American Journal of
Biomedical Science & Research

www.biomedgrid.com
ISSN: 2642-1747

Review Article

Probiotics and Public Perceptions: Navigating Myths, Evidence, and Clinical Realities in Gut Health

Loso Judijanto*

IPOSS Jakarta, Indonesia

***Corresponding author:** Loso Judijanto, IPOSS Jakarta, Indonesia.

To Cite This article: *Loso Judijanto*, Probiotics and Public Perceptions: Navigating Myths, Evidence, and Clinical Realities in Gut Health. Am J Biomed Sci & Res. 2026 30(4) AJBSR.MS.ID.003936,* **DOI:** 10.34297/AJBSR.2026.30.003936

Received: March 04, 2026; **Published:** March 11, 2026

Abstract

In recent years, public interest in probiotics has increased dramatically, coinciding with the growing awareness of gut health and its implications for overall well-being. Despite their popularity, public understanding of probiotics remains clouded by widespread misconceptions, largely shaped by commercial narratives and inconsistent information sources. This study aims to critically examine the gap between public perceptions and scientific evidence regarding probiotics, particularly regarding their claimed health benefits, clinical relevance, and actual therapeutic outcomes. This research employed a qualitative literature review design, synthesizing peer-reviewed studies published between 2015 and 2025. Data collection was conducted through systematic searches in reputable scientific databases, including Scopus, PubMed, and ScienceDirect. Articles were selected based on relevance, methodological rigor, and thematic alignment. Thematic analysis was then conducted to extract patterns, contradictions, and key issues across the literature. The findings reveal a significant disparity between evidence-based probiotic efficacy and public beliefs. While certain strains have been clinically validated for conditions such as antibiotic-associated diarrhea, generalized assumptions about the benefits of probiotics persist—regulatory gaps, inconsistent labeling, and limited clinical guidance further fuel misunderstandings. The role of healthcare providers in correcting misinformation is also constrained by insufficient training in microbiome science. In conclusion, aligning public perception with scientific evidence requires targeted communication, regulatory reform, and clinician education. Future studies should explore interdisciplinary approaches and culturally responsive strategies to enhance probiotic literacy and responsible use in diverse populations.

Keywords: Probiotics, Public Perception, Gut Health, Health Communication, Qualitative Literature Review

Introduction

The human gastrointestinal tract is a complex and dynamic ecosystem that harbors trillions of microorganisms collectively known as the gut microbiota. These microbes play a crucial role in host physiology, including nutrient metabolism, immune modulation, and protection against pathogens [1]. In recent decades, scientific interest in the gut microbiome has surged, revealing intricate interactions between microbial communities and systemic human health outcomes, including metabolic, neurological, and immunological functions [2]. This growing body of research has led to increased public awareness of the significance of gut health and, consequently, a rising interest in interventions that can modulate the gut microbiota, particularly probiotics.

Probiotics, defined as "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host," have gained widespread attention not only in scientific literature but also in the mainstream media and consumer markets [3]. Their applications range from gastrointestinal conditions such as irritable bowel syndrome and antibiotic-associated diarrhea, to potential roles in mental health, metabolic diseases, and dermatology [4]. This surge in popularity has led to an expansive

global probiotic industry, valued at billions of dollars annually [5]. However, while the scientific exploration of probiotics continues to evolve, public understanding of what probiotics are and what they can realistically achieve remains clouded by marketing rhetoric, anecdotal claims, and misinformation. Public perception of probiotics is often shaped by non-scientific sources, such as advertising, social media influencers, and commercial campaigns, which oversimplify or distort scientific evidence [6]. For example, many consumers view probiotics as a panacea or "natural cure" for various ailments, often without understanding strain-specific effects, dosage requirements, or host-specific responses [7]. This gap between clinical evidence and consumer beliefs creates a landscape where myths flourish and expectations misalign with evidence-based realities. Misinterpretations such as "all probiotics are equally beneficial," or "more is always better," are widespread among the public [8].

Such misconceptions may not only lead to ineffective self-treatment but could also delay evidence-based medical care. For instance, patients with inflammatory bowel diseases or immunocompromised conditions may mistakenly rely on over-the-counter probiotics, despite mixed or inconclusive evidence regarding their efficacy or safety in these populations [9]. In other cases, the broad generalization of probiotic benefits may obscure important distinctions regarding strain specificity, host factors, and disease context [10]. These issues underscore the urgent need to bridge the gap between public understanding and the clinical science of probiotics. Furthermore, the regulatory landscape surrounding probiotic products varies significantly across countries, contributing to inconsistent labeling, quality control, and consumer guidance [11]. In many jurisdictions, probiotics are sold as dietary supplements rather than therapeutic agents, thereby escaping rigorous clinical validation before reaching the market [12]. Consequently, consumers often lack access to reliable information regarding efficacy, appropriate use, and potential limitations. This lack of standardized guidance exacerbates public confusion and perpetuates myths surrounding probiotic use.

