



International  
Microbiota  
Observatory

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by **BIOCODEX**   
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# INTERNATIONAL MICROBIOTA OBSERVATORY

## EDITION 2023 KEY FINDINGS

*The microbiota is made up of billions of microorganisms (bacteria, viruses, fungi, etc.) living in symbiosis with our body. We have an intestinal microbiota, as well as microbiota of the skin, mouth, lungs, urinary tract, vagina... These microbiota play an essential role in our health.*

*But what do our fellow citizens know today about the role of microbiota? What do they know about how to take care of their microbiota? Do they suffer from health problems that they associate with their microbiota? What role do healthcare professionals play in informing patients?*

*To answer these questions, the Biocodex Microbiota Institute commissioned Ipsos to conduct a major international survey on the subject: the International Microbiota Observatory. To carry out this survey, Ipsos questioned 6,500 people in 7 countries (France, Portugal, Spain, USA, Brazil, Mexico and China). For each country, the sample questioned was representative of the country's population aged 18 and over, in terms of gender, age, profession, region and urban area. The survey was conducted over the Internet from March 21 to April 7, 2023. The results were presented on June 27, World Microbiome Day.*

*Data was collected using the quota method, the most commonly used sampling plan for obtaining a representative sample of the population studied. Within each country, the quota variables were gender, age, region and socio-professional category. The data were adjusted (1) within each country to ensure that each population was once again representative, and (2) globally to ensure that each country represented the same weight. Statistical analyses were carried out using Cosi software (M.L.I., France, 1994), with a significance level of 95%. The sample of 6,500 individuals enables a detailed analysis according to several age groups: 18-24, 25-34, 35-44, 45-59, 60 and over.*

*The survey population is 48% male, 52% female. The average age is 46.9. The sample of 6,500 individuals enables a detailed analysis by age group: 18-24, 25-34, 35-44, 45-59, 60 and over.*

*The 26-question questionnaire included (1) socio-demographic data (2), an assessment of knowledge of microbiota (3), the level and desire for information on the part of healthcare*

*professionals (4), the identification and adoption of behaviors designed to combat microbiota imbalances (5), and women's level of knowledge, information and behaviors concerning the vulvo-vaginal microbiota (6).*

*The questionnaire lasted 10 minutes. The terms used in the questionnaire to talk about the microbiota were adapted to the terms commonly used in each country.*

## A) The microbiota, a little-known organ.

### 1) Very little knowledge of the word "microbiota".

**As a general rule, knowledge of microbiota is fairly low: only 1 in 5 people say they know the exact meaning of the term microbiota (21%),** while the rest admit to knowing the term by name only (43%). More than 1 in 3 people say they've never even heard of the word (36%).

**Moreover, when we dig deeper into their level of knowledge, the notions are superficial.** While a small majority claim to know the intestinal microbiota (53%, but only 24% know exactly what it is), other types of microbiota are much less well known: whether it's vaginal microbiota (45% of interviewees know the term, but only 18% know exactly what it is), oral microbiota (43% know it by name, but 17% know what it is) or skin microbiota (40% know the term, but only 15% know what it is). Others are even less well known, such as urinary microbiota (only 14% know exactly what it is), pulmonary microbiota (13% know exactly what it is) and ENT microbiota (11% know exactly what it is).

**On the other hand, the term "intestinal flora" is now better understood than "intestinal microbiota":** more than 8 out of 10 people have heard the term (86%), and more than 1 in 2 claim to know exactly what it is (53%). This is even more the case in Latin America (71%) than in Europe (52%) or China (only 39%).

### 2) And relatively poor knowledge of the role and importance of microbiota

Around 3 out of 4 interviewees are aware that a risk of microbiota imbalance can have major consequences for health (75%), that our diet has major consequences on the balance of our microbiota (74%) and that our microbiota play a real role in immune defense mechanisms (72%).

**For the rest, knowledge remains very moderate.** More than 1 in 3 people are unaware that antibiotics have an impact on our microbiota (34%). Nearly 1 in 2 people are unaware that microbiota are made up of bacteria, fungi and viruses (46%), and that they enable the gut to deliver essential health information to the brain (47%). 1 in 2 people think that when our microbiota is unbalanced or malfunctioning, there's not much we can do about it (47%). Finally, the vast majority of those interviewed were unaware that many diseases, such as Parkinson's, Alzheimer's and autism, could be linked to microbiota (75%).

