FOOD, NUTRITION & SAFETY MAGAZINE
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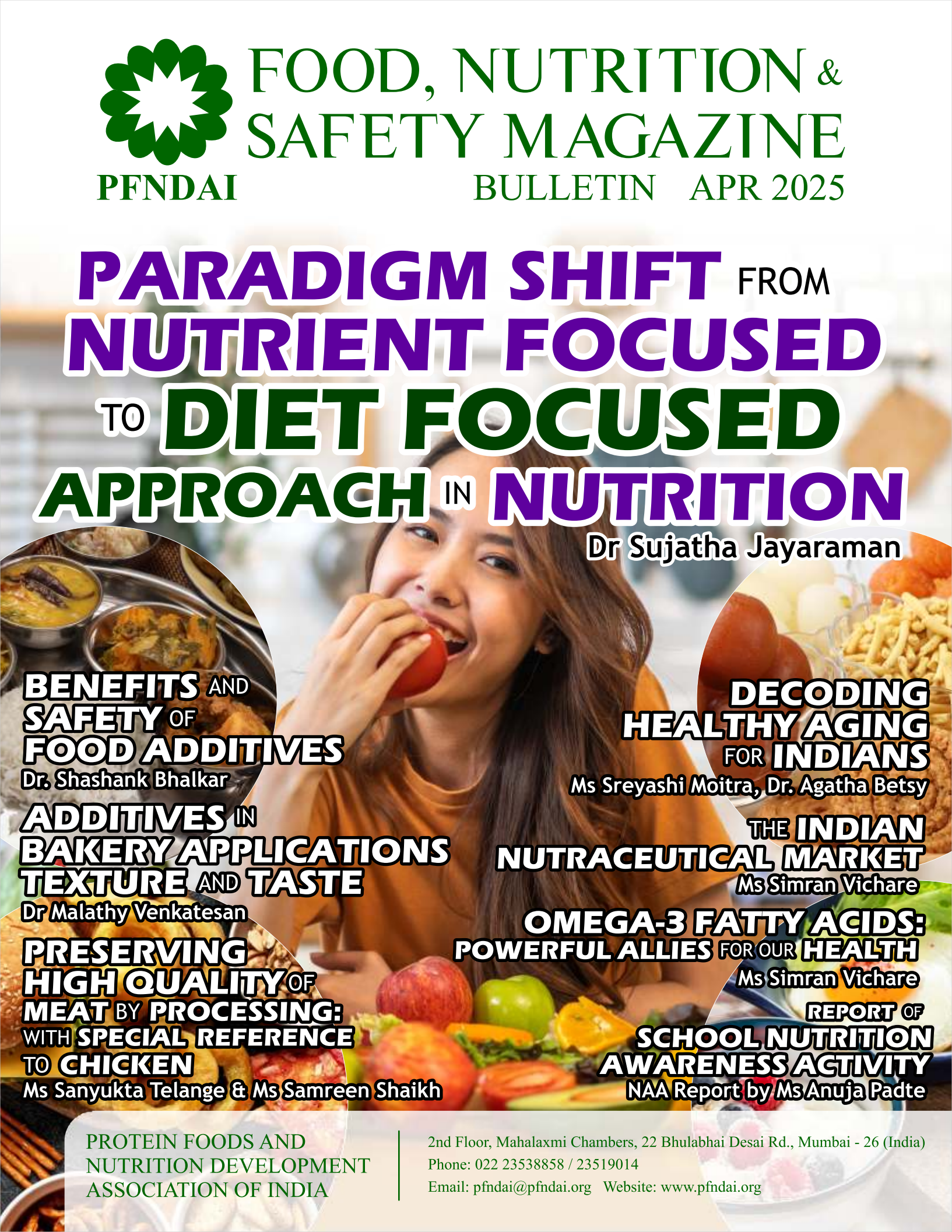
PARADIGM SHIFT FROM NUTRIENT FOCUSED TO DIET FOCUSED APPROACH IN NUTRITION

Dr Sujatha Jayaraman



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PROTEIN FOODS AND NUTRITION DEVELOPMENT ASSOCIATION OF INDIA

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MAKING INDIA LESS HUNGRY

According to a UN report, globally the highest number of undernourished people are in India (https://thewire.in/health/undernourished-highest-global-india-un-report).

We are home to over 194.6 million (19.5 crores) undernourished people. This is an improvement over two decades since 2004-06, when the figure was 240 million (24 crores).Still, this is a staggering figure, and still, we only worry about non-communicable diseases, calling ourselves the diabetes capital of the world.

We definitely should worry about the non-communicable diseases, but certainly not with a neglect of hungry people, especially the children and young mothers. We keep advocating fresh home cooked food, when they just cannot afford any food. We are going to have an increase in population, and unfortunately, environmental changes will show unfavourable conditions for growing common crops. There has to be radical shift in our thinking and plan a credible solution which is achievable in the foreseeable future.

First of all, we don't have the best agricultural productivity per land usage, suffer a higher post-harvest spoilage and nutrient quality losses, and reluctance to move to newer foods and sources of nutrients. We have not checked newer sources of nutrients. We have such a large variety of plants, yet we are obsessed with providing only a handful of cereals and pulses for our energy and protein needs. We need to seriously consider marine resources as a possibility that the whole world is looking at. Algal proteins and other nutrients can be very valuable when dietary sources are limited. We also need to take a relook at genetically modified crops. Although we have set up the mechanism to clear GM foods but have yet to seriously look at bringing some into the realm. GM soya beans have been used elsewhere for decades.

There are many herbs and microgreens that are rich in micronutrients, but they need to be screened for both safety and viability. Unless we start looking differently, we may be faced with difficult choices when the weather becomes unfavourable and our common crops either lose productivity or nutrient contents. The only things that would survive would be insects, then we will start fighting over whether to consider them pests or food. Traditional foods are fine as long as the conditions don't change. However, when there is a substantial change due to increasing demand as well as diminishing supply, we need to change accordingly in our thinking. Now is the time when we can thoroughly do screening and testing for availability, suitability as well as safety. If we wait too long, we are risking our large population facing famines. We can't wait for another miracle like Green Revolution to save us.

Let us be less emotional and more pragmatic and start research in the right direction with the aim of preventing hunger especially from our younger population that depends on us for proper nutrition and health.

Prof Jagadish Pai, Editor, PFNDAI

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THE COMPLIANCE BURDEN OF FIXED ENFORCEMENT DATES

AUTHOR
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Chairman,
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July 1st has been designated as the enforcement date for amendments to labelling and display regulations, subject to a minimum of 180 days from the date of notification.

In emergencies, the matter may be decided on a case-to-case basis. For decades, businesses have faced multiple unplanned labelling enforcement dates, and the logic of benefiting some with a full-year window while others get 180 days needs explanation. Redesigning new materials and exhausting previous inventories apart from increased costs disturbs routine manufacturing activities.

When regulatory deliberations take 14 - 39 months to notify standards, the need for imposing narrow time restrictions should be justified. Ease of doing business is providing reasoned and predictable lead times, not mitigating unease imposed previously. Businesses elsewhere enjoy a more enabling environment than in India: a practice worth emulating.

In 2004, the US FDA ruled it would set uniform compliance dates (UCD) for new labelling regulations in 2-year increments and periodically announced these dates since then. Two-year increments enhance the industry's ability to make orderly adjustments to new labelling requirements without exposing consumers to outdated labels. The rule proactively provides industry lead times to plan new materials and adjust label inventories, avoiding sudden disruptions and disturbed economic activity.

For example, as early as December 30, 2024, it proactively announced January 1, 2028, as the new UCD for final food labelling regulations notified on or after January 1, 2025, and on or before December 31, 2026. It further clarifies that no change in compliance dates in final notifications published before January 1, 2025, is intended.

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Where, under special circumstances, there is justification, these will be made known. It generally encourages the industry to comply as quickly as feasible.

Since the PFA days, regulators have preferred enforcement dates without explaining the 180-day or one-year limits or reasons for not adopting an open 2-year window. Even though the US FDA's language is formal, it offers clarity, certainty, and rationale.

FSSAI could improve its notification process, communicating a policy akin to the US FDA approach, alleviating the compliance burden, and enhancing the operational efficiencies of Indian businesses.

The Economic Survey 2024-25 put out a blunt message for deregulation: "Get out of the way and allow businesses to focus on their core mission of productivity and reduced costs in doing business".

"Adding layers of operational conditions to policies to prevent abuse makes them incomprehensible and regulations needlessly complicated, taking them further from their original purposes and intents.

Easier said than done. Label changes are frequently triggered by non-gazette administrative orders and directions constantly issued u/s 16.5 and 18.2.

The observations of the Comptroller Auditor General of India (JPC 2018) that "FSSAI continues to issue directions without following the procedure of previous publication, notification and approval of the Central Government,(as contained in section 92 of the Act) and despite the Supreme Court declaring such procedure as mandatory is a pointer.

Government pronouncements do not necessarily translate into executive compliance. To stop micromanaging economic activity, the entrenched reluctance to walk the talk is a colossal change. Until then, the regulatory burden from convoluted conditions and labyrinthine language will continue.

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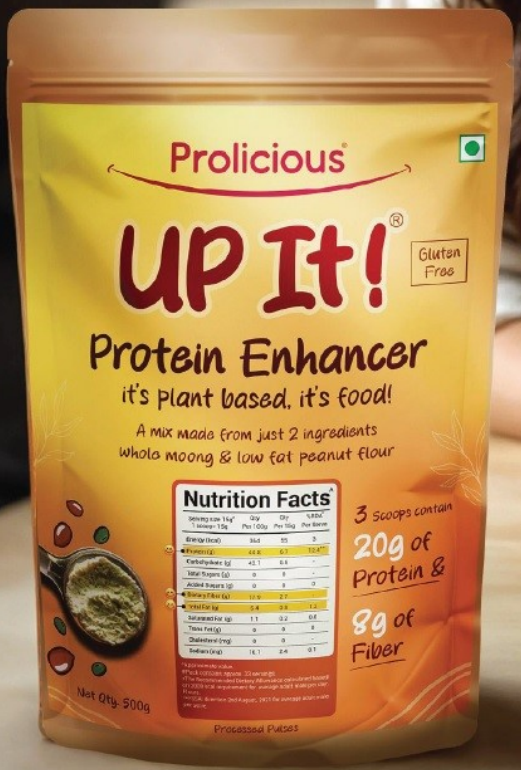

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PARADIGM SHIFT FROM NUTRIENT FOCUSED TO DIET FOCUSED APPROACH IN NUTRITION

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India is currently grappling with a complex nutritional landscape characterized by the triple burden of malnutrition—undernutrition, micronutrient deficiencies, and the rising prevalence of overweight and obesity. Despite various governmental initiatives, such as POSHAN Abhiyaan, the Eat Right India movement, food fortification, and Maternal & Child Nutrition Initiatives, significant nutritional challenges remain.

For decades, public health efforts and industry practices have emphasized reducing single nutrients such as sugar, salt and fat and fortifying products with specific vitamins and minerals. While these efforts are important, they fail to fully capture the complexity of real-world eating habits.

In this context, should the future of nutrition focus on paradigm shift from isolated components to a diet conversation?

A Holistic Diet Goes Beyond Just "Healthy" Products

A holistic diet focuses on overall well-being by integrating physical, mental, and emotional health through nutrient-dense foods and mindful eating habits. This philosophy aligns with global and national dietary guidelines, including those from the World Health Organization (WHO) and the National Institute of Nutrition (NIN) Dietary Guidelines for Indians. These guidelines emphasize dietary diversity—consuming a variety of foods from different food groups to meet nutrient needs through a well-balanced daily diet.

Meal planning typically revolves around a 2,000 kcal/day framework, ensuring adequate portions from 5–7 food groups out of the 10 food groups (Cereals & Millets, Roots & Tubers, Pulses, Fruits, Vegetables, Green Leafy Vegetables, Nuts & Oilseeds, Dairy, Flesh Food, Spices & herbs)to provide balanced nutrition throughout the day, rather than focusing on a single nutrient-based approach.

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In contrast, the heavy reliance of Indian diets on a single macronutrient—carbohydrates—has led to inadequate intake of proteins, healthy fats, and essential micronutrients, causing dietary imbalances over time. Indian diets are heavily carbohydrate-based due to the high consumption of cereals. According to the ICMR- National Institute of Nutrition's "What India Eats" report (2020), urban adults consume an average of 1,943 kcal/day, with approximately 60% of calories from carbohydrates while rural adults consume an average of 2,081 kcal/day, with around 70% of calories from carbohydrates. This nutritional imbalance is a significant contributor to India's rising burden of non-communicable diseases (NCDs), including diabetes—earning India the label of the diabetes capital of the world.

To address the growing health challenges, there is an urgent need for a paradigm shift from nutrient-focused approach- Embracing a holistic, balanced diet that prioritizes diverse food groups can improve overall nutrition and reduce the risks associated with dietary imbalances.

A well-structured diet can also accommodate indulgent foods occasionally- what matters is portion size and frequency of consumption. A healthy eating pattern is built on variety, balance, and moderation, not deprivation. It is our choices over time, not a single meal or snack, that determine the health impact of our diets.

A Systems Approach to Product Design

The food industry faces an urgent challenge: balancing taste, nutrition, sustainability, and evolving consumer expectations. Reformulation—improving the nutritional profile of products—is at the heart of this effort. Over the past decade, rising concerns about noncommunicable diseases like diabetes and obesity have driven companies to reshape their portfolios. This involves two core strategies: reducing nutrients to limit (such as sugar, salt, and saturated fats) in existing products and innovating new, healthier options tailored to modern dietary needs, including high-protein, high-fibre and fortified foods.

At Hindustan Unilever Limited (HUL), our innovation strategy follows a systems approach—an integrated framework grounded in international dietary guidelines. This approach considers product-specific factors such as portion size, frequency of consumption, and the product's role in a balanced diet. For instance, meal products are formulated to deliver more energy than snacks, reflecting their larger contribution to daily calorie intake.

However, the true value of reformulation lies in its public health impact. Unilever's analysis of national dietary studies from five countries (US, UK, France, China, and Brazil) involving 110,000 participants shows that if all foods met Unilever's Science based Nutrition Criteria, the average intake of calories, salt, sugar, and saturated fats could drop by up to 30%, aligning closely with World Health Organization (WHO) recommendations (Mariska et al., 2022). Real-world examples underscore this potential—Public Health England's salt reduction program led to a 15% decrease in average salt intake between 2003 and 2011, contributing to lower blood pressure and reduced rates of heart disease and stroke (He et al., 2014).

By adopting a holistic, evidence-based approach, the food industry can drive tangible improvements in public health while preserving taste and consumer satisfaction. Reformulation is not just about what we remove—it's about delivering better nutrition in every bite and making healthy dietary patterns practical, accessible, and affordable for all.

A Celebration of Food and Culture

Indian dietary wisdom has long embodied the principles of balance, diversity, and sustainability. Our traditional thalis, rich in whole grains, fermented foods, and pulses, naturally align with modern nutrition science.

For instance:
• Fermented foods (idli, dhokla, kanji) improve gut health through probiotics.
• Spices like turmeric, black pepper, and cumin offer anti-inflammatory benefits.
• A mix of grains (wheat, rice, millets) ensures diverse nutrient intake.
Rather than reinventing the wheel, the food industry must modernize and scale these principles to fit contemporary lifestyles—making healthy eating easy, enjoyable, and affordable.

The Future of Nutrition: A Collective Responsibility

Transforming our food system is not the responsibility of any single stakeholder—it requires collaboration across industries, regulators, and public health experts. Industry must drive innovation—reformulating products, investing in research, and making healthier choices accessible. Regulatory bodies must align policies—encouraging fortification, setting portion guidance, and supporting sustainable food systems. Nutrition professionals must shift the conversation—from "good vs. bad foods" to overall dietary patterns and lifestyle balance.

Small Actions, Big Impact

Diet is the single most powerful lever for health and well-being. Change does not happen overnight—but it does happen one meal at a time, one choice at a time. A truly healthy food system is one where:
• Consumers enjoy balanced, culturally relevant diets.
• Packaged foods contribute to better nutrition, not just convenience.
• Healthier choices are the easier and more accessible option.

The future of food is not about restriction but about informed diet choice —the right foods, in the right balance, at the right time. Healthy products, healthy diets, healthy lives—the power is in our hands.

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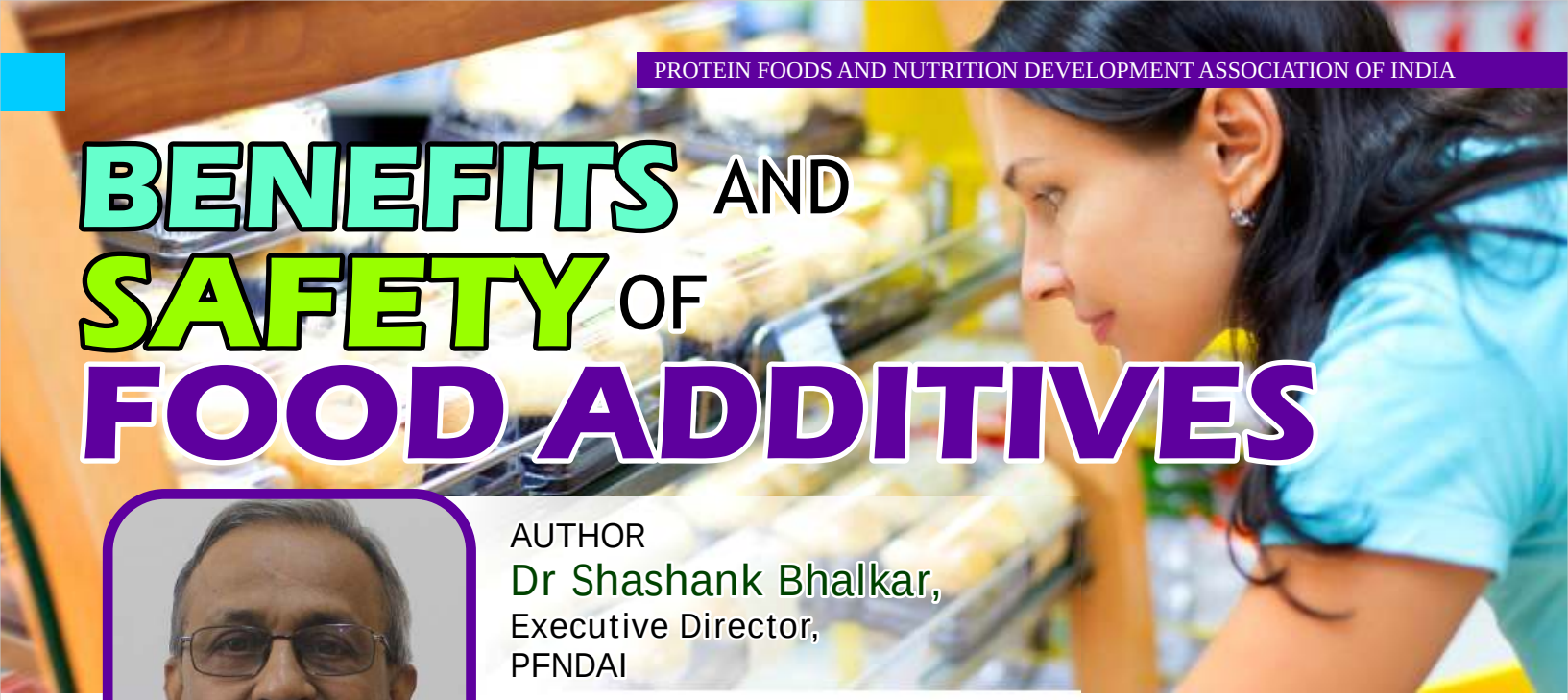

BENEFITS AND SAFETY OF FOOD ADDITIVES

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Demonising Processed Foods has become very common among persons with limited knowledge who do it on social media. Food Additives which are an essential part of Processed Foods are no exception.

When we search for the word “Food Additives” on social media platforms such as Instagram or Facebook, it can be frightening. Many so-called experts will be guiding us on the status of different food additives. Additive X will give you cancer. Additive Y will play havoc on your gut. When you are eating a food containing a particular additive, you are eating poison. A particular additive is not allowed by the EU and is used in the product. Cellulose, which is added as a source of fibre is termed as “Wood fibre”. Doubts are even created regarding the additive's GRAS status, saying Food companies pay heavily to scientists to get GRAS approval. Not only Generation Z, but people of all ages are influenced by what is on social media. Therefore,a normal consumer will be in a thoroughly confused state of mind regarding“Food additives” and the “Processed foods” in which they are essentially used. It will be beneficial to see what food additives are used in the foods and whether they are safe to use. The process of their approval and how regulators prepare the standards to safeguard the consumers.

Eating food is one of the fundamental necessities of living. Although the desire to eat has remained constant throughout history,how food is consumed has changed significantly. It is from eating raw meat and plants to eating raw food cooked on fire. This was followed by the agricultural commodities made into different products and consumed fresh. With industrialisation, there was a shift of populations from villages to urban places. As people had to spend more time in workplaces, this led to the need to preserve food for a longer time. This in turn gave rise to an industry of processed foods which produce foods on a large scale and can be preserved for a longer time. Safe food is also required for food security and public health. Preserving foods for a longer time and processing by different methods require to addition few chemicals into the food. These chemicals are food additives and the definition has changed over the period.

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By the definition of Codex Alimentarius food additive is, “Any substance not used as food itself and not used as a typical ingredient in the food.” If they have nutritive value or not, they may be added to food for a technological or multipurpose such as organoleptic purpose in manufacture, processing, preparation, treatment, packing, packaging, transport, or holding of such food results. The definition does not include contaminants or substances added to food for keeping or improving nutritional qualities. They are recognised by unique international numeric numbers. (1).

Food additives could be natural, where they are natural extracts. For example, beetroot extract betanins are used as natural red colours. They can be artificial where they are not naturally derived and produced synthetically. (2), (3)

They can also be classified by their functions. Preservatives are a class of compounds that help to stop the spoilage of foods by preventing the growth of microorganisms. Salt, sugar, and oil have been used as natural preservatives in traditional products. Preservatives like Benzoates in beverages and sulphur dioxide in sugar are synthetic preservatives. Antioxidants help prevent fat oxidation which gives off odour to food and extends the shelf life for sensory quality. Typical examples of antioxidants are tocopherols, ascorbic acid, TBHQ. Colour plays an important function in food processing as it restores the colour loss during processing, helps reduce batch-to-batch variation, and makes food visually appealing. Flavour enhancers enhance the taste and flavour of the product. Typical examples are monosodium glutamate, hydrolysed vegetable proteins or yeast extracts. Flavourings added in small amounts give a particular taste to the product.

