

Probiotics: The Beneficial Bacteria For Human Health

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Abstract :

Probiotics are living bacteria that are good for our health, especially our digestive system. They are frequently referred to as "good bacteria" since they contribute to the maintenance of a healthy balance of microorganisms in our gut. Probiotics have been known for centuries, although the term "probiotic" was coined in the twentieth century. A scientist named **Elie Metchnikoff** is credited with introducing Probiotics as we know them today.

The number of probiotics in food varies based on the meal, the fermentation technique, and the bacteria strains utilized. Here are some common probiotic-rich foods and their approximate probiotic amounts:

Fermented foods have been consumed for their preservation characteristics and health advantages since ancient times. Fermentation was practiced by ancient civilizations such as Mesopotamia, Egypt, India, and China. Ancient Egyptians, for example, employed fermented milk products to treat digestive disorders.

Probiotics' involvement in supporting gut health and controlling digestive illnesses such as irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), and diarrhea have been widely researched. Recent research has looked at specific probiotic strains and combinations in certain illnesses, proving their ability to reduce symptoms and enhance the quality of life.

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Probiotic scientific guidelines differ based on the organization or nation offering the advice. Here are some suggestions and recommendations from credible scientific and medical institutions:

World Health Organisation (WHO) and United Nations Food and Agriculture Organisation (FAO): The WHO and FAO issued recommendations together in 2002, which were revised in 2018. The recommendations provide forth broad concepts for assessing the safety and efficacy of probiotics, as well as requirements for strain identification, manufacturing, and labeling. They also emphasize the importance of scientific research to back up health claims.

Balanced nutrition and regular exercise are two of the most critical factors to maintain a healthy lifestyle. In the current global scenario, where malnutrition is prevalent, probiotics can be an essential ingredient beneficial for different groups of consumers, from infants to adults and aging segments. Players are researching to overcome the delivery and stability challenges of probiotics. Active nutrition players, as well as researchers, are interested in understanding the mechanism of action of probiotic cultures. In vitro and clinical studies are being conducted to understand the role played by probiotic strains inside the human body

Acknowledgement :

In the name of God the Beneficent, the Merciful. All pray to almighty “God” whose mercifulness, benevolence, and vengeance gifted me the ever-carrying father, Mr. Kirankumar Joshi, and mother, Mrs. Harsha Kirankumar Joshi who always gave me efforts, and necessary blessings, who reciprocate my sincerity and loyalty, my toppling faith and collapsing dreams, extend a selfless smile, feel my nerve, hold my hand, value my emotions and care my sentiments

Introduction :

Probiotics are living bacteria that are good for our health, especially our digestive system. They are frequently referred to as "good bacteria" since they contribute to the maintenance of a healthy balance of microorganisms in our gut.

These microbes are naturally present in our bodies, but stress, poor food, illness, or antibiotic usage can all upset the equilibrium of our gut flora. This imbalance can result in digestion troubles, reduced immunity, and other health issues.



Figure .1 : Our Gut Microbes .

Probiotics operate by replenishing and re balancing the healthy bacteria in our stomach. They can be found in fermented foods such as yogurt, kefir, sauerkraut, Kimchi, and others. Probiotics are also available as dietary supplements in capsules, pills, and powders.

Probiotics aid digestion and nutrition absorption when ingested. They also help to produce vitamins including vitamin K and some B vitamins. Furthermore, probiotics can boost our immune system by limiting the growth of dangerous bacteria, increasing antibody synthesis, and activating immune cell activity.

According to research, probiotics may give a variety of health benefits, including:

Probiotics can help relieve symptoms of digestive problems such as irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), and diarrhoea. They may also help with bloating, gas, and constipation.

Probiotics have been demonstrated to boost the immune system, lowering the risk of respiratory infections, allergies, and certain autoimmune diseases.

Maintaining Urogenital Health: By maintaining a healthy balance of bacteria in the urogenital tract, certain strains of probiotics can help prevent and treat urinary tract infections (UTIs) and vaginal yeast infections.

Management of Mental Health: New research reveals a link between gut health and mental health. Probiotics may benefit mental health disorders such as anxiety, depression, and stress by altering the gut-brain axis.

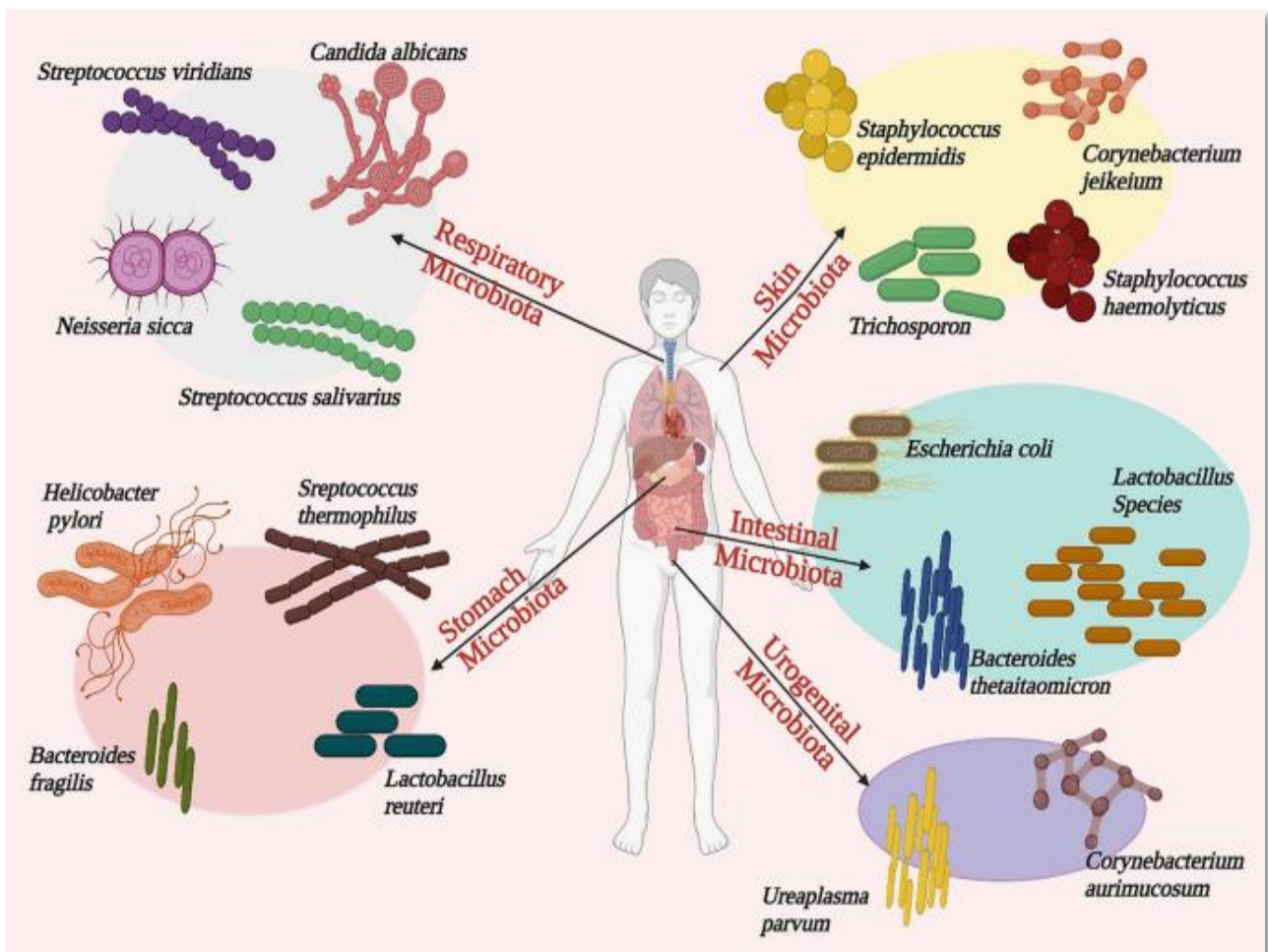


Figure .2 : Presence Of Microbes In Each And Every Part Of The body.

It's crucial to note that probiotic effects can vary depending on the strain, dosage, and individual circumstances. Consult a healthcare practitioner if you have any underlying health concerns or are thinking about utilizing probiotics for a specific purpose.

To summarize, probiotics are living bacteria that can improve our general health, particularly our digestive health. The digestive system and immune system are also affected. We may sustain the balance of good bacteria in our gut and potentially experience a variety of health benefits by including Probiotics-rich foods into our diet or taking probiotic supplements.

DEFINITION :

Probiotics have been known for centuries, although the term "probiotic" was coined in the twentieth century. A scientist named **Elie Metchnikoff** is credited with introducing probiotics as we know them today.



The Russian-born biologist Elie Metchnikoff is known as the "Father of Probiotics." He did studies on the immune system and lifespan in the early twentieth century, which prompted him to investigate the role of beneficial bacteria in the gut.

Metchnikoff was prompted by the finding that certain rural inhabitants in Bulgaria, particularly those who consumed fermented dairy products such as yoghurt, lived longer and had better general health. He believed that the lactic acid bacteria found in fermented foods were important in encouraging health and longevity.