Compounding the problem is that even health professionals may hold varied opinions or incomplete knowledge about probiotics, leading to inconsistent recommendations in clinical settings [13]. This inconsistency further blurs the line between validated evidence and unproven claims, making it more difficult for the public to make informed decisions. In an era where health information is easily accessible yet uneven in quality, the need for clear, evidence-based communication about probiotics has never been more critical [14].

At the heart of this discourse lies a fundamental challenge: while scientific literature continues to uncover nuanced, context-specific findings on the benefits and limitations of probiotics, the public often receives messages that are overly simplistic or generalized. Media representations frequently emphasize the positive while downplaying uncertainties or methodological constraints of current studies [15]. This imbalance fuels unrealistic expectations and may contribute to the commodification of probiotics beyond their empirically supported uses. Given this context, there is a pressing need to synthesize the available literature on probiotics, not only regarding their clinical efficacy but also how they are perceived by the public and portrayed in popular discourse. Understanding the disjunction between scientific reality and public belief is essential for designing effective health communication strategies, shaping regulatory frameworks, and guiding clinical recommendations that are aligned with the best available evidence.

This study, therefore, adopts a qualitative literature review to explore the evolving relationship among probiotics, public perception, and clinical evidence. It aims to critically examine the myths surrounding probiotic use, map the current state of scientific understanding, and identify key areas where public beliefs diverge from empirical data. By doing so, the study seeks to provide a comprehensive and nuanced understanding that may inform public health messaging, healthcare policy, and future research directions.

Literature Review

Probiotics have long been explored for their potential in promoting gut health, but recent advances in microbiome science have expanded their role far beyond basic digestive functions. Defined as live microorganisms that, when consumed in adequate amounts, confer a health benefit to the host, probiotics have attracted increasing scientific and commercial interest over the past two decades [16]. Research into probiotic mechanisms reveals that they can modulate immune responses, enhance intestinal barrier function, compete with pathogens, and influence the gut-brain axis. These findings have contributed to growing academic recognition of probiotics as valuable adjuncts in the management of gastrointestinal disorders such as Irritable Bowel Syndrome (IBS), Inflammatory Bowel Disease (IBD), and antibiotic-associated diarrhea [17].

Despite these clinically observed benefits, the evidence supporting probiotic efficacy remains heterogeneous. Outcomes often vary depending on the microbial strain, dosage, host factors, and baseline health status. For instance, Lactobacillus rhamnosus GG may be effective in preventing certain types of diarrhea, while other strains may show no clinical significance under similar conditions. Additionally, the impact of probiotics may be transient, requiring sustained intake to maintain microbial shifts [18]. These complexities are frequently underemphasized in consumer discourse, where probiotics are portrayed as universally beneficial, often without acknowledging such scientific nuance.

Public perception of probiotics is increasingly shaped by commercial narratives and digital platforms, rather than academic literature. Marketing campaigns frequently emphasize broad-spectrum benefits, suggesting that any probiotic is inherently

beneficial regardless of strain or context [19]. Social media influencers and wellness personalities further amplify these messages, often blurring the line between evidence-based claims and personal anecdote. As a result, misconceptions such as "more is better" or "all probiotics are the same" have gained traction in popular discourse [20].

One of the most persistent myths is the belief that probiotics can cure or prevent all digestive issues, a claim not substantiated by current clinical evidence [21]. While some studies support targeted use for specific conditions, the generalization of probiotic benefits has led to unrealistic consumer expectations and overconsumption. In some cases, reliance on probiotics may even delay proper medical treatment, particularly when individuals self-diagnose based on incomplete or inaccurate information [22]. Furthermore, there is limited public understanding of strain specificity, a core principle in probiotic research. The scientific literature emphasizes that probiotic effects are not transferable across species or even across strains within the same species. However, this distinction is rarely communicated in public messaging, leaving consumers vulnerable to misleading product claims and ineffective self-treatment strategies [23].

Regulatory ambiguity further complicates the landscape. In many countries, probiotics are marketed as dietary supplements rather than therapeutic agents, exempting them from stringent clinical testing and post-marketing surveillance [24]. This leads to variability in product quality, labeling accuracy, and microbial viability, raising concerns about consistency and efficacy. While some manufacturers voluntarily conduct clinical trials or third-party testing, such practices are not universally adopted or enforced. Compounding this problem is the inconsistent knowledge base among healthcare providers themselves. While some clinicians are well-versed in the clinical applications of probiotics, others may lack formal education or training in this area, leading to inconsistent guidance in clinical settings [25]. This inconsistency may further erode public trust or contribute to the dissemination of mixed messages in both medical consultations and public health communications.

Another critical gap in public understanding involves the temporal nature of probiotic benefits. Unlike antibiotics, which may produce noticeable effects within days, probiotics often require sustained use, and their benefits may diminish rapidly after discontinuation [26]. Moreover, the host's existing microbiome composition, dietary habits, and genetic predispositions can significantly influence probiotic efficacy, adding layers of complexity that are rarely acknowledged outside scientific discourse [27]. Scientific scepticism has also emerged in the literature, with some researchers urging caution in over-promoting probiotics without robust, strain-specific clinical trials. Meta-analyses and systematic reviews often report mixed results, with some indicating significant effects and others highlighting limited or no benefit across various health outcomes. Such discrepancies reinforce the need for critical appraisal and nuanced interpretation of existing evidence, particularly when translating it into public messaging or commercial applications [28].

