Gut Health Research Opens Market Opportunities

Recent microbiome research drives startups to develop D2C wellness solutions focused on improving gut health

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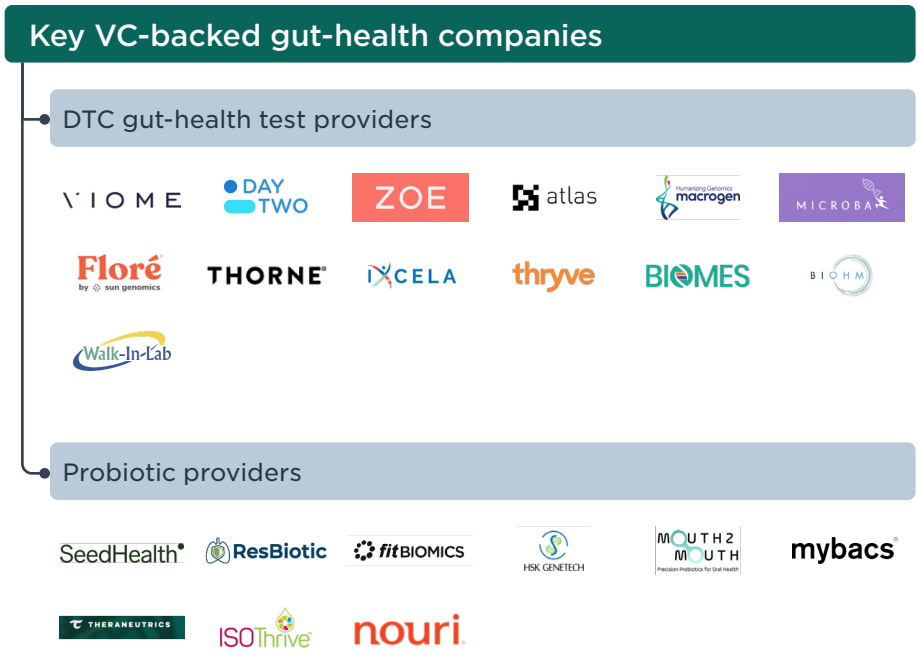
Introduction

The concept and study of the human microbiome is relatively new. It started in 2007 when the Human Microbiome Project (HMP) began to unearth the potentially massive role microbiota plays in overall health. Microbiome research now attracts ample funding from governments and nongovernmental organizations (NGOs). As a result, startups are applying the insights discovered by academic institutions, governmental organizations, and pharmaceutical companies to conduct proprietary research and develop direct-to-consumer (D2C) wellness solutions. These solutions tend to focus on providing consumers with testing kits that can help inform personalized health recommendations and the use of probiotic supplements. We are cautious on the market outlook as there is little independent research to support some of the claims being made by providers. Positive research could dramatically increase the size of the market, but there is no clear timeline for when or if such findings may occur. In the meantime, the industry may struggle to gain mainstream traction.

We estimate the market will generate around $12.5 billion in 2025. Key factors propelling growth include increasing prevalence of health conditions such as diabetes, depression, and heart disease; heightened preventative health engagement; rising medical costs; and increased microbiome research. This note provides a market map of VC-backed startups, explains the factors driving and hindering the industry, and provides a market outlook.



Market size

Microbiome research is just beginning, which makes it difficult to define the space's future market size. However, based on current microbiome research, we value the market at around $58 billion and estimate it will reach $100 billion in 2025.

Market components

- The total market for at-home tests was valued at about $9.1 billion in 2020, up from $7.9 billion in 2019, driven by COVID-19 at-home tests and the increased prominence of virtual care. Without impactful research, we do not expect at-home gut-health tests to drive the at-home testing market; we anticipate at-home gut test providers to generate around $1 billion in 2025. Increased individual, provider, and insurer comfortability could increase the market opportunity for at-home gut-health test providers.

- The total market for dietary supplements is expected to reach $198.0 billion in 2025, with probiotic supplements accounting for 5.8% of the market, or $11.5 billion. Future research could result in probiotic supplement providers gaining or losing market share to other dietary supplements.

