

Nutri-Bulletin

Nutrition Society of Sri Lanka



President's Message



It is my great pleasure to welcome you to **Nutri-Bulletin – July 2026, Issue II** of the Nutrition Society of Sri Lanka (NSSL).

Nutrition is increasingly recognized as a cornerstone of health, well-being, and sustainable development. Yet, the burden of malnutrition in all its forms, including undernutrition, micronutrient deficiencies, overweight, obesity, and diet-related non-communicable diseases, continues to challenge health systems globally and within Sri Lanka. Addressing these complex issues requires coordinated, evidence-informed actions that extend beyond individual behaviour change to the broader environments in which people live, learn, work, and make food choices.

A healthy food environment is fundamental to enabling healthier dietary behaviours. The availability, affordability, accessibility, promotion, and marketing of foods profoundly influence dietary patterns across the life course. Creating supportive food environments, therefore, demands strong multisectoral collaboration and policies that prioritize public health while ensuring equitable access to safe, nutritious, and sustainable diets for all.

The Nutrition Society of Sri Lanka remains committed to advancing nutrition science and translating evidence into policy and practice. We are proud to contribute to national initiatives that strengthen healthy food environments, including efforts to improve nutrition standards in schools and other community settings. Such initiatives highlight the critical role that evidence-based policies can play in protecting and promoting the health of present and future generations.

This volume of the Nutri-Bulletin reflects our continued commitment to disseminating current scientific knowledge, showcasing local research, and fostering dialogue among researchers, practitioners, policymakers, and students. By sharing emerging evidence and best practices, we hope to inspire innovation and strengthen collective efforts to address Sri Lanka's evolving nutrition challenges.

I extend my sincere appreciation to the Editorial Committee, contributors, reviewers, and all members of the Society whose dedication has made this publication possible.

Together, let us continue to advocate for healthier food environments, support evidence-informed nutrition policies, and work towards a healthier, more resilient Sri Lanka.

Prof. Kumari M. Rathnayake
President
Nutrition Society of Sri Lanka

Editor's Message



Rethink Snacks: Choose Healthy and Natural Snacks

As National Nutrition Month 2026 draws to a close, the Nutrition Society of Sri Lanka is pleased to release this special edition of the Nutri-Bulletin, reaffirming the importance of this year's theme: **"Rethink Snacks - Choose Healthy and Natural Snacks."**

Sri Lanka is undergoing a rapid nutrition transition, characterised by the triple burden of malnutrition. While undernutrition, stunting, wasting, and micronutrient deficiencies persist among children and pregnant women, there is a simultaneous and alarming rise in overweight, obesity, and diet-related non-communicable diseases (NCDs) among adults. Adolescents are particularly vulnerable, with nearly 70% regularly consuming fast food and street foods, often opting for ultra-processed, energy-dense snacks and sugar-sweetened beverages.

In this context, it is critical to rely on robust scientific evidence. Frequent consumption of ultra-processed snacks high in sugar, salt, and unhealthy fats contributes to excessive energy intake, disrupts metabolic health, impairs insulin sensitivity, and interferes with natural appetite regulation. For most healthy adults with a normal BMI, routine snacking is often unnecessary.

However, for young children, growing adolescents, pregnant and lactating mothers, and physically active individuals, snacks can play a valuable role provided they are nutrient-rich and minimally processed. We strongly encourage a shift toward locally available, wholesome options such as fresh fruits and vegetables, nuts and seeds, boiled pulses, yams, unsweetened curd or milk, and traditional preparations like kola kanda.

This edition of the Nutri-Bulletin promotes a balanced, evidence-based approach: prioritising wholesome main meals, practising mindful meal planning, and choosing healthy, natural snacks when needed. It also highlights the importance of supportive environments and policies, including healthier food environments in schools and workplaces, regulation of unhealthy food marketing, and fiscal measures such as taxes on sugar-sweetened beverages.

As nutrition professionals, we have a vital responsibility to translate science into action. Let us seize the momentum of National Nutrition Month 2026 to champion informed food choices, revive Sri Lanka's traditional healthy dietary patterns, and contribute meaningfully to reducing the growing burden of NCDs in our country.

We trust this edition of the Nutri-Bulletin will offer clear guidance and practical insights for health professionals, policymakers, educators, and the general public alike.

Dr. Thushanthi Perera
Editor
Nutrition Society of Sri Lanka

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Past President's Feature Article

We are delighted to introduce the **Featured Article** segment to the NSSL Nutri-Bulletin, a special space dedicated to insightful contributions from leading experts in the field of nutrition and food science. This new initiative aims to enrich the newsletter's content, strengthen readership engagement, and inspire prospective authors to share their knowledge and expertise.