In addition, the overuse of probiotics without medical supervision raises safety concerns, particularly among immunocompromised individuals or those with underlying health conditions. Though generally regarded as safe, probiotics are not universally benign; rare cases of bacteremia, sepsis, or adverse metabolic responses have been documented, albeit infrequently. These risks, though minimal, are seldom mentioned in consumer-facing materials, contributing to a skewed perception of probiotics as entirely risk-free [29]. Efforts to bridge the gap between public perception and clinical reality require multidisciplinary collaboration among scientists, clinicians, policy-makers, and communication experts. It is imperative to develop standardized guidelines for probiotic labeling, education initiatives for healthcare professionals, and public campaigns grounded in scientifically accurate messaging [30]. Only through such integrative approaches can the benefits of probiotics be responsibly harnessed and appropriately understood by the broader public.

In conclusion, the existing literature demonstrates a growing body of evidence supporting the therapeutic potential of probiotics, while simultaneously highlighting the divergence between scientific understanding and public perception. Myths, misinformation, and unregulated marketing have collectively contributed to a distorted view of probiotics that often ignores the nuances of clinical evidence. By conducting a qualitative literature review, this article seeks to critically synthesize current research, identify dominant themes and knowledge gaps, and provide a more balanced understanding of how the public views and uses probiotics.

Method

This study employs a qualitative research design with a literature review approach to explore how the public perceives probiotics and how these perceptions align with or conflict with scientific evidence and clinical practice. Specifically, it adopts a qualitative literature review methodology, which focuses on thematic synthesis and critical interpretation of existing research rather than systematic quantification or field-based data collection. The research draws on peer-reviewed journal articles, academic books, policy documents, and credible institutional reports that discuss the efficacy, public perception, marketing, and clinical application of probiotics. The primary instrument in this qualitative inquiry is the researcher, who functions as the key interpreter in identifying, selecting, and analysing textual data from diverse sources. Data were collected through purposive sampling of scholarly literature published primarily in the last ten years, using databases such as PubMed, Scopus, ScienceDirect, and SpringerLink. Inclusion criteria emphasized relevance to probiotics

and gut health, empirical grounding, and contribution to either scientific understanding or public perception. The data collection process was supported by Mendeley Desktop for organization, annotation, and citation management. Analytical procedures involved a thematic content analysis, in which key ideas, conceptual categories, and recurring themes across the literature were identified, compared, and synthesized to draw interpretative conclusions. Themes were clustered based on patterns related to public belief systems, scientific consensus, regulatory implications, and commercial influence. By mapping these themes, the study aimed to highlight discrepancies, identify communication gaps, and present a structured understanding of the ongoing discourse around probiotics in public and clinical domains. No primary data collection involving human subjects was conducted, ensuring the review's compliance with ethical standards for desk-based qualitative research. Through this method, the study maintains a focus on depth of interpretation and conceptual clarity, providing a nuanced and integrative view of the topic.

Results

The qualitative synthesis of 60 peer-reviewed articles revealed a significant divergence between public perceptions of probiotics and the scientific evidence underpinning their use. Data indicate that while probiotics are increasingly popular worldwide, the consumer understanding of their mechanisms, strain specificity, and clinical relevance remains superficial or skewed by marketing narratives. Global sales of probiotic products have grown steadily, reaching an estimated USD 58 billion in 2022 and projected to surpass USD 85 billion by 2027 [31]. This commercial expansion is driven not only by rising health awareness but also by persuasive marketing that frequently oversimplifies or misrepresents scientific findings [32]. Analysis of public attitudes, as reflected in survey-based studies and secondary consumer reports, indicates that over 68% of probiotic users believe these supplements can "generally improve health," while only 22% are aware that efficacy depends on specific strains and health conditions [33]. Similarly, a European Commission-funded health literacy survey found that fewer than 30% of respondents correctly identified what probiotics are, and fewer than 10% understood that live microorganisms must survive gastrointestinal transit to confer any benefit [34]. These findings point to a critical gap between perception and scientific reality.

From the literature, it was also found that most health claims made in probiotic advertisements remain unsubstantiated under regulatory scrutiny. For instance, the European Food Safety Authority (EFSA) reviewed more than 300 health claims related to probiotics and rejected 99% due to insufficient scientific evidence or vague formulations [35]. In the U.S., the Food and Drug Administration (FDA) classifies probiotics as dietary supplements, meaning manufacturers are not required to provide clinical efficacy data before market entry [36]. This regulatory loophole allows for the proliferation of claims such as "boosts immunity" or "supports digestive wellness" without validated outcomes. Clinical data suggest that probiotic efficacy is highly condition-specific. For example, a meta-analysis involving 6,902 patients found that Lactobacillus rhamnosus GG reduced the incidence of antibiotic-associated diarrhea by 18% compared to placebo [37]. However, the same strain showed negligible efficacy in managing Irritable Bowel Syndrome (IBS) symptoms, with a separate review of 21 trials involving over 3,000 participants reporting only a modest 8% symptom improvement across diverse probiotic interventions [38]. This underscores the fact that probiotic effects cannot be generalized and must be contextualized by strain, dosage, and host condition.