## B) We know little about how to combat the risk of microbiota imbalances.

### 1) Vague knowledge of preventive behaviors.

Faced with questions designed to assess their knowledge of the right things to do, the interviewees gave a relatively low average score of 4/7.

In terms of behaviors known to be essential to good health, the score was almost flawless! A very large majority recognize the need for a balanced diet (84%), physical activity (76%) and avoiding smoking (72%) to limit the risk of microbiota imbalance. But these good results need to be put into perspective, as these behaviors are also known to be the ones to adopt in order to combat a very large number of health problems.

**However, when it comes to more specific behaviors, the level of knowledge plummets:** only 1 in 3 people know that it's better not to wash twice a day to preserve their skin's microbiota (35%). Fewer than 1 in 2 women know to avoid douching because it's bad for their vaginal microbiota (42%).

And how could it be otherwise when only 1 in 4 people say they've heard the term "dysbiosis" (28%) and only 1 in 10 think they know exactly what it is (10%).

### 2) The terms "probiotics" and "prebiotics" are currently little known by the general public.

A majority of those interviewed consider that probiotics (62%) and prebiotics (51%) should be consumed to combat the risk of microbiota imbalance. But at the same time, only 43% claim to know exactly what probiotics are. The situation is no better for prebiotics, with only 1 in 4 people knowing exactly what they are (27%). **What the survey shows is that the general public's knowledge on the subject is "fuzzy" today, with many thinking that probiotics are good for the body because they've heard of them, but don't really know what they're used for.**

### 3) The beginning of awareness?

More than 1 in 2 people today say they have adopted behaviors in their daily lives to maintain the balance of their microbiota (57%). **This new awareness is to be applauded, but it should also be put into perspective. Firstly, because only 1 in 7 people say they do this "a lot" (15%), while most of the others say they do it only "a little" (42%).** Secondly, 43% of those questioned said they had not adopted any specific behavior. The results of the International Microbiota Observatory show that there's still a lot to be done in this area.

## C) The causal link between certain health problems and a possible imbalance in microbiota is still poorly understood.

### 1) Faced with frequent health problems likely to be linked to microbiota imbalance...

The prevalence of disorders potentially linked to microbiota imbalance is now quite high. A large proportion of people admit to having suffered from the following health problems over

the past 5 years: firstly, intestinal problems (58%) and digestive system disorders such as abdominal pain or alternating episodes of constipation and diarrhea (57%). Nearly 1 in 2 people also cite oral disorders such as periodontitis, cavities or mouth ulcers (47%). ENT problems such as otitis, sinusitis, allergic rhinitis, bronchitis and laryngitis are also frequently cited (41%), as are skin problems such as acne, atopic dermatitis, psoriasis or seborrheic dermatitis (40%). Many also claim to have experienced gastroenteritis (34%), urogenital infections such as cystitis, urethritis, bacterial vaginosis, vaginitis or mycosis (30%). Finally, more than 1 in 4 people say they have suffered from post-antibiotic diarrhea (26%).

## 2) ...many patients don't make the connection between the two.

They do so for certain health problems where the link with microbiota imbalance is more obvious and known, such as post-antibiotic diarrhea. 56% of those who have had it link it to an imbalance in their microbiota. On the other hand, 44% of those affected either don't or don't know. **This is already much less the case for intestinal disorders (53%), digestive system disorders (52%) and gastroenteritis (51%), for which only 1 in 2 sufferers make the connection with an imbalance in their microbiota.** For other problems, the vast majority of patients don't make the connection with a disorder, whether it's their skin problems (only 38% do), oral disorders (33%) or ENT problems (32%).

## D) Information provided by healthcare professionals: a game-changing vector of information!

The general public's lack of knowledge about the microbiota is all the more problematic today, as the vast majority of those questioned seem to be unable to adopt behaviors that would enable them to fight as much as possible against the risks of imbalances in their microbiota. And this information is still too rarely provided by doctors.