Industry drivers

Increased government funding for research

The concept and study of the human microbiome began when the National Institutes of Health (NIH) invested $215.0 million into HMP between 2007 and 2016 to understand how microbial flora affects human health and disease.[1] Since then, governments globally have invested.

Government funding for microbiome research

Project/initiative	Dates	Funder	Focus	Capital invested (M)
Metagenomics of the Human Intestinal Tract project (MetaHIT)	2008 to 2012	European Commission	Gut bacteria	EU contribution €11.4[2]
MetaCardis (Metagenomics in Cardiometabolic Diseases)	2012 to 2018	EU	Gut microbes in cardiometabolic diseases	EU contribution €12.0[3]
Horizon	2014 to 2020	EU	To invest across various projects	$96.9[4]
Additional Microbiome project investment (not-HMP)	2012 to 2016	NIH	Varies	$728[5]
National Microbiome Initiative	Launched 2016-present	US	Microbiome impact on healthcare, food production, and environmental restoration.	$121 in federal funds[6]
Million Microbiome of Humans Project (MMHP)[7]	Launched 2019, three- to five-year completion target	China	Sequence & analyze up to 1 million microbial samples	TBD

Source: European Commission, MetaCardis, National Library of Medicine, The White House President Barack Obama, National China GeneBank, Markets and Markets

Increased prevalence of chronic diseases, raising medical costs, and heightened focus on preventative health actions

US health spending is projected to grow at an average annual rate of 5.4% for 2019 to 2028, reaching $6.2 trillion by 2028.[8] Studies have found links between the gut microbiome and chronic diseases, including depression, obesity, type 2 diabetes, and certain types of cancer.[9] Microbiome tests could help individuals determine the variability of their gut bacteria in response to diet, possibly minimizing risk of chronic diseases and related medical costs. Probiotics could potentially help maintain a healthy gut.

1: "A Review of 10 Years of Human Microbiome Research Activities at the US National Institutes of Health, Fiscal Years 2007-2016," National Library of Medicine, NIH Human Microbiome Portfolio Analysis Team, February 26, 2019.
2: "Metagenomics of the Human Intestinal Tract," European Commission, last updated July 16, 2019.
3: "Consortium," MetaCardis, n.d.
4: "Human Microbiome Market by Product (Prebiotics, Probiotics, Food, Diagnostic Tests, Drugs), Application (Therapeutic, Diagnostic), Disease (Infectious, Metabolic/Endocrine), Research Technology (Genomics, Proteomics, Metabolomics) - Global Forecast to 2028, Markets and Markets, n.d.
5: "A Review of 10 Years of Human Microbiome Research Activities at the US National Institutes of Health, Fiscal Years 2007-2016," National Library of Medicine, NIH Human Microbiome Portfolio Analysis Team, February 26, 2019.
6: "Announcing the Microbiome Initiative," The White House, President Barack Obama, Jo Handlesman, May 13, 2016.
7: "Million Microbiomes from Humans Project," National China GeneBank, n.d.
8: "NHE fact sheet," Centers for Medicare & Medicaid Services, last updated December 16, 2020.
9: "Part 1: The Human Gut Microbiome in Health and Disease," Integrated Medicine, Matthew J. Bull and Nigel T. Plummer, December 13, 2014.; "Cancer and the Gut Microbiota: An Unexpected Link," Science Transitional Medicine, Laurence Zitvogel, et al., January 21, 2015. ; "Gut Microbiome and Depression: How Microbes Affect the Way we Think," Cureus, Therese Limbana, Farah Khan, Noha Eskander, August 23, 2020.

Background: Explaining the microbiome

The gut microbiome consists of all living organisms in the gastrointestinal tract (including bacteria, protozoa, and fungi). There are over 1 trillion types of microbiota, and together they function as an additional organ. A person's microbiome is first created during birth and quickly develops during infancy. By age three, a stable, adult-like community is developed, and you can no longer tell a child's biome from an adult's.[10] However, gut microbiomes can differ from person to person, and they are continually altered throughout our lives by numerous factors, including stress, environment, diet, medications, age, and comorbid disease.[11]

With over 1,000 species of bacteria in each individual's gut microbiome, and with each one playing a different role, most studies focus on bacteria and analyze how bacterial gene function corresponds with human health and metabolism. Rapid advances in DNA sequencing technology have accelerated bacteria identification, and new technology allows researchers to analyze the impact of bacteria at an exponential rate. As research into the microbiome accelerates, more health conditions (such as inflammatory bowel disease, type 2 diabetes, multiple sclerosis, certain types of cancer, and depression) have been linked to an unbalanced microbial composition (dysbiosis).[12] However, the complexity of the microbiome and individual variance make it difficult to identify cause-effect relationships between these conditions and a person's gut bacteria.