Sweeteners are natural and synthetic. Sugar and honey are natural sweeteners that used for a long time in food products. Intense sweeteners like acesulfame K, aspartame, and stevia are used in small amounts to offer sweetness to the product. Soft drinks or sweetening tablets are examples. Whereas, bulk sweeteners like polyols have similar sweetness to sugar and are used to substitute sugar in many product formulations. They also give mouthfeel in sugar-free products. Acidity regulators control the acidity or alkalinity of the product. Examples are citric acid, tartaric acid, and lactic acid. Anticaking agents when added allow free movement of particles. Silicon dioxide is added to salt to make it free-flowing.

Antifoaming agents prevent frothing or disperse the foam. Polydimethylsiloxane is an antifoaming agent. Glazing agents are the additives that provide a sheen or protective coating on the surface of a product. Emulsifiers help to make a stable emulsion when a mixture of two ingredients with different phases is to be mixed. Lecithin is used to make a stable emulsion of oil-water emulsions. Some products like mayonnaise, and ice cream have smooth textures because of emulsifiers. Stabilisers and thickeners which improve the texture of the food. When added they give a smooth creamy texture to food. Some common examples are guar gum, xanthan gum, and carrageenan. They are commonly used in dairy products, dressings, and sauces. Gelling agents help to make a gel. Pectin is used to prepare jams and jelly.

Presently so much negative has been talked about that creates doubts about the safety of Food Additives. However, with the globalization of Food Trade, the safety of Food Additives has become of prime importance. This is because different countries have different regulations and there is a possibility that unsafe food may get exported to a country with no strict regulations. These additives must undergo a risk assessment to be safe for human consumption. Risk assessment is a scientific process, that needs toxicologists and nutritionists to work together.

Joint FAO/ WHO Expert Committee on Food Additives (JECFA) evaluates the safety of Food additives. JECFA and the Scientific Committee on Foods (SCF) decide Acceptable Daily Intake (ADI) values. ADI (4) is the value of an additive if consumed at that dosage daily throughout life, there would not be an "appreciable health risk." The ADI is generally derived from the lowest no observed adverse effect level (NOAEL) obtained from long-term animal studies. ADI is then calculated by applying a safety or uncertainty factor, generally 100 to the NOAEL obtained from the most sensitive species. This can be further explained by taking an example of a particular additive. Suppose in a long-term toxicity study of the additive, NOAEL of carcinogenicity in mice is 10mg/Kg. Then ADI will be 10mg/ Kg divided by 100, which means ADI will be 0.1 mg per Kg body weight per day. In such a case, a 60 Kg body weight person will be at no risk if he consumes less than 6mg (60*0.1) daily of this particular additive for a lifetime. Any food additive used in the food package has either an E-number given by the European Union (EU) or by an International Numbering System (INS-No.) signifying the approval by JECFA.

Risk assessment is part of the risk analysis process. (5) Before approval of any food additive, a rigorous Scientific evaluation of associated hazardsis carried out during Risk assessment. This exercise is carried out before approval of an additive and repeated periodically,as the environment changes. Risk assessment of Food Additives is a science-based approval process with four steps.

The first step is Hazard identification (Step 1): This finds the intrinsic properties of an additive that can affect health. A review of appropriate published scientific databases is done for human and animal toxicological studies. Epidemiological data is given more importance than lab-based data. This approach is also termed the "weight of evidence approach".

The second step is Hazard characterization (step 2): The safety of food additives is decided based on toxicity data. This step involves both "dose-response extrapolation" and "dose scaling". The toxicity levels estimated in animals should be extrapolated both qualitatively as well as quantitatively to much lower levels for comparison to human exposure levels. In dose scaling JECFA uses mg/ Kg body weight for "inter-species" scaling. Many approaches including Mathematical models can be used to characterize dose-response relationships.

Exposure assessment (Step 3): Once the dose is decided, it is necessary to ascertain the exposure of the additive to the consumer. This step requires the help of experts in the field of Nutrition to estimate the actual consumption of food additives.

Food Frequency Questionnaire (FFQ) or twenty-four-hour dietary records are generally used to estimate the intake of Foods likely to contain additives. The concentration of additives in the foods is analysed to find out the dietary exposure of the additive to the food.

Risk Characterisation (Step 4): In this step, the probability of occurrence of adverse effects on humans because of exposure to Food Additives is assessed. This is generally done by comparing ADI values of additives with exposure levels in humans. Risk can be characterized by different exposure scenarios. Hazard Index (HI) is also the term for characterizing risk and is calculated by the average daily intake dose (ADD) for the additive from the diet expressed as a percentage of ADI. If HI is less than 100% indicating that there is no harm to exposure of that additive.

What is GRAS additive? The US FDA database contains the list of food additives reviewed and deemed safe for consumption by the FDA. GRAS stands for "Generally Recognised as Safe." The FDA established the GRAS list in 1958 for substances considered safe based on their long history of everyday consumption or the results of scientific research. However, as the scientific knowledge advanced, the FDA required more rigorous testing for the new additives to be added to the GRAS list. In 1997, the FDA introduced the concept of "self-determination" of GRAS status. Now manufacturers have two options. He can submit a request to add the substance to the GRAS list and the FDA to review the safety based on the scientific process. FDA will undertake the evaluation and the process could be lengthy. Manufacturers can opt for the "self-determination" process, where he is allowed to decide whether the substance is safe. However, the onus is on the manufacturer to show the substance is safe. There are concerns about the "self-determination process as critics think this procedure is too lenient or there is a conflict of interest.

Therefore, food additives undergo a systematic risk assessment for their safety for human consumption.

Each country has their regulations on Food additives. In the United States, the additives are regulated by the US FDA. Each additive undergoes safety testing. A list of approved food additives with the maximum usage levels is set to assure safe consumption. In the EU this is controlled by the European Food Safety Authority (EFSA). The safety of the food additives is assessed before they are approved for use. In Canada, Health Canada is responsible for the safety evaluation of additives before they are permitted to be used. In Japan, the Ministry of Health, Labour, and Welfare determines the safety of food additives before they are approved for use in food products. In Australia and New Zealand, Food Standards Australia, and New Zealand (FSANZ) regulate the use of Food Additives. In India, the use of Food Additives and the maximum level allowed is determined by FSSAI.

There are concerns raised about the health risks of a few additives. However, all food additives undergo a scientific risk assessment process for their safety. Each country has regulations for the use with the maximum usage limit. This should be strictly followed. Consumers should read the labels to make an informed choice.

This is because he may be allergic to a particular chemical. In recent years there has been a demand for clean labels and the use of natural ingredients.

This trend is expected to continue. Earlier use of natural additives like colourants was restricted because of the high cost in use. However, newer technologies like Precision fermentation will help to bring the costs down. 3-D printing technology can create complex food textures and structures without the use of thickeners or emulsifiers. There is pressure from consumers on regulators on stricter regulations. Increased attention to sustainability has led to the development of biodegradable eco-friendly additives. Advancement in technology is also making personalise and customise food products to individual needs. An example is making gluten-free bread with the same texture and flavour as normal bread by using enzymes.

With the advancement of technology and changing consumer preferences, there can be changes in the way food additives are produced or used. However, their use in Processed Foods is unquestionable and will stay.

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ADDITIVES IN BAKERY APPLICATIONS FOR TEXTURE AND TASTE

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Sensory properties are essential for consumer acceptance of all types of bakery products. Texture is considered critical for the quality of some products. In this way, texture determines the consumer perception and value attributed to the products.

Besides, the texture is also pivotal from the technological and economic points of view to minimize losses during production, storage or transportation. For example, it can be pointed out the case of overly harder crust in bread, leading to rejection at the production stage, or fracturability of cookies, resulting in high losses during transportation.

Texture can be analysed through instrumental methods, sensory evaluation, or both. Instruments are used to quantify a wide variety of textural characteristics of foods. On the other hand, sensory tests are carried out by a number of panellists/ judges, with or without training, in a standard tasting room equipped with individual tasting. While instrumental tests provide faster and more precise quantifiable results, sensory tests provide complete information better adjusted to consumer perception (1).

Measuring textural properties of bakery and pastry products is very important in quality control and for the development of new products. Instrumental texture analysis, particularly the TPA (texture profile analysis), represents an important breakthrough, being presently widely used by the food industry and the scientific community. TPA is an objective method; the textural attributes it estimates can correlate with the sensory textural attributes. Hence, this method is fast enough and needs easy sample preparation to be used in quality control in the processing line.

Common additives used include hydrocolloids, emulsifiers, acidic ingredients, flavours, enzymes and preservatives.

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1. Hydrocolloids: (2)

Food hydrocolloids are high-molecular weight hydrophilic bio-polymers used as functional ingredients. The term hydrocolloids, embraces all polysaccharides extracted from plants (e.g. guar gum, locust bean gum), seaweed (alginates, agar) and microbial sources (xanthan gum), as well as gums derived from plant exudates (gum arabic), and modified biopolymers prepared by chemical treatment of cellulose (carboxy methyl cellulose, hydroxy propyl methyl cellulose), modified starches, pectin, gelatin

Global hydrocolloids market is valued at around $ 4.4. billion with a total volume of about 260 000 tonnes (gelatin 46.3 %, guar gum 11.8 %, carrageenan 8.5 %, pectin 7.7 %, arabic gum 7.7 %, xanthan gum 4.6 %, locust bean gum 3.9 %, carboxymethyl cellulose 3.9 %, alginates 3.1 % and agar 2.7 %).The global modified starch market size was estimated at USD 11.8 billion in 2021 and is anticipated to expand at a compound annual growth rate (CAGR) of 5.3% from 2022 to 2030.

Guar gum is used as a thickening and stabilizing agent in a wide variety of foods, usually in amounts less than 1 % of the food weight. The incorporation of guar gum into baked foods (e.g. wheat bread, biscuits, breakfast cereals) improves their palatability. The softening effect of guar gum on bread may be due to a possible inhibition of the amylopectin retrogradation, since guar gum preferentially binds to starch, thus preventing the formation of a spongy matrix.

The application of guar gum in combination with diacetyl tartaric acids ester of monoglycerides (called DATEM, emulsifier primarily used in baking) helps to improve volume and texture of bread obtained from non-frozen and frozen dough. Xanthan gum is also applied as a stabilizer in concentrations of 0.1–0.4 %, emulsifying agent for bakery fillings and as a fat substitute in bakery products. Xanthan gum can also induce dough strengthening; it increases water absorption and the ability of the dough to retain gas. It thus increases the specific volume of the final bread and the water activity of the crumb resulting in improved texture and taste. Xanthan gum is also used to improve the texture and moisture retention in cake batters and dough, muffins, biscuits and bread mixes. Baked goods containing xanthan gum have an increased volume and moisture, higher crumb strength, less crumbling and greater resistance to shipping damage. Locust bean gum adds viscosity to the dough, results in higher baked product yields and improves the final texture of the product.

Modified starch is natural starch treated in a way that changes one or more of its initial physical or chemical properties. Modified starch enhances the baking performance by improving texture, stability, and storage life. It controls moisture content and prevents stickiness in cakes and pastries.

Cross-linking modifications do not degrade at high temperatures of baking (120°C to 230°C). Therefore, they provide good structure and texture like soft crumbs in cakes and a tender bite in cookies(3).

The hydrocolloid pectin is popular for its gelling characteristics and used largely in preparation of jams and gels. Addition of pectin in fermented bakery products and pastry activates fermentation and accelerates biochemical and microbiological processes in the dough.

It was also noted that pectin affects gluten springiness. In one study it was seen that with addition small quantity of pectin, the bread crust acquired a golden-brown colour, and the crumb had a thin-walled, with high porosity. It was further found that the best results could be achieved when dry pectin was pre-mixed with salt and when yeast was preactivated in a pectin-sugar solution (4).

Gelatin can be considered one of the most versatile hydrocolloids in the food industry because it can be used as a gelling, thickening, water-binding, emulsifying,
foaming and film-forming agent, Gelatin is able to create a fat-like matrix in emulsions where exhibit shear thinning properties and creaminess similar to fat but free of calories. In baking applications, it was seen that gelatin enhanced the bread qualities significantly, while retarding the staling process. This was due to absorption of water by gelatin thereby resulting in less water available to form crystal lattice and restricting the migration of starch molecules (5).

2. Emulsifiers (6)

Emulsifiers are fatty substances possessing both lipophilic and hydrophilic properties. This gives these molecules surface active characteristics. Emulsifiers are multifunctional ingredients when used in bakery products. The three major functions are (1) to assist in blending and emulsification of ingredients, (2) enhance the properties of the shortening, and (3) beneficially interact with the components of the flour and other ingredients in the mix.

Applications of emulsifiers in bread making are advantageous to the baker as well as the consumer; helps to improve crumb structure (finer and closer grain), brighter crumb, increased uniformity in cell size; improved slicing characteristics of bread, improved crust thickness; emulsification of fats resulting in reduction of shortening, - improved symmetry, improved gas retention resulting in lower yeast requirements, better oven-spring, faster rate of proofing and increased loaf volume, longer shelf-life of bread. Lecithin, the byproduct of the edible oil industry is becoming more and more popular. Other emulsifiers extensively used in bakery applications are monoglycerides and derivatives (e.g. DATEM), sorbitan esters (e.g. polysorbate 60), lactic acid derivatives (e.g. Sodium stearoyl lactate SSL), polyglycerol esters.

Emulsifier application in cakes improve the physical properties of cake batters (viscosity, specific gravity and stability), cake quality parameters (moisture loss, density, specific volume, volume index, contour, symmetry, colour and texture) and sensory attributes. Emulsifiers have more importance when egg is replaced with whey protein in eggless cakes since egg helps in emulsification actions.

In one reported study, eggless cakes were analysed to investigate functional potential of the emulsifiers and results were compared with those of control cake containing egg. Almost in all cases emulsifiers, changed properties of eggless cakes significantly to result in similarities with control cakes containing egg. The eggless cake samples with Distilled glyceryl mono stearate (DGMS)-lecithin blend were more appreciated by sensory panellists than the rest of the cakes. The study confirmed that DGMS-lecithin emulsifier blend in combination with soy milk is effective in producing a completely eggless cake that could be a perfect achievement in the cake baking industry.

The enzyme Lipase has been applied to improve the performance of cakes using the surfactants produced by lipase due to enzyme action to replace emulsifier additives.

Studies show that cakes baked with either the enzyme lipase (0.003 g/100 g) or emulsifier (0.5 g/100 g) displayed volume and crumb cell structure that were similar to those of control cakes. During storage time, cakes with lipase displayed lower hardness.

Both improvers, at low concentrations, could improve certain physical characteristics, such as crumb structure, of cakes with inulin as a fat replacer (7).Inulin is used as a fat substitute, and it also contributes to the desired taste and texture of baked goods and cereals. Emulsifier provided improved cake crumb with a more homogeneous cell structure. Lipase displayed a better texture profile during storage. Therefore, good-quality cakes with 50% and 70% fat replacement could be obtained using lipase or emulsifier at low levels.

3. Acidic ingredients in baked products (8)

Primitive baking acids included tartaric acid and cream of tartar from the winemaking industry. Several decades later, in the late 1800s and early 1900s, acid phosphate and food phosphates were developed and successfully introduced to the baking industry. The first commercially produced baked sweet goods contained baking soda and acidic ingredients (e.g. sour milk and citric juices). This system created the proper conditions for “unplanned” chemical leavening in cakes. In conjunction with a food-grade base such as baking soda, leavening acids produce carbon dioxide that provides the leavening or expansion effect in baked products. This mixture is commonly known as baking powders which often include a carrier or vehicle, such as starch.

Baking acids participate in the neutralization reactions with bases (sodium bicarbonate, potassium bicarbonate, ammonium bicarbonate):

Base + Leavening Acid → Neutral Salt + Water + Co2

The optimum acid (or combination of acids) is the one that produces a final product with the intended characteristics such as volume, crumb structure, crust colour, etc. This is especially significant in cakes where the neutralization of baking powder with sodium phosphates plays a significant role in the final appearance of cakes, especially the crumb grain therefore texture and taste.

The acidic additives could be from natural sources such as tartaric acid, fumaric acid, cream of tartar, citric acid or chemicals such as sodium aluminium sulphate, sodium aluminium phosphate, mono calcium phosphate, dicalcium phosphate, and others.

Acidic ingredients such as vinegar are sometimes added to gluten-free baked good recipes as an attempt to improve quality. In one study, the effects of acetic acid, citric acid, lactic acid, and monosodium phosphate on rice flour and HPMC based gluten-free bread were tested. Finished loaves were tested for pH, bread volume, cell area of the crumb, and hedonic sensory analysis.

The ingredient with the most promise for improving the texture of rice flour-based gluten-free bread was monosodium phosphate, which significantly improved texture liking of the finished product compared to other test samples, and significantly increased the bread volume and cell area compared to test and control samples. Monosodium phosphate was most effective at improving volume and cell area at a dose of 0.8% flour weight.

Ascorbic acid (vitamin C) is used in bakery products as an oxidation agent that increases dough strength by oxidizing sulfhydryl groups (-SH) to disulfide bond (S-S).

The result is strengthening of the gluten network to retain gas cells, softening of the crumb and increasing the bread volume.

4. Flavours and colours (9)

Bakery products in general have a distinct and pleasant aroma and flavour, which play a major role in influencing customer preferences and popularity of a certain bakery product, and they are significantly reliant on individual sensibilities and preferences. Food colourings and flavourings are also often used in bakery products to enhance their appearance and taste. These additives can be natural or artificial, and can range from simple vanilla extract to complex chemical compounds. While bread has its own characteristic aroma, flavours and colours are added to other baked products such as cookies and cakes to enhance the taste and flavour.

There are over 540 volatile substances in bread. Still, the favourable aroma attributes of bread are mostly due to a relatively small amount of the volatile components present. The aroma and flavour characteristics of bread are influenced by a variety of elements, including the recipe, particularly the flour and other non-wheat ingredients added, the method of fermentation, the addition of enzymes and improvers, and baking. Additionally, storage could have significant effects on the aromatic profile. In general, the ingredients and processing techniques used for fermented products and bread determine how their flavour and aroma develop.

Besides improving and strengthening the flavour, salt used in bread-making process contributes to the texture and stability of final products.

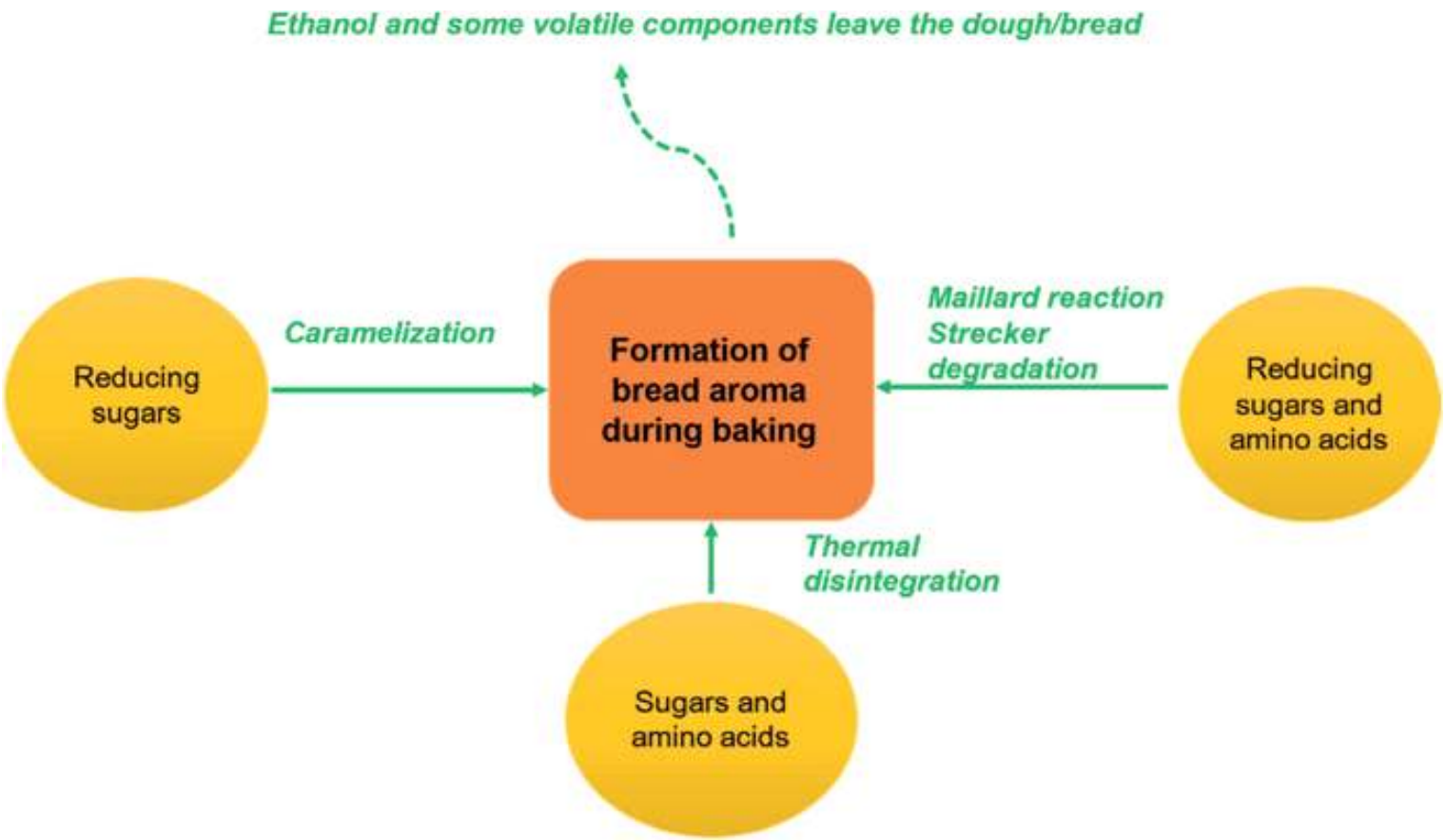
It also controls the yeast activity, enhances the gluten network, and helps the dough retain gas. In addition, salt can also cover off-flavoured bitterness.

The flavour and aroma features of baking products are also contributed by other common ingredients such as fat, sugar, milk, and whey. Important thermochemical reactions that are responsible for the creation of natural aroma and colour in baked products are caramelization and the Maillard reaction, and they take place simultaneously. The primary distinction between these two processes is that caramelization is the pyrolysis of sugars, whereas the Maillard reaction is the interaction of sugars and amino acid. The temperature of the process determines the extent of the colour and aroma.