Probiotic Food :

The number of probiotics in food varies based on the meal, the fermentation technique, and the bacteria strains utilized. Here are some common probiotic-rich foods and their approximate probiotic amounts:

Yogurt: One of the most well-known probiotic foods is yogurt. The number of live bacteria in yogurt varies, but a typical serving (about 150 g or 5 oz) can contain billions of colony-forming units (CFUs) of probiotic bacteria such as *Lactobacillus acidophilus* and *Bifidobacterium bifidum*.



Figure.3 : Probiotic Yogurt

Kefir is a fermented milk drink that contains several probiotic microorganisms. Depending on the fermentation procedure and time of fermentation, the number of Probiotics in kefir can range from several million to several billion CFUs per milliliter.



Figure. 4 : Kefir

Sauerkraut: Sauerkraut is a fermented cabbage product that is high in Probiotics. However, the probiotic value of sauerkraut can diminish while cooking. A serving of raw sauerkraut.

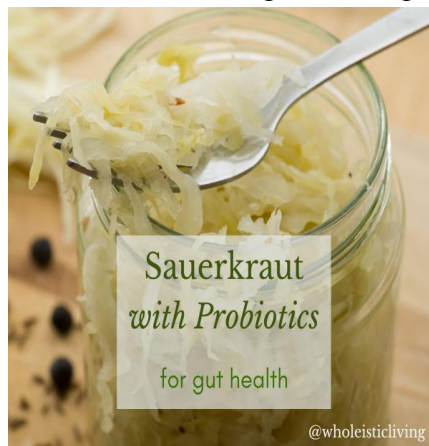


Figure. 5 : Sauerkraut Of Cabbage

Kimchi is a classic Korean meal made of fermented vegetables, most commonly cabbage. Kimchi, like sauerkraut, has a variable probiotic content, however, a serving (about 100 grams or 3.5 ounces) may contain millions to billions of CFUs.



Figure .6 : Kimchi - a different type of cabbage found in korea

Miso is a fermented soybean paste that is widely used in Japanese cuisine. While miso has a lesser probiotic concentration than other fermented foods, it nevertheless contains helpful bacteria such as *Lactobacillus* and *Bifidobacterium* species.



Figure. 7 : Miso

Tempeh: Tempeh is a fermented soybean food that originated in Indonesia. *Rhizopus oligosporus*, a probiotic fungus, is commonly found in it. Tempeh's probiotic content varies, but it typically contains millions to billions of CFUs per serving.

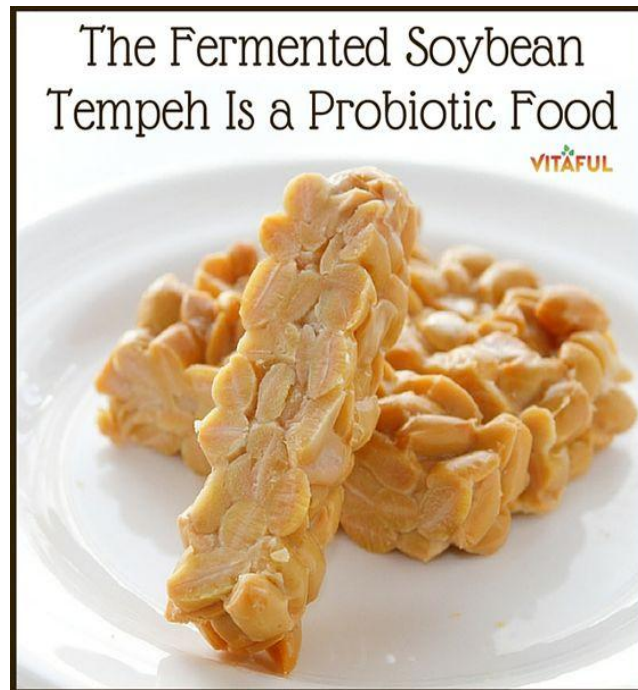


Figure .8 : Tempeh

It's vital to remember that probiotic content varies depending on brand and cooking method. Furthermore, due to factors such as storage conditions and expiration dates, the number of live bacteria can decrease over time. If you're looking for a specific probiotic strain or a higher concentration, probiotic pills, which deliver a standardized dosage of specific strains, may be necessary.

HISTORY :

Probiotics have been around for thousands of years, with evidence of fermented foods and their health benefits documented in ancient cultures. Here is a timeline of probiotic history:

Fermented foods have been consumed for their preservation characteristics and health advantages since ancient times. Fermentation was practiced by ancient civilizations such as Mesopotamia, Egypt, India, and China. Ancient Egyptians, for example, employed fermented milk products to treat digestive disorders.

Élie Metchnikoff, a Russian scientist, is widely regarded as the pioneer of contemporary Probiotics. Metchnikoff studied the immune system and the role of beneficial microorganisms in the gut in the early twentieth century.

His work was informed by his observations of the life and health of Bulgarian peasants, which he linked to their use of fermented milk products. Metchnikoff advocated that beneficial bacteria be used to promote health.

The 1950s: Albert Szent-Györgyi, a Nobel laureate and microbiologist, created the word "probiotic" in 1953. He coined the word to describe compounds that help helpful microbes grow. This word contributed to the formalization of the area of probiotics.

Microbiological advances in the 1960s enabled the discovery and classification of diverse bacterial strains. This enabled scientists to better comprehend the many kinds and strains of bacteria, as well as their potential health advantages.

The 1970s: Probiotic research progressed, with studies concentrating on their impact on the gut microbiota, digestion, and immune system. The concept of probiotics has gained traction in the scientific community.

Probiotic supplements and fortified meals began to appear on the market in the 1980s. Companies began producing and marketing products containing certain strains of bacteria with verified health benefits.

Late twentieth century: Scientific awareness of probiotics expanded, with research examining their potential applications beyond gut health. Researchers began researching the effects of probiotics on allergies, immune system problems, and even mental health.

The area of probiotics has developed further in the twenty-first century, with greater research, clinical studies, and commercial availability of probiotic products. The scientific community began investigating personalized probiotic techniques, taking into account characteristics such as individual gut microbiota makeup and specific health issues.

Probiotics are now generally recognized for their potential health advantages, and several research is being conducted to investigate their uses. Probiotic pills and meals are widely available, making it simple for people to include these helpful microorganisms in their everyday life. Ongoing research strives to elucidate other mechanisms of action and potential new uses for probiotics.

RECENT RESEARCH ON PROBIOTICS :

Recent probiotic research has concentrated on several elements of their possible health benefits and their effects on various illnesses. Here are some significant topics of modern probiotic research:

Probiotics' involvement in supporting gut health and controlling digestive illnesses such as irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), and diarrhea have been widely researched. Recent research has looked at specific probiotic strains and combinations in certain illnesses, proving their ability to reduce symptoms and enhance the quality of life.

Support for the Immune System: Probiotics have been demonstrated to alter the immune system and improve immunological function. A recent study has looked at the effect of Probiotics on lowering the risk and duration of respiratory tract infections like the common cold and flu.

Probiotics have also been investigated for their ability to treat allergic disorders such as eczema and allergic rhinitis.

Mental Health and Brain Function: In recent years, there has been a lot of focus on the gut-brain link, and probiotics have been examined for their possible impact on mental health issues like anxiety, depression, and stress. Probiotics may alter brain function and behavior via the gut-brain axis, according to a new study, opening up new paths for mental health therapies.

Probiotics have been studied for their effect in sustaining urogenital health in women. Recent research has looked into the use of certain probiotic strains to prevent and control urinary tract infections (UTIs), bacterial vaginosis, and vaginal yeast infections. The findings are encouraging, demonstrating the potential of probiotics in women's health.

Metabolic Health and Weight Management: Probiotics have been studied for their impact on metabolic health, including blood sugar management, insulin sensitivity, and lipid metabolism. According to some research, some probiotic strains may aid in weight management and lower the risk of obesity.

While recent research has yielded encouraging results, the science of probiotics is still in its early stages, and more study is needed to better understand their methods of action, appropriate doses, unique strain effects, and potential combinations with individual characteristics. When considering probiotics as part of a health routine, it is best to consult with a healthcare practitioner and take into account particular health issues.

GENERAL RESEARCH IN PROBIOTICS :

Probiotic research in general covers a wide variety of topics, examining many aspects of their influence on human health and well-being. The following are some broad probiotic research topics:

Composition and Diversity of the Gut Microbiota: Researchers study the composition and diversity of the gut microbiota, including the identification and characterization of various bacterial strains. This study contributes to a better understanding of the natural balance of bacteria in the gut and how it links to general health.

Processes of Action: Researchers are attempting to decipher the processes through which probiotics exert their positive benefits. Understanding how probiotics interact with the gut epithelium, control the immune system, influence gene expression, create helpful metabolites, and compete with dangerous bacteria is all part of this.

