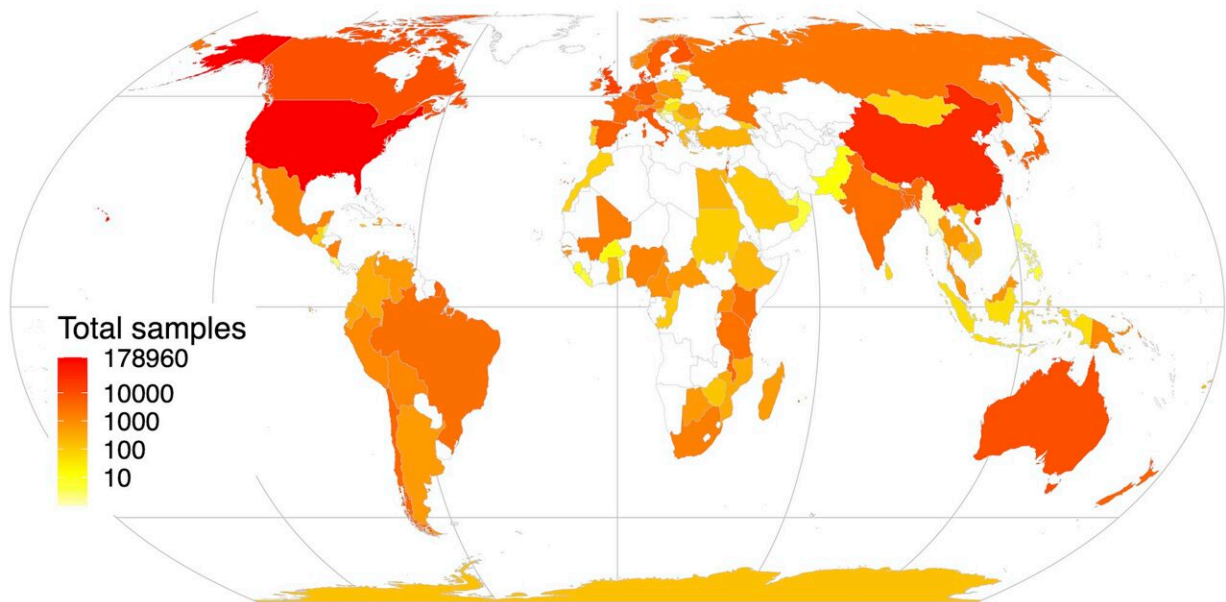


Human microbiome research excludes developing world

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A map illustrating the global distribution of publicly available human microbiome samples. Dark red indicates the highest number of samples, followed by orange and yellow with the fewest. White areas of the map indicate countries with no samples found. Credit: Abdill RJ et al., 2022, *PLOS Biology*, CC-BY 4.0 (creativecommons.org/licenses/by/4.0/)

New studies emerge daily on the effect of the human microbiome on human health: colon cancer, ulcers, and cognitive conditions such as Alzheimer's disease have been associated with the communities of microbes that live in our bodies. However, global research into the

human microbiome is heavily biased in favor of wealthy countries such as the United States and United Kingdom, according to a study publishing February 15th in the open-access journal *PLOS Biology* by Richard Abdill, Elizabeth Adamowicz and Ran Blekhman at the University of Minnesota.

The authors evaluated global repositories of DNA sequencing data used to measure [microbiome](#) content and found that almost half of all publicly available samples come from subjects in the U.S., even though that country represents only 4.3 percent of the [global population](#). These findings raise questions about whether advances in the field will be applicable to countries that have fewer resources and populations that don't receive as much attention in the literature.

The "[human microbiome](#)" refers to the communities of microorganisms living on and in the [human body](#)—estimates suggest a person's human cells are greatly outnumbered by the trillions of bacteria making up their microbiome, living everywhere from the small intestine to the surface of the eyeball.

Research shows that these microbes have extensive interactions with their human hosts and have wide-ranging effects, both positive and negative. Some gut microbes, for example, help break down food into nutrients that humans cannot naturally access, while others have been linked to conditions such as inflammatory bowel disease, stomach cancer, and diabetes. Accordingly, billions of dollars have been invested in researching these relationships since the early 2000s. To understand where this funding was being used, the Minnesota researchers inventoried more than 440,000 samples of human microbiome data shared in international repositories maintained by organizations such as the National Institutes of Health in the United States and Japan's National Institute of Genetics.

"Interest in the human microbiome has been growing worldwide," said Richard Abdill, the study's lead author. "When we look at how the field is developing, who is being included, and where resources have been allocated, it is clear that our understanding of the 'human' microbiome does not include most humans. Our study is a step towards quantifying this disparity."

There are many reasons for these disparities, such as economic and political factors that impact scientific research, and logistical difficulties with performing research in countries with less infrastructure. However, the microbiome is in turn influenced by factors such as genetics, geography, diet, and lifestyle, making it important to study many populations to find links to [human health](#). Because of this, the authors maintain that the exclusion of the developing world from microbiome research threatens to create a situation in which future microbiome-based medical treatments may only be effective for people in some countries or populations.

Of the samples for which a country of origin could be determined, the researchers found more than 71 percent came from Europe and North America, almost five times as many as would be expected given their [population](#). Central and Southern Asia was the most underrepresented region: Though more than 2 billion people live in countries such as India, Pakistan, and Bangladesh, only 13,620 microbiome samples were available from that region, or 1.5 percent of samples from almost 26 percent of the world's population. No samples at all were found from countries such as Algeria, Yemen, Afghanistan, and Kazakhstan.

Blekhman adds, "Interest in the human microbiome has been growing quickly, but there are conspicuous gaps in where that interest is being directed. Our study investigated all publicly available human microbiome samples—almost half a million samples—to quantify these gaps. We found that our understanding of the 'human' microbiome

leaves out a lot of the humans."

More information: Abdill RJ, Adamowicz EM, Blekhman R (2022) Public human microbiome data are dominated by highly developed countries. *PLoS Biol* 20(2): e3001536.
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