Caramelization begins with the melting of sugar on the dough's surface at 130–140°C and progresses to a rise in temperature, resulting in the synthesis of coloured multiple oligosaccharides with varying flavours ranging from sweet to bitter.

Maillard reaction, that is, the formation of melanoidin, begins at a temperature of about 100°C and is accelerated by increasing the temperature. It involves very complex interactions between reducing sugars (glucose, fructose, and maltose) and amino acids (lysine), proteins, or peptides, resulting in the formation of coloured polymers aldehyde-amine and heterocyclic components with nitrogen.

Figure 1. Maillard reaction ref: 6



A final example of an additive used in bakery products is artificial sweeteners. These substances are used to sweeten products without adding calories. Examples of artificial sweeteners used in bakery products include saccharin, aspartame, and sucralose. More recently bakers have started adding some of these additives to make lower calorie products or for those worried about sugar intake.

Summary:

Additives are substances added to food products to enhance their flavour, texture, appearance, or shelf life. The use of additives in bakery products is a common practice in the food industry, as they can help to improve the quality and safety of these products. Food additives are assessed for potential harmful effects on human health before they are approved for use. Additives perform diverse functions in baked food and help to improve texture, taste along with shelf life.

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DECODING HEALTHY AGING FOR INDIANS

AUTHORS

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"Today, most people, even in the poorest countries, are living longer lives. But this is not enough. We need to ensure these extra years are healthy, meaningful and dignified. Achieving this will not just be good for older people, it will be good for society as a whole."– Dr. Margaret Chan, Former Director General, WHO

By 2050, the aged population of India is expected to double comprising almost 20% of the total population (UNFPA). With the rise in the aging population comes enormous challenges that impact the overall health of the society. Every fourth Indian over 60 years and every fifth Indian over 45 years reported having poor health. 75% of the elderly have one or more chronic diseases. 40% of the elderly have one or other disabilities. 1 in 4 has some kind of multi-morbidity. Diabetes is more common among senior citizens in urban India. More than 20% of the aging population has T2 DM, where more than 15% was in the age range of 45-59y[1]. the prevalence was about 9% in the rural aging population.[2] Around 20% of the elderly in India have mental health issues. With so many health challenges it becomes even more critical to take a preventive and proactive approach.[3]

While acknowledging the issues we must understand, aging is normal however choosing to age in a healthy way is our choice and the faster we choose to live a healthy life the better we can manage the challenges of aging. Healthy aging is not just a personal issue, but a societal imperative. As the elderly population grows, so does the burden on the healthcare system, families, and caregivers. Chronic diseases, such as diabetes, hypertension, and dementia, are on the rise, and if left unchecked, can lead to significant morbidity, mortality, and economic costs.

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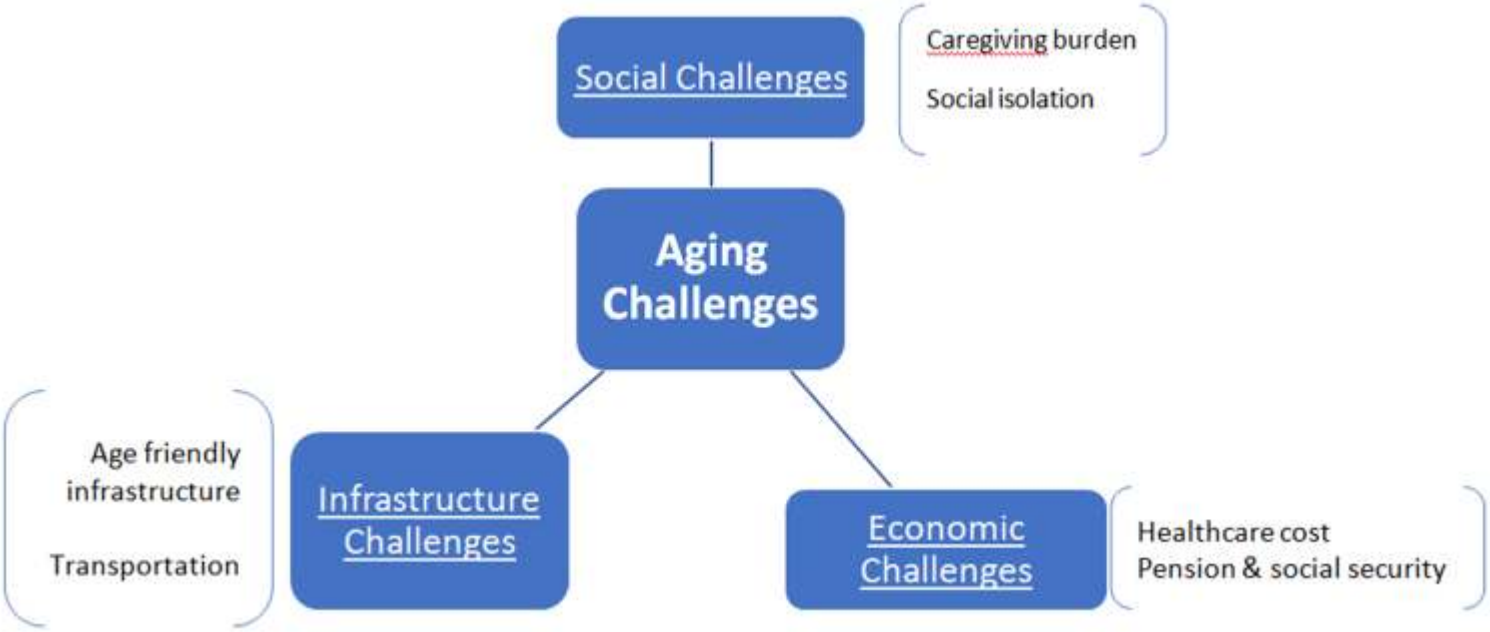
Creative Visualisation

However, healthy aging is achievable

By adopting healthy lifestyles, including regular physical activity, balanced diets, and stress management, Indians can reduce their risk of chronic diseases and maintain their physical and cognitive function. Additionally, investing in age-friendly infrastructure, social support systems, and healthcare services can enable older adults to live independently, productively, and with dignity.

By prioritizing healthy aging, India can reap significant benefits, including improved health outcomes, increased productivity, and reduced healthcare costs. It's time for India to make healthy aging a national priority.

Increase in the aging population comes with various challenges



WHO, 2024 Aging and Health[5]

The Double Threat to Healthy Aging: Physical Inactivity and Poor Diet

Physical inactivity and poor diet are two major obstacles to healthy aging. Research shows that regular physical activity can reduce the risk of age-related diseases, such as cardiovascular disease, diabetes etc[4]. Conversely, a low nutrient and calorie dense diet can accelerate cognitive decline and increase the risk of dementia[5]. Adherence to a Mediterranean-style diet, rich in fruits, vegetables, and whole grains, was associated with a lower risk of cognitive decline and dementia6.

By adopting a balanced diet and engaging in regular physical activity, individuals can significantly improve their chances of healthy aging. The World Health Organization (WHO, 2018) recommends at least 150 minutes of moderate-intensity physical activity per week, and a diet rich in whole foods, fruits, and vegetables[4]. By making these lifestyle changes, individuals can reduce their risk of age-related diseases and promote healthy aging.

Nutrition in prevention of age related NCDs.

Since aging is marked with physiological, physical and cognitive changes in the human body, it is crucial to make nutrition a priority. Incorrect diet in the elderly may lead to some of the non-communicable diseases like type II diabetes, coronary heart disease, kidney ailments etc. which in turn may reduce the quality of life. Reduced food intake in aging population may result in inadequate nutrient intake and create an impaired health status.

Physiological changes causing poor appetite: The process of aging is also marked by reduced appetite which led to reduced food intake. As a consequence, it gets difficult for the aging population to meet the daily requirement of essential nutrients.

There are physiological changes that are evident in elderly population include hormonal changes, sensory impairment, change in the gastrointestinal tract, oral health etc. changes in hormones in the body like *Cholecystokinin (CCK), ghrelin, leptin, insulin* etc. also acts as factors for reduced appetite. With age, it is evident that the increase in plasma CCK, which helps provide satiety leads to early satiety resulting low food intake. On the other hand, ghrelin, the hunger hormone which helps enhance the gastric emptying is found to be low in elderly. As a result, there can be a delay in gastric emptying leading to lower food intake. Almost 6% of people in India over 45 years ate smaller portions or skipped meals, and 5.3% did not eat, even when they were hungry.[3]

Additionally, elderly individuals may also face challenges like tooth loss, decreased salivation, neurodegenerative conditions like Parkinson's disease which may interfere the normal chewing, swallowing and overall food intake. These issues can lead to nutritional deficiencies. Malnutrition in the elderly population increases the chance of infections, fatigue, muscle loss and lower recovery rate from illness. Such conditions require geriatric friendly food options that are soft, easy to chew yet nutrient dense. Foods like oat porridge, mashed vegetables, soft fruits, smoothies and fortified puddings can ensure ease of consumption while addressing dietary needs. Enriching foods with essential nutrients like vitamins, minerals and easily digestible proteins can support geriatric health. Clear labelling with easy-to-understand, relatable communications and convenient packages made for seniors will further enhance the accessibility.

Hence, with the changes in physical and physiological state, the right nutritional intervention and strategy is important for a healthy aging. While the calorie need is lower in elderly population, the same is not implied for protein or other essential nutrients. As a result, a nutrient dense diet at the right interval is necessary.

Aging is process that comes with increased risk of non-communicable diseases (NCD) because of the altered metabolism. Nutrition plays a very important role in preventing and managing these disorders. Let's understand how nutritional interventions can help prevent the age related NCDs.

1. Sarcopenia: As we age, with reduced food intake, a chronic deficiency may cause loss of muscle mass in the body, known as sarcopenia. Muscle mass decreases ~ up to 8% per decade after the age of 30[7]. Muscle strength declines up to 40% for >40 years[8].

Age related sarcopenia is prevalent in India at over 42% indicating either a lower intake or utilization of protein among elderly.[9] due to metabolic changes during aging, the ability to produce muscle protein reduces drastically. Protein is a macronutrient required for several bodily functions. Among which keeping the muscle mass sufficient is one of the major functions of protein. Intake of amino acids, especially leucine is linked with enhanced muscle protein synthesis. Multiple studies quote that intake of 3g leucine through high quality protein diet enhanced the muscle protein synthesis in elderly.

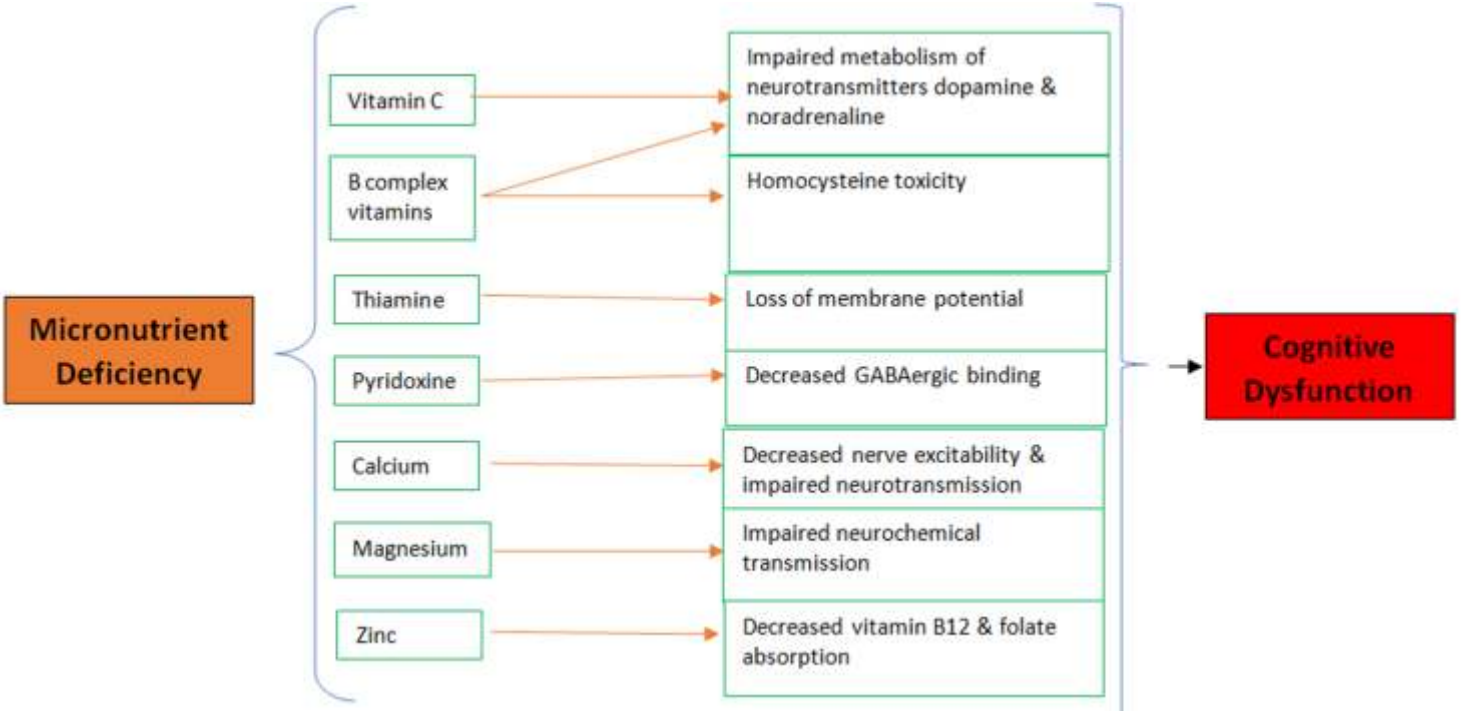
2. Osteoporosis: Aging process is linked to many degenerative states and bone loss is one of them. Elderly women are more prone to bone loss especially after menopause due to lower level of estrogen in the body. Bone loss is a *'silent' process* that affects millions of people worldwide. Osteoporosis happens when bone becomes porous due to bone mineral loss and nearly 1 in 5 adults in India has osteoporosis with higher prevalence in women and elderly.[10] For optimum bone health calcium and vitamin D3 plays a crucial role. Vitamin D3, a fat-soluble vitamin, also plays role in the calcium absorption. A deficiency in the vitamin is linked with decreased intestinal calcium absorption. There are multiple factors like decreased ability of the skin to synthesize vitamin D, decreased sun exposure, decreased ability of intestine to receive vitamin D3, inability of the kidney to convert vitamin D3 to active form could be the reason for vitamin D deficiency in elderly. It is reported that serum 25(OH)D level below 50nmol/l is associated with increased muscular weakness and decreased physical function among elderly. Hence, for bone health both calcium and vitamin D3 is important to be incorporated either through diet or supplementation. It is important to take at least 1200mg/ day of calcium and 800-1000IU/ day of vitamin D3.

3. Immunity: Lower serum zinc is reported among elderly and this could be a reason for weakened immune function, susceptibility to infections among elderly. Zinc is a mineral essential for optimum functioning of the immune system in the body. The recommended daily allowance (RDA) of zinc is 17mg/ day among elderly men and 13.2mg/ day among elderly women. Apart from the role in maintaining immune function in the body, zinc plays vital roles in the synthesis of Retinol-Binding Protein (RBP), which is needed for the transportation of vitamin A to plasma and retinol mobilization in the liver. Low serum zinc is also associated with increased vitamin E requirement as it may decrease the absorption of vitamin E in the intestine. Vitamin C absorption is also impaired by lower serum zinc. Hence, it is important to include sufficient amount of zinc in the diet either through food or supplementation.

4. Cognition: The deficiency in B6, B12 and folate is linked with the increased levels of serum homocysteine. This increased level of serum homocysteine increases the risk of developing Alzheimer's and dementia which are common cognitive disease among elderly. Vitamin B complex comprises of eight water soluble vitamins that are required at a small quantity however, it is crucial to meet the requirement. Some of the B complex vitamins are associated with normal functioning of cognition, brain atrophy and cellular function.

In one small study in Bangalore shown the prevalence of vitamin B12 deficiency is 40% and among which it is more prevalent in elderly.[11] More frequent use of laxatives to treat constipation is linked to reduced absorption of B vitamins. B vitamins, especially B12 is mostly found in animal food sources making it difficult to meet the daily requirement by vegetarians.

Micronutrients plays an important role in maintaining cognitive performance. Below are the effects of micronutrients in cognitive performance.[12]

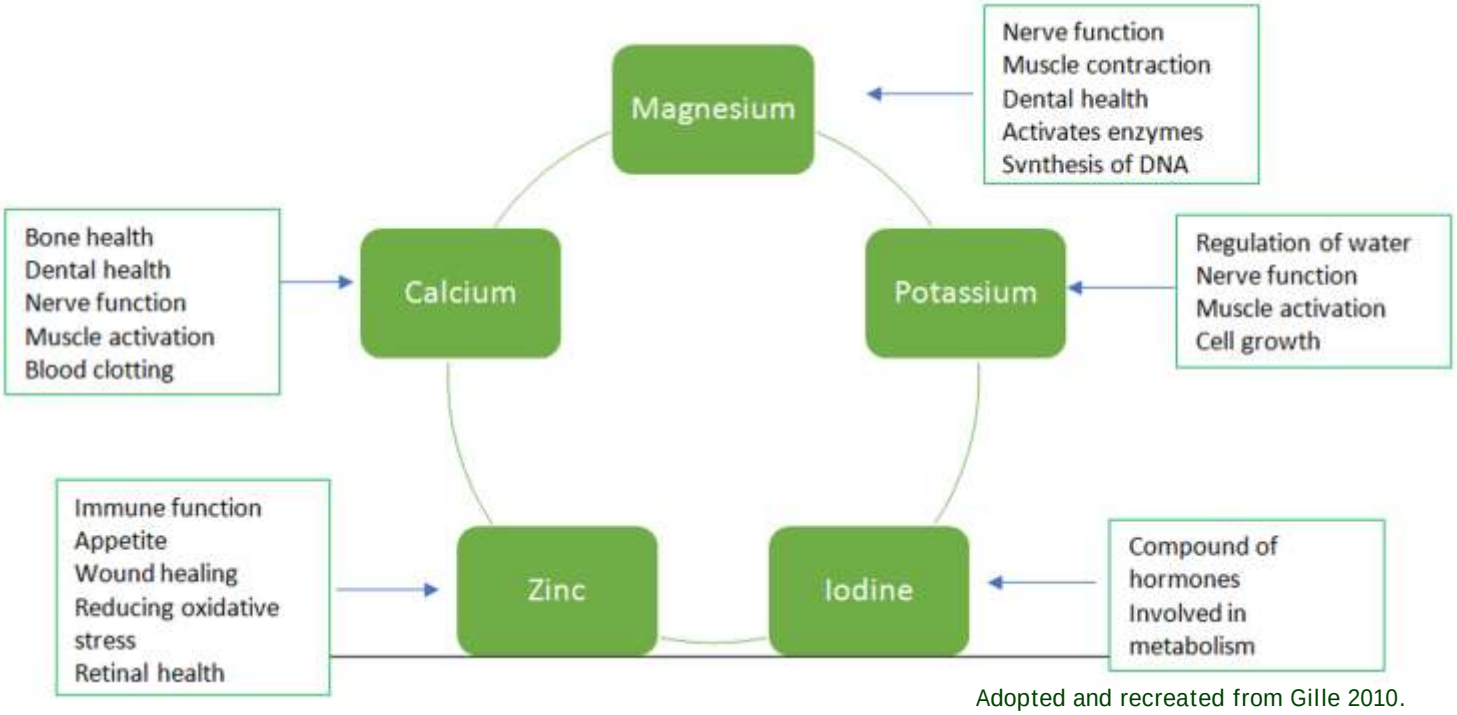


5. Cardiovascular diseases:

Cardiovascular diseases are comprising of several heart conditions including coronary artery diseases, peripheral artery diseases, stroke and heart failure.In India, the largest share of morbidity and mortality is due to cardiovascular diseases. Prevalence of self-reported diagnosed CVD in older adults aged 45 years and above is 28%. The prevalence increases with age making it 34% for adults aged 60-74y. Further, the prevalence is higher leading to 37% in those aged 75 years and above. The prevalence is higher in women than men and in urban area than in rural.[1]

Hypertension or high blood pressure is a condition where the pressure of blood against the walls of the arteries is constantly high. In 2019, prevalence of hypertension among older adults aged over 60 years and above was around 63% with nearly half of them not knowing about their condition. Aging is one of the independent factors of hypertension and it is more prevalent in elderly as compared to their younger counterpart[13]. Several dietary factors like high salt intake, low calcium, potassium & magnesium take might result in high blood pressure by causing reduced sodium excretion and increased pressure on the wall of the arteries. Nutritional intervention like reduced sodium intake, consumption of fish oil, potassium and magnesium are proven to be beneficial in prevention of hypertension in elderly.