Gut-Brain Axis: The gut-brain axis, or the relationship between the gut and the brain, is a study topic. Scientists are investigating how probiotics affect brain function, mental health, and behavior via communication routes between the stomach and the brain.

immunological Modulation: Researchers are looking at the effects of probiotics on immunological function, such as immune cell activation, anti-inflammatory molecule synthesis, and immune response control. This study adds information on how probiotics may benefit immune system function and illness prevention.

Digestive Disorders: Several studies have been conducted to investigate the efficacy of probiotics in the treatment of digestive disorders such as irritable bowel syndrome (IBS), inflammatory bowel disease (IBD), and diarrhea. The goal of the research is to better understand the precise strains and processes of probiotics that contribute to symptom relief.

Metabolic Health: The effects of probiotics on metabolic health factors such as blood sugar management, insulin sensitivity, and lipid metabolism are being studied. This study looks at the possibility of probiotics as a treatment for metabolic illnesses such as type 2 diabetes and obesity.

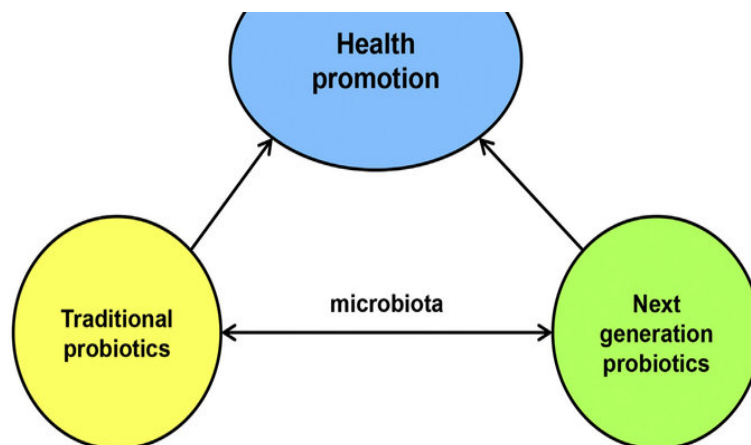
Women's Health: Research focuses on the function of probiotics in women's urogenital health, including the prevention and treatment of urinary tract infections (UTIs), bacterial vaginosis, and vaginal yeast infections. Researchers look on certain strains and formulations that may enhance women's health.

Allergies and Autoimmune illnesses: The potential effects of Probiotics on allergies, autoimmune illnesses, and inflammatory diseases are investigated. Their capacity to modify immunological responses, decrease inflammation, and impact the genesis and progression of various illnesses is being studied.

Antimicrobial characteristics: Researchers investigate probiotics' antimicrobial characteristics, namely their capacity to prevent the development and activity of dangerous bacteria, particularly antibiotic-resistant strains. This study advances our understanding of how probiotics can aid in the maintenance of a healthy microbial balance and the prevention of illnesses.

Safety and Quality Control: Studies are carried out to assess the safety and quality of probiotic products, ensuring that they fulfill regulatory criteria and are free of dangerous contaminants. This involves testing probiotic strains' viability and stability throughout manufacture, storage, and ingestion.

Probiotic research, in general, seeks to increase our understanding of their mechanisms of action, identify particular strains for targeted health benefits, optimize doses and formulations, and investigate their potential uses in the prevention and management of various health disorders.



Isolated from life experiences

Targeting general sub-health population

Generally safe for normal population

Functional foods or food additives

• Isolated from microbiota/NGS study

• Target specific diseases

• Safety to be evaluated

• Develop as drugs

Figure .9 : Next Generation Probiotic

PREGNANCY AND PROBIOTICS :

Probiotics have gained popularity due to their possible pregnant advantages. Here is a summary of the studies and considerations around Probiotics in pregnancy:

Probiotics may aid in the maintenance of healthy gut flora during pregnancy. They can aid in the maintenance of a healthy microbial community, digestion, and nutrient absorption. Probiotics have also been examined for their ability to modify immunological responses, which may be advantageous during pregnancy when the immune system changes.

Gestational Diabetes Prevention: Some research suggests that probiotic strains such as *Lactobacillus* and *Bifidobacterium* species may help lower the chance of developing gestational diabetes, a disease that can arise during pregnancy and impact both the mother and the baby.

Preeclampsia prevention: Preeclampsia is a potentially fatal disease marked by elevated blood pressure during pregnancy. While research is still in its early stages, there is some indication that probiotics, particularly those containing *Lactobacillus rhamnosus*, may help lower the risk of preeclampsia. More research is needed, however, to show a definite causal association.

Allergy Risk Reduction: Maternal use of particular probiotics during pregnancy and lactation has been researched for its ability to lower the risk of allergic diseases in newborns, such as atopic dermatitis (eczema) and asthma. The results are varied, and more study is needed to find the best strains, doses, and timing.

Preterm Birth and Infection Prevention: Some studies show that taking specific probiotics during pregnancy may help reduce the risk of preterm birth and lower the incidence of certain diseases, such as urinary tract infections (UTIs) and bacterial vaginosis. *Lactobacillus* species are frequently investigated in this context.

Antibiotic-Associated Diarrhoea Prevention: drugs may be required to treat some illnesses in pregnant women, but drugs might alter the normal balance of gut flora. Taking probiotics alongside antibiotics may help avoid antibiotic-related diarrhea and improve gut health.

While research on probiotics in pregnancy is encouraging, larger-scale, well-designed clinical studies are required to develop solid guidelines for their usage. Individual issues, such as unique health problems, allergies, and medicines, should also be considered.

Before beginning any probiotic program during pregnancy, consult with your healthcare professional to confirm that it is appropriate for your unique requirements and medical history.



Figure .10 : Benefits of Probiotic during pregnancy



Figure .11 : Pregnancy And Probiotics

SCIENTIFIC GUIDELINES FOR PROBIOTICS :

Probiotic scientific guidelines differ based on the organization or nation offering the advice. Here are some suggestions and recommendations from credible scientific and medical institutions:

World Health Organization (WHO) and United Nations Food and Agriculture Organization (FAO): The WHO and FAO issued recommendations together in 2002, which were revised in 2018. The recommendations provide forth broad concepts for assessing the safety and efficacy of Probiotics, as well as requirements for strain identification, manufacturing, and labeling. They also emphasize the importance of scientific research to back up health claims.

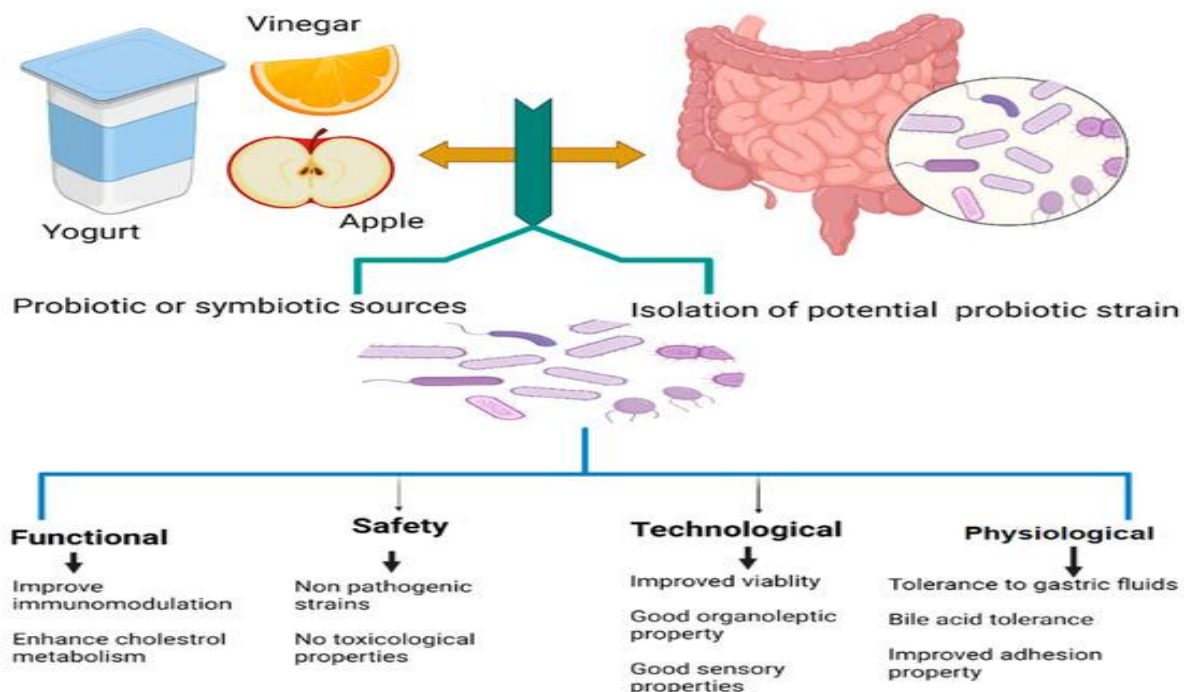
ISAPP (International Scientific Association of Probiotics and Prebiotics): ISAPP is a scientific organization comprised of probiotic and prebiotic professionals. They give probiotic-related guidelines and consensus statements. Their consensus statements span a wide range of topics.