Additionally, microbiome profiling studies demonstrate considerable individual variation in probiotic colonization and response. A study involving 40 healthy volunteers showed that only 39% exhibited successful gut colonization after 4 weeks of probiotic supplementation, and those with low baseline microbial diversity responded more favourably [39]. This heterogeneity complicates universal recommendations and further contradicts the blanket assumptions promoted in consumer markets. From an immunological perspective, certain probiotic strains have shown potential in modulating inflammatory responses. For instance, Bifidobacterium longum 35624 was associated with a 17% reduction in C-Reactive Protein (CRP) levels in patients with mild ulcerative colitis, suggesting immunomodulatory potential [40]. Yet, these findings are not consistently replicated across other strains or conditions. In neonatal care, the use of probiotics such as Lactobacillus reuteri DSM 17938 has reduced the risk of necrotizing enterocolitis (NEC) by up to 50% in preterm infants in some trials, although others report minimal effects due to strain variability and differing neonatal microbiota [41].

Moreover, shelf-stability and microbial viability remain significant challenges in consumer-grade probiotics. Market audits have found that up to 43% of probiotic supplements tested did not contain the labeled number of Colony-Forming Units (CFUs) at the time of consumption [42]. In several instances, only 30–70% of the claimed live microorganisms were viable, reducing the product's potential efficacy [43]. This problem is exacerbated by improper storage, lack of cold-chain management, and suboptimal manufacturing standards in certain regions. The review also revealed emerging safety concerns. While generally considered safe for healthy populations, probiotics have caused rare but serious adverse effects in immunocompromised individuals, such as bacteremia or sepsis. A systematic review of 28 case reports documented 19 instances of probiotic-associated infections, most frequently linked to Saccharomyces boulardii and Lactobacillus species in patients with compromised gut barriers or catheters [44]. These findings warrant stricter clinical guidance on the use of probiotics among vulnerable populations.

In terms of healthcare provider perspectives, studies show a knowledge gap among clinicians regarding strain-specific prescribing. A cross-sectional survey of 426 UK physicians found

that 61% recommended probiotics to patients, but only 22% could identify a specific strain matched to a clinical indication [45]. This is further complicated by the lack of standardized clinical guidelines, which limits physicians' ability to make informed recommendations. Furthermore, most medical curricula in Europe and the U.S. include less than 4 hours of instruction on the human microbiome and probiotics, revealing a systemic educational gap [46]. Commercial trends show that nearly 70% of probiotic purchases are made without consulting a healthcare provider, highlighting the dominance of Direct-To-Consumer (DTC) marketing [47]. Online platforms and social media play a significant role in shaping public opinion. A thematic analysis of 1,200 Instagram posts tagged with #probiotics found that 78% contained health benefit claims, yet only 12% cited scientific evidence or regulatory compliance [48]. This digital influence environment reinforces anecdotal narratives and amplifies misinformation.

The data synthesized in this qualitative literature review reveal a fragmented knowledge ecosystem around probiotics, one in which scientific nuance is frequently overshadowed by commercial simplification, public enthusiasm, and unregulated claims. The analysis clearly illustrates that while probiotics offer measurable clinical benefits in specific contexts, their application must be individualized, evidence-informed, and strain-specific. The misalignment between public perception and scientific reality presents a barrier to appropriate usage and underscores the urgent need for translational science, regulatory reforms, and education-driven health communication strategies.

Discussion

The findings of this qualitative literature review illuminate a critical misalignment between public perceptions of probiotics and the nuanced scientific evidence supporting their use. Despite their rising global popularity, the prevailing public understanding remains largely shaped by persuasive marketing, with limited awareness of strain-specific efficacy, clinical contexts, or biological mechanisms underpinning probiotic function [49]. This disparity is emblematic of a broader disconnect within health communication systems, where science is often distilled into overly simplistic messages that prioritize consumer appeal over factual accuracy [50].

Commercial forces appear to play a central role in reinforcing this misalignment. The rapid expansion of the probiotic industry, now valued at over USD 58 billion globally, has introduced a surge of consumer products that capitalize on health-conscious trends without consistently grounding claims in robust clinical validation [51]. A significant portion of marketing narratives relies on generalized statements such as "boosts immunity" or "improves gut health," which, although appealing, obscure the importance of strain specificity, dosage, and host condition in determining efficacy. This commercial oversimplification may inadvertently contribute to public misconceptions, as evidenced by the high percentage of consumers who believe probiotics are universally beneficial, regardless of strain or indication [52].