Nutrients of importance for elderly[14]



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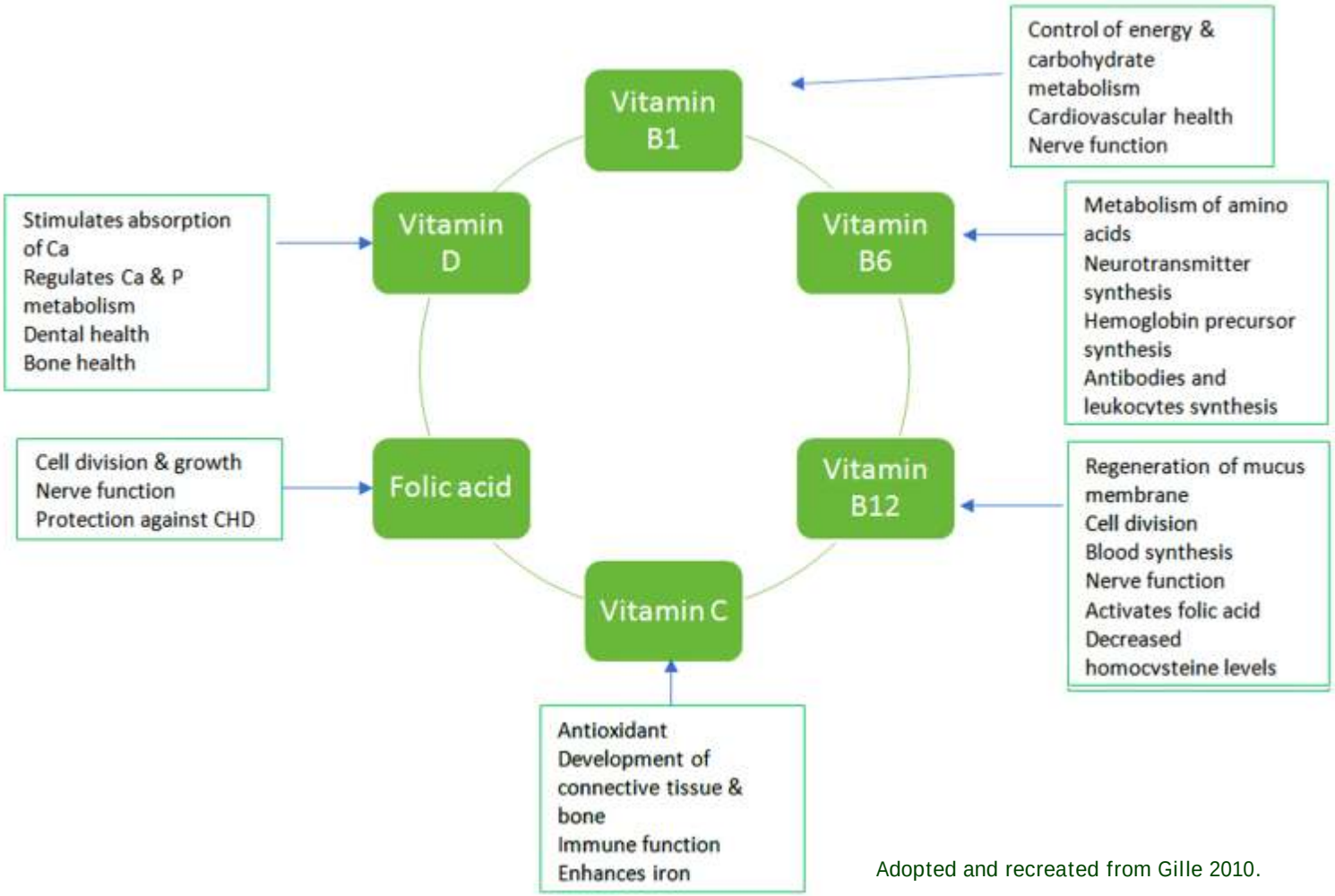

Adopted and recreated from Gille 2010.

The increased decline in the health status with age makes them home bound resulting in decreased physical activity. With aging, an increase in the medication is also known to affect the health. Economic, social factors as well as the changes in metabolic health and increased risk of chronic diseases with aging can severely affect the nutritional status. Interestingly, majority of the age-related disorders can be prevented through proper nutritional interventions.

Aging is a process and does not happen overnight. Hence, taking a preventive measure to tackle a healthy aging is ideal to raise the health standards of elderly in India. A special emphasize must be given to geriatric health in order to improve the overall health status of the country. In conclusion, as the Ayurveda proverb says 'when the food is wrong, medicine is of no use and when the food is right, the medicine is of no need.'

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PRESERVING OF HIGH QUALITY MEAT BY PROCESSING: WITH SPECIAL REFERENCE TO CHICKEN

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Meat is widely consumed around the world and is known for its nutritional benefits. In India, chicken, mutton, fish, and seafood are staple choices in many households. Meat can be classified into various types, such as red meat, poultry meat, and fish meat. In this article, we will be focusing mainly on poultry meat. Poultry meat is obtained from hens, turkeys, ducks, quails, etc.

Poultry meat,especially chicken, is widely consumed and is a good source of protein with all the essential amino acids required for growth and maintenance, along with various other nutrients like fats, vitamins and minerals. The chemical composition of poultry meat typically consists of 72–75% water, 18–22% protein, 1.5–5% fat, and 1–1.2% minerals.Chicken is also known as white meat as it is low in myoglobin (a protein), which is responsible for the red colour of meat. Poultry meat comes in different parts like breasts, thighs, legs, wings, etc. Each one is used to make different products (1).

Chicken is one of the leanest meats, particularly when consumed without the skin. Younger chickens have less fat compared to older chickens and hens. Chicken fat is primarily located under the skin, contributing to its moisture, succulence, and flavour (2). The digestibility of various cuts of meat differs due to the varying amounts and types of connective tissue present in each cut.

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Cuts with more connective tissue are tougher and need longer cooking times to become tender, while those with less connective tissue are generally more tender and easier to digest.

Mechanisms responsible for meat spoilage

Although meat is highly nutritious and a rich source of protein, it is highly perishable. Spoilage occurs due to many reasons such as oxidation, spoilage microorganisms and enzymatic autolysis. As poultry meat has high water content and excellent nutrient composition, it provides an ideal environment for microbial growth. Microbial spoilage in poultry is primarily caused by *Pseudomonas spp.*, which produce ammonia, dimethyl sulphide, and putrid odours and by *Shewanella putrefaciens* in high-pH cuts, such as legs and skin-on products, while Enterobacteriaceae, Acinetobacter, and lactic acid bacteria (LAB) contribute to a lesser extent. Meat contamination occurs at various processing stages, with Acinetobacter and Aeromonas being predominant in the initial phases, whereas Pseudomonas becomes more prevalent during refrigerated storage. Airborne contamination is highest during receiving and de-feathering but gradually declines through evisceration, chilling, and packaging. Hence, it is important to maintain strict hygiene protocols throughout processing to minimize microbial contamination and spoilage.

Lipid oxidation is another factor that deteriorates the quality of meat. It begins after slaughter when unsaturated fatty acids react with oxygen, forming free radicals. This process continues during storage, even at low temperatures, leading to off-flavours, rancidity, and nutrient loss, particularly in highly unsaturated fatty acids. The use of antioxidants can help slow oxidation and preserve poultry flavour.

Autolysis refers to postmortem chemical changes caused by endogenous enzymes. Lipolytic enzymes contribute to fat deterioration, amylolytic enzymes convert glycogen to lactic acid, and proteolytic enzymes break down proteins into amino acids and non-protein nitrogen, increasing soluble nitrogen content in meat. The activity of these enzymes is influenced by pH and temperature. The psychrotrophic bacteria multiply on poultry surfaces at refrigeration temperatures, producing metabolic by-products and extracellular enzymes. These lead to off-odours and slime, as bacteria consume low molecular weight nitrogenous compounds, such as amino acids. To maintain meat quality and extend shelf life, proper cooling, storage, and enzyme inactivation through heat treatments are essential. Curing salts and acids help inhibit autolytic enzymes, slowing degradation and spoilage (7,8).

Prevention Techniques

Since meat is highly perishable, it is very crucial to preserve it to increase its shelf life. At ambient temperature, bacteria and spoilage organisms grow at a higher rate, as this temperature is favourable for their growth. The temperature between 5-60° Celsius is called as a 'Danger Zone' where maximum growth takes place. The various methods that can be used to prevent meat from spoilage include traditional methods like canning, smoking, curing, drying, and pickling, as well as modern methods like lowering temperature and the use of various additives (1, 3).

Water activity (aw) refers to the amount of water in food that is not bound to food molecules and is available to support the growth of microorganisms. Most fresh meats, fruits, and vegetables have a water activity above 0.85 and fall into the "moist food" category, which requires refrigeration or other methods to control pathogen growth. Water activity in poultry can be controlled by methods such as drying, refrigeration, or adding sodium chloride and/or sugar, which bind free water and inhibit microbial growth. Curing meat and poultry has been practised for a long time. It is also known as salting, and it is the oldest form of meat preservation. Curing methods are of two types: dry and wet curing. In wet curing, meat cuts are dipped in a brine solution. Dry curing involves rubbing salt, sugar or spices over meat pieces and storing them in a container in a cool and dry place. The salt provides flavour and acts as a preservative by absorbing moisture and reducing water activity (5).

Drying is also one of the oldest methods of food preservation and is a crucial aspect of food processing. It preserves various foods by reducing water availability and lowering water activity, which prevents the growth of microorganisms such as *Staphylococcus aureus*. As a result, dried foods exhibit greater stability during storage. While food was once dried in open-air conditions, modern times have seen the development of advanced equipment and techniques for drying foods. Sun-drying is the oldest method for drying, where the food is exposed to sunlight in an open-air environment. This technique relies heavily on climatic conditions and comes with certain limitations, including extended drying times and the risk of external contamination. To address these challenges, mechanical drying methods are now employed in the production of dried meat, ranging from traditional to more innovative techniques such as convective hot air drying, freeze drying, vacuum drying, microwave drying, etc.

Smoking is a process that provides a drying effect to meat and imparts a desirable taste, pleasant odour, and uniform colour. The meat can be smoked by natural wood smoke or by liquid smoke. Natural wood smoke is produced from hardwood sawdust or logs, producing a smoky aroma and amber-brown colour. Liquid smoking, on the other hand, is created by burning organic material at high temperatures, retaining the smoky compounds. Liquid smoke is applied to the poultry meat in different ways. The most common methods include spraying, where liquid smoke can be sprayed directly onto the surface of the meat or by soaking the meat in a solution of liquid smoke and water for a specific time.

Canning is a traditional food preservation method in which the food product is placed in a jar or can and heated to a specific temperature for a specific time. For the canning of poultry, it is important to use only good-quality meat. The goal of canning is to eliminate or inhibit microbial growth by destroying vegetative cells, spores, and enzymes that cause spoilage or pose health risks. The time-temperature relationship in canning depends on the heat resistance of specific microorganisms. In canned poultry meat, processing targets *C. perfringens*, *Salmonella spp.*, *Staphylococcus spp.*, and *Campylobacter spp.*, while long-shelf-life products undergo additional botulinum heating.

The canning process involves four key steps: food preparation (cleaning, selection, size reduction, scalding), filling (cans,

exhaustion and sealing, and thermal processing (heating and cooling). When canning meats and poultry, it is important to use the right equipment. A pressure canner will reach the high temperature needed to kill the harmful bacteria in meat (4,7).

Low-temperature methods aim to reduce or slow the rate of spoilage by lowering temperatures, which can inhibit microbial growth. However, while low temperatures are effective, they do not stop the growth of psychrophilic bacteria (3). Chilling is a crucial process in meat production, reducing the temperature of carcasses to 4°C within 4 hours of slaughtering. It is essential for meat's hygiene, safety, and shelf life. Chilling can be done through immersion chilling or air chilling. Air chilling reduces carcass surface temperature faster, improving drying and minimizing microbial spoilage. Air-chilled carcasses have better microbial quality than water-chilled ones.

Freezing is an effective method for preserving the original qualities of fresh foods. The freezing process is faster at lower temperatures. Fast freezing produces higher quality meat, as slow freezing forms large ice crystals that damage cells and denature proteins. While freezing halts microbial growth at -18° C, some enzymatic reactions and spoilage processes, like oxidative rancidity, continue. Freezing reduces the viable microbial population by about 60%, but some microorganisms may still grow during storage. The shelf life of frozen meat can be extended with vacuum packaging and consistent low temperatures, with frozen meat typically lasting up to 12 months at -18° C (1,3).

Food irradiation is an effective method for improving meat safety and quality by reducing microorganisms and extending shelf life without affecting sensory characteristics like taste, colour, or texture when used at the right dose. However, it can alter the chemical and nutritional properties of meat, such as amino acids, fatty acids, and vitamins. The impact on meat's physical properties, like tenderness and texture, is dose-dependent; low doses may improve these qualities, while high doses can lead to protein denaturation(6).

High Hydrostatic Pressure (HHP) is a non-thermal food processing technique gaining global attention as an alternative to thermal treatments and chemical preservatives. It preserves food's natural taste, flavour, and nutrients while inactivating spoilage microbes like *E. coli*, *Campylobacter jejuni*, *Listeria monocytogenes*, *Staphylococcus aureus*, and *Clostridium botulinum*. Its effectiveness varies based on bacterial species, pressure levels, temperature, and pH. Despite extending shelf life and maintaining food quality, HHP has limitations, including bacterial resistance and high initial investment costs (7,8).

Chemical methods – Additives

Meat preservation relies on various additives to extend shelf life, maintain quality, and prevent spoilage caused by microbial growth, oxidation, and enzymatic activity. Sodium chloride (NaCl) reduces water activity and inhibits bacterial growth, while nitrites (sodium and potassium nitrite) stabilize meat colour, enhance flavour, and prevent the growth of *Clostridium botulinum*; however, should be used in limits as excessive use may lead to nitrosamine formation. Benzoates inhibit yeast and mould growth, particularly in low-pH environments.

Antioxidants like Butylated Hydroxyanisole (BHA), Butylated Hydroxytoluene (BHT), and Tertiary Butylhydroquinone (TBHQ) prevent lipid oxidation, reducing rancidity, while ascorbic acid (Vitamin C) and its derivatives enhance nitrite effectiveness and minimize harmful nitrosamine formation. Phosphates, along with being an antioxidant, improve water retention, texture, and juiciness of the meat. Organic acids such as lactic acid suppress spoilage bacteria like *Listeria monocytogenes* and *Salmonella spp*, while sorbic acid inhibits bacterial and fungal growth (7,8).

Conclusion:

In addition to various methods used to reduce spoilage and extend the shelf life of poultry meat, proper storage and handling are essential for maintaining quality. Contamination can occur at multiple stages: production, processing, transportation, and even at retail outlets or in homes. It is crucial to store poultry at the correct temperatures without fluctuations and to maintain hygiene throughout the handling process, from slaughter to the final product. The Indian poultry market has seen significant growth; however, spoilage continues to pose a major challenge. While the organized sector has been implementing Food Safety Management Systems, widespread adoption is still limited, particularly in the unorganized sector. This sector often lacks a reliable cold supply chain as well as hygienic processing and handling practices. Inadequate refrigeration, gaps in transportation, and poor storage conditions contribute to economic losses and food safety issues. Investing in cold supply chains and providing training for small-scale producers on proper handling, clean infrastructure, and basic food safety are crucial steps to reduce spoilage, minimize economic losses, and ensure a safer poultry industry in India.

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THE INDIAN NUTRACEUTICAL MARKET

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The Indian nutraceutical market has witnessed remarkable growth in recent years, driven by a shift in consumer behaviour towards preventive healthcare and a growing awareness of nutritional needs for improving immune support and overall health.

As of 2023, the nation's nutraceutical market is valued at approximately $6.1 billion, reflecting a significant increase over estimation, with projections indicating growth of around 11.4% through the decade's end. The main drivers behind this growth are largely attributed to rising disposable incomes, urbanization, increased focus on preventive healthcare, rise of chronic conditions, and ageing population. Additionally, the Indian government's initiatives to promote investment in the nutraceutical sector and improve the nutritional status of its citizens have created a positive environment for market expansion. Ayurveda, a traditional Indian medicine system, is influencing consumer preferences, with many turning to its herbal ingredients for health needs, both domestically and internationally.

The Indian nutraceutical market encompasses a wide range of products, including functional foods, beverages, and dietary supplements. Supplements account for about 35-40% of the market, while functional foods, particularly dairy products, cereals, and confectionery, represent the largest segment. The pandemic has catalysed a shift in public health policy, emphasizing illness prevention and immune support, which has further fuelled the demand for nutraceuticals.

Changing Health Needs

The COVID-19 pandemic has highlighted the links between illness, economic status, and nutritional status, prompting a shift towards preventive health measures. As a result, consumers are increasingly seeking products that enhance immunity and overall well-being. This trend is evident among older consumers, who are more likely to purchase functional foods and supplements aimed at addressing age-related health issues.

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Moreover, younger consumers are also becoming proactive about their health, seeking out nutraceutical products that can help them maintain their health as they age. Popular products among Indian consumers include multivitamins, fish oils, and ingredients that support digestive health, heart health, and ingredients that possess anti-inflammatory properties like brahmi and amla.

Ingredient Trends

The Indian nutraceutical market is characterized by a diverse range of ingredients that cater to specific health concerns. Multivitamin supplements dominate the market. However, there is a growing interest in individual ingredients that target specific health issues, driven by increased consumer awareness and education regarding the benefits of these ingredients.

Omega-3 fatty acids, for instance, are gaining popularity as consumers become more aware of their health benefits, particularly for immune support and heart health. Deficiency of Omega-3 is predominantly seen. Part of the reason for this has been a lack of vegetarian-friendly sources in a majority-vegetarian country. However, this is changing. There is an increase in awareness of omega-3 benefits, which brings new opportunities to the manufacturers. It is also seen that the usage of omega-3 supplements is highest among youth.

Probiotics are another area of growth, with traditional Indian foods like yogurt and curd serving as common sources. Consumer awareness of the benefits of probiotics has increased in recent years. Additionally, Vitamin D and B12 deficiencies are prevalent among Indian consumers, prompting a demand for supplements to address these gaps.

Ashwagandha, an adaptogen in Ayurveda, is believed to reduce inflammation, improve sleep, increase energy, and improve libido by helping the body respond to various stressors. Clinical trials show promising results, including reduced anxiety and blood glucose levels among those taking ashwagandha.

Curcumin, a key ingredient in Ayurveda, is used for skin conditions and anti-ageing effects. India is the largest consumer and exporter of curcumin, which has been explored for various conditions, including cancer treatment.

Fibre is a common ingredient in Indian supplements, functional foods, and beverages, as over two-thirds of consumers suffer from digestive disorders. Common fibre ingredients include psyllium husk, fructo-oligosaccharides (FOS), and inulin, which are used in bakery, bars, beverages, and dairy products. FOS is used as a sweetener to cut sugar and calories, while inulin is used as a texturizer, prebiotic fibre, and sugar and fat replacer. Other ingredients include fenugreek seeds, black cumin seeds, and fennel fibres for improved digestion and lowered cholesterol and blood glucose levels.

Innovative Formats

The perception of nutraceuticals as medicinal products requiring a doctor's prescription is changing. Consumers are focusing on preventive health, leading to the emergence of innovative product formats that appeal to a broader audience. According to a 2021 survey, there is a growing interest in functional and fortified foods, as well as new supplement formats, such as gummies and chewable vitamins.

The survey revealed that 33% of Indian respondents expressed interest in gummy formats for vitamins and supplements, while 44% were keen on fortified yogurts and ready-to-drink beverages. This shift towards more accessible and enjoyable formats is helping to demystify nutraceuticals and encourage wider consumption among the population.

Sourcing ingredients from the Indian market, encompassing vitamins, minerals, botanicals, and other plant- and animal-derived ingredients, is thriving. Agriculture provides abundant raw materials for nutraceuticals and functional foods. The marine environment is being explored for novel ingredients. The sector is expanding because of the government's focus on improving nutritional status, skilled workforce, and manufacturing expertise.

Ayurvedic and traditional ingredients

Ayurveda, with its long history and established practices, is increasingly influencing the nutraceutical market globally. Ingredients such as ashwagandha, tulsi, turmeric, Boswellia, milk thistle, amla, liquorice root and arjuna are gaining popularity in many places seeking authentic and effective health solutions. The Indian government has recognized the potential of Ayurvedic products and has taken steps to promote their export through international trade fairs and collaborations with foreign governments.

The Ministry of AYUSH (Ayurveda, Yoga and Naturopathy, Unani, Siddha and Homeopathy), established to promote traditional medicine, has signed numerous agreements to facilitate the international trade of Ayurvedic and herbal products.

Future potential for the Indian nutraceutical industry

India's nutraceutical industry has increased from 2% in 2017 to 3.5%, and it is increasing at a CAGR of around 21% a year. This growth is driven by a growing evidence base, which includes standardizing bioactive components in plants and conducting clinical studies. Future potential areas to expand include: Medicinal plant farming, developing active nutraceutical ingredients (ANIs), formulation dosage industry, start-up incubation, and academia. It is believed that these areas will help enhance quality and build the capacity of ingredients.

Regulatory Landscape

The Indian government has introduced new regulations to align its nutraceutical market with international standards. The Food Safety and Standards Authority of India (FSSAI) handles food safety and regulation, ensuring that nutraceutical products meet safety and quality standards.

Recent regulatory changes have simplified licensing requirements for nutraceutical manufacturers, making it easier for companies to enter the market and ensuring consistent quality. Additionally, the government is also making efforts for encouraging international investment and boosting domestic production.

Sports supplements are classified as Foods for Special Dietary Uses (FSDU) and must follow FSDU regulations, including labelling and supply chain transparency. Manufacturers must register with the FSSAI and obtain necessary licenses.

Novel ingredients for nutraceuticals are non-specified food and ingredients, including novel foods, food ingredients with no history of human consumption in India, new additives, and foods manufactured using novel technology.

Conclusion: The Indian nutraceutical market is undergoing a transformative phase, driven by changing consumer preferences, a focus on preventive health, and the integration of traditional practices like Ayurveda.

With a strong regulatory framework and increasing interest in innovative product formats, the sector is in an ideal place for future growth. As consumers continue to prioritize health, the demand for nutraceuticals is expected to rise, making it an exciting time for industry players to capitalize on emerging trends and opportunities.