For **Issue II** of the NSSL Nutri-Bulletin, we are honoured to feature an invited article by **Senior Professor Anoma Chandrasekara**, Past President of the Nutrition Society of Sri Lanka. Aligning with the 2026 National Nutrition Month theme, Prof. Chandrasekara has graciously contributed her expertise on:

"Transforming Food Environments for Improved Health and Wellness in Sri Lanka: Collaborative Efforts between Food Scientists and Nutritionists"



Senior Professor Anoma Chandrasekara
Past President, Nutrition Society of Sri Lanka

Professor Anoma Chandrasekara serves as Senior Professor in Food Science & Human Nutrition at the Department of Nutrition and Dietetics, Wayamba University of Sri Lanka. She joined the university in 1997 as a probationary lecturer and was among the founding members of the first teaching panel for the pioneering undergraduate Nutrition degree programme at the institution.

She holds a B.Sc. (Agriculture) with a specialisation in Food Science and Technology and an M.Phil. in Food and Nutrition from the University of Peradeniya, Sri Lanka. She earned her PhD in Biochemistry from the Department of Biochemistry at Memorial University of Newfoundland, Canada.

Professor Chandrasekara has built a distinguished research programme focused on the bioactivities and mechanisms of action of phenolic compounds from underutilised tropical food resources, including cereals, legumes, roots, tubers, and herbs, with a strong emphasis on promoting wellness and managing chronic diseases. Her outstanding contributions have earned international acclaim, including recognition among the **World's Top 2% Scientists**.

She has authored and co-authored more than 50 peer-reviewed journal articles and book chapters, along with over 200 conference abstracts. In addition to her academic and research commitments, she actively serves on numerous faculty and university committees and contributes to several national professional bodies, including the Council of the Nutrition Society of Sri Lanka, the Science Education Committee of the Sri Lanka Association for the Advancement of Science (SLAAS), and the Advisory Committee on Elderly and Disability Health Care Services. She is also an accredited teacher in higher education by the Staff and Educational Development Association (SEDA), UK.

Transforming Food Environments for Improved Health and Wellness in Sri Lanka: Collaborative Efforts between Food Scientists and Nutritionists

The food environment includes the physical, socio-cultural surroundings, economic, and policy settings that influence food choices and dietary behavior of people in a country. While individual knowledge and motivation play an important role in eating habits, the environment in which people make decisions on food plays a more significant role. The availability, accessibility, affordability, convenience, and promotional activities of foods shape the dietary patterns of people and, consequently, health outcomes. Evidence from recent decades shows that rapid urbanization, globalization, technological advancements, and changing lifestyles of all segments of the population have transformed food environments worldwide. These changes have contributed to both improvements in food availability and variety and increasing health-related challenges such as obesity, micronutrient deficiencies, and diet-related non-communicable diseases (NCDs).

Transforming food environments is an important strategy for promoting wellness and achieving sustainable health outcomes. A supportive, healthy food environment assists individuals and communities to make correct food choices more easily and consistently. Such transformation requires coordinated efforts from governments, food industries, educational institutions, healthcare systems, communities, and consumers. Shifting towards healthier food environments needs to use a multidisciplinary approach, and the collaboration between food scientists and nutritionists is important in this multisectoral process.

Food environments are composed of external and personal determinants. External factors include food availability, processing, marketing, prices, labeling, and regulations. Personal factors are those related to accessibility, affordability, convenience, socio-cultural influences, and individual preferences. In sum, these factors together determine what foods people purchase, prepare, and consume and share in the family. In the present Sri Lankan food environment, highly processed foods rich in sugar, salt, and unhealthy fats are widely available and heavily marketed. People tend to buy them due to convenience, and relatively low cost from different sources as mobile sale points. However, healthier foods such as fruits, vegetables, legumes, whole grains, and nuts may be less accessible or affordable, particularly among low-income population segments. This may lead to poor dietary choices, which are frequently driven by environmental constraints rather than nutritional knowledge or attitudes alone.

Establishment of a healthy food environment is an essential strategy for preventing malnutrition in all its forms, including undernutrition, micronutrient deficiencies, overweight, and obesity. Furthermore, it is necessary to revisit poor dietary habits that contribute as leading risk factors for controlling cardiovascular diseases, diabetes, hypertension, certain cancers, and several other chronic conditions, which are alarmingly increasing in Sri Lanka. Beyond maintaining the physical health of the population, the diet affects mental health, cognitive performance, overall productivity, and quality of life.



In addition, in the long run, it assures greater sustainability and resilience of food systems, ensuring economic benefits such as reduced healthcare costs.

Food scientists play a vital role in developing safe, nutritious, affordable, and consumer-acceptable food products. Through advances in food processing, preservation, fortification, packaging, and product innovation, food scientists can enhance the nutritional quality, shelf life, and accessibility of foods while maintaining safety and sensory appeal. They can contribute to reducing food losses, improving food security, and developing functional foods that address emerging health problems.