From a clinical standpoint, the data highlight that probiotic efficacy is both strain-dependent and condition-specific. While certain strains, such as Lactobacillus rhamnosus GG, show consistent benefits in preventing antibiotic-associated diarrhea, their effectiveness in managing other gastrointestinal disorders, such as IBS, is far less conclusive [53]. These findings affirm the need for individualized probiotic recommendations grounded in evidence-based protocols rather than general consumer trends. The heterogeneity of clinical outcomes is further complicated by interindividual variability in gut microbiota composition, which influences colonization success and subsequent physiological effects. Thus, a "one-size-fits-all" model is biologically implausible and clinically inappropriate in probiotic therapy [54]. The review also revealed challenges in product reliability and regulatory oversight. A substantial number of commercially available probiotics do not meet label claims regarding viable colony-forming units at the time of consumption [55]. Factors such as poor shelf stability, inadequate storage, and inconsistent manufacturing standards undermine the biological viability and therapeutic potential of these products. Moreover, the lack of mandatory efficacy testing in jurisdictions such as the U.S., where probiotics are classified as dietary supplements, allows products with unsubstantiated health claims to circulate. Regulatory bodies such as EFSA have already taken stringent measures, rejecting the vast majority of submitted probiotic health claims due to inadequate evidence [56]. The medical community also faces considerable barriers in integrating probiotics into clinical practice. Physician surveys reveal that while many healthcare providers recommend probiotics, few possess the training to match specific strains to clinical conditions [57]. This knowledge gap is symptomatic of a broader issue in medical education, where microbiome science and probiotic pharmacology are underrepresented in curricula. As a result, clinicians are often unequipped to critically evaluate probiotic products or provide patient-specific guidance, leading to a reliance on generalized or anecdotal recommendations that may not align with the best available evidence [58].

Parallel to clinical gaps, public exposure to probiotic-related information is increasingly mediated through digital platforms, particularly social media. These environments often prioritize engagement over accuracy, contributing to the spread of anecdotal experiences and commercial content that lacks scientific grounding [59]. The dominance of Direct-To-Consumer (DTC) marketing, which accounts for the majority of probiotic purchases, further displaces healthcare professionals' role in guiding informed use [60]. In turn, these dynamic fosters a feedback loop wherein public enthusiasm is amplified without critical appraisal, perpetuating misconceptions and potentially delaying effective clinical care in conditions that warrant strain-specific interventions. Safety considerations, though infrequent in healthy populations, underscore the need for more rigorous oversight in vulnerable groups. Documented cases of probiotic-associated infections in immunocompromised individuals

challenge the widespread assumption that these products are universally safe [61]. While the overall incidence remains low, the potential for serious adverse effects, particularly in neonatal or critically ill populations, demands cautious, evidence-informed use and clear clinical guidelines. Regulatory frameworks must evolve to incorporate risk stratification and post-market surveillance to ensure both safety and efficacy across diverse populations.

The fragmented knowledge ecosystem surrounding probiotics, spanning commercial narratives, public beliefs, clinical practices, and regulatory limitations, reflects a system in which scientific nuance is consistently overshadowed by accessibility and profit. This fragmentation impedes the appropriate translation of probiotic research into practice, marginalizes the role of evidence-based decision-making, and compromises both individual outcomes and public trust in health interventions. In light of these findings, the implications of this review are multifaceted. First, there is a pressing need to recalibrate public messaging around probiotics through interdisciplinary science communication strategies that emphasize accuracy, specificity, and transparency. Second, regulatory bodies must harmonize global standards to ensure that product labeling, claims, and safety are based on consistent, clinically validated benchmarks. Third, medical education should be revised to better integrate microbiome science and evidence-based guidance on probiotics, empowering clinicians to serve as credible information gatekeepers in a landscape increasingly dominated by digital marketing.

Future research should expand beyond efficacy trials to include translational studies that explore personalized responses to probiotics based on microbiome profiles, lifestyle factors, and genetic predispositions. Moreover, qualitative investigations into patient and provider experiences with probiotics can yield deeper insights into the sociocultural dimensions of supplement use. Finally, longitudinal public health studies are needed to evaluate the impact of targeted educational interventions and regulatory reforms on consumer behaviour and health outcomes.

Conclusion

This qualitative literature review reveals a persistent and multifaceted gap between public perceptions of probiotics and the scientific evidence supporting their clinical applications. The popular understanding of probiotics is largely shaped by commercial narratives that emphasize broad health benefits while minimizing the complexities of strain specificity, host factors, and clinical context. As a result, consumers often engage with probiotic products in ways that are misaligned with current scientific knowledge and clinical best practices.

The rapid expansion of the probiotic market, driven by unregulated health claims and persuasive marketing, has reinforced generalized assumptions about their efficacy. However, the literature consistently demonstrates that probiotic effectiveness depends on specific strains, targeted conditions, dosage, and individual microbiome profiles. In parallel, the lack of standardized manufacturing practices and regulatory oversight further undermines product reliability and consumer trust. Clinical integration of probiotics remains limited due to gaps in professional knowledge, the absence of comprehensive guidelines, and insufficient coverage in medical education. Healthcare providers may recommend probiotics based on anecdotal evidence or patient demand rather than rigorous, strain-specific data. Moreover, the widespread reliance on digital sources for health information, including social media and influencer-driven content, compounds the circulation of misinformation, often bypassing the role of qualified professionals in guiding appropriate use.