(Disclaimer: The above write-up is based on Vitafoods India report on 'Spotlight on the Indian nutraceuticals market' February 2024 Spotlight on the Indian nutraceuticals market [Report])

OMEGA-3 FATTY ACIDS: POWERFUL ALLIES FOR OUR HEALTH

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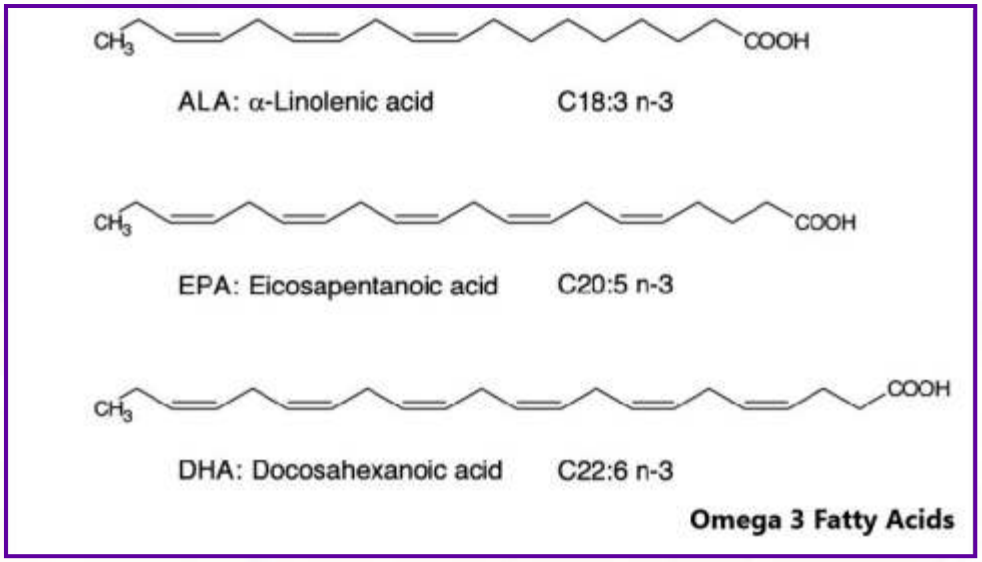
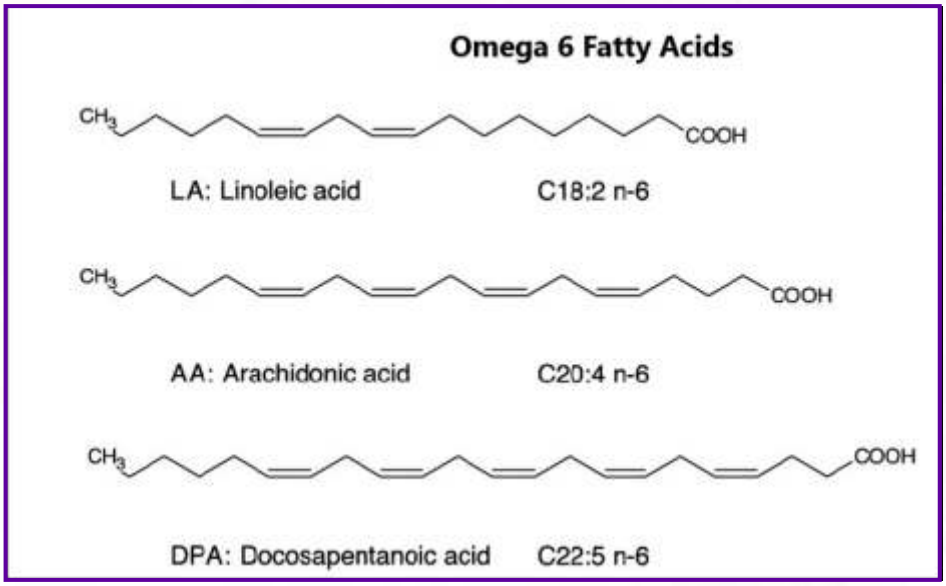
Understanding Omega-3 Fatty Acids

Omega-3 fatty acids are polyunsaturated fats essential for human health. Since the human body cannot synthesize these fats, they must be obtained from dietary sources such as fish, algae, and fortified foods. The key omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are particularly beneficial for the brain, eyes, and cardiovascular system.

The importance of omega-3s was first highlighted in the 1970s through research on the Inuit population in Greenland. Despite consuming a diet rich in fat, the Inuit exhibited lower incidences of cardiovascular disease than the people in the mainland in Denmark, prompting further investigation into the health benefits of polyunsaturated fatty acids.





Established and Emerging Health Benefits

Recommendations depend on body weight, gender and age group. Omega 3 is important throughout our lifespan. Starting from birth to growing up, it is quite essential in critical life stages like pregnancy and old age as they play an important role for many vital organs like their role in brain development, cardiovascular health, and vision maintenance. It is important for various components of cell membranes present in the brain, neural tissues, and even the retina of the eye. These are also found abundantly in the vascular and heart tissues.

Their role here lies in ensuring the membranes have their fluidity, signalling and mediating certain processes as EPA and DHA act as mediators for several processes. For example, EPA will result in mostly the resolvents, which play an important role in reducing inflammation, specifically the lower pro-inflammatory cytokines.

As we are aware, both EPA and DHA need to obtain from either fish sources or algae sources for their efficient use. A review that looked at the DHA status in omnivores, vegetarians, and vegans observed that, in omnivores, the status was not that great; in vegetarians, the DHA status was even lower, and in vegans, the DHA status was very, very low as long-chain omega-3s are difficult to be obtained on a plant-based diet. The solution is to increase the status by diet or by using food fortified with omega 3. There are various studies supporting that people consuming Omega 3-fortified foods had a better omega 3 index.

• Omega 3 and heart health:

Meta-analysis showed a significant impact on the heart health of subjects when given omega 3 fatty acids, and the analysis was able to look at dose dependency specifically for myocardial infarctions. It revealed that if one gram of EPA plus DHA per day is consumed, then one can see an association of a reduction in risk of 9%of myocardial infarctions. It shows that omega-3s contribute to lower resting heart rates and improved vascular function.

• Muscle Health and Exercise Recovery:

There is also an impact of omega 3 fatty acids on exercise. Omega-3s support inflammation reduction, which is crucial for muscle recovery post-exercise. There was a study with cyclists wherein they were given supplements with fish oil before exercise.

The results were that the total number of heartbeats changed; it got lower, signifying the importance of omega-3 fatty acids. When one exercises or over-exercises, they may see an increase in pro-inflammatory cytokines and inflammation. Omega-3 fatty acids help with down regulation and also protect the muscle and the muscle cells. Studies show enhanced muscle function and reduced soreness among omega-3-supplemented individuals.

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• Cognitive Function and Mood Regulation:

EPA and DHA play vital roles in neurogenesis and neural signalling. Omega-3 supplementation supports cognitive function in aging adults and helps maintain a stable mood. EPA-dominant omega-3s are beneficial for individuals with depressive symptoms, particularly in postpartum women.

Sleep and Eye Health:

Clinical trials suggest improved sleep duration and quality, particularly in children supplemented with DHA. Omega-3s help mitigate dry eye symptoms, especially for individuals exposed to prolonged screen time.

Omega-3 Deficiency: A Global Concern

Despite their proven benefits, 94% of the global population has suboptimal omega-3 levels, with nearly half being deficient. The omega-3 index, a measure of omega-3 levels in red blood cells, indicates that most countries fall below the recommended threshold for optimal cardiovascular health. Vegetarians and vegans are particularly at risk due to dietary restrictions limiting fish and seafood consumption.

• Addressing Omega-3 Deficiency through Fortification

To bring the situation of deficiency under control, experts recommend increased dietary intake through fish consumption, fortified foods, or direct supplementation. Fortified products such as omega-3-enriched eggs, dairy, and plant-based alternatives have shown promising results in raising omega-3 levels.

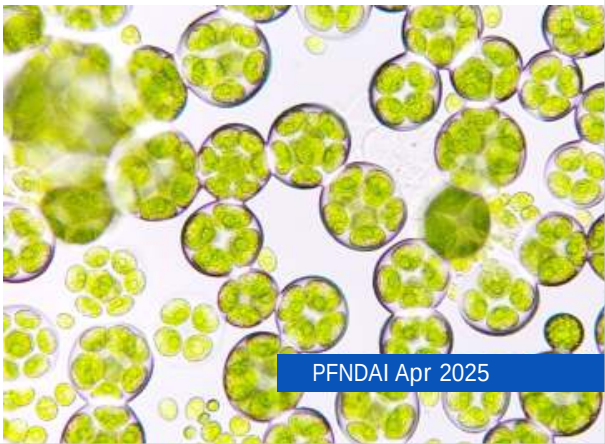
• Sustainable Omega-3 Production: Algae as a Game-Changer

Historically, fish oil has been the primary source of omega-3s, but overfishing and climate change pressures have necessitated alternative solutions. Microalgae-derived omega-3s present a sustainable and scalable option, bypassing the need for fish as intermediaries.

It is possible to directly source omega-3s from microalgae, for instance, ensuring a consistent, high-quality supply free from marine contaminants. Innovations in algal omega-3 production include a patented strain capable of producing both EPA and DHA, with a controlled cultivation process that guarantees purity and sustainability.

These advancements support a wide range of applications, from infant nutrition to plant-based diets. Environmentally, algal omega-3 production is independent of marine biomass, reducing the carbon footprint associated with traditional fish oil extraction.

Economically, as global fish stocks face increasing stress, algal omega-3s provide a long-term, viable alternative to meet rising demand while promoting ocean conservation.



Conclusion

There are many valuable insights into the multifaceted benefits of omega-3s and the importance of optimum intake across all life stages. With growing challenges in marine sustainability, algal omega-3 innovations offer a promising and eco-friendly alternative to traditional fish-based sources. As scientific research continues, omega-3 fatty acids continue to be essential for lifelong health and well-being.

(Disclaimer: The above write-up is based on a webinar on 'Omega-3 Fatty Acids: the powerful allies to our health' by DSM-Firmenich January 2025 https://www.dsm-firmenich.com/en/businesses/taste-texture-health/news-events/events/Omega-3-Fatty-Acids--the-powerful-allies-to-our-health.html)

Author's note- This article discusses the importance of omega-3 fatty acids, particularly EPA and DHA. The body primarily obtains omega-3 fatty acids from alpha-linolenic acid (ALA), a plant-based essential fatty acid.

However, ALA must be converted to EPA and DHA to perform various functions, and this conversion is relatively inefficient in humans and depends on several factors, such as age, gender, and metabolic conditions. As the ability to convert ALA decreases with age, it becomes challenging for older adults to maintain adequate levels through ALA alone. To address these limitations, fortifying foods with preformed EPA and DHA, especially from sustainable sources like microalgae, is crucial.

This approach will be beneficial, particularly for vulnerable groups such as the elderly, vegetarians, and vegans, as it enhances bioavailability and bridges the nutritional gap that ALA-rich foods may not cover.

REPORT OF SCHOOL NUTRITION AWARENESS ACTIVITY

NAA Report by
Ms Anuja Padte,
Food Scientist, PFNDAI

On March 10th, 2025, Protein Foods & Nutrition Development Association of India (PFNDAI), in collaboration with JRS Rettenmaier, successfully executed a comprehensive Nutrition Awareness Activity at TMC School No. 38, Shanti Nagar, Thane West.

The initiative was designed to educate and inspire 27 students from the 7th standard, fostering a deeper understanding of healthy dietary practices and nutritional well-being.

The event commenced with a welcoming address by Dr. Shashank Bhalkar, Executive Director of PFNDAI. Dr. Bhalkar provided an insightful introduction to PFNDAI's mission and objectives, emphasizing the importance of nutrition education in shaping healthy lifestyles.

The students then participated in a creative poster competition, which served as a dynamic platform for them to visually express their knowledge and understanding of food and nutrition.

The competition encouraged artistic expression while reinforcing key nutritional concepts. A panel of judges meticulously evaluated the posters, selecting the top three entries based on creativity, accuracy, and clarity of message.

These winning students were later recognized for their outstanding contributions.

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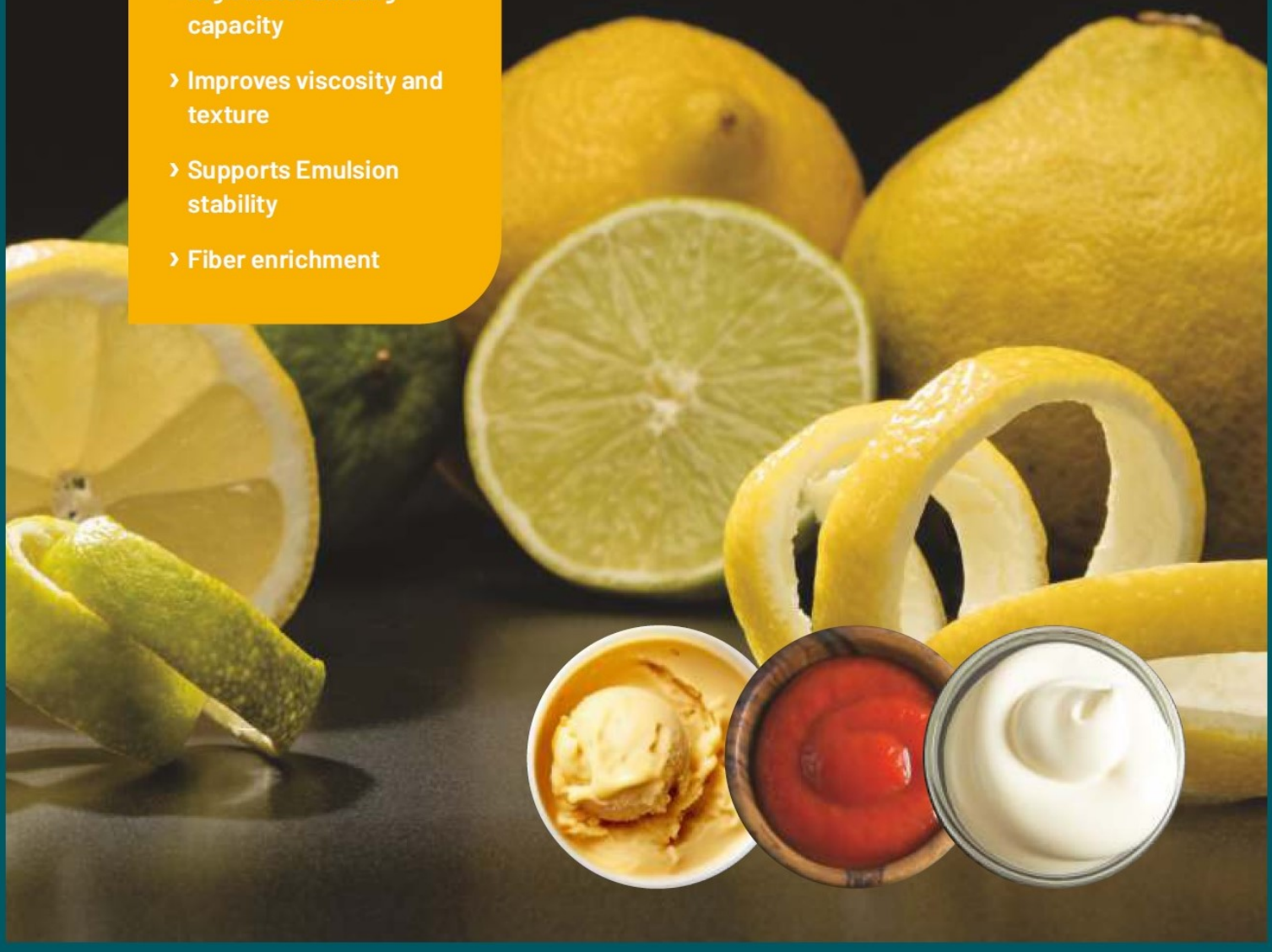

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question-and-answer segment that facilitated active participation and allowed students to clarify their doubts and deepen their understanding.

The event culminated in a formal prize distribution ceremony. The winners of the poster competition were awarded certificates of achievement and prizes, acknowledging their exceptional efforts.

All participating students received certificates of participation and thoughtful gifts, recognizing their engagement and commitment to learning.

A pivotal segment of the activity was an interactive nutrition session led by expert professionals from JRS Rettenmaier.

Dr. Meeta Raheja, Ms. Prajakta Surve, and Ms. Prachi Kale delivered an engaging and informative presentation covering essential topics such as balanced diets, the significance of healthy eating habits, and the practical application of the Food Pyramid.

The session was designed to be highly interactive, incorporating a dedicated

To provide a practical demonstration of healthy eating principles, JRS Rettenmaier generously sponsored a nutritious afternoon meal for all attendees. This meal served as a tangible example of how to incorporate balanced and healthy food choices into daily life.Overall, this initiative underscores the importance of community partnerships in fostering nutritional well-being and contributing to the overall health and development of young individuals.

REGULATORY ROUND UP

AUTHOR
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Dear Readers, Please find below new notifications, orders, etc. since the last round-up

Draft Food Safety and Standards (Vegan Foods) Amendment Regulations, 2025 : It is proposed that FSS (Vegan Foods) Regulations be amended in 2025.The format for authorizing the product as Vegan by the appropriate authority in the exporting country has been specified. The present regulation did not specify the format. Sub-regulation 3 of Regulation 5 has now given a specific format as “Form I”.

In addition to regular details like details of exporter importer and package etc., there is a declaration giving details about Vegan product requirements. This will remove the ambiguity and therefore beneficial to the importers. This is a good step for ease of doing business.

Waiving of Registration Fees for Anganwadi [ICDS] Centers and Introducing new KoB : All FBOs are supposed to have a license or registration as per FSS (Licensing and Registration of Food Businesses) Regulations 2011. Anganwadi Centers provide supplementary nutrition to a very critical group of people like pregnant and lactating women till six months after childbirth and every child from six months to six years.

Therefore, obtaining a license under the FSS Regulations is mandatory. The food authorities have created a separate Kind of Business (KOB) ‘Anganwadi (ICDS) Centers’ under Food Services for Registration. When Anganwadi (ICDS) Centers apply for registration, they will be given five years of registration and the registration fees will be waived.

The waiver shall come into force from 12th March 2025.This is a very good move by the food authorities to encourage the Anganwadis for the registration which will ensure safe food they serve.

Revised list of FSSAI notified laboratories for testing of fortificants in Fortified Rice (FR), Fortified Rice Kernel (FRK) and Vitamin-Mineral Premix for Fortified Rice Kernel : The approved list of laboratories for testing fortificants in FR and FRK is given in Annexure 1 and Annexure 2 respectively. A list of laboratories for testing these fortificants in Vitamin-Mineral Premix for FRK is given in Annexure 3.

FBOs should check the latest validity of accreditation of these notified laboratories before sending samples. This order supersedes the earlier order dated 05.03.2025

Daily omega-3 supplementation can slow biological aging, research shows

05 Feb 2025 | By Jolanda van Hal

https://www.nutritioninsight.com/news/clinical-research-daily-omega-3-slows-biological-aging.html

This research highlights the potential of omega-3 supplementation in promoting healthier aging. A clinical trial involving 777 Swiss participants found that taking one gram of omega-3 daily over three years slowed biological aging by an average of 2.9–3.8 months. The study used DNA methylation clocks to measure these effects, which are considered reliable markers of biological age.

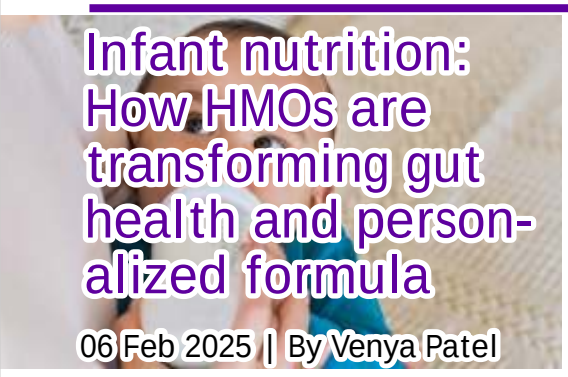
Interestingly, combining omega-3 with vitamin D (2,000 IU daily) and a simple home exercise program amplified the benefits. This combination reduced cancer risk by 61% and pre-frailty by 39%, showcasing the synergistic effects of these interventions.

The findings are part of the DO-HEALTH study, Europe's largest trial on healthy aging, which aims to explore strategies for extending health spans in older adults. The study underscores the affordability and safety of these interventions, making them accessible public health solutions.

The study on omega-3 supplementation and its impact on biological aging is part of the DO-HEALTH trial, Europe's largest clinical trial on healthy aging. Participants were 777 Swiss individuals aged 70 or older. Studied for three years. Daily intake of 1 gram of omega-3, 2,000 IU of vitamin D, and a simple 30-minute home exercise program three times a week. Researchers used DNA methylation clocks, which are molecular markers of biological age, to assess the effects.

Omega-3 supplementation alone slowed biological aging by an average of 2.9–3.8 months over three years. Combining omega-3 with vitamin D and exercise amplified the benefits, reducing cancer risk by 61% and pre-frailty by 39%.
Omega-3 has anti-inflammatory properties.Vitamin D prevents uncontrolled cell proliferation. Exercise induces apoptosis (cell death) of cancer cells.The combination of these interventions addresses different pathways, enhancing overall health benefits.

These interventions are affordable and safe, making them viable public health strategies. The study supports the idea that simple, accessible interventions can extend health spans in older adults. It highlights the importance of combining nutritional supplements with physical activity for maximum benefits.



Infant nutrition: How HMOs are transforming gut health and personalized formula

06 Feb 2025 | By Venya Patel

https://www.nutritioninsight.com/news/gut-health-hmo-infant-formula-personalized-infant-nutrition-breastfeeding-formula-dairy-nutrients.html

Human Milk Oligosaccharides (HMOs) are revolutionizing infant nutrition by bridging the gap between breast milk and formula.

Companies like Novonesis and dsm-firmenich are leading the way in producing HMOs at a commercial scale. Novonesis' HMO Mix replicates the five most abundant HMOs in human milk, improving gut health and microbiome composition in infants. dsm-firmenich has developed seven HMOs, which closely mimic the composition of human milk.

HMOs promote gut health by fostering beneficial bacteria like bifidobacteria and reducing harmful microbes.

They support immune health, brain development, and digestive health, with claims driving product success in these areas. HMO compositions vary based on maternal genetics and regional differences. Companies are tailoring formulas to reflect these variations, ensuring infants receive region-specific nutrition.

Studies confirm the safety and efficacy of HMO-enriched formulas, showing outcomes like improved stool quality and microbiome health closer to breastfed infants. Producing HMOs at an industrial scale involves overcoming challenges like nutrient gradients during fermentation. Innovations in strain engineering and process design have addressed these issues. Companies are adopting green energy and biogas to ensure sustainable production practices.

The demand for HMO-enriched products is growing, with a 12% CAGR in baby food launches featuring HMOs from 2019 to 2024.Europe leads in HMO product launches, followed by Asia and North America. Continued research aims to explore the long-term health impacts of HMOs. Efforts are underway to make formulas even more personalized and sustainable. These advancements are transforming infant nutrition, offering a closer alternative to breast milk for infants who cannot be breastfed.

Are juice cleanses really healthy? New research challenges growing trend

06 Feb 2025 | By William Nichols

https://www.nutritioninsight.com/news/juice-cleanses-microbiome-imbalances-gut-health-fiber-research-holistic-detox.html

New research from Northwestern University challenges the popular belief that juice cleanses are a healthy way to detoxify the body.

The study, published in Nutrients, reveals that a juice-only diet, even for as little as three days, can disrupt the microbiome, leading to negative health effects such as inflammation and cognitive decline.

The juice-only group in the study showed significant increases in bacteria linked to inflammation and gut permeability.In contrast, a whole plant-based food diet resulted in more favorable microbial changes.

Juicing removes much of the fiber found in whole fruits and vegetables, which is essential for feeding beneficial gut bacteria that produce anti-inflammatory compounds like butyrate.Without fiber, sugar-loving bacteria can thrive, disrupting the gut microbiome and potentially impacting metabolism, immunity, and mental health.The oral microbiome responded rapidly to the juice-only diet, showing a decline in beneficial bacteria and an increase in harmful bacteria associated with inflammation.