The European Society for Paediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN) established recommendations for the use of probiotics in pediatric gastroenterology in 2014. The recommendations encompass particular probiotic strains and their efficacy in a variety of pediatric gastrointestinal disorders, such as acute gastroenteritis, antibiotic-associated diarrhea, and inflammatory bowel disease.

The American Gastroenterological Association (AGA) produced a recommendation on the function of probiotics in the management of gastrointestinal illnesses in 2020. The recommendation examines the evidence supporting probiotic usage in a variety of diseases, including IBS, ulcerative colitis, and pouchitis. It recommends the use of various probiotic strains for specific conditions.

National Institute for Health and Care Excellence (NICE): NICE, a UK-based organization, offers clinical guidelines to healthcare professionals. NICE advocates using probiotics to reduce antibiotic-associated diarrhea in individuals receiving antibiotics in their advice on treating common illnesses.

These guidelines and recommendations assist healthcare practitioners and researchers in navigating the area of probiotics by offering evidence-based information on strain selection, therapeutic indications, doses, and potential safety concerns. It is crucial to remember that guidelines may change when new data arises, and regional variances in recommendations may occur. Consultation with healthcare specialists is essential for determining the most effective probiotic methods based on individual requirements and conditions.



BENEFITS OF PROBIOTICS FOR NEWBORN BABIES :

Probiotics have the potential to provide various advantages to newborn newborns. Here are some of the most important advantages that have been investigated and observed:

Improved Gut Health: Probiotics can help babies build a healthy gut microbiome. Early colonization of beneficial bacteria can help to maintain a healthy gut microbiota, which is important for digestion, nutrient absorption, and the development of a strong immune system.

Digestive difficulties: Probiotics have been demonstrated to help neonates with typical digestive difficulties including colic, constipation, and acid reflux. They can aid in the regulation of bowel motions, the reduction of gas, and the promotion of general gut health and comfort.

Diarrhoea Prevention: Certain probiotic strains, such as *Lactobacillus rhamnosus* GG and *Saccharomyces boulardii*, are useful in preventing and treating infantile diarrhea. Probiotics can help restore the balance of intestinal flora that has been disturbed by diarrhea, therefore reducing the length and intensity of symptoms.

Immune Function Enhancement: Probiotics help to modulate and enhance the immune system. They can promote immune cell generation, improve intestinal barrier function, and boost immunological response to infections. This immunological support is especially important for neonates with undeveloped immune systems.

Allergy Prevention: According to some studies, some probiotics may help lower the chance of developing allergies in newborns, such as eczema and food allergies. Probiotics can reduce the risk of allergic responses by modulating the immune system's response to allergens and promoting immunological tolerance.

Respiratory Infection Prevention: Probiotics may have a role in lowering the risk of respiratory infections in neonates, such as common colds and respiratory tract infections. They can boost respiratory immune defenses and lower the intensity and duration of respiratory symptoms.

While probiotics may have potential advantages for babies, individual strains, doses, and formulations should be carefully studied. It is best to consult with a healthcare practitioner before giving probiotics to neonates.

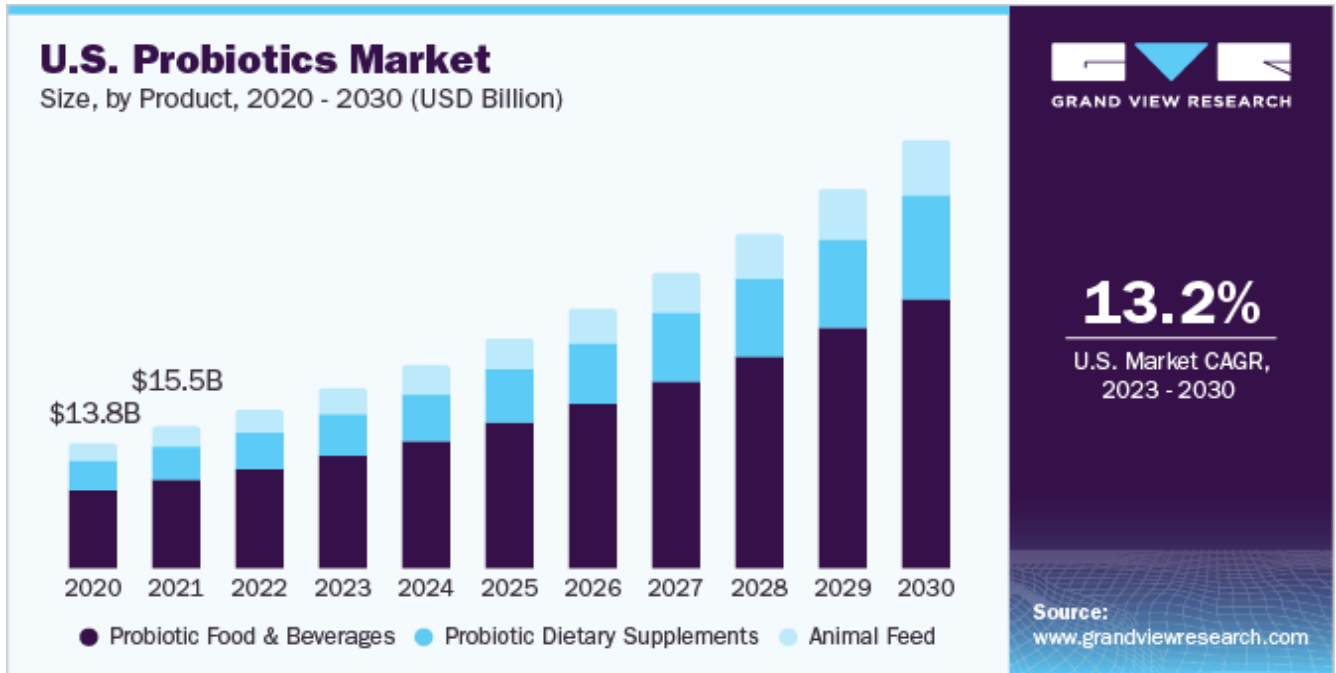
Before administering probiotics to babies, consult with a healthcare practitioner to guarantee the most appropriate probiotic product and dose for their unique needs. Furthermore, probiotics should only be used under medical supervision, especially in preterm newborns or those with underlying health issues.



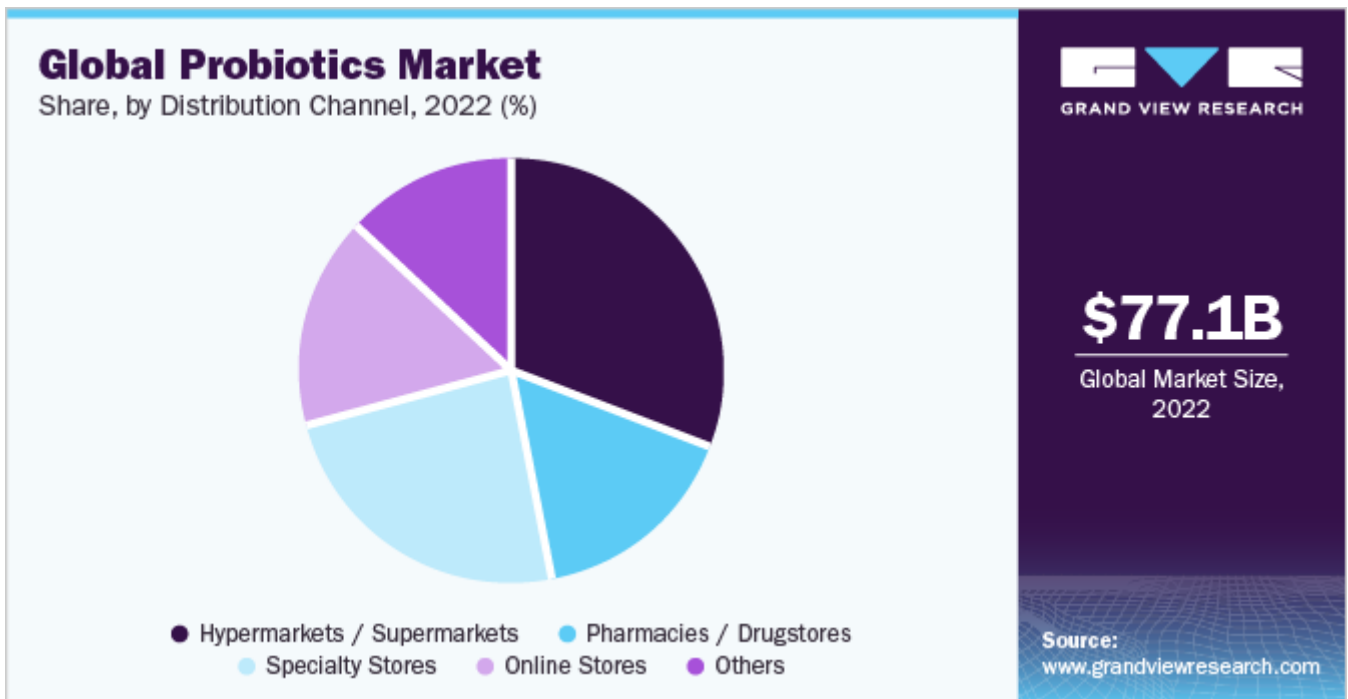
Figure .12 : Benefits Of Probiotics For New Born Babies

Global probiotic Market .