Animal models suggest changing one's diet can influence the microbiome within a single day.[13] Therefore, we believe DTC gut-health startups will likely focus on influencing the microbiome through diet.

Emerging technologies poised to benefit

Personalized probiotic supplement providers

According to Grand View Research, the global probiotics market, which includes food and supplements, is expected to grow at 6.9% to $77.1 billion in 2025.[14] Probiotic supplement providers stand to benefit from increased awareness and research related to the microbiome's impact on health. Startups are leveraging microbiome research and trends to develop over-the-counter and therapeutic products. For example, Fitbiomics decodes the microbiome of elite athletes to develop performance-enhancing probiotics. IsoThrive develops prebiotics to modulate the gut microbiome and promote digestive health. Seed Health initially sold probiotics; however, it recently raised a $40.0 million Series A to expand into clinical research and novel therapeutics. Pendulum, Seed Health, and Jetson formulate various probiotics aimed at lowering glucose, boosting immunity, and maintaining cardiovascular health.

10: "Development of the Gut Microbiome in Infancy and its Impact on Health Later in Life," Allergology International, Masaru Tanaka, Jiro Nakayama, October 2017.
11: "Current Understanding of the Human Microbiome." Nature medicine, Gilbert, Jack A et al., April 10, 2018.
12: "Part 1: The Human Gut Microbiome in Health and Disease," Integrated Medicine, Matthew J. Bull and Nigel T. Plummer, December 13, 2014.
13: "The Effect of Diet on the Human Gut Microbiome: A Metagenomic Analysis in Humanized Gnotobiotic Mice," Science Transitional Medicine, Peter J. Turnbaugh et al., November 11, 2009.
14: "Probiotics Market Growth & Trends," Grand View Research, June 2019.

D2C at-home gut-health tests

At-home gut-health test providers inform consumers which bacteria inhabit their gut. These kits can also recommend dietary changes and predict future health disorders. Founded in 2016, Viome sells a $199 "Health Intelligence Kit" and a $199/month subscription plan that includes vitamins, probiotics, and two Health Intelligence tests per year. It has over 200,000 customers and expects to hit $100 million in revenue in 2022. Another at-home gut-health test company, ZOE, released its first test kit in 2022.[15] The kit analyses gut health, blood fat, and blood sugar reactions to food to provide ongoing, personalized nutritional advice. Interim clinical trial results reveal participants lost an average of 11 pounds after three months following their personalized plan.[16]

Considerations

Further research needed to support claims

Existing gut microbiome research by governments and third parties (such as NGOs and therapeutic developers) is compelling but nascent. If research demonstrates the ability to manage weight through the microbiome, gut-health solutions could easily take market share from the $72 billion weight loss market.[17] However, if further research does not support current claims or prove the ability to impact health through the gut, the market will dissipate for both probiotic and gut-health test providers. Discovering causation between lifestyle changes, microbiota, and overall health may take years. Since there are over 1 trillion species of microbiota—and various studies suggest individuals only share a small percentage of those species—analyzing specific bacteria strains presents a challenging task.

Previous D2C test provider failures raise red flags

In 2019, two early-stage microbiome companies shut down. The first, uBiome, declared bankruptcy after being raided by the Federal Bureau of Investigation in 2019. The company's co-founders are accused of defrauding investors of $60 million by making false claims about the company's prospects.[18] The second, Arivale, evaluated genetic, blood markers, microbiome, and lifestyle data to deliver personalized recommendations. After securing a $136.0 million post-money valuation, Arivale shut down in April 2019. Arivale's CEO reported that high customer-acquisition and genetic-testing costs, lack of consumer interest, and staying too focused on its flagship offering instead of launching lower-cost, simpler programs caused its closure.[19] While neither of these failures signify an end to the microbiome opportunity, they may make investors more cautious.