Researchers suggest blending fruits and vegetables instead of juicing to retain fiber.Pairing juices with whole foods can help balance the impact on the microbiome.This study highlights the importance of dietary fiber and cautions against relying solely on juice cleanses for health benefits.

Boosting breakfast nutrition: Scientists create healthier pancake alternatives

06 Feb 2025 | By William Nichols

https://www.nutritioninsight.com/news/whole-grain-healthy-pancakes-wsu-research-breakfast-nutrition-refined-flour.html

This research from Washington State University (WSU) is a game-changer for breakfast lovers who want healthier options without sacrificing taste.

Researchers tested replacing refined flour with whole-grain options like buckwheat, quinoa, millet, and whole-wheat flours.Substitutions ranged from 25% to 100%, with buckwheat, quinoa, and whole-wheat flours maintaining taste and texture similar to traditional pancakes.Millet flour required slight pre-cooking to integrate seamlessly into the recipe.

Whole-grain flours add fiber and protein, addressing the "empty calories" issue of refined flour pancakes.The recipe's leavening system and other ingredients (sugar, oil, salt) were kept unchanged to ensure accurate comparisons.

The findings could lead to healthier alternatives for other baked goods.Understanding how whole-grain flours behave under various cooking conditions can help refine their use in recipes.This research is aimed at improving food nutrient density through collaboration between plant breeders, nutrition experts, and food scientists.

Researchers plan to study the properties of whole-grain flours further, focusing on viscosity, cook time, size, and texture to make them indistinguishable from refined flour.This study not only enhances breakfast nutrition but also paves the way for healthier food innovations.

Researchers reveal powerful role of women's groups in transforming nutrition systems

07 Feb 2025 | By Venya Patel

https://www.nutritioninsight.com/news/womens-nutrition-wellness-wellbeing-rights-india-south-asia.html

Women's groups are emerging as transformative forces in improving nutrition systems by addressing economic, social, and institutional barriers.

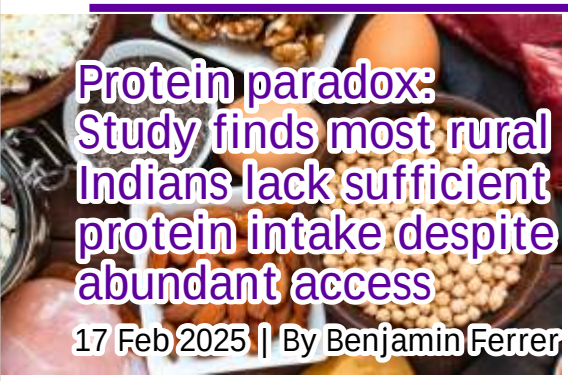
Women's groups leverage peer support, advocacy, and community-led initiatives like nutrition gardens and kitchens to ensure access to nutritious food. They promote financial independence, organize communities, and hold systems accountable.

Unlike individual efforts, women's groups amplify voices, challenge societal norms, and influence decision-makers at local and state levels. They act as watchdogs, ensuring government nutrition programs and services reach those in need. Economic empowerment, women's agency, and social behavior change interventions are particularly effective in improving nutrition outcomes. Women's groups foster knowledge-sharing and mutual encouragement, making it easier to adopt and sustain healthier dietary habits.

Deep-rooted inequalities limit women's decision-making power and access to resources. Many programs rely on irregular funding, hindering long-term sustainability. Expanding beyond pilot programs remains a challenge.

Recommendations:
Collaborative Program Design: Develop policies with women's groups at the center, ensuring their voices shape strategies. Leadership Promotion: Foster grassroots leadership and rights-based movements for sustainable change. Regional Networks: Establish South Asia-wide networks for knowledge-sharing and advocacy.

Women's groups are not just beneficiaries but leaders in driving systemic change in nutrition systems. Their collective action transforms communities, making them key drivers of health and well-being.



Protein paradox: Study finds most rural Indians lack sufficient protein intake despite abundant access

17 Feb 2025 | By Benjamin Ferrer

https://www.nutritioninsight.com/news/india-nutrition-malnutrition-protein-deficiency-food-security-diet.html

This study highlights a paradox in rural India where protein deficiency persists despite access to protein-rich foods.

Here's a detailed summary: Over two-thirds of households in India's semi-arid tropics consume less protein than recommended, even with access to legumes, dairy, and livestock products. Diets rely heavily on staple grains like rice and wheat, which lack essential amino acids for balanced nutrition.

Protein-rich foods are underutilized due to cultural preferences, limited nutritional awareness, and financial constraints. Surprisingly, even wealthier families often fail to meet protein intake recommendations, challenging the assumption that affordability is the sole issue.

Households with educated women are more likely to consume balanced diets, emphasizing the importance of female education and empowerment.

India's Public Distribution System (PDS) improves calorie intake but reinforces cereal-dominated diets, limiting protein diversity. Researchers recommend including pulses, millets, and other protein-rich foods in PDS programs.

Nutrition Education: Integrate education into public health programs and school curricula to promote diverse diets.

Empowering Women: Invest in female education to improve household nutrition decision-making.

Region-Specific Strategies: Tailor approaches to local dietary patterns and challenges.

Support for Farmers: Encourage cultivation of nutrient-dense crops like pulses and millets.

Dr. Stanford Blade of ICRISAT highlights the organization's role in developing climate-resilient pulse varieties and sustainable farming practices to support India's nutrition goals.This multi-pronged approach aims to address the root causes of protein deficiency and promote balanced nutrition across rural India.

Redefining bioavailability: Building consumer trust with safe and effective supplements

19 Feb 2025 | By Jolanda van Hal

https://www.nutritioninsight.com/news/redefining-bioavailability-safe-effective-supplements-consumer-trust.html

Improving nutrient bioavailability and absorption is essential for meeting consumer expectations of supplement efficacy.

Consumers today are highly informed about what they consume and demand products that are both effective and safe, aligning with their wellness routines. Bioavailability ensures that active ingredients are usable by the body, but environmental sensitivities like heat, light, and oxygen can reduce their efficacy. Techniques such as microencapsulation help protect active ingredients and release them at optimal sites in the body to maximize absorption. However, formulators face challenges ensuring safe levels of enhanced bioavailability, as excessive absorption can lead to toxicity.

Clinical validation of supplements is becoming a key factor in shaping market preferences. Consumers favor products with evidence-backed health claims, which drive trust and innovation. Partnering with ingredient suppliers who support product claims with science strengthens brand identity and assures product quality.

New delivery methods, such as liposomes and monoacylglycerides (MAG), significantly enhance bioavailability. MAG-based omega-3 formulations offer higher absorption compared to traditional formats like triglycerides and ethyl esters. Advanced technologies, such as modified release profiles, ensure the targeted delivery of active ingredients. Omega-3 fatty acids, especially EPA and DHA from fish oil, are highly valued for their health benefits. However, enhancing their absorption remains a challenge. Solutex'sMaGOmega technology demonstrates superior EPA and DHA bioavailability, achieving purity and convenience in low-dose softgel capsules.

A 12% increase in global supplement launches claiming bioavailability from 2019 to 2024 reflects growing consumer interest.Brands focusing on high-concentration ingredients and evidence-backed claims are gaining competitive advantages in the nutraceutical industry.There is growing consumer awareness, technological advancements, and the need for clinical validation in redefining bioavailability for supplements.

The future of cognitive health: PhytoGaia explores the latest nootropic and nutraceutical trends

18 Feb 2025 | By William Nichols

https://www.nutritioninsight.com/news/nootropics-nutraceuticals-brain-health-phytogaia-tocotrienols-memory-support-tocogaia.html

There's a rising demand for products enhancing cognitive and brain health due to an aging global population projected to

reach 1.6 billion by 2050. Younger consumers, including students and parents, are also turning to nootropics for improved focus and learning. PhytoGaia emphasizes tailoring products to consumer needs for measurable, science-backed results in areas like stress resilience, cognitive performance, and sleep quality. They incorporate advanced methods such as wearable health-tracking devices in their clinical trials to provide a holistic, personalized evaluation of product efficacy.

Personalized health solutions are at the core of approach, utilizing real-time data to develop effective, customized products. They offer innovative delivery formats like orodispersible films and konjac jelly for flexible adaptation to consumer preferences.

Tocotrienols, a unique form of vitamin E, possess exceptional biological activities due to their structure, making them highly effective for cognitive support. TocoGaia is designed to enhance tocotrienol intake, which is typically too low in diets, and support brain and cognitive health. It prioritizes rigorous clinical research and clean production processes to meet evolving regulatory standards for safety, efficacy, and transparency. The Malaysian Ministry of Health recently recognized palm tocotrienols for improving cognitive function and reducing oxidative stress, further validating their potential.

An evolving regulatory landscape emphasizes the importance of substantiating health claims with robust scientific evidence. Company's commitment to adhering to stringent controls and delivering high-quality ingredients ensures they stand out in the competitive nootropic and nutraceutical markets. The companies are combining innovation, technology, and consumer-driven insights to redefine cognitive health solutions.

Microgreens deemed better mineral source than mature vegetables in malnutrition fight

27 Feb 2025 | By Venya Patel

https://www.nutritioninsight.com/news/microgreens-healthy-superfoods-wellness-food-vegetables-micronutrients-plant-based-diet-mineral.html

A recent study highlights microgreens as a highly nutritious option to combat global malnutrition and diversify diets.

Microgreens of broccoli, black radish, red beet, pea, sunflower, and bean were analyzed for their macro-, micro-, and antioxidant content. Microgreens, harvested early, demonstrate higher mineral bioavailability compared to mature vegetables. They can be more effective sources of essential nutrients, addressing the global issue of micronutrient deficiencies affecting 25% of the population.

Red beet microgreens: Rich in organic acids like flavonoids and citric acid, with potential anti-inflammatory and antioxidant properties.

Black radish microgreens: Highest phenolic content and antioxidant capacity, supporting strong free radical neutralization.

Bean microgreens: High ascorbic acid (vitamin C) content, promoting immune health and skin maintenance.

Sunflower microgreens: Contain calcium and fumaric acid, benefiting bone health and energy production.

Broccoli microgreens: Rich in phenolic compounds, iron, and manganese for red blood cell production.

Pea microgreens: Abundant in phosphorus and copper, supporting bone and cardiovascular health.

Bioactive variations between microgreens reveal specialized benefits, such as black radish's high scavenging activity against free radicals and red beet's high flavonoid content with anti-carcinogenic properties.Organic acids like citric and succinic acid contribute to flavor profiles and metabolic benefits.

Seasonal and genetic factors also influence aromatic compounds in microgreens.Researchers suggest strategically incorporating specific microgreens into diets to target specific health needs, such as enhancing antioxidant intake or boosting flavonoid consumption. The study used uniform nutrient solutions to assess mineral content and emphasized how growing mediums impact microgreen quality and nutrient content.

Study highlights sustained release isomaltulose in sleep-improving bedtime drink

26 Feb 2025 | By Benjamin Ferrer

https://www.nutritioninsight.com/news/sleep-health-supplements-insomnia-relaxation-isomaltulose-palatinose-beneo.html

Isomaltulose, a carbohydrate with slow and sustained release, has been found to improve sleep quality when consumed in a bedtime drink. It balances blood glucose levels, particularly during the first half of the night, extending the deep sleep phase by an average of 22 minutes. Balanced blood glucose levels help reduce wakefulness and promote restful sleep, which are vital for physical recovery and cognitive health.

Conducted with 20 healthy young men (mean age: 24 years) in a randomized, double-blind, placebo-controlled, cross-over format. Participants consumed a bedtime drink with either isomaltulose or glucose (50 g dissolved in 300 ml water), 15 minutes before sleep. Sleep metrics and blood glucose were monitored using polysomnography and actigraphy.

Isomaltulose led to slower and sustained glucose release, preventing dips in blood sugar levels and enhancing the deep sleep phase. Participants showed improved memory recall for neutral story content after consuming Isomaltulose, highlighting its cognitive benefits. Derived from sucrose via enzymatic rearrangement, Isomaltulose offers full carbohydrate energy (4 kcal/g) with slow-release properties. It is low glycemic, non-cariogenic, vegan, kosher, halal, and non-GMO. Unlike typical sugars, its physiology resembles complex carbohydrates, allowing for steady absorption and balanced energy levels.

Insomnia prevalence affects 10–30% of the population, with poor sleep being linked to obesity, impaired glucose metabolism, and dementia. Isomaltulose ability to sustain overnight blood sugar levels suggests potential for dietary interventions targeting sleep disorders and cognitive decline. Growing interest in multifunctional formulations that combine sleep aids with other wellness benefits, such as immune support and hormonal balance. Beneo's research highlights the importance of choosing the right carbohydrate for sleep and mental well-being.

Are Diet Drinks Damaging to Gut Health?

The article by Donna Eastlake examines the potential negative impact of diet drinks on gut health and the implications for the beverage industry.

The global diet soft drinks market is currently valued at $4.87 billion and is projected to grow at a 3.8% CAGR over the next five years.Its growth is largely driven by rising obesity rates and consumer demand for lower-calorie drink options. Gut health has become a major focus in the food and beverage sector, growing into a $51.62 billion industry with an 8.3% CAGR projected through 2030.Consumer understanding of gut health's impact on overall well-being has fueled the demand for gut-friendly products, such as probiotic-infused foods and drinks.

Artificial sweeteners in diet drinks may disrupt the natural balance of gut bacteria, potentially affecting blood sugar regulation and insulin response.Poor gut health is associated with autoimmune issues, digestive disorders, and even an increased risk of colorectal cancer.Research suggests that changes in gut environment due to diet drinks may increase the risk of insulin resistance, which is a precursor to type 2 diabetes.

Many consumers are now choosing foods and beverages that promote gut health while avoiding those believed to harm it, posing challenges for diet drink manufacturers.The beverage industry, which operates under strict regulatory oversight (e.g., EFSA approvals for sweeteners), has an opportunity to develop reduced-sugar alternatives free from artificial sweeteners.Early movers in this space could dominate the market if consumer preferences shift.

While diet drinks have gained popularity for their low-calorie appeal, they face scrutiny due to potential gut health risks. The industry has the chance to adapt by innovating gut-friendly, sweetener-free beverage options to remain competitive in this rapidly evolving market.

https://www.foodnavigator.com/Article/2024/12/17/are-diet-drinks-damaging-to-gut-health/

WUR develops physics-guided method to reduce sugar and fat in baked goods without texture loss

07 Feb 2025

https://www.nutritioninsight.com/news/wur-develops-physics-guided-method-to-reduce-sugar-and-fat-in-baked-goods-without-texture-loss.html

Wageningen University & Research (WUR) has developed an innovative method to reduce sugar and fat in cakes by 30% while maintaining their sensory qualities, such as sweetness, softness, and moistness.

The method involves adjusting the properties of the water-sugar mixture and replacing fat with dietary fibers to maintain the structure and consistency of baked goods. This approach ensures that the texture and flavor remain comparable to traditional recipes.

The study applied physicochemical principles, including: Volumetric density of hydrogen bonds: Influences protein denaturation and starch gelatinization. Molar volume density of hydroxyl groups: Governs starch pasting properties. Flory-Huggins water interaction parameter: Regulates the hygroscopic behavior of sugar mixtures. Volume fraction of flour: Contributes to the overall structure and texture.

Sensory tests confirmed that the modified recipes retained the desired qualities of conventional cakes. The research is part of the LowCalIFood initiative, which aims to incorporate protein- and fiber-rich ingredients from plant sources into baked goods.

The study aligns with global efforts to improve the nutritional profile of food products. For example, Cargill has achieved significant sugar reductions in its bakery products while maintaining consumer acceptance, using a combination of advanced ingredient portfolios and sensory insights. This breakthrough not only enhances the healthiness of baked goods but also opens doors for further innovations in food reformulation.

Sweet alternatives to target sugar reduction solutions

17 Feb 2025 | By Gaynor Selby

https://www.nutritioninsight.com/news/ingredion-oobli-natural-sweeteners-sugar-reduction-sweet-proteins.html

Ingredion and Oobli have joined forces to revolutionize sugar reduction in food and beverages by leveraging sweet proteins.

Produced via fermentation, sweet proteins are cost-effective, have no glycemic impact, and do not affect the gut microbiome. They are climate-friendly, requiring less land, water, and carbon compared to traditional sugarcane farming.

Sweet proteins are versatile and can be used in sodas, baked goods, yogurts, and candies. They complement natural sweeteners like stevia, helping food companies achieve ideal sweetness levels while managing costs. Ingredion and Oobli aim to accelerate the adoption of sweet proteins as a healthier alternative to sugar. The collaboration includes testing co-developed products and gathering customer feedback to refine solutions.

Oobli has received FDA GRAS (Generally Recognized as Safe) approval for two sweet proteins, monellin and brazzein, confirming their

safety for use in food products.Oobli recently secured $18 million in Series B1 funding, with strategic investors like Ingredion Ventures supporting its growth.The partnership will showcase new sweet treats at Future Food Tech in San Francisco in March 2025.This collaboration represents a significant step toward healthier, sustainable sweetener solutions.

Brain boosters: Biohacking culture and advancing AI health analytics drive new cognitive ingredients

18 Dec 2024 | By Sade Laja

https://www.nutritioninsight.com/news/cognitive-health-brain-nootropics-astaxanthin-chicory-root-fiber-astareal-sensus.html

The increasing interest in brain health and cognitive performance has led to the development of new cognitive ingredients and brain boosters that cater to different demographics and wellness goals.

With the rise of biohacking culture and advancements in AI health analytics, the field of neuroprotection is expanding to include healthy aging solutions and personalized brain health interventions. Nootropics and neuroplasticity boosters are gaining popularity, supported by scientific research on the gut-brain axis and the role of oxidative stress in brain health.

Astaxanthin, a potent antioxidant derived from red sea algae, is emerging as a key player in the mental health space, with the ability to cross the blood-brain barrier and provide neuroprotective effects. Similarly, prebiotic chicory root fiber is being recognized for its potential in supporting mental health through its effects on gut microbiota and the gut-brain axis. Companies like AstaReal and Sensus are developing innovative formulations that combine these ingredients with other nutrients to target cognitive health, vision support, and stress management. As the industry focuses on personalized nutrition and female-focused products, functional foods and beverages are becoming popular options for delivering brain-boosting benefits.

AI-driven health analytics and innovative ingredients are shaping brain health solutions, particularly in the context of aging populations and competitive lifestyles. Emphasis on nutritional interventions to boost cognitive performance, mental resilience, and emotional well-being.Applications extend across new categories like women's health and sports nutrition.

Growing biohacking culture and its role in personalized brain health solutions.Advances in genomics, AI health analytics, and wearable neurotech support precision neuroscience.The gut-brain axis is a critical research area, with ingredients like chicory root fiber showing neuroprotective and anti-inflammatory effects.

Natural astaxanthin is a potent antioxidant capable of crossing the blood-brain barrier.It shows promise for preventing oxidative stress, neuroinflammation, and enhancing brain and cognitive health.Innovative formulations by AstaReal combine astaxanthin with other nutrients to address vision and cognitive health, mental resilience, and oxidative stress reduction.

This prebiotic supports the gut-brain axis by stimulating beneficial intestinal bacteria that contribute to mental health improvements.Studies highlight its role in reducing stress-induced mood issues and supporting cognitive function.

Personalized nutrition based on genetic biomarkers and microbiota profiling is on the horizon.Functional foods, beverages, and synergistic ingredient blends (e.g., prebiotics with vitamins and minerals) are ripe for development.Expanding research on organ-brain axes, such as the skin-brain axis, for targeting oxidative stress and brain inflammation.Potential to reshape "beauty-from-within" and brain aging categories.

Plant-based options, circadian rhythm alignment solutions, and formulations addressing both sleep and cognitive health.Multifunctional supplements that support immune health and hormonal balance.

Multidisciplinary approach to brain health, integrating cutting-edge research and nutrition science offers innovative, personalized wellness solutions.

Ultra-processed foods: Experts unpack science, health, and industry perspectives

28 Feb 2025 | By Insha Naureen

https://www.foodingredientsfirst.com/news/ultra-processed-foods-science-industry-consumer-insights.html

The Nova system categorizes foods into four groups: unprocessed/minimally processed, processed culinary ingredients, processed, and ultra-processed foods (UPFs).

Ultra-processed foods are often associated with adverse health impacts but are highly convenient and profitable due to low-cost ingredients and long shelf life.Experts criticize the Nova system for being overly broad, excluding nutritional value, and lacking scientific evidence, which makes it challenging to evaluate food's contribution to health outcomes.

Some UPFs, like whole-grain bread and fortified cereals, offer health benefits and are unfairly categorized with less nutritious foods like candy bars.Minimally processed foods can also be caloric-rich and nutrient-deprived, which may contribute to overeating and obesity.Plant-based meat alternatives raise questions about the effects of technological processes on nutritional value and health outcomes.

The University of Copenhagen leads a two-year initiative to redefine UPF classification to distinguish between healthy and unhealthy UPFs.Many experts call for a more nuanced approach that considers nutritional value and excludes blanket categorization.

Emerging food technologies, like protein extrusion, could create health-promoting UPFs but are still classified under Nova's broad definition.Recommendations include avoiding free sugars, refined seed oils, and severe processing while optimizing processes to preserve nutrients.Strict laws regulate ingredient use in the US and EU, but emerging technologies lack comprehensive regulatory frameworks.Experts urge food companies to leverage science in formulations and technologies to create safer, healthier UPFs.

Consumer education is key, but relying on governments and companies for awareness is unrealistic.Scientists, educators, and media should disseminate unbiased, scientifically grounded information about food and nutrition.Experts predict UPFs will continue to dominate the food supply due to their convenience and safety.There is optimism that a more scientific definition of UPFs will refine classifications and improve public health outcomes.

Holistic Perspectives:Encourages consumption of minimally processed foods for better health.Raises concerns about “non-UPF” labels misleading consumers into thinking certain treats are healthy when they’re not.Advocates for interdisciplinary nutrition research to address public health challenges.

What is stopping the cultivated meat sector fulfilling its potential?

18 Feb 2025 | By Sade Laja

https://www.foodingredientsfirst.com/news/cultivated-meat-good-food-institute.html

Cultivated meat holds significant promise as a sustainable alternative to conventional meat, with the potential to address climate change, enhance food security, and drive economic growth.

Peer-reviewed studies suggest it could reduce land usage by up to 90% compared to traditional beef production, cut climate impacts by up to 92%, and decrease air pollution by as much as 94%. Additionally, it is estimated that cultivated meat could contribute €85 billion (US$89 billion) to the EU economy and create up to 90,000 highly skilled jobs by 2050. In Germany, it could generate up to 250,000 jobs by 2045 with sufficient investment and regulatory support.