The global **probiotics market size** was estimated at **USD 77.12 billion in 2022** and is expected to grow at a compound annual growth rate (CAGR) of 14.0% from 2023 to 2030. The growing awareness about the health benefits of probiotics, such as improved gut health and overall digestive function, is anticipated to boost the growth of the market across the globe. As more people become interested in taking a proactive approach to their health, they are looking for natural, non-pharmaceutical solutions that can help support their gut microbiome. The market penetration of dairy products is projected to be high on account of the increased consumption of functional dairy products for digestive wellness.



Manufacturers are investing in clinical research to develop new strains of probiotics that would help boost immunity, support women’s health concerns, and balancing of nutrition. The key players in the market are focusing on introducing products with new ingredient formulations. Rising awareness regarding weight management is a key factor fueling the market growth owing to increasing obesity rates and chronic diseases. In May 2023, Roquette introduced PEARLITOL ProTec, an innovative excipient specifically designed to enhance the stability of probiotic supplements. This new offering addresses the challenge of maintaining the viability and efficacy of probiotics throughout their shelf life.



Key Companies & Market Share Insights

The global market is characterized by intense competition, mainly attributed to several players operating in the market. Various companies operating in the market are offering innovative products to cater to consumer demand. For instance, in November 2022, Arla Foods Group announced the launch of fermented protein drinks, which contain whey-based hydrolysates Lacprodan HYDRO.365 and Nutrilac FO-8571. The company is looking to develop trendy beverages that are high in probiotics and protein, enabling it to stand out amidst the competition. Some of the prominent players in the global probiotics market include:

- Arla Foods
- BioGaia
- Chr. Hansen Holding A/S
- Danone
- DuPont De Nemours, Inc.
- General Mills, Inc.
- i-Health, Inc.
- Lallemand Inc.
- Lifeway Foods Inc.
- Mother Dairy Fruit & Vegetable Pvt. Ltd.
- Kerry Group plc
- Nestle S.A.
- Probi AB
- Yakult Honsha Co., Ltd.

Global Probiotics Market Report Segmentation

This report forecasts revenue growth and provides an analysis of the latest trends in each of the sub-segments from 2017 to 2030. For this study, Grand View Research has segmented the probiotics market report based on product, ingredient, end-use, distribution channel, and region:

Product Outlook (Revenue, USD Million, 2017 - 2030)

- Probiotic Food & Beverages
- Dairy Products
- Non-Dairy
- Cereals
- Baked Food
- Fermented Meat
- Dry Foods
- Probiotic Dietary Supplements
- Food Supplements
- Nutritional Supplements
- Specialty Supplements
- Infant Formula
- Animal Feed

Ingredient Outlook (Revenue, USD Million, 2017 - 2030)

- Bacteria
- Yeast

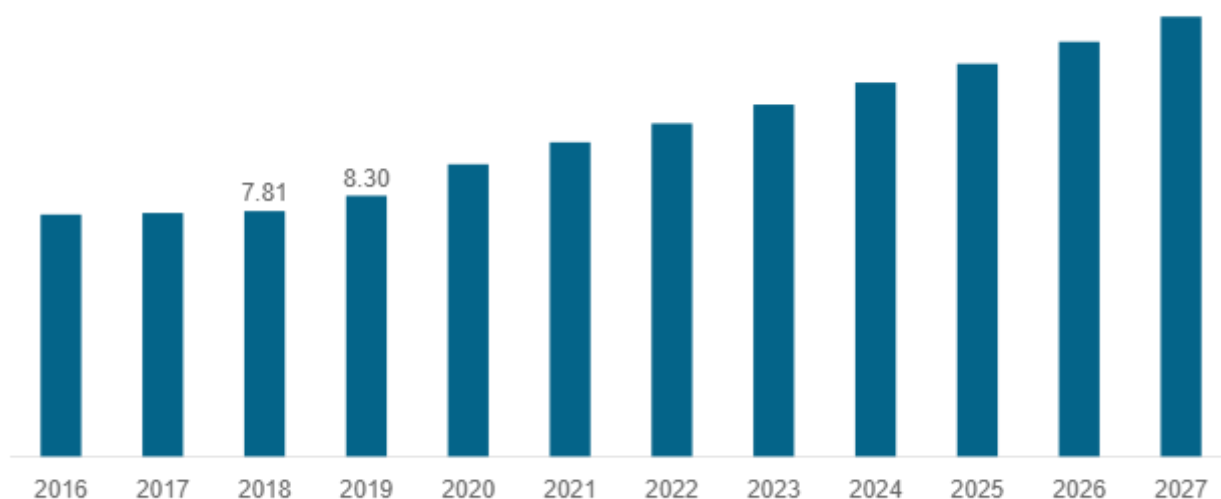
End-use Outlook (Revenue, USD Million, 2017 - 2030)

- Human Probiotics
- Animal Probiotics

Distribution Channel Outlook (Revenue, USD Million, 2017 - 2030)

- Hypermarkets / Supermarkets
- Pharmacies / Drugstores
- Specialty Stores
- Online Stores
- Others

North America Probiotics Market Size, 2016-2027 (USD Billion)

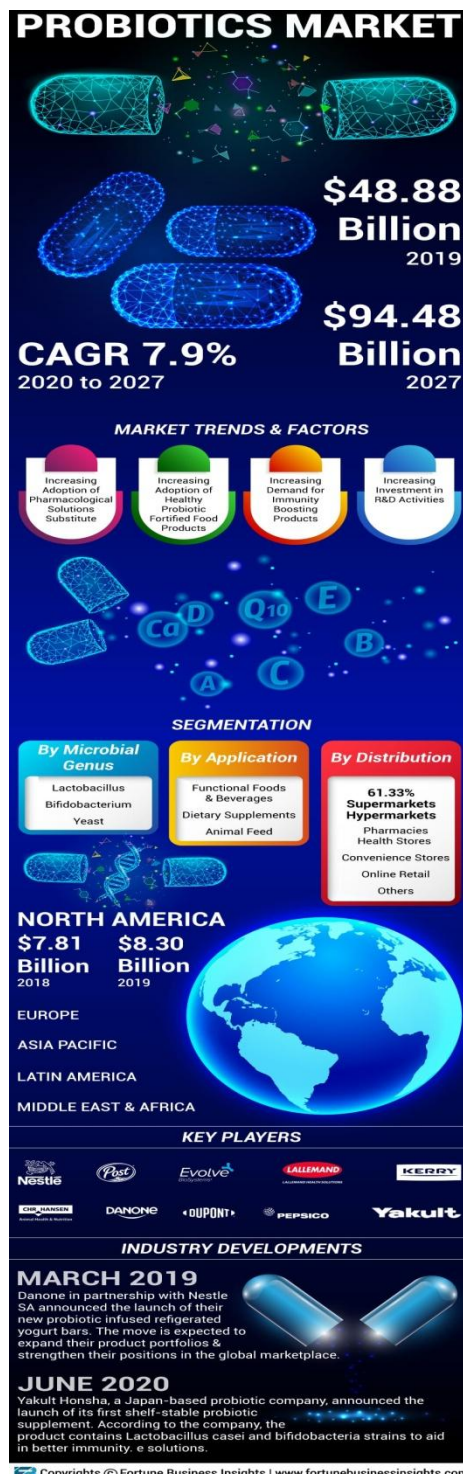


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Regional Outlook (Revenue, USD Million, 2017 - 2030)

- North America
- U.S.
- Canada
- Mexico
- Europe
- Germany
- UK
- France
- Italy
- Spain
- Asia Pacific
- China
- Japan

- India
- Australia & New Zealand
- Central & South America
- Brazil
- Argentina
- Middle East & Africa
- Saudi Arabia
- South Africa