### 1) Information is still too rare, especially when it comes to antibiotics...

Fewer than 1 in 2 patients say that their doctor has ever explained to them how to maintain balanced microbiota (44%, but only 19% have had this explained to them more than once), or prescribed probiotics or prebiotics (46%, but only 21% say they have done so several times). Only a minority of those interviewed claim to have been made aware by their doctor of the importance of having a well-balanced microbiota (42%). Finally, only 1 in 3 said their doctor had ever taught them what microbiota was and what it was used for (37%, and only 15% had had this explained to them several times).

**The information provided by doctors when prescribing antibiotics illustrates just how inadequate it still is to make patients aware of the risks of treatment in terms of microbiota imbalance.** Prescribing antibiotics should be an opportunity to provide essential information on the microbiota, but in many cases it isn't. When prescribing antibiotics, for example, the patient's microbiota is at risk. When antibiotics are prescribed, less than 1 in 2 patients say that their doctor has informed them of the risk of digestive problems associated with antibiotics (41%). Only 1 in 3 were given advice on how to minimize the negative

consequences of taking antibiotics on their microbiota (34%) or informed that taking antibiotics could have negative consequences on the balance of their microbiota (33%).

**2) ...yet the information provided by healthcare professionals has a major impact on patient knowledge and behavior.**

What the survey shows is that once a patient has received all the information on the subject, and repeatedly, his or her relationship with microbiota changes significantly, and stands out from the average. More than 9 out of 10 people (95%) who have received repeated information from their healthcare professional have adopted behaviors to keep their microbiota balanced, compared with 57% of all those surveyed. Their ability to give correct answers to the knowledge test is also much higher, with an average score of 7.5/10 (compared with 5.8/10 overall). They also know much more than others exactly what probiotics (76% vs. 43% overall) and prebiotics are (66% vs. 27% overall). Repeated information from a healthcare professional therefore has a very strong impact on knowledge levels and behaviors.

## **E) Real differences in knowledge and behavior depending on the profile of the people surveyed.**

**1) The 25-34 and 35-44 age groups: the best informed and most aware of the problems of microbiota imbalance**

It's a fact that these two age groups still have a higher level of knowledge than the others, particularly the 25-34 age group. For example, the latter are the most familiar with the precise meaning of intestinal microbiota (30%), up 6 points on the sample as a whole. They are also much more familiar than others with the term "dysbiosis" (43% vs. 28% overall). But they also stand out in terms of behaviors: 66% of them have adopted specific behaviors to keep their microbiota balanced (versus 57% overall). Why is this age group more sensitive to microbiota issues? Probably because it also represents the generation of parents with young children. The survey also shows that parents of young children are better informed than the population as a whole (66% of parents also say they have adopted behaviors to protect the balance of their microbiota).

**2) The 60+ age group: the least aware in terms of knowledge and behavior.**

**Even though they are at an age when health problems linked to aging will, for many of them, become increasingly present, they are also those who today show themselves to be the least informed about microbiota.** For example, they are the least aware of the precise meaning of intestinal microbiota (20%, down 4 points on the overall figure) and dysbiosis (19%, down 9 points on the overall figure).

**They are also the least likely to have adopted behaviors to keep their microbiota balanced (only 50% vs. 57% overall).** Here again, in view of this discrepancy, doctors have an essential role to play in getting senior citizens to change their behavior to take better account of the balance of their microbiota. Yet these are subjects about which they say little.

**People aged 60 and over are the least likely to be prescribed probiotics and prebiotics (just 32%, compared with 63% of 25-34 year-olds).** Only 1 in 3 people have ever had their doctor explain to them how to keep their microbiota in balance (32% vs. 58% for 25-34 year-olds). 1 in 4 say they have already had an explanation of what microbiota is (26% vs. 50% for 25-34 year-olds).

## F) A world tour of microbiota through two very different examples: France and Mexico

### 1) The French are the least aware of the behaviors to adopt to preserve the balance of the microbiota, and they are also the least likely to discuss this with their doctor.

In terms of knowledge of their microbiota, the French have a number of shortcomings, far greater than in other countries. Their knowledge on the subject is highly varied. On the one hand, they know slightly more than others exactly what is meant by the words "intestinal microbiota" (28% vs. 24% overall) or "intestinal flora" (62% vs. 53% overall). On the other hand, they are among those who know the least about the precise meaning of terms such as "dysbiosis" (only 4% vs. 10% overall), "probiotic" (31% vs. 43% overall) or "prebiotic" (14% vs. 27% overall).