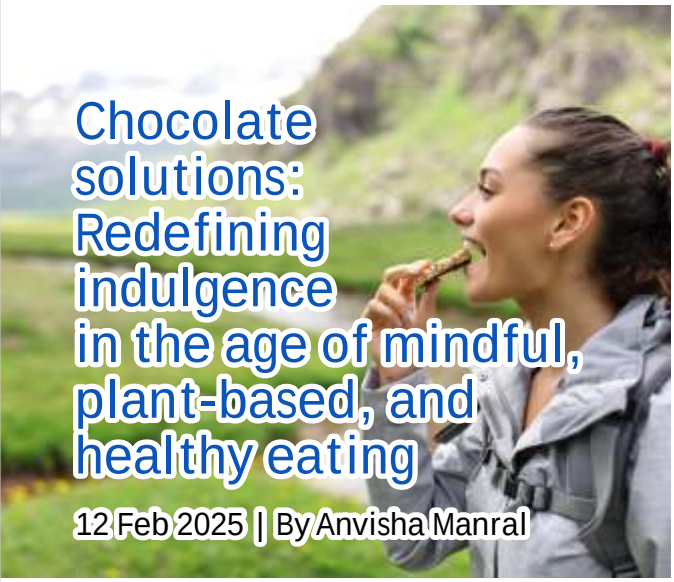
However, the sector faces significant hurdles in scaling up production. The cost of cell culture media (nutrients needed for cell growth) is high, and the industry requires better availability of cell lines and advanced scaffolding to replicate the textures of conventional meat. Moreover, large-scale production facilities are scarce, and small companies struggle to secure funding for their operations.

Initiatives like Maastricht's "Cultivate At Scale" aim to address these challenges by offering shared infrastructure, reducing the financial burden on startups.

Governments play a crucial role in overcoming these barriers by investing in open-access research and integrating food innovation into their green growth strategies. While progress has been made in countries like the UK, which has invested £75 million (US$94 million) in alternative protein development, some regions, like Italy, have resisted due to misinformation and controversies surrounding cultivated meat.

The industry has witnessed exciting developments, such as Mosa Meat's application for EU approval of its cultivated beef fat, which could improve the flavor of plant-based products. Companies like Gourmey (cultivated foie gras), Ivy Farm (cultivated wagyu beef), and various European startups focusing on seafood are pushing the boundaries of innovation in the field.

Over the next 5–10 years, cultivated meat is expected to expand its range of offerings and improve affordability and accessibility. However, this will require collaborative efforts from startups, researchers, governments, and larger food industry players to invest in research, infrastructure, and production scaling.



Chocolate solutions: Redefining indulgence in the age of mindful, plant-based, and healthy eating

12 Feb 2025 | By Anvisha Manral

https://www.foodingredientsfirst.com/news/chocolate-industry-trends-mindful-plant-based-indulgence.html

Consumers are increasingly seeking healthier chocolate options, including reduced sugar, fat, and calorie content.

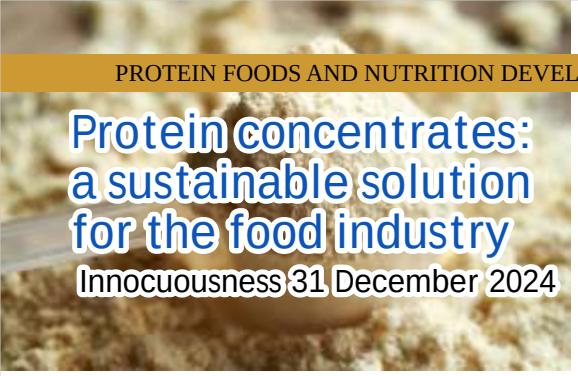
This demand has given rise to "permissible indulgence," where individuals enjoy chocolate without guilt by opting for healthier formulations.There's a significant shift toward plant-based diets, prompting the development of dairy-free chocolates. Ingredients like oat, almond, and coconut milk are being used to replicate traditional textures, appealing to consumers with dietary restrictions or ethical concerns.

Consumers demand transparency, minimal processing, and the use of natural, non-GMO, gluten-free, and allergen-free ingredients. Ethical sourcing and environmental protection are also priorities.

Companies are reformulating chocolate products to improve their nutritional profile. For example, brownies with reduced sugar and high fiber content achieve better Nutri-Score ratings without compromising taste. To address issues like bitterness and fat blooming in sugar-reduced chocolate, innovative approaches like using alternative fats (e.g., high-oleic sunflower oil) and aerated chocolate chunks are being employed. Upcycled cacao juice concentrate and plant-based milk ingredients are being integrated to reduce waste and enhance sustainability.

To mitigate challenges like climate change and poor harvests, companies are providing direct support to cocoa producers, promoting agroforestry practices, and ensuring traceability in supply chains. The chocolate industry is exploring new ingredients, such as tiger nut milk, to make the category more inclusive while maintaining functionality and taste.

Premium products featuring exotic ingredients, bold flavor combinations, and artisanal craftsmanship are gaining popularity. These products cater to consumers seeking unique and luxurious experiences. Innovations like multilayer chocolates with varied textures are particularly appealing to Gen Z consumers who value fun and sensory appeal. Sustainability and consumer preferences are driving significant changes in the chocolate industry, pushing companies to innovate while addressing ethical and environmental concerns.



Protein concentrates: a sustainable solution for the food industry

Innocuousness 31 December 2024

https://www.foodnewslatam.com/inocuidad/54-ingredientes/15864-concentrados-proteicos-una-soluci%C3%B3n-sostenible-para-la-industria-alimentaria.html

The article explores the potential of protein concentrates, particularly those derived from unconventional flours (HNC), as a sustainable and nutritious solution for the food industry.

With the global population increasing and natural resources becoming scarce, the food industry is seeking sustainable alternatives. Protein concentrates from HNC are emerging as a viable solution. These concentrates are made from legumes and pseudocereals, which offer high protein content, fiber, vitamins, and essential minerals.

Protein concentrates are processed products where the protein content is increased compared to other components. Traditionally, they come from whey, soy, peas, rice, and eggs. HNC-based concentrates are gaining popularity due to their nutritional value and eco-friendliness. HNC-based concentrates contain a complete amino acid profile, making them ideal for vegetarian and vegan diets. They enhance the sensory and nutritional quality of foods.

Their production requires fewer resources (water, land) compared to animal protein sources.They generate lower greenhouse gas emissions, reducing their environmental impact. HNC protein concentrates are more affordable, though market expansion is needed to encourage competition and improve availability. Used in plant-based products like vegan burgers and sausages. Enhance gluten-free foods by boosting their nutritional profile. Serve as supplements for athletes, offering a rich protein source.

Research by the Institute of Agricultural Research (INIA) focuses on improving these concentrates by leveraging local raw materials and developing advanced technologies. The aim is to produce healthy, traceable, and safe food for both domestic consumption and export markets. As extraction methods evolve and production becomes more efficient, HNC protein concentrates are expected to contribute significantly to a sustainable and healthy global food system.

Top consumer trends in dairy for 2025

By Teodora Lyubomirova 20-Dec-2024

The dairy industry is embracing innovation to align with evolving consumer preferences and nutrition trends.

The focus for 2025 lies in protein-packed products, functionality, lactose-free options, and catering to healthy aging populations. High-protein claims continue to drive new product development (NPD). Items such as spoonable and drinkable yogurts, snack bars, and protein-enhanced cheeses are gaining traction globally.Brands like Nestlé, Danone, Arla Foods, Coca-Cola's Fairlife, and Premier Nutrition are leading this trend. High-protein cottage cheese is rising in popularity in the US, aligning with consumer shifts towards low-calorie, nutrient-dense snacks. The focus on protein-rich diets coincides with broader holistic lifestyle changes among consumers, emphasizing nutrient-dense foods for weight management.

Functional dairy products, particularly fermented items like kefir, are gaining recognition for their gut health benefits. Fortified options, such as probiotic-enriched milk, are being explored but face challenges like pricing and consumer education. Advancements in food technology could enable the addition of live microorganisms to heat-treated products, potentially transforming the ambient dairy category.

Lactose-free dairy is expanding due to dietary needs and its newfound appeal as a health-focused option. Products like lactose-free milk and butter, often combined with protein claims, are flourishing. Coca-Cola's Fairlife brand is a standout in this category, leveraging lactose-free, low-sugar, and high-protein attributes. With aging populations, particularly in

Asia, dairy products that support muscle health, immunity, and nutrition are becoming important. Ingredients like lactoferrin, colostrum, and specialized dairy derivatives (e.g., MFGM and BLG) are enabling brands to diversify into adult nutrition and early-life supplements.

The dairy industry is focusing on addressing the demand for convenient, health-oriented products while also tapping into sustainability and innovation. The combination of high-protein claims, functional benefits, and specialized nutrition is shaping the future of dairy.

https://www.foodnavigator-usa.com/Article/2024/12/20/top-consumer-trends-in-dairy-for-2025/

Snackification revolution: Global snacks sales to surpass $680 billion in 2024

By Gill Hyslop 09-Jan-2025

https://www.foodnavigator-usa.com/Article/2025/01/09/global-snack-sales-to-hit-680bn-in-2024-trends-insights/

Snack sales globally reached remarkable heights in 2024, reflecting consumers increasingly replacing traditional meals with snacks.

This trend is attributed to the growing demand for convenience, evolving lifestyles, and economic uncertainties. Insights from Euromonitor International's report emphasize how snack culture is reshaping eating habits across regions, fueled by tradition, innovation, and changing dietary preferences.

Projected Sales: Global snack sales are forecasted to hit $680 billion in 2024, marking a 3.7% rise from 2023. North America contributes 28% of global snack sales, driven by on-the-go lifestyles and innovation. Asia-Pacific accounts for 24%, followed closely by Western Europe with 23%. Middle East and Africa are projected to experience explosive growth with a 4.6% CAGR from 2024 to 2029, fueled by urbanization and rising disposable incomes.

India: Leads globally in snackification, with 18% of adults replacing meals with snacks in 2024 (down slightly from 21% in 2023).Market expected to grow from $5.34 billion in 2024 to $10.92 billion by 2033. Factors driving growth include urbanization, disposable income increases, and shifts in youth behavior.

United States: Meal replacements with snacks rose to 17% in 2024, reflecting the shift toward flexible food options. Per capita snack revenue exceeded $131 in 2024. Market forecasted to grow at 4.11% CAGR from 2024-2029, driven by diverse health-conscious products.

United Kingdom: Growth in snack replacement: 13% of adults replacing meals with snacks in 2024, up from 10% the previous year. Robust snack market valued at over £3 billion in 2023, with annual growth of 3.74% projected from 2025 to 2029.

Countries like Singapore, Canada, and Brazil are experiencing similar growth, with emerging markets across Latin America, Africa, and Southeast Asia showing accelerated adoption. Manufacturers leverage local traditions to innovate culturally resonant products.

Consumer Motivations: Snacks have evolved beyond hunger satisfaction: Convenience: Fast-paced lifestyles demand quick solutions. Emotional Comfort: Stress reduction and joy through affordable treats. Personalized Options: Rising preference for specific dietary needs (keto, paleo, plant-based). Social Media Impact: Platforms like TikTok and Instagram drive snack trends via influencer collaborations and viral campaigns.

Industry Challenges & Opportunities: Navigating economic pressures and consumer preference shifts. Increased competition across regions and demographic diversity. Innovating culturally inspired flavors and premium options. Meeting demands for sustainable packaging and clean-label ingredients.

The snackification trend highlights a pivotal transformation in global eating habits. Snacks now symbolize convenience, indulgence, and evolving dietary needs, redefining traditional meal consumption. Manufacturers face both the challenge of innovation and the opportunity to connect deeply with consumer preferences across the globe.

Breaking down clean label sugar reduction and sweet perception

By Deniz Ataman 13-Jan-2025

https://www.foodnavigator-usa.com/Article/2025/01/13/sugar-reduction-solutions-to-reduce-sugar-and-retain-taste/

The article discusses strategies for reducing sugar in food formulations while preserving taste and functionality, driven by the clean-label movement. Consumers demand naturally sweetened products that mimic the sensory attributes of traditional sugar-sweetened items, pushing manufacturers to adopt innovative solutions.

Sugar contributes to taste, texture, moisture retention, and shelf-life extension. Reducing sugar involves balancing sweetness, volume, moisture, and addressing off-flavors.

Companies use blends of ingredients, such as modified food starch, sweetness modulators, and aromatics, to substitute sugar without compromising taste. Enhancing sweet aromas like vanilla or caramel can trick the brain into perceiving greater sweetness.

US consumers favor caloric sweeteners (e.g., honey, brown sugar, sucrose) over no/low-calorie alternatives due to safety concerns. Sweeteners like aspartame (a possible carcinogen) and erythritol (linked to cardiovascular risks) face scrutiny.

Sweetness signals energy intake, shaping human growth and satiety. Aroma plays a pivotal role in modifying perceived sweetness.

Companies like Icon Foods leverage sweetness modulators (e.g., thaumatin, Reb M stevia) to reduce sugar while retaining functionality. Precision fermentation produces sweet proteins like monellin and brazzein, offering potent sweetness and GRAS (Generally Recognized as Safe) status. The Natural Sweetener Alliance combines expertise in biotechnology and sweetener production to deliver sustainable, reduced-calorie options like Reb M.

Manufacturers are working to future-proof their supply chains amidst global uncertainties. Challenges: Safety concerns about artificial sweeteners. Balancing sugar reduction with maintaining functional attributes in products. Opportunities: Clean-label trends driving demand for natural alternatives. Leveraging consumer awareness of healthier options.

Complex factors driving global public attitudes towards salt reduction: Multi-country study

By CM Tay 13-Jan-2025

https://www.foodnavigator-asia.com/Article/2025/01/13/complex-factors-driving-global-public-attitudes-towards-salt-reduction/

The study underscores the importance of multifaceted strategies that address demographic, cultural, and health-related factors influencing attitudes toward sodium reduction. Customization is key to successfully reducing excessive sodium intake globally. This multi-country study investigated public attitudes towards salt reduction across seven countries: the United States, United Kingdom, France, Japan, Indonesia, Thailand, and Brazil. Using a survey with 7,090 participants averaging 46 years old, researchers analyzed factors such as gender, age, occupation, health status, and cultural context to understand the complex influences on sodium reduction attitudes. The study highlighted the need for tailored approaches to effectively reduce excessive sodium intake globally.

Socio-demographic Factors: Gender: In France, women showed lower awareness of sodium reduction compared to men, possibly due to traditional health and dietary beliefs. In Japan and Thailand, older individuals demonstrated higher awareness, likely because of increased health consciousness with age. Occupation: Grocery and food service employees in France and Japan exhibited greater awareness of sodium reduction, reflecting their exposure to food-related information and its influence on dietary choices. General Nutrition Link: Positive attitudes toward healthier dietary practices, like reducing sugar intake or increasing vegetable consumption, were correlated with support for sodium reduction in France and Brazil.

Cultural Context: Resistance to government-promoted sodium reduction efforts was observed in countries with strong culinary traditions, such as France and Japan. This resistance emphasizes the importance of incorporating local cultural values into dietary strategies.Dietary habits tied to cultural identities influence food choices and attitudes toward changes like sodium reduction, suggesting the need for culturally sensitive messaging.

Health Status: In the UK, individuals with heart disease were less supportive of sodium reduction, possibly viewing dietary adjustments as difficult. Conversely, Brazilians with hypertension were more likely to favor sodium reduction, showcasing variability based on specific health conditions. Targeted interventions are required to address the diverse impacts of health conditions on sodium reduction attitudes.

Business and Policy Implications: Food producers, restaurants, and grocery retailers should customize strategies based on regional dietary preferences, age, gender, and professional exposure to food-related information. In countries where processed foods are the primary source of salt intake, industries should prioritize product reformulation. Meanwhile, regions with home-cooked meals should focus on educational campaigns encouraging reduced salt usage during preparation.

Study Limitations: Internet Bias: As the study was conducted online, it might not represent populations without digital access. Self-Reported Data: Potential biases like social desirability and recall limitations could have influenced responses. Measurement Scale: The seven-point Likert scale may not capture the full spectrum of attitudes toward sodium reduction. Cross-Sectional Design: The study did not establish causative relationships, necessitating further research to validate findings.

The study underscores the necessity for multi-faceted, customized strategies that account for gender, age, occupation, health status, cultural influences, and dietary practices. These approaches can better address the varying attitudes toward sodium reduction across diverse population segments and regions.

South Korea launches 19 government-backed reduced-sodium and sugar products

By Pearly Neo 09-Dec-2024

https://www.foodnavigator-asia.com/Article/2024/12/09/south-korea-launches-19-government-backed-reduced-sodium-and-sugar-products/

The South Korean Ministry of Food and Drug Safety (MFDS) seeks to meet national health targets by reducing sodium and sugar intake among citizens. These launches are part of the national Comprehensive Plan for Reducing Sodium and Sugar.

Processed Food Categories: Includes items like packaged sandwiches, hamburgers, bakery goods, soups, tteokbokki (rice cake soup), Korean sausage (sundae), strawberry ice creams, and iced teas. Key Developments: Sandwiches with up to 45% less sodium. Hamburgers with 30% sodium reduction. Ice creams with 50% less sugar, adjusted using sweeteners like allulose. All products carry 'less salt' or 'reduced sugar' labels for convenience. Local labeling standards require: At least 10% reduction in salt or sugar compared to average values.25% reduction compared to similar products from the same manufacturer. Reformulation Methods: Sodium Reduction: Low-sodium ingredients replace existing ones. Increased use of vegetables in items like sandwiches and burgers. Soupy products adjusted by balancing high-sodium ingredients and salt substitutes for taste satisfaction. Sugar Reduction: Controlled sugar content in ingredients. Sweeteners like allulose and monkfruit were utilized to maintain acceptable taste. Sodium Intake: Rising due to convenience foods, particularly among single-person households. Sugar Intake: Girls aged 6-11 consuming beyond WHO-recommended limits, with bread and ice cream being top contributors.

The MFDS plans to expand the initiative further, focusing on food items with beneficial ingredients like milk protein and calcium. Comprehensive reviews will guide the selection of new food and beverage items for reformulation. This is a significant step towards healthier dietary practices in South Korea, addressing both health concerns and consumer preferences.

Nutrition labels meant to promote healthy eating could discourage purchases

February 6, 2025 Science Daily

https://www.sciencedaily.com/releases/2025/02/250206134602.htm

This study reveals a fascinating insight into the psychology of food labelling.

It shows that while labels aimed at encouraging healthier choices might have good intentions, they can sometimes backfire. Consumers may perceive "healthy" labelled foods as less tasty, leading to a reduced willingness to purchase them unless backed by clear, credible criteria like FDA standards.

The research emphasizes the need for transparency and education when it comes to food labels. By helping people understand what "healthy" truly means, policymakers and food manufacturers can make these labels more effective and positively influence eating habits. It's a delicate balance between promoting healthier choices and addressing consumers' expectations around taste and indulgence.
When yogurt was labelled as "healthy," consumers were willing to pay 18% less compared to the unlabelled control. Adding a "great taste" label alongside "healthy" reduced willingness to pay even further by 25%. This suggests that health-focused labels might unintentionally evoke perceptions of poor taste.

The scepticism toward "healthy" labels, was mitigated when accompanied by an explanation stating that the label adhered to FDA standards (e.g., low in saturated fat, added sugar, and sodium). This highlights how authoritative backing and clarity can improve label effectiveness.

The study suggests that consumers often associate health claims with a compromise on indulgence and flavour. On the other hand, a standalone "great taste" label neither positively nor negatively influenced consumers' willingness to pay.The findings support the need for clear and transparent criteria for health claims on packaging. FDA-backed labelling might help build trust and influence healthier choices effectively.Addressing consumer misconceptions—like the idea that "healthy" equals "tasteless"—could encourage acceptance of healthful products without discouraging purchases.

Manufacturers might need to rethink how they present health attributes, ensuring they appeal to both health-conscious and taste-driven buyers.The study provides valuable insights into designing labels that balance promoting healthier eating habits with maintaining consumer trust and satisfaction.

Leading authentication provider launches portal to combat food fraud in herb and spice market

28|Feb|2025

https://www.foodingredientsfirst.com/news/leading-authentication-provider-launches-portal-to-combat-food-fraud-in-herb-and-spice-market.html

Belfast-based authentication provider Bia Analytical has launched new technology that will reduce the time needed to detect tampering in herbs and spices products from days to minutes.

Despite the high risk of food fraud, authenticity testing traditionally takes up to two weeks to complete and is limited to a small sample size due to volume-based cost. Belfast-based authentication provider Bia Analytical introduced a web-based portal

designed to detect tampering in herbs and spices within minutes. The launch of Bia Analytical's portal means food testing laboratories — and other organizations across the supply chain — can access and use its authenticity models.

The portal combines advanced chemometrics, AI-powered modeling and spectroscopy. It displays complex analytics in easy-to-understand dashboards and can be accessed by standard web browsers, meaning professionals across different locations and organizations can view the same information at the same time.The portal can connect to handheld spectrometers, launched in 2024, enabling rapid screening of herbs and spices for government bodies, food manufacturers, and retailers.

Food fraud costs the industry approximately £12 billion (US$15 billion) annually. A 2021 EU study revealed that over half of the products in the market contained undeclared plant material, with oregano being the most affected.Developed using Amazon Web Services (AWS) cloud services, the portal encourages frequent and high-volume testing.Reading Scientific Services Ltd (RSSL) partnered with Bia Analytical for beta testing to advance the technology further.

The technology aims to transform quality control processes for high-volume food manufacturers and grocery retailers, ensuring safety and authenticity across the supply chain.This innovation is poised to modernize food analysis and significantly enhance the industry's ability to combat fraud.

https://www.ift.org/news-and-publications/blog/2024/scanning-the-horizon

The blog discusses how regulatory horizon scanning serves as a critical tool for food and beverage companies to stay ahead of evolving government regulations.

Horizon scanning provides companies with early visibility into upcoming changes in the regulatory environment. By anticipating new rules, businesses can proactively adapt formulas and labels efficiently.

Scanning can address short-term changes or look further into the future, depending on strategic goals.

Why Is Horizon Scanning Essential? It allows businesses to identify impactful regulations in advance, enabling agile responses.

Companies can deploy lobbying and advocacy efforts to shape government proposals and secure favorable transitional measures. Proactive tracking prevents last-minute changes, saving resources and maintaining compliance.

