in 10 (30%) now knowing exactly what it means (+4 points vs. 2023).

Half (50%) of those surveyed said they consume probiotics, while almost 2 in 5 (44%) claim they use prebiotics.

3. The majority of those facing health problems potentially linked to a microbiome imbalance believe this is indeed the case.

Over the past twelve months, many of those surveyed said they had suffered from problems potentially resulting from microbiome imbalances.

This is the case for digestive problems: a third (33%) of those surveyed said they had experienced one or more episodes of post-antibiotic diarrhea, 36% had experienced gastroenteritis, and 67% other intestinal or digestive problems. It is likely that some of those surveyed over-report gastroenteritis, since it is here measured at a relatively high level. More than likely, some of these individuals considered certain episodes of diarrhea or vomiting to be gastroenteritis, without having obtained a proper diagnosis of gastroenteritis from a health professional.

The other health problems experienced are also relatively common: 50% have suffered from oral disorders such as periodontitis, cavities, or mouth ulcers, 48% have had ENT disorders such as ear infections, sinusitis, allergic rhinitis, bronchitis, or laryngitis, while 45% declare having had skin problems such as acne, atopic dermatitis, psoriasis, or seborrheic dermatitis. Lastly, 33% have had urogenital infections, whether urinary tract infections (cystitis, urethritis, bacterial vaginosis) or yeast infections (mycosis).

The survey shows just how many people today are faced with health problems potentially linked to dysbiosis.

In fact, most of those surveyed link these problems to their microbiome, especially when the problems are digestive or urogenital. Indeed, among those who have had post-antibiotic diarrhea in the last twelve months, half (53%) make the link with their microbiome, as do those who have had gastroenteritis (53%).



55% of those who have had a urogenital infection link it to their microbiome, with women more likely to make this link (59%) than men (49%).

The link to the microbiome is less obvious for other health problems: only 2 in 5 (40%) link skin problems they have had this year to their microbiome, 36% their oral or dental problems, and 33% their ENT problems.

4. Parents, 25-44 year-olds and women are the most knowledgeable about the microbiome

A. The “golden age” for microbiome: parents and 25-44 year-olds

Parents and the 25-44 age group know the most about microbiome and have received more information on the subject from health professionals. They are also more likely than others to say they have changed their behavior to preserve their microbiome.

Familiarity with the term “microbiome” stood at 76% for parents with children under 3, 78% for 25-34 year-olds, and 75% for 35-44 year-olds, compared with 70% overall. The findings are similar for all microbiomes. For example, the gut microbiome is known to 65% of parents of children under 3, 67% of 25-34 year-olds, and 63% of 35-44 year-olds, while overall, only 56% know what it is.

This greater awareness of the microbiome can be explained in part by the role of healthcare professionals: **parents of children under 3 report having received the most information on the microbiome from a healthcare professional (58%).** Similarly, 55% of 25-34 year-olds and 47% of 35-44 year-olds have received information about the microbiome, its role, and its function from healthcare professionals, compared with 45% overall. They had also received more information on the behaviors to adopt to maintain a balanced microbiome: 62% for parents with children under 3, 60% for 25-34 year-olds, and 52% for 35-44 year-olds, versus 48% overall.

Since they are more informed and knowledgeable than the average, **these groups are more inclined to change their behavior to protect the balance and proper functioning of their microbiome.** This is the case for 68% of parents of children under 3, 67% of 25-34 year-olds, and 63% of 35-44 year-olds, compared with 58% overall.



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B. When it comes to taking care of their microbiome, women know more than men

While women might not always know the meaning of terms related to the microbiome, they stand out for a more precise understanding of the microbiome's role: nearly 3 out of 4 (74%) know the microbiome plays an important role in vaginal health (vs. 68% overall and 62% for men); 73% know that antibiotics can alter the microbiome (vs. 70% overall and 66% for men); while nearly half (49%) know the microbiome is not located exclusively in the gut (vs. 46% overall and 42% for men).

Women are also more likely to modify their behavior to maintain a balanced microbiome: a practice adopted by 60% of women, compared with 58% overall and 56% for men.

Lastly, women are more likely to have been prescribed probiotics or prebiotics than the average (52%, vs. 50% overall and 48% for men).

5. However, some groups still have less understanding and awareness about the microbiome than others, particularly seniors.

A. Despite their age, which exposes them to a growing number of health problems, seniors are less informed than others about the right behaviors to adopt to maintain a balanced microbiome.

Only 61% of seniors have heard of the microbiome (-9 points vs. the overall figure). **However, the term “intestinal flora” is better known among seniors:** 58% know exactly what it is, versus 56% overall (and 44% for under-25s).