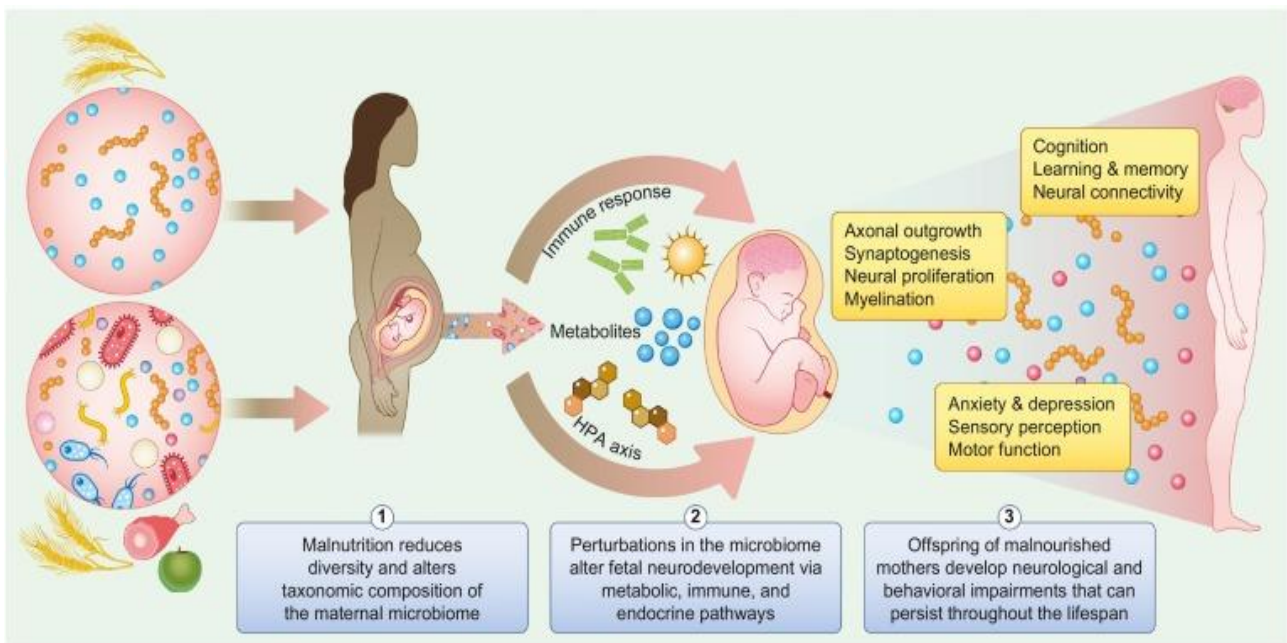


Probiotics – Can it solve the problem of malnutrition?

Balanced nutrition and regular exercise are two of the most critical factors to maintain a healthy lifestyle. In the current global scenario, where malnutrition is prevalent, probiotics can be an essential ingredient beneficial for different groups of consumers, from infants to adults and aging segments. Players are researching to overcome the delivery and stability challenges of probiotics. Active nutrition players, as well as researchers, are interested in understanding the mechanism of action of probiotic cultures. In vitro and clinical studies are being conducted to understand the role played by probiotic strains inside the human body

Impact of malnutrition

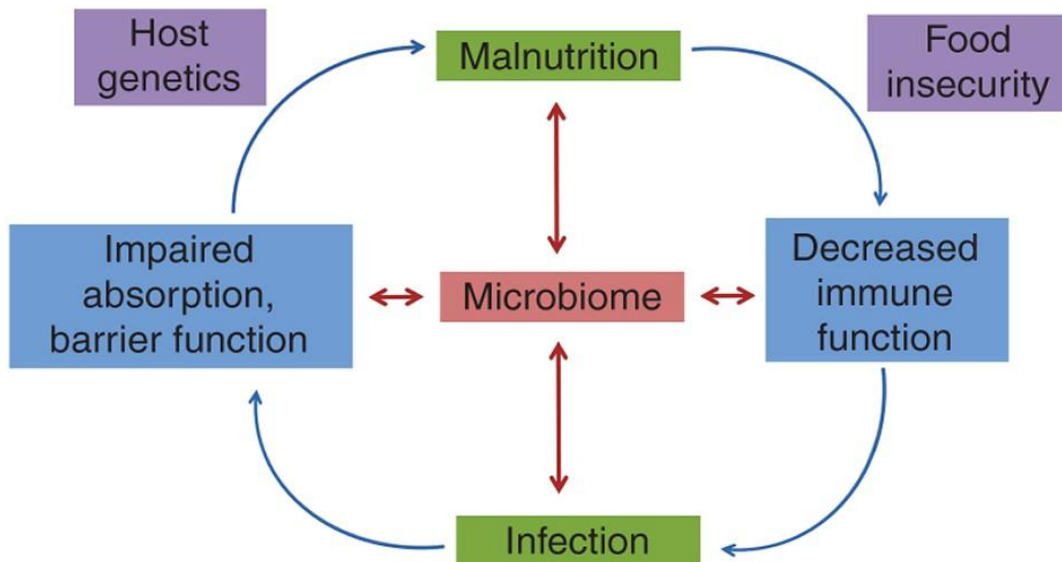
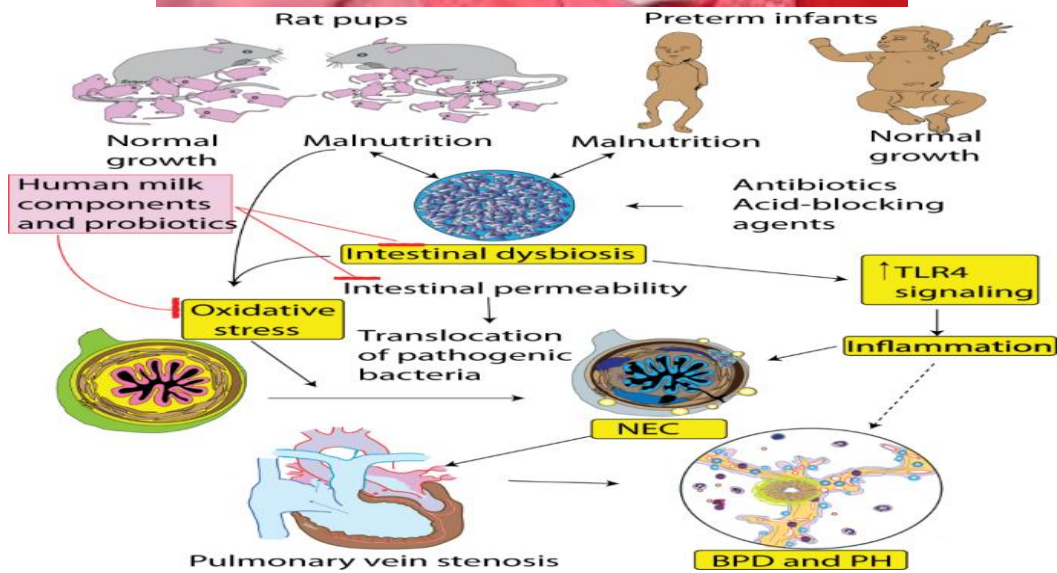
According to the Global Nutrition Report, 2018, children experience multiple forms of malnutrition globally. Nearly 4% of children under five years of age experience stunted growth despite the effort and investment of countries to control malnutrition. Approximately 3.62% of children were both stunted and wasted, while 1.87% were overweight and stunted.

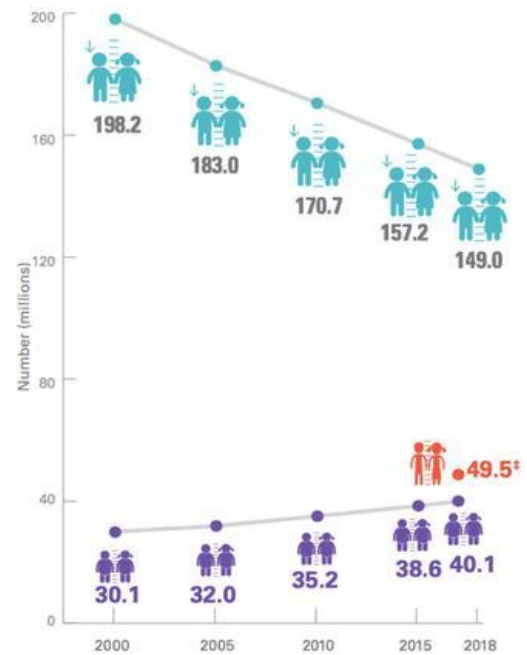
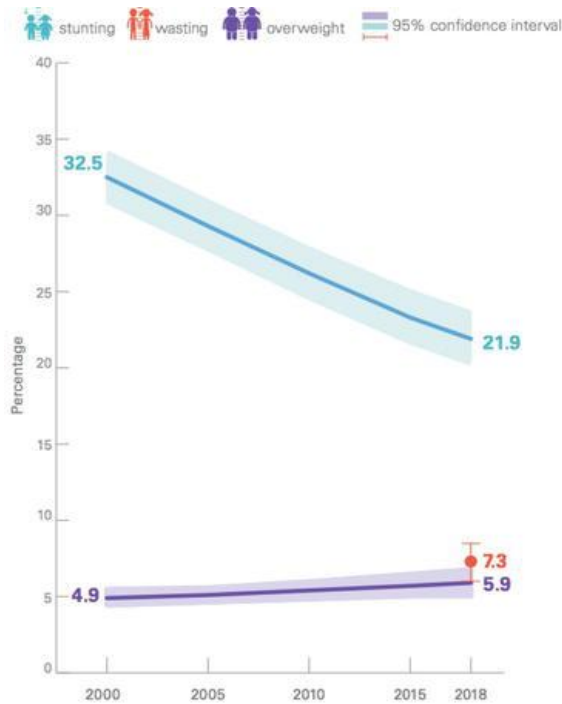
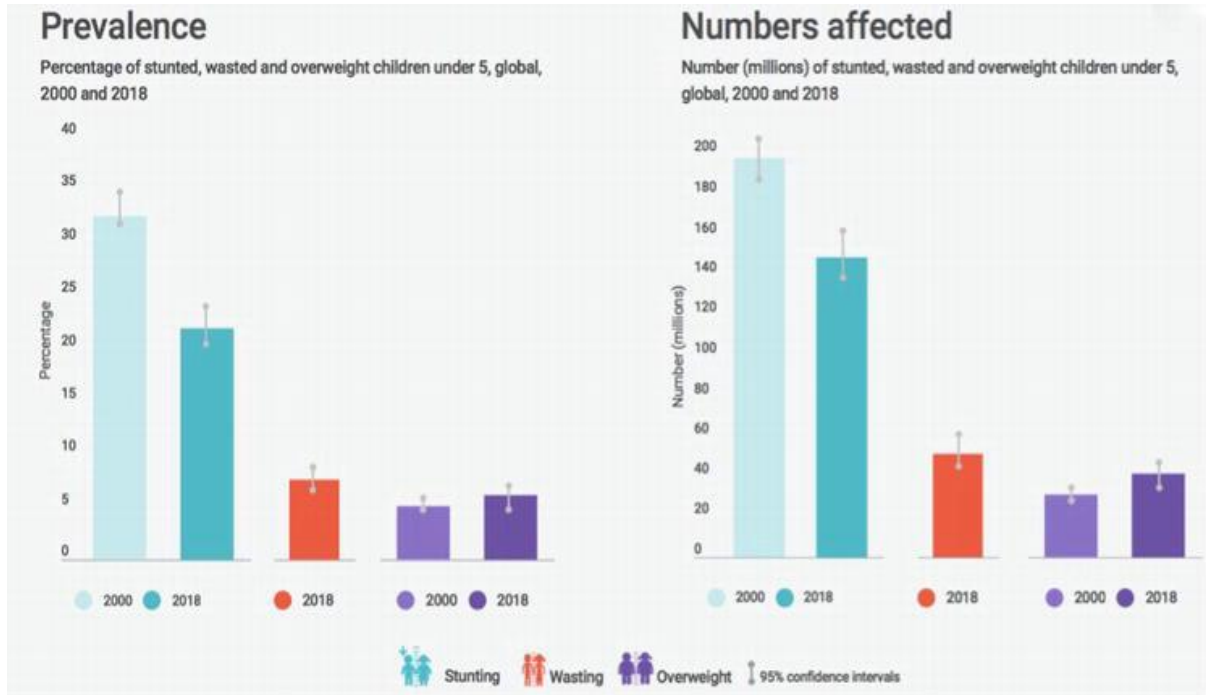