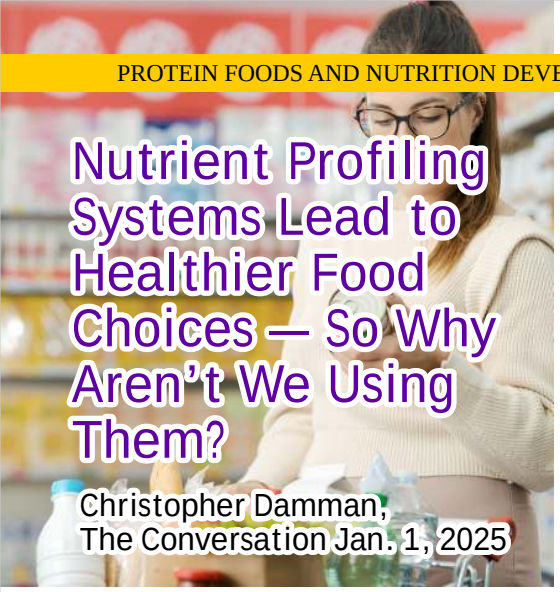
Leatherhead Food Research performs quarterly horizon scans tailored to the specific needs of food businesses in regions like the UK, EU, and US. Their experts, fluent in local languages, closely monitor regulatory developments across markets. The service filters out irrelevant details, focusing only on critical changes to ensure efficiency.

Regulations like the EU's Packaging & Packaging Waste Regulation (PPWR) demand that all packaging be recyclable by 2030.Criteria for recyclable packaging won't be finalized until 2028, creating a tight window for compliance.

Other significant measures include the EU Deforestation Regulation (EUDR), Green Claims Directive (GCD), Corporate Sustainability Due Diligence Directive (CSDDD), and Waste Framework Directive (WFD). Many of these require comprehensive traceability systems, which take time to develop and implement.

Businesses should utilize horizon scanning to track these measures early. Prior planning ensures enough time for system adjustments and compliance strategies.

Leatherhead also provides personalized services to help companies navigate these challenges effectively. This proactive approach to regulatory tracking helps businesses mitigate risks and adapt smoothly to industry changes.



Nutrient Profiling Systems Lead to Healthier Food Choices — So Why Aren't We Using Them?

Christopher Damman,
The Conversation Jan. 1, 2025

https://www.inverse.com/health/nutrient-profiling-systems-grocery-stores

Imagine a world where food on grocery store shelves is ranked by its healthiness. In some countries, that is the reality.

The article explores how nutrient profiling systems (NPSs) are helping consumers make healthier food choices in some countries, while also highlighting the lack of similar systems in the United States. Here's a detailed breakdown: NPSs evaluate the healthiness of foods based on their nutrient content, assigning scores to simplify decision-making for consumers. Examples of NPSs: Nutri-Score (France): Grades foods A to E using color codes.

Health Star Rating (Australia): Rates foods on a scale of 0.5 to 5 stars. Traffic Light System (UK): Uses green, yellow, and red to indicate nutrient levels.

These systems assign positive points to nutrients typically underconsumed, like fiber, fruits, and vegetables. Negative points are given for overconsumed nutrients like sugar, saturated fats, and sodium. A single combined score helps consumers understand food healthiness at a glance, avoiding the need to interpret detailed Nutrition Facts labels.

NPSs align with the NOVA system, which categorizes foods by their level of processing. Ultra-processed foods, linked to health risks like obesity and cancer, often receive low scores. However, NPSs provide nuance, ranking healthier options within ultra-processed categories, such as low-sugar plant-based milks.

The Nutrient Consume Score (NCS): Developed by gastroenterologist Christopher Damman, the NCS rates foods from 1 to 100, incorporating microbiome-related factors and unprocessed food characteristics. It uses nutrient ratios (e.g., carbohydrate-to-fiber, saturated fat-to-unsaturated fat) to measure health effects more comprehensively. NCS aims to fill gaps in current systems by accounting for bioactive compounds, omega-3 fats, and other neglected nutrients.

Limitations of Current Systems: Incomplete data and a lack of standardization in some systems.Oversight of factors like alcohol's health impacts and individual dietary needs.Correlations identified by these systems may not prove causation regarding health outcomes.

NPSs demonstrate potential in reshaping consumer habits and encouraging healthier food production by companies. Systems like Nutri-Score in Europe have shown success in influencing purchasing decisions. In the U.S., tools like smartphone apps are emerging as interim solutions until standardized systems are adopted. By simplifying nutrition information and promoting healthier choices, NPSs could address rising metabolic diseases globally.

FDA recommends plant-based foods prominently state main ingredient

By Deniz Ataman 07-Jan-2025

https://www.foodnavigator-usa.com/Article/2025/01/07/fda-recommends-plant-based-foods-prominently-state-main-ingredient/

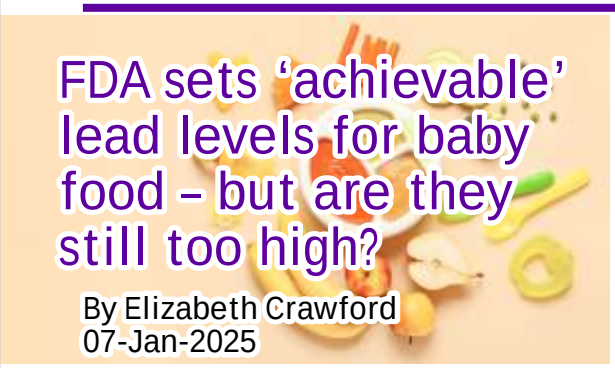
FDA suggests clearly stating the plant sources (e.g., soy, lentil, walnut) on packaging for plant-based alternatives to animal-derived foods.

If a product contains multiple plant sources, the predominant source by weight should be stated first, with all sources listed in the ingredient statement. The product name or statement of identity should prominently communicate the plant sources in bold type that is at least half the size of the largest print on the display panel. Modified spellings (e.g., "Chik'N" or "Cheeze") should include the plant source for clarity.

Products labeled with terms like “pork-free” should also include the plant source to distinguish them from other similar alternatives. Brands can use terms like "artificially beef flavored" to indicate the flavor of a plant-based product, provided it doesn't imply the use of animal-based ingredients.

The FDA aims to reduce confusion for consumers and ensure they have the necessary information to make informed purchasing decisions. This guidance applies to plant-based alternatives to eggs, seafood, poultry, meat, and dairy products, but excludes plant-based milk alternatives.
Some industry groups argue that the recommendations may:Burden Manufacturers: Requiring plant source details in product names could be seen as unnecessary since ingredient panels already disclose this information.Limit Consumer Choice: Treating plant-based products differently from others in the market may be perceived as unfair.

The FDA's draft guidance maintains that plant-based products can use terms traditionally associated with animal-derived foods (e.g., "yogurt" or "cream cheese") as long as they are differentiated clearly, such as using "plant-based."The FDA has opened the draft guidance for public comments until May 5, 2025, allowing stakeholders to share their views and suggestions.



FDA sets 'achievable' lead levels for baby food – but are they still too high?

By Elizabeth Crawford
07-Jan-2025

https://www.foodnavigator-usa.com/Article/2025/01/07/fda-finalizes-lead-caps-for-baby-food/

The FDA has finalized voluntary caps on lead levels in packaged baby and toddler food to balance food safety and manufacturing feasibility.

The caps are based on scientific evidence showing that there is no safe level of lead exposure for children, while acknowledging lead's natural and environmental presence makes complete elimination unattainable.

- 10 parts per billion (ppb) for fruits, vegetables (excluding single-ingredient root vegetables), mixtures, yogurts, custards/puddings, and single-ingredient meats.
- 20 ppb for single-ingredient root vegetables and dry infant cereals.

These levels are non-binding, but products exceeding them may be considered adulterated and could face regulatory enforcement.FDA analyzed 689 processed food samples and found that most already meet these caps:90% of samples had lead levels below 10 ppb.94% of samples fell under the proposed limits. The caps are expected to reduce children's lead exposure by up to 27%, making them "achievable" under current best practices (e.g., peeling root vegetables, ensuring clean processing equipment).

Supporters view the caps as a positive step toward safer baby food.Believe the limits reflect real-world conditions, such as the presence of lead in soil.Criticsargue the caps do not go far enough to protect children.Cite delays in FDA action and question whether the agency maximized protections for public health.Urge states to adopt stricter heavy metal regulations.

Advocates are encouraging states to implement tougher laws, similar to California's AB899, which mandates heavy metal testing and disclosure for baby foods. California also has broader legislation banning harmful food additives and synthetic dyes.Under the FDA's "Closer to Zero" initiative, the agency continues to explore ways to limit lead and other heavy metals in children's food. This includes:Collecting data on grain-based snacks like teething products and puffs; Setting caps for heavy metals in additional food categories; Enforcing existing guidelines on arsenic and lead levels in juices.

Five must-know regulations set to impact the APAC food and beverage sector in 2025

By Pearly Neo 08-Jan-2025

https://www.foodnavigator-asia.com/Article/2025/01/08/five-must-know-regulations-set-to-impact-the-apac-food-and-beverage-sector-in-2025/

Here's a detailed summary of the regulations expected to influence the Asia-Pacific (APAC) food and beverage sector in 2025:
EU Deforestation Regulation (EUDR) Delay: The implementation of the EUDR has been postponed by a year to 31 December 2025.

The delay provides a 12-month phase-in period aimed at helping stakeholders adapt, but no significant changes to the law itself are expected. Concerns remain from palm oil producers in Indonesia and Malaysia about issues such as the exclusion of smallholders and non-recognition of national anti-deforestation efforts. These unresolved issues may complicate compliance and implementation.

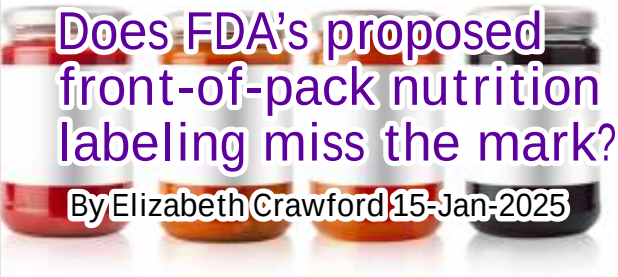
Singapore's Nutri-Grade Expansion: The Nutri-Grade labeling system will extend its coverage to include sodium and fat content, in addition to sugar. Reformulating products to meet these standards may raise costs significantly, potentially impacting product pricing and consumer adoption of healthier options.

Indonesia's Halal Law Enforcement: Indonesia has started enforcing its Halal Law for all food and beverage products, making halal certification mandatory for medium and large businesses. Small and micro businesses have until October 2026 to comply. The government views this regulation as an economic opportunity to position Indonesia as a global leader in halal food products. A new system for international companies with existing halal certification has also been launched to streamline the process.

Australia's Genetically Modified (GM) Food Definition: Australia has redefined GM foods to exclude those without novel DNA, including those processed with new breeding techniques (NBTs). Foods with no novel DNA will not require GM labeling. This adjustment could simplify compliance and encourage trade by reducing the regulatory burden for certain food products.

India's Food Safety Compliance Efforts: India has introduced stricter regulations, such as minimum shelf-life requirements for e-commerce food sales, to improve food safety. However, experts believe that regulatory changes alone are insufficient without addressing compliance gaps, particularly in the small and medium business sector. Issues like lack of awareness, inconsistent quality checks, and improper handling practices continue to pose challenges.

These regulations highlight the dynamic landscape of food safety and compliance in the APAC region and their potential economic, logistical, and consumer implications.



Does FDA's proposed front-of-pack nutrition labeling miss the mark?

By Elizabeth Crawford 15-Jan-2025

https://www.foodnavigator-usa.com/Article/2025/01/15/fda-proposed-front-of-pack-nutrition-labeling/

The article explores the U.S. FDA's proposed rule on mandatory front-of-pack (FOP) nutrition labeling, aimed at helping consumers make healthier dietary choices.

This initiative focuses on highlighting three key nutrients to limit: saturated fat, sodium, and added sugars. The labels will display the percentage of the daily value of these nutrients per serving alongside interpretive descriptions like "Low," "Medium," or "High." The FDA believes this approach will simplify nutritional information for consumers, especially those with lower nutrition knowledge.

FDA's FOP Labeling Proposal: Objective: The proposed FOP labels aim to simplify and emphasize nutritional information so consumers can quickly assess how a product fits into a healthy diet. This is expected to complement the existing back-of-pack Nutrition Facts label. Design: A minimalistic black-and-white "Nutrition Info" box will include the percent daily values of saturated fat, sodium, and added sugars per serving. Each nutrient will also be marked as "Low," "Medium," or "High" for interpretive context. Reasoning: Research shows that not all consumers frequently use or understand the back-of-pack labels, particularly those with lower income, education, or nutritional knowledge. FOP labels are expected to bridge this gap, providing accessible and actionable information.

Public Health Advocacy Perspective: Organizations like the American Heart Association and the Center for Science in the Public Interest (CSPI) welcome the proposal. They see it as an incentive for food companies to create healthier products and as a tool to combat diet-related chronic conditions such as diabetes, heart disease, and high blood pressure.

Advocates also applaud the move for its potential to empower consumers to make informed choices more efficiently, especially in fast-paced grocery shopping scenarios.

Industry Concerns: Costs: Trade groups argue that implementing the proposed labeling will be expensive and might not effectively educate consumers about broader dietary patterns. Transparency: The Food Industry Association and others criticize the FDA's reliance on what they call outdated and opaque research. They also believe the labels focus too narrowly on three nutrients, excluding others like calories or "nutrients to encourage." Added Sugars: Concerns have been raised that the emphasis on added sugars might unintentionally push manufacturers to use artificial sweeteners, which some health advocates find problematic.

Disagreements Over Design Choices: Omission of Calories: Some stakeholders argue that calories should have been included to offer a more holistic view of a product's nutritional impact. Simplistic Approach: Critics claim that the chosen FOP design oversimplifies nutritional messaging, potentially misleading consumers or creating gaps in their understanding of healthier eating patterns.

If approved, companies with over $10 million in annual food sales will have three years to comply, while smaller companies will have four years. Overall, the FDA's proposal marks a significant step towards improved public health but has sparked debate between public health advocates and industry groups about its efficacy and potential unintended consequences.

Cognitive and memory warning letters and litigation trends: Best practices for reducing risk

By A?a Waldstein, 15-Jan-2025

https://www.nutraingredients-usa.com/Article/2025/01/15/what-cognitive-claims-supplement-companies-can-and-cannot-make/

Cognition and memory products are big business, and the Food and Drug Administration (FDA), National Advertising Division (NAD), Federal Trade Commission (FTC) and plaintiff attorneys are paying attention.

This leads to warning letters, competitor challenges and lawsuits, but it can be confusing to know how to discuss ingredients and products without crossing the compliance line or becoming an easy lawsuit target.

FDA is primarily concerned with product safety and ensuring companies do not make disease claims, such as Alzheimer's. FTC focuses on ensuring advertising is truthful, substantiated, and not misleading. To distinguish from the FDA, the FTC may allow dietary supplement disease claims if they are presented truthfully and have solid scientific substantiation, such as a well-powered Randomized Controlled Trial (RCT) on the finished product. This doesn't mean companies should make disease claims about dietary supplements, but it helps to showcase the differences between these two regulatory agencies.

NAD assesses the truthfulness and accuracy of advertisements and provides a streamlined process for resolving advertising disputes. Plaintiff attorneys send demand letters or initiate class action lawsuits, which are expensive to defend and settle. The basis for these lawsuits often cites false advertising allegations, but it is common for compliant structure-function claims like "focus" to trigger lawsuits, as the cost of defending the case is often much more than a quick settlement.

Statements like "improved focus" or "enhanced cognition" may attract FDA warning letters, particularly if paired with disease claims. Claims such as "mild stress" may pass scrutiny, but "chronic stress" or links to ADHD or Adderall can trigger warnings or lawsuits."Brain fog" claims may avoid enforcement unless connected to diseases like long-haul COVID.

Litigation Triggers: Quantifiable Claims: Phrases like "85% memory improvement" are subjective and difficult to substantiate. Clinically Proven: Assertions such as "clinically shown to improve memory within 90 days" can attract lawsuits or FTC attention if evidence isn't robust. Definitive Terms: Terms like "100% effective" are risky because they imply guaranteed results, requiring reliable scientific substantiation.

A recent case involving Prevagen highlights risks. Claims like “Prevagen reduces memory problems associated with aging” were deemed materially misleading.

Best Practices for Companies: Avoid definitive or quantifiable terms unless backed by strong scientific evidence. Refrain from making disease claims, even indirectly. Be cautious about statements on product packaging, as these are more scrutinized than social media content.

New diabetes figures raise questions over HFSS regulations

By Donna Eastlake 07-Jan-2025

https://www.foodnavigator.com/Article/2025/01/07/diabetes-figures-raise-questions-over-hfss-regulations/

The article delves into the rising concerns over the effectiveness of HFSS (high in fat, salt, and sugar) regulations, particularly in light of new data linking sugar-sweetened beverages to increasing cases of diabetes and cardiovascular diseases.

Global Impact of Sugary Drinks: Research from Tufts University estimates that sugar-sweetened beverages are responsible for 2.2 million new cases of type 2 diabetes and 1.2 million new cases of cardiovascular disease annually. Developing regions like Sub-Saharan Africa, Latin America, and the Caribbean are particularly affected.

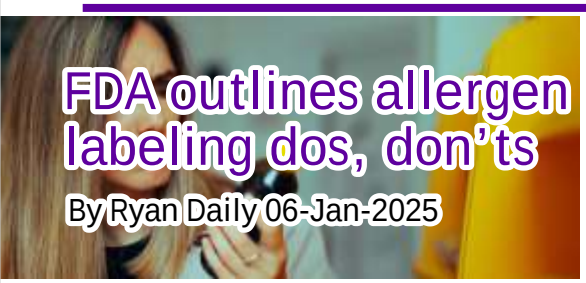
Regional Highlights: In Colombia, sugary drinks account for over 48% of new diabetes cases. Similarly, Mexico and South Africa report significant percentages of diabetes and cardiovascular cases linked to these beverages.

European Context: Diabetes is now one of the most common chronic conditions in Europe, with 61 million Europeans living with type 2 diabetes. WHO estimates that one in three cases remains undiagnosed.

Challenges with Current Regulations: Despite sugar-reduction policies in countries like the UK, US, and EU nations, diabetes and cardiovascular cases continue to rise globally. The rapid digestion of sugary beverages leads to blood sugar spikes, weight gain, and insulin resistance, contributing to metabolic disorders.

Researchers and health organizations advocate for more robust interventions, including: Public health campaigns; Stricter advertising regulations for sugary drinks; Increased taxes on sugar-sweetened beverages. Experts emphasize the need for urgent, evidence-based actions to curb the consumption of sugary drinks.

While governments in Europe have implemented restrictions, there is no indication of further regulations from the European Union at this time. Health advocates argue for stricter measures targeting high-sugar products like biscuits, confectionery, and large portion sizes in the out-of-home sector.



FDA outlines allergen labeling dos, don’ts

By Ryan Daily 06-Jan-2025

https://www.foodnavigator-usa.com/Article/2025/01/06/allergen-free-labeling-requirements-explained/

FDA updated guidance on food allergen labeling, emphasizing its importance in preventing health risks and costly recalls for consumerpackaged goods (CPG) companies.

The FDA has introduced new recommendations for labeling non-listed food allergens, in addition to the top nine allergens: crustacean shellfish, eggs, fish, milk, peanuts, sesame, soybeans, tree nuts, and wheat. The agency evaluates non-listed allergens based on scientific factors, prevalence, severity of reactions, and production-related information.

Food allergies affect millions of Americans, with no current cure. Early recognition and management are crucial to prevent serious health consequences. In 2024, over 70 recalls were issued for undisclosed allergens, costing companies an average of $10 million per recall.

The Food Allergen Labeling and Consumer Protection Act (FALCPA) of 2006 defined major allergens and established labeling requirements.

The Food Allergen Safety Treatment, Education, and Research Act (FASTER) of 2023 added sesame to the list of major allergens. Concerns arose when manufacturers began adding sesame to products to avoid cross-contact regulations.

CPG companies must disclose allergens either in the ingredient list (e.g., "whey (milk)") or using a "contains" statement (e.g., "Contains eggs, milk"). Labels must be in English unless distributed in territories where another language is predominant, such as Puerto Rico.T emporary reformulations can use sticker labels, provided they fully cover incorrect ingredient lists.

Undeclared allergens accounted for nearly half of recalls in 2023, highlighting the need for stricter compliance. The FDA encourages manufacturers to consider food safety risks and adhere to updated labeling practices. The guidance aims to enhance consumer safety and reduce the financial burden of recalls while addressing emerging challenges in allergen labeling.

FDA's long-term strategy for infant formula: What manufacturers need to know

By Deniz Ataman 14-Jan-2025

https://www.foodnavigator-usa.com/Article/2025/01/14/fdas-strategy-for-infant-formula-emphasizes-safe-secure-infant-formula-supply/

FDA's long-term strategy for the infant formula industry, focusing on enhancing resiliency and safety to address vulnerabilities exposed during the 2022 formula shortage.

Strengthening Supply Chain Resiliency:Diversify production facilities and reduce reliance on single suppliers for critical ingredients.Encourage manufacturers to develop redundancy risk management plans (RRMPs) to mitigate disruptions like pandemics or facility closures.Promote tracking of production and inventory levels for early detection of supply issues.

Ensuring Safety and Preventing Contamination:Conduct yearly safety inspections, including microbiological and nutritional sampling.Enhance inspector training through workshops and improve contamination prevention strategies.Collaborate with manufacturers to streamline best practices for sampling, corrective actions, and root cause analyses.

Streamlining Regulatory Processes:Expedite premarket reviews for new formula submissions to reduce the risk of shortages.Advocate for global regulatory harmonization to improve supply chain flexibility during shortages.

The FDA aims to bolster consumer confidence by encouraging innovation and diverse competition in the infant formula market.Biotech companies like All G and Arla Foods are contributing to supply chain resiliency with innovative ingredients:All G's recombinant bovine lactoferrin: GRAS-approved and identical to the protein in human breast milk, suitable for various applications including infant formula.Arla Foods' whey protein hydrolysates: GRAS-approved and cost-effective, targeting gut health, immunity, and allergies in infants.

The FDA emphasizes participation in international standards committees like Codex Alimentarius to enhance supply chain flexibility and harmonize regulations globally.The strategy represents a proactive approach to safeguarding the infant formula supply chain, ensuring safety, and fostering innovation to meet future challenges.