This lower awareness about the microbiome means **fewer seniors have adopted behaviors aimed at maintaining the balance of their microbiome** (a mere 50%, vs. 58% overall). Only 43% of seniors use probiotics (vs. 50% overall), while 35% consume prebiotics (vs. 44% overall). When it comes to the right behaviors to preserve the balance of the vaginal microbiome, barely half of women (56%) aged 60 say they use a soap-free cleanser, while only 43% sleep without underwear (vs. 67% and 54%, respectively, for 25-34 year-olds).

The provision of information by healthcare professionals is proving to be deficient. Only 1 in 3 seniors (34%) has received information about the microbiome, its role and its function



(vs. 45% overall). What's more, only 1 in 3 (37%) has received advice from their doctor on how to maintain a balanced microbiome (vs. 48% overall).

6. Health professionals play a key role in raising awareness, informing the public, and encouraging the adoption of appropriate behaviors.

A. Healthcare professionals are seen as the most reliable source of information on the microbiome

Across all age groups and in every country surveyed, healthcare professionals are the most trusted source for reliable and relevant information on the microbiome. 78% of respondents consider healthcare professionals to be the most reliable source of information on the microbiome. Teachers and professors come in a distant second (8% consider them the most reliable and relevant source). There is therefore no question that healthcare professionals must play a central role in raising awareness about the microbiome.

For under 25 year olds, awareness about the microbiome is also frequently raised via school and studies. 1 in 4 young people (25%) first heard about the microbiome at school or during their studies (vs. 11% overall). For young people, teachers and professors are among the most trusted sources of reliable and relevant information on the microbiome (78%, vs. 68% overall).

B. If knowledge on the microbiome improved in 2024, this is also because health professionals have raised public awareness about its importance.

This is one encouraging finding of the survey: health professionals provided more information on microbiome than the previous year. Nearly half (45%) responded that their doctor has explained what the microbiome is and what it does (+6 points vs. 2023). What's more, almost half (48%) claim to have been informed by their doctor of the importance of having a balanced microbiome (+6 points vs. 2023). Compared to last year, more respondents feel their doctor has explained to them the right behaviors to adopt to maintain a balanced microbiome (48%, +5 points vs. 2023). While this improvement in the



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information provided by healthcare professionals should be welcomed, the majority of those surveyed still feel such advice to be highly inadequate.

In the case of antibiotic prescriptions, patients certainly received more information from healthcare professionals this year, but less than half (46%) have been informed by their doctor of the risks of digestive problems linked to antibiotics (+2 points vs. 2023). Only 2 in 5 (39%) have been informed that taking antibiotics could adversely affect the balance of their microbiome (+3 points vs. 2023) or have received advice on how to minimize any such adverse effects (+3 points vs. 2023).

In 2024, gynecologists also provided their patients with much more information: 43% of women say their gynecologist has explained what the vaginal microbiome is and what it does (+7 points vs. 2023). Furthermore, almost half (48%) have been made aware of the importance of preserving the balance of their vaginal microbiome as much as possible (+8 points vs. 2023) or have received information on the behaviors to adopt to maintain the balance of their vaginal microbiome (+7 points vs. 2023).

However, while the information provided by professionals increased this year, once again only a minority of people received such information.

C. Information provided by healthcare professionals has a strong impact on people's knowledge and behavior

This year's results once again show that information provided by healthcare professionals has a major impact on people's knowledge and behavior.

Individuals who have repeatedly received information about microbiome from their healthcare professional are more likely to know exactly what the microbiome is (53%, vs. 23% overall). Healthcare professionals' role in raising awareness is thus essential, since it is particularly effective.

Those especially informed by their healthcare professional also stand out in terms of their knowledge of the role and function of the microbiome, with an average score of 7/9 (compared with 5.6/9 overall). Almost all such individuals are aware that an imbalance in the microbiome can in some cases have significant health consequences (93% vs. 77%), but also of the links between the microbiome and diseases such as irritable bowel syndrome (IBS), obesity, or vaginosis (85% vs. 64%).



Of these, 95% said they had changed their behavior to maintain a balanced microbiome, compared with 58% overall.

Repeated information from healthcare professionals thus has a real, proven, and positive influence on microbiome-related knowledge and behavior.

7. Significant disparities between countries in terms of knowledge on the microbiomes

A. Varying levels of knowledge about the term “microbiome”

Knowledge of terms relating to the microbiome varies widely from country to country. This year, 7 in 10 people said they are familiar with the term “microbiome”, but only 1 in 5 know exactly what it means (23%). Without having a precise knowledge of what it is, the public in some countries has heard more about the microbiome than in others, as is the case with the Vietnamese (92%), French (85%), Chinese (76%), Spanish (76%), and Poles (75%). Conversely, fewer Americans (62%), Portuguese (62%), Moroccans (59%), and Finns (41%) are familiar with the term “microbiome”.