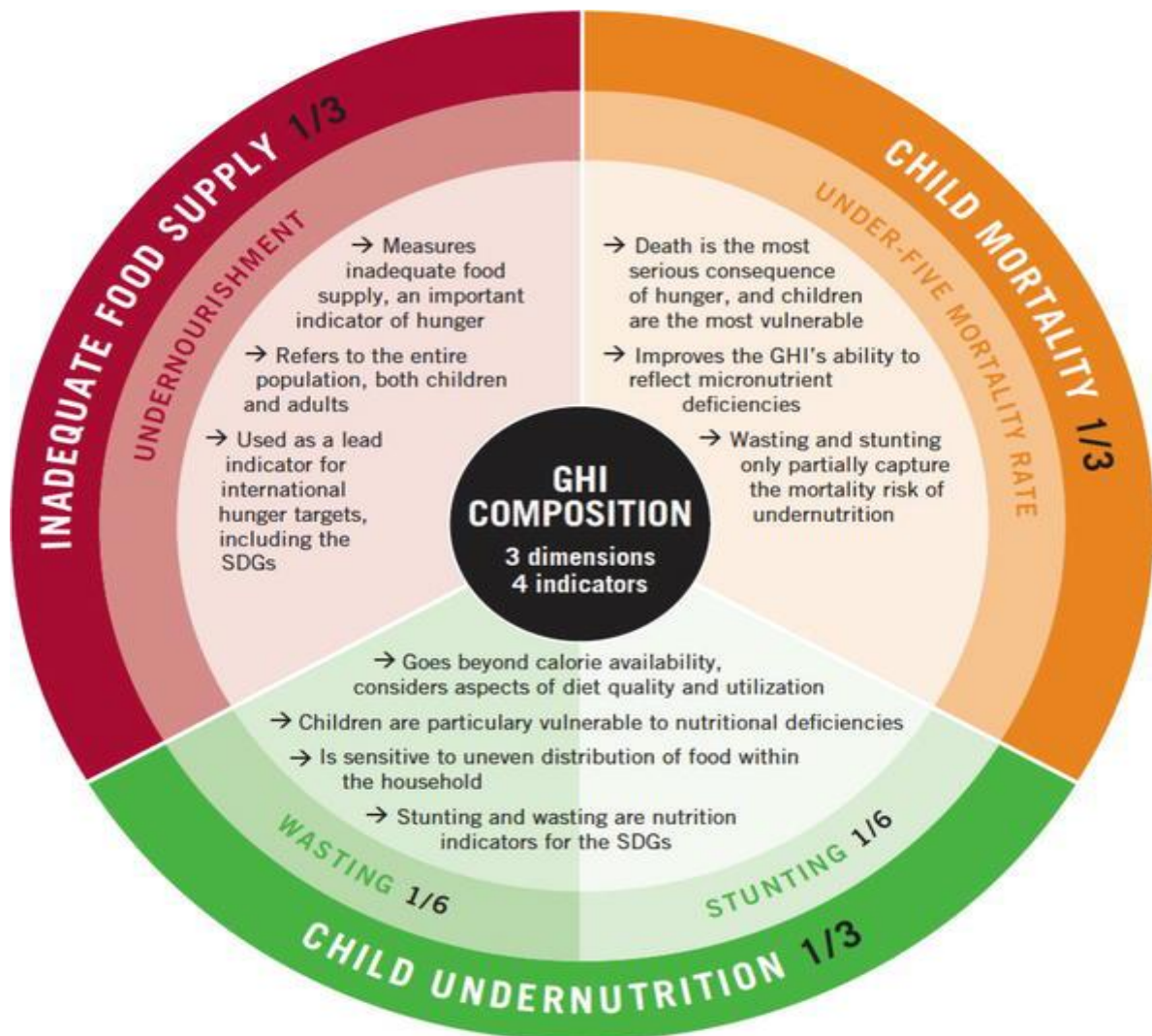
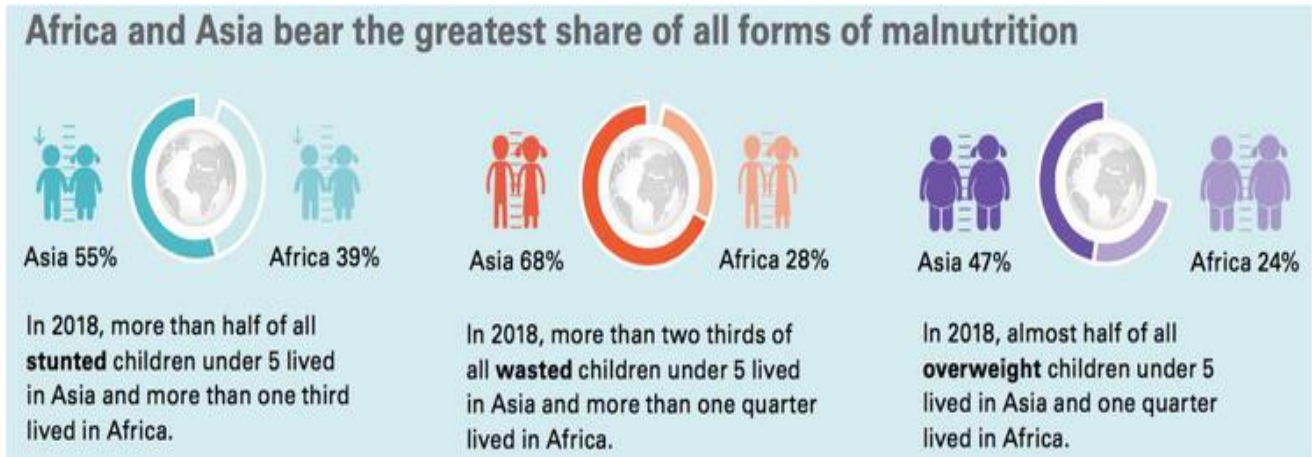
Trends in Neurosciences

Additionally, the report showed that there are nearly 15% of infants with low birth weight. Exhibit 1 represents the prevalence of undernourishment and the proportion of stunted children under five years reported in the Food Sustainability Index, 2018, by the Economist Intelligence Unit (EIU). According to the study, approximately 32.8% of women in their reproductive years were suffering from anemia. Further, 32.5% of non-pregnant women and 40.1% of pregnant women were anemic. As per the data gathered between 2013 and 2018, approximately 41% of infants were exclusively breastfed, which is a slight improvement from 37% of infants solely breastfed between 2005 and 2012. According to the African Child Policy Forum in 2018, approximately 60% of children could not meet the minimum meal frequency threshold. It reported that nearly 90% of children are malnourished, and the number of stunted children reached about 60 million in Africa. As per the report by the World Health Organization (WHO) in 2018, common childhood diseases accounted for deaths of nearly 6.2 million population that include

children and adolescents below 15 years. WHO proposed that affordable and straightforward interventions, such as adequate nutrition and safe water, can help control malnutrition.