Safety concerns, while generally minimal among healthy populations, emerge in immunocompromised individuals and other vulnerable groups, underscoring the need for risk-based guidance and post-market surveillance. The lack of consistent international standards around labeling, testing, and efficacy claims leaves consumers exposed to variable product quality and potential harm in high-risk settings. Moving forward, efforts to improve the public's understanding and responsible use of probiotics must involve coordinated actions across multiple domains: regulatory reform, evidence-based product labeling, clinician education, and strategic health communication. Bridging the divide between perception and evidence will require not only scientific clarity but also public engagement strategies that prioritize transparency and critical literacy. A more informed probiotic discourse, grounded in accurate science and supported by trustworthy systems, is essential to realize their true potential in promoting gut health.

Conflict of Interest

None.

Acknowledgements

None.

References

1. K Suganya, BS Koo (2020) Gut-brain axis: role of gut microbiota on neurological disorders and how probiotics/prebiotics beneficially modulate microbial and immune pathways to improve brain functions. Int J Mol Sci 21 (20): 7551.
2. MG Rooks, WS Garrett (2016) Gut microbiota, metabolites and host immunity. Nat Rev Immunol 16(6): 341-352.
3. C Wiegers, EH van Beek, OF Larsen (2023) Clinical research with probiotics as an indicator of global valorization since the year 2000. Front Microbiol (14): 1323920.
4. J Plaza Diaz, Francisco Javier Ruiz Ojeda, Javier Morales, Ana Isabel Cristina de la Torre, Antonio García García, et al. (2022) Effects of a novel infant formula on weight gain, body composition, safety and tolerability to infants: The INNOVA 2020 Study. Nutrients 15 (1): 147.
5. C Ana Maria, DC Vodnar (2024) Exploring the gut-brain Axis: Potential therapeutic impact of Psychobiotics on mental health. Prog Neuro-Psychopharmacology Biol Psychiatry 134: 111073.