Similar differences can be found when it comes to knowledge about the gut microbiome: 56% of those surveyed had heard of it, a figure which masks major disparities between countries. The Vietnamese (87%), French (70%), Chinese (65%), Mexicans (62%), and Spanish (61%) stand out for their greater knowledge about gut microbiome. By contrast, Americans (49%), Moroccans (47%), Poles (45%), Portuguese (42%), and Finns (33%) are less familiar with the term.

However, while some countries are more informed about the microbiome, this does not necessarily mean they have adopted beneficial behaviors that promote a balanced microbiome.

B. Countries where the public is best informed about the microbiome’s role and function: higher adoption of beneficial behaviors and greater awareness among healthcare professionals

In some countries, a virtuous circle is evident: more people have adopted behaviors beneficial to their microbiome, with more having received information on the subject from healthcare professionals. This is the case in Mexico, Brazil, China, Vietnam, and Poland.



The Vietnamese are the most likely to report having changed their behavior to protect their microbiome: 84% say they have (vs. 58% overall), with a third saying they do so “a lot”. Mexicans (67%), Poles (65%), and the Chinese (62%) are also among those who have changed their behavior the most.

Probiotic consumption is much higher in these countries than the average (50%): 79% in Vietnam, 68% in China, 66% in Mexico, 60% in Poland, and 56% in Brazil. In the same vein, the Vietnamese (87%), the Chinese (62%), Mexicans (56%), Poles (51%), and Brazilians (50%) also stand out for their higher consumption of prebiotics (vs. 44% overall).

When faced with health problems, Mexicans, together with the Chinese and the Vietnamese, link them most closely to microbiome problems. In Mexico, this is particularly the case for gastroenteritis (72%, vs. 53% overall), urogenital infections (66%, vs. 55% overall), and post-antibiotic diarrhea (63%, vs. 53% overall). In addition to intestinal or urogenital problems, a majority of Vietnamese (60%), Mexicans (56%), and Chinese (55%) also made the connection between their microbiome and skin problems they suffered during the year (vs. 40% overall).

Mexico, together with Brazil, China, and Vietnam, and to a lesser extent Poland, are the countries with the highest levels of microbiome education, due in part to a greater awareness of the subject among healthcare professionals.

77% of Vietnamese, 57% of Mexicans, 51% of Brazilians, and 51% of Chinese say they have received explanations from healthcare professionals about what the microbiome is and what it does (vs. 45% overall).

People in these countries were also more likely to have been informed about the right behaviors to adopt to maintain a balanced microbiome: 75% of Vietnamese, 67% of Mexicans, 54% of Brazilians, and 54% of Chinese (vs. 48% overall).

Poland is a special case: while Poles have not received much information on the role and function of the microbiome (39%), they are more likely than average to have been prescribed prebiotics or probiotics (68% vs. 50% overall).



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C. Countries lagging behind in their knowledge on microbiome and microbiome protection: few behaviors adopted to preserve microbiome and information still poorly disseminated by healthcare professionals

Other countries stand out for their lower adoption of behaviors aimed at preserving the microbiome. What they have in common is that the public in these countries has received the least information on the subject from healthcare professionals. Finland, Portugal, France, Spain, the USA, and Morocco figure in this group.

Only a third (36%) of Finns have modified their behavior to maintain the balance of their microbiome (vs. 58% overall). The Portuguese (47%), the French (48%) and Americans (54%) are also less likely than average to have done so.

Probiotic consumption is much lower in these countries than the overall average (50%): 25% in Finland, 36% in Portugal, 33% in France, 30% in Morocco, and 44% in Spain. Similarly, Finns (19%), the Portuguese (24%), the French (25%), Moroccans (27%), and the Spanish (35%) also stand out for their low consumption of prebiotics (vs. 44% overall).

When faced with a health problem, Finns, like the French, Spanish, Portuguese, and Moroccans, are less likely to make the connection between the health problem and their microbiome. In Finland, for example, this is the case for oral disorders (20%, vs. 36% overall), skin problems (19%, vs. 40% overall), and ENT disorders (14%, vs. 33% overall). This is also the case when the problems relate to the gut. Only a minority of the French (28%), Spanish (40%), Portuguese (40%), and Moroccans (42%) make the connection between gastroenteritis they have suffered and their microbiome.

Finns are the least likely to report having received information from their healthcare professionals. Only 19% had received an explanation about what the microbiome is and what it does (vs. 45% overall), 20% on the right behaviors to adopt to maintain a balanced microbiome (vs. 48% overall), and 22% on the importance of having a balanced microbiome (vs. 48% overall). More generally, the level of information provided by healthcare professionals is lowest in Europe and the United States.