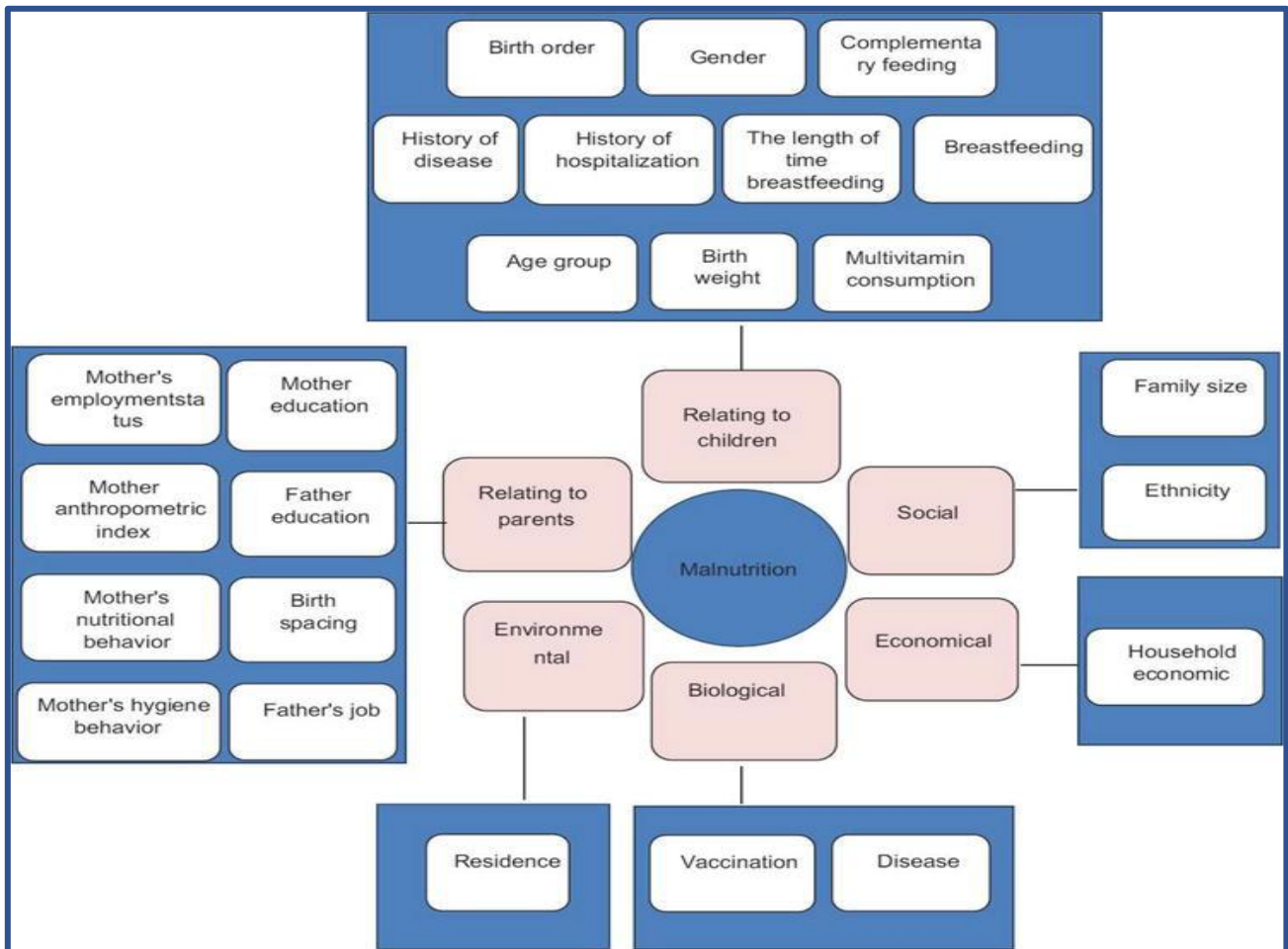


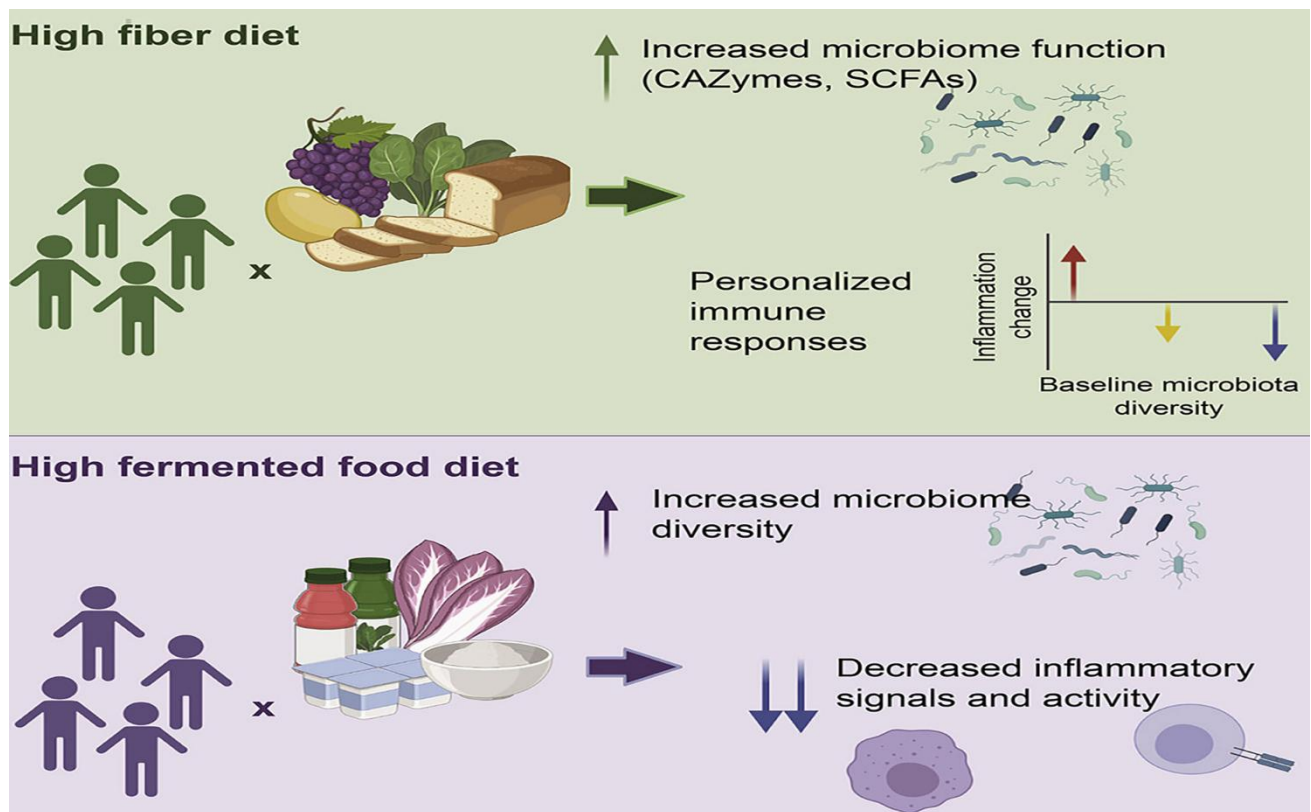




Child health goals under NHP-2017 and SDG-2030

Child health indicator	Current status	NHP 2017	SDG 2030
Neonatal mortality rate (NMR)	24	16 by 2025	<12
Infant mortality rate (IMR)	34	28 by 2019	—
Under-5 mortality rate (U5MR)	39	23 by 2025	≤25





Conclusion :

In conclusion, the evidence strongly supports the notion that Probiotics are indeed beneficial for the human body. These live microorganisms, when consumed in adequate amounts, can have a positive impact on our overall health and well-being. Probiotics play a crucial role in maintaining a balanced and diverse gut micro biome, which in turn has far-reaching effects on various aspects of our health.

Numerous studies have demonstrated the potential benefits of probiotics, including improved digestive health, enhanced immune function, and even potential mental health benefits. Probiotics have been shown to alleviate symptoms of various gastrointestinal disorders, such as irritable bowel syndrome and diarrhea, and may even help prevent certain infections.

Furthermore, the gut-brain connection has shed light on the influence of probiotics on mental health, with emerging research suggesting a potential role in reducing anxiety and depression symptoms.

It is important to note that the effectiveness of specific probiotic strains can vary, and individual responses may differ. Therefore, consulting with a healthcare professional or nutritionist to determine the most appropriate probiotic supplementation is advisable.

In a world where health and well-being are paramount, incorporating probiotics into our daily lives through dietary choices or supplements can be a prudent decision. While more research is needed to fully uncover the extent of their benefits and mechanisms of action, the existing body of evidence suggests that probiotics are a valuable addition to our quest for a healthier and happier life.