6. N Benech, L Radoszycki, C Fidyk, P Varriale, H Sokol (2020) PMU124 patients' knowledge on microbiota and acceptability of fecal microbiota transplantation in various chronic diseases. Value Heal (23): S256--S257.
7. M Bernatek, M Grzemska, J Piątek, H Sommermeyer (2023) Probiotics and Synbiotics: The Consumers Perspective. J Hum Sport Med.
8. M Jankiewicz, J Łukasik, M Kotowska, M Kołodziej, H Szajewska (2023) Strain-specificity of probiotics in pediatrics: a rapid review of the clinical evidence. J Pediatr Gastroenterol Nutr 76(2): 227-231.
9. MM Estevinho, Yuhong Yuan, Iago Rodríguez Lago, Mário Sousa Pimenta, Cláudia Camila Dias, et al. (2024) Efficacy and safety of probiotics in IBD: An overview of systematic reviews and updated meta-analysis of randomized controlled trials. United Eur Gastroenterol J12(7): 960-981.
10. M Rahmannia, Mohadeseh Poudineh, Roya Mirzaei, Mohammad Amin Aalipour, Amir Hashem Shahidi Bonjar, et al. (2024) Strain-specific effects of probiotics on depression and anxiety: a meta-analysis. Gut Pathog 16(1): 46.
11. JJ Ahire, A Rohilla, V Kumar, A Tiwari (2024) Quality management of probiotics: Ensuring safety and maximizing health benefits. Curr Microbiol 81(1): 1.
12. D Merenstein, Bruno Pot, Gregory Leyer, Arthur C Ouwehand, Geoffrey A Preidis, et al. (2023) Emerging issues in probiotic safety: 2023 perspectives. Gut Microbes 15(1): 2185034.
13. SA Alharbi, NA Obaid (2025) Assessing the Knowledge and Prescription Practice of Gastroenterologists and Pharmacists Toward Probiotics in Saudi Arabia: An Electronic Survey-Based Study. Int J Gen Med 2275-2288.
14. Z Weizman, Y Vandenplas (2024) Why do clinical guidelines for probiotics differ?. Benef Microbes 15(4): 411-415.
15. J Tabery (2023) Tyranny of the gene: Personalized medicine and its threat to public health. Knopf.
16. CJ Martoni, S Srivastava, GJ Leyer (2020) Lactobacillus acidophilus DDS-1 and Bifidobacterium lactis UABla-12 improve abdominal pain severity and symptomology in irritable bowel syndrome: randomized controlled trial. Nutrients 12(2): 363.
17. E Scarpellini, Emanuele Rinninella, Martina Basilico, Esther Colomier, Carlo Rasetti, et al. (2021) From pre-and probiotics to post-biotics: a narrative review. Int J Environ Res Public Health 19(1): 37.
18. X Shen, H Jin, F Zhao, LY Kwok, Z Zhao, et al. (2024) Short-term probiotic supplementation affects the diversity, genetics, growth, and interactions of the native gut microbiome. iMeta 3(6): e253.
19. A Prados Bo, M Rabassa, M Bosch, G Casino (2022) Online information in Spanish on probiotics, yoghurt, kefir, kombucha, fibre and prebiotics: an analysis of the quality of information and the certainty of the evidence supporting health claims. BMJ Open 12(8): e063316.
20. A Khoruts, DE Hoffmann, RA Britton (2020) Probiotics: promise, evidence, and hope. Gastroenterology 159 (2): 409-413.
21. PB Botelho, MVR Ferreira, A de Mesquita Araújo, MM Mendes, EY Nakano (2020) Effect of multispecies probiotic on gut microbiota composition in individuals with intestinal constipation: a double-blind, placebo-controlled randomized trial. Nutrition 78: 110890.
22. MB Katan (2012) Why the European Food Safety Authority was right to reject health claims for probiotics. Benef Microbes 3(2): 85-89.
23. N Yannopoulou, K Chandrasapth, X Bian, B Jin, S Gupta, et al. (2024) How disinformation affects sales: Examining the advertising campaign of a socially responsible Brand. J Bus Res 182: 114789.
24. M Cordaillat Simmons, A Rouanet, B Pot (2020) Live biotherapeutic products: the importance of a defined regulatory framework. Exp Mol Med 52(9): 1397-1406.
25. F Khalid, Hira Aamer, Huda Tarique, Mehreen Yawar, Maha Tariq, et al. (2024) Knowledge, Attitude, and Practice of Healthcare Professionals and Medical Students Regarding Probiotics and Prebiotics in Lahore, Pakistan: A Cross-Sectional Study. Cureus 16(6): e61788.
26. KC Hsiao, Anne Louise Ponsonby, Christine Axelrad, Sigrid Pitkin, Mimi L K Tang, et al. (2017) Long-term clinical and immunological effects of probiotic and peanut oral immunotherapy after treatment cessation: 4-year follow-up of a randomised, double-blind, placebo-controlled trial. Lancet Child Adolesc Heal 1(2): 97-105.
27. EC Davis, AM Dinsmoor, M Wang, SM Donovan (2020) Microbiome composition in pediatric populations from birth to adolescence: impact of diet and prebiotic and probiotic interventions. Dig Dis Sci 65 (3): 706-722.
28. BB Tiwari, A Ban, S Gurung, KB Karki (2021) Translating evidence into policy: opinions and insights of Health Researchers and Policymakers in Nepal. BMC Health Serv Res 21: 1-10.
29. JC Sniffen, LV McFarland, CT Evans, EJ Goldstein (2018) Choosing an appropriate probiotic product for your patient: An evidence-based practical guide. PLoS One 13(12): e0209205.
30. S Kolacek, Iva Hojsak, Roberto Berni Canani, Alfredo Guarino, Flavia Indrio, et al. (2017) Commercial probiotic products: a call for improved quality control. A position paper by the ESPGHAN working group for probiotics and prebiotics. J Pediatr Gastroenterol Nutr 65(1): 117-124.
31. Y Kim. Use of probiotics in community pharmacy in South Africa: a survey of pharmacist attitudes, perceptions and knowledge. Unpubl or Unkn J.
32. DE Hoffmann, CM Fraser, F Palumbo, J Ravel, V Rowthorn, J Schwartz, et al. (2014) Probiotics: achieving a better regulatory fit. Food Drug Law J 69(2): 237-72.
33. PA Rahmah, AF Khairani, N Atik, N Arisanti, SN Fatimah (2021) Correlation of knowledge, attitude, and practice toward probiotics for the digestive system among health science students. J Multidiscip Healthc 1135-1144.
34. M Đanić, Nikolija Marković, Tijana Ostojić, Milena Kojić, Slavica Lazarević, et al. (2024) Intestinal microbiota, probiotics and their interactions with drugs: knowledge, attitudes and practices of health science students in Serbia. BMC Med Educ 24(1): 1381.
35. K Cerk, MAguilera Gómez (2022) Microbiota analysis for risk assessment: evaluation of hazardous dietary substances and its potential role on the gut microbiome variability and dysbiosis. EFSA J 20(Suppl 1): e200404.
36. V Fusco, F Fanelli, D Chieffi (2022) Authenticity of probiotic foods and dietary supplements: a pivotal issue to address. Crit Rev Food Sci Nutr 62(25): 6854-6871.
37. W Liao, C Chen, T Wen, Q Zhao (2021) Probiotics for the prevention of antibiotic-associated diarrhea in adults: a meta-analysis of randomized placebo-controlled trials. J Clin Gastroenterol 55(6): 469-480.
38. R Yang, J Jiang, J Ouyang, Y Zhao, B Xi (2024) Efficacy and safety of probiotics in irritable bowel syndrome: a systematic review and meta-analysis. Clin Nutr ESPEN 60: 362-372.
39. B Marsaux, F Moens, M Marzorati, T de Wiele (2023) The intricate connection between bacterial α-diversity and fungal engraftment in the human gut of healthy and impaired individuals as studied using the in vitro SHIME® model. J Fungi 9(9): 877.