Their knowledge of the various behaviors to adopt is the lowest in comparison with the other countries surveyed. On this subject, they take last place in the ranking, with an average knowledge score of 3.8/7. Fewer of them know that consuming probiotics (45% vs. 62% overall) and prebiotics (31% vs. 51% overall) can have beneficial effects on their microbiota.

In view of their knowledge, they are also the least likely to declare that they have adopted specific behaviors to preserve the balance of their microbiota: only 47% have done so (-10 points compared to the overall figure), and only 10% say they do so "a lot" (-5 points compared to the overall figure).

The French, like all Europeans, make little connection between the health problems they encounter and their microbiota. Only 51% make this connection with post-antibiotic diarrhea. For all other health problems, only a minority make the connection.

**At the same time, the French are the least likely to discuss the subject with their doctor.** Only 27% say they have ever been prescribed probiotics or prebiotics (versus 46% overall). They are also the least likely to say that their doctor has explained the right behaviors to adopt (25% vs. 44% overall). Finally, only 1 in 4 French people have ever had the purpose of microbiota explained to them (23% vs. 37% overall). Only 1 in 10 has had their doctor suggest they test their microbiota (14% vs. 30% overall).

**When it comes to prescribing antibiotics, the French are the least likely to receive information from their doctors on the imbalances that can result,** whether it's advice on the risks of digestive problems (only 38% say they have received such advice), or on how to limit



the impact on their microbiome (27% vs. 34% overall). Few doctors tell them that taking antibiotics could affect the balance of their microbiota (24% - the lowest figure - versus 33% overall).

**In all countries, but particularly in France, patient education is now a key issue, to teach patients about the role of the microbiota and the behaviors they should adopt to preserve it as well as possible.**

**But France is not alone when it comes to knowledge and good behavior. Two other European countries (Spain and Portugal in particular) and the United States have a number of shortcomings when it comes to microbiota.**

**2) In Mexico: knowledge levels well above the rest and more virtuous behaviors, probably due to greater involvement of healthcare professionals in patient education**

Mexico is probably one of the countries, along with Brazil, with the highest levels of education in terms of knowledge about what people need to know and do to preserve their microbiota. In Latin America, it's the terms "intestinal flora" (71%, 68% in Brazil and 73% in Mexico) and "vaginal flora" (47%, 52% in Brazil and 43% in Mexico) that are really well known.

**Mexicans are among those with the best knowledge of the role of microbiota** (even if their average score of 6/10 on the knowledge test is not exceptional, it is the best). They are among those most aware that microbiota imbalance can in some cases have major consequences on health (81% vs. 75% overall), that our diet has a major impact on the balance of our microbiota (81% vs. 74% overall), and that it plays an important role in immune defense mechanisms (78% vs. 72% overall).

**Brazilians and Chinese (both 64%) are among those who declare having adopted the most specific behaviors to preserve the balance of their microbiota (62%).** In fact, they are the most knowledgeable about what needs to be done to achieve this (with a score of 4.3/7 on the knowledge test, the highest). They are the most aware of the importance of a balanced diet (90%) and physical activity (83%). What's more, they are particularly aware of the importance of consuming probiotics (80% vs. 62% overall) and prebiotics (70% vs. 51% overall).

**Mexicans, and to a lesser extent Brazilians and Chinese, are much more likely than others to link certain health problems to their microbiota.** Of the 8 medical problems tested, there are 5 for which a majority of Mexicans make the link with the microbiota. This is the case, for example, for post-antibiotic diarrhea (66%), urogenital infections (62%), episodes of intestinal disorders (69%) and digestive system disorders (65%).

**In addition, Mexicans talk a great deal to healthcare professionals on this subject, reporting that they are much more likely to be prescribed probiotics and prebiotics by their doctor (71% vs. 46% overall), to have had the right behaviors explained to them to maintain a good balance within their microbiota (63% vs. 44% overall), or to have been made aware of the**

importance of preserving the balance of your microbiota as much as possible (56% vs. 42% overall).

**Mexico, and to a lesser extent Brazil and China, are the 3 countries where knowledge and adoption of the right behaviors are now at the most advanced levels, even if there are still areas for improvement.** For example, poor knowledge of douching is now a major problem in China (only 19% of women know not to do it, and that it's very bad for the vaginal microbiota).