15: "Marc Benioff-backed Microbiome Startup Viome Says it Expects $100M in Revenue Next Year," TechCratic, Taylor Soper, April 15, 2021.
16: "Gut Health Company ZOE Lands $20M to Speed up Program Rollout," Mobile Health News, Mallory Hackett, May 6, 2021.
17: "The US Weight Loss & Diet Control Market," Research and Markets, March 2021.
18: "SEC Charges Co-Founders of San Francisco Biotech Company With $60 Million Fraud," US Securities and Exchange Commission, March 18, 2021.
19: "Why Arivale Failed: Inside the Surprise Closure of an Ambitious 'Scientific Wellness' Startup," GeekWire, Todd Bishop and James Thorne, April 26, 2019.

Outlook

DNA sequencing better fit for D2C market in the short term

Most D2C test providers (such as Thryve) analyze DNA. RNA sequencing is currently believed to provide greater insight and accuracy, but it has a higher price tag. Current costs inhibit the development of a market for D2C gut-health tests that sequence RNA. Over the long term, RNA sequencing costs will likely decrease, allowing D2C gut-health test providers to sequence the whole genome.

Risk-takers to cover gut-health solutions

We expect gut-health test providers to partner with employers, insurers, and physicians to provide low-cost products to consumers. To secure these partnerships, providers must prove causation between a health solution and decreased health costs. DayTwo originally sold D2C, but the company now sells its gut-health solution to employers, health plans, and providers. Selling to businesses allows DayTwo to charge a higher price and use whole-shotgun sequencing, a method used to sequence random DNA strands.

Increased integration between gut-health test providers and other healthtech solutions

Unlocking personalized wellness advice will likely rely on numerous datapoints (such as data surrounding activity levels, sleep, medications, genomes, microbiomes, and glucose levels) from multiple devices, tests, and systems. We anticipate that gut-health test providers will integrate with electronic health records, biometric tracking devices, and data analysis providers.

Researchers likely to leverage gut-health test data

Gut microbiomes can vary 100% person-to-person, creating research barriers for companies looking to delve into the space.[20] Researchers may utilize test result data to understand microbiota trends and develop therapeutics. Consumer privacy laws make it illegal to sell health data, but test providers could partner with researchers and pharmaceutical companies or develop proprietary research/therapeutic development departments, as D2C genetic test providers have done. 23andMe and Ancestory.com, originally at-home genetic test providers, now utilize their genomic databases for drug development.

Gut-health test providers to sell supplements

D2C gut-health test providers can increase revenues by selling targeted supplements to users. Flore (Sun Genomics) tests its consumers' gut microflora and uses the results to formulate a personalized probiotic. Biome and Thryve sell gut testing kits, which provide supplement and health recommendations. Consumers may use these insights to purchase supplements from their platforms or third-party retailers.

20: "Our Second Genome," Imagine Magazine, Johns Hopkins University Center for Talented Youth, Rob Knight and Daniel McDonald, September 2013.

Subscription gut-health solutions

The human gut microbiome continually changes, which allows providers to develop subscription plans that offer reoccurring tests and personalized health tracking solutions. For example, nutrition tracking apps could integrate gut-health test results to build nutrition plans and provide ongoing diet tracking. Some companies have taken his route. Viome offers "Precision Supplements Complete with Health Intelligence" for $199/month, which includes a health intelligence kit shipped every six months, as well as supplements and probiotics shipped monthly. The company also offers a "Precision Probiotics + Prebiotics with Viome's Gut Intelligence™ Test" for $59/month, which includes an initial gut-intelligence test and monthly probiotics.

Success of gut-health industry threatens chronic care management providers

The market opportunity for chronic-illness-management companies may be threatened if gut-health companies successfully minimize the number of individuals with chronic illnesses. Furthermore, nutrition and fitness advice and tracking providers may need to implement new findings related to gut health and/or leverage individual gut-health test data to remain competitive.