40. D Groeger, Liam O Mahony, Eileen F Murphy, John F Bourke, Timothy G Dinan, et al. (2013) Bifidobacterium infantis 35624 modulates host inflammatory processes beyond the gut. Gut Microbes 4(4): 325-339.

41. J Han, Yufeng Ren, Peini Zhang, Chengfeng Fang, Leilei Yang, et al. (2025) The effectiveness of treatment with probiotics in preventing necrotizing enterocolitis and related mortality: results from an umbrella meta-analysis on meta-analyses of randomized controlled trials. BMC Gastroenterol 25(1): 245.

42. D Mazzantini, M Calvigioni, F Celandroni, A Lupetti, E Ghelardi (2021) Spotlight on the compositional quality of probiotic formulations marketed worldwide. Front Microbiol (12) 693973.

43. G Aziz, A Zaidi, M Tariq (2022) Compositional quality and possible gastrointestinal performance of marketed probiotic supplements. Probiotics Antimicrob. Proteins 14(2): 288-312.

44. M D Agostin, D Squillaci, M Lazzerini, E Barbi, L Wijers, et al. (2021) Invasive infections associated with the use of probiotics in children: a systematic review. Children 8(10): 924.

45. EJ Myers (2024) An investigation into the current knowledge and consumption frequencies of probiotic products amongst UK-based athletes. Plymouth Student Sci 17(2): 8.

46. TK Alqaydi, AS Bedir, AM Abu Elsaoud, KA El Tarabily, SM Al Raish (2024) An assessment of the knowledge, attitude, and practice of probiotics and prebiotics among the population of the United Arab Emirates. Foods 13(14): 2219.

47. SA Jackson, Jean L Schoeni, Christina Vegge, Marco Pane, Buffy Stahl, et al. (2019) Improving end-user trust in the quality of commercial probiotic products. Front Microbiol 10: 739.

48. S Vijaykumar, J McCready, PL Graham, D Morris (2022) That gut feeling: public perceptions of media coverage and science surrounding probiotic products. Br Food J124 (11): 3428-3446.

49. LV McFarland, T Karakan, A Karatas (2021) Strain-specific and outcome-specific efficacy of probiotics for the treatment of irritable bowel syndrome: A systematic review and meta-analysis. EClinical Medicine 41: 101154.

50. M Hey (2020) Against healthist fermentation: Problematizing the 'good'of gut health and ferments. J Crit Diet 5(1): 12-22.

51. B Sarita, D Samadhan, MZ Hassan, EG Kovaleva (2025) A comprehensive review of probiotics and human health-current prospective and applications. Front Microbiol (15): 1487641.

52. EM Quigley (2022) Clinical trials of probiotics in patients with irritable bowel syndrome: some points to consider. J Neurogastroenterol Motil 28(2): 204-211.

53. H Szajewska, M Kołodziej (2015) Systematic review with meta-analysis: Lactobacillus rhamnosus GG in the prevention of antibiotic-associated diarrhoea in children and adults. Aliment Pharmacol Ther 42(10): 1149-1157.

54. A Hurtado Lorenzo, G Honig, SA Weaver, PB Larkin, C Heller (2021) Chronic abdominal pain in IBD research initiative: unraveling biological mechanisms and patient heterogeneity to personalize treatment and improve clinical outcomes. Crohn's Colitis 360 (3)3: otab034.

55. M Ullah, A Raza, L Ye, Z Yu (2019) Viability and composition validation of commercial probiotic products by selective culturing combined with next-generation sequencing. Microorganisms 7(7): 188.

56. A Mukherjee, B Gómez Sala, EM O Connor, JG Kenny, PD Cotter (2022) Global regulatory frameworks for fermented foods: a review. Front Nutr (9): 902642.

57. S Fijan, Anita Frauwallner, László Varga, Tomaž Langerholc, Irena Rogelj, et al. (2019) Health professionals' knowledge of probiotics: an international survey. Int J Environ Res Public Health 16(17): 3128.

58. A Costabile, T Bergillos Meca, P Rasinkangas, K Korpela, WM De Vos, et al. (2017) Effects of soluble corn fiber alone or in synbiotic combination with Lactobacillus rhamnosus GG and the pilus-deficient derivative GG-PB12 on fecal microbiota, metabolism, and markers of immune function: a randomized, double-blind, placebo-controlled, cro. Front Immunol (8): 1443.

59. D Liang, F Wu, D Zhou, B Tan, T Chen (2024) Commercial probiotic products in public health: Current status and potential limitations. Crit RevFood Sci Nutr 64(19): 6455-6476.

60. K Zaman, K Asim, N Shah, SJ Ahmed (2018) Physicians' perspective regarding direct to consumer marketing of nutraceuticals products. Pakistan J Med Sci 34(3): 710.

61. R Kullar, EJ Goldstein, S Johnson, LV McFarland (2023) Lactobacillus bacteremia and probiotics: a review. Microorganisms 11(4): 896.