Nutritionists provide evidence-based guidance on dietary requirements, nutrient adequacy, food consumption patterns, and the prevention and management of nutrition-related diseases. They assess population nutritional needs, identify dietary gaps, and develop nutrition interventions and policies that promote healthy eating behaviors. Their understanding of the relationship between food, health, and human behaviour is essential for ensuring that food innovations contribute meaningfully to public health outcomes.

Since availability, affordability, and accessibility are basic determinants of dietary behaviour, it is necessary to increase the availability and accessibility of nutritious foods at affordable prices. Therefore, efforts should focus on increasing the production, distribution, and presence of fruits, vegetables, legumes, fish, milk products, and other nutrient-rich foods. Further, all strategies that empower these key pillars need to be addressed simultaneously by the government and private sector partnerships. Furthermore, regulating food marketing and advertising is essential as they significantly influence dietary preferences, particularly among children and adolescents. Uncontrolled exposure to advertisements for sugary drinks, fast foods, and ultra-processed snacks can shape consumption patterns from an early age. However, the role of food scientists in developing safe, nutritious, affordable, and culturally appropriate foods, improving and modifying food processing, preservation, reformulation, packaging, and food safety is pivotal.

Modifications and alternatives for existing popular foods and beverages should be introduced at affordable prices while restrictions and regulations on unhealthy food choices are in place. Introduction of carbonated natural fruit juices low in sugar and rich with nutrients and dietary fiber, baked foods with whole grains, and multi grains added with different dehydrated fruits, and biscuits and cookies rich in dietary fiber, low sugar and fat are few such examples.

Creating a balanced information environment on foods helps consumers to make correct choices. Thus, with food environmental changes, nutrition education plays an important complementary strategy. Nutrition education empowers individuals to understand dietary recommendations and make healthier decisions.

Feasible and practical interventions are necessary for influencing lifelong eating habits among children, adults and in communities. In addition to traditional interventions such as nutritious meal programs, restrictions on unhealthy foods, community gardens and agricultural projects, nutrition education and food policies, infrastructure development associated with food environment transformation is paramount in Sri Lanka. It is noted that many school canteens and cafeteria at workplaces, and educational institutions do not provide healthy food choices due to the limitations of infrastructure and facilities to distribute safe food at affordable prices abiding with existing food regulations.

The food industry and food scientists have a substantial influence over the dietary patterns of people in the country. Therefore, responsible industry practices are needed to contribute positively to public health. Actions are urgently needed to reformulate products to reduce sugar, salt, and unhealthy fats. Furthermore, detailed nutrition labeling, responsible marketing practices, and continuous development of healthier food products to expand the availability of a variety of foods in the market are much needed.

Food environment transformation should go hand in hand with sustainability. Sustainable diets promote health while minimizing environmental impacts. In this, encouraging inclusion of underutilized fruits, vegetables, and green leafy vegetables in plant-based dietary diversity can be afforded by the majority of the population. Introduction of economical portion sizes for all food types facilitates limited consumption amounts of sugar, salt, and unhealthy fat while reducing food waste. Even at the production levels supporting sustainable agricultural practices, conserving biodiversity and strengthening local food systems encourage sustainable food environments.

Transforming food environments is one of the most effective and sustainable approaches to improving population wellness. Healthy eating should be supported by environments that make nutritious choices accessible, affordable, attractive, and convenient. By improving food availability, affordability, accessibility, marketing practices, education, and policy frameworks, societies can create conditions that promote healthier diets and better health outcomes. The synergy between food scientists and nutritionists is critical for transforming food environments. Nutritionists can identify nutritional challenges and health priorities, while food scientists can translate these requirements into practical food solutions. By engaging all sectors such as governments, communities, food industries, food scientists, and nutritionists, societies can create environments where healthy choices become easier, leading to better health and well-being for all in the population.



Rethink Snacks: Choose Healthy and Natural Snacks



Sri Lanka is currently undergoing a significant nutrition transition, characterized by a persistent burden of undernutrition alongside a rapidly increasing prevalence of overweight, obesity and diet-related Non-Communicable Diseases (NCDs) as well as micronutrient deficiencies (Ministry of Health, 2023). This triple burden of malnutrition reflects profound changes in dietary patterns, food environments and lifestyle changes. According to National Nutrition Month 2025 data, malnutrition indicators among children under five years of age are: stunting 10.1%, wasting 8.6%, underweight 16.1% and overweight/obesity 0.57%. Obesity among school children is 3.5%. Around 13.2% of pregnant women were underweight during the first trimester and moderate and severe anaemia among pregnant women at the booking visit was 14.3% (Family Health Bureau, 2025). According to the STEPS survey conducted in 2021, around 47.6% adult females and 30.0% adult males were overweight, while 15.2% adult females and 6.3% adult males were obese (Ministry of Health & Department of Census & Statistics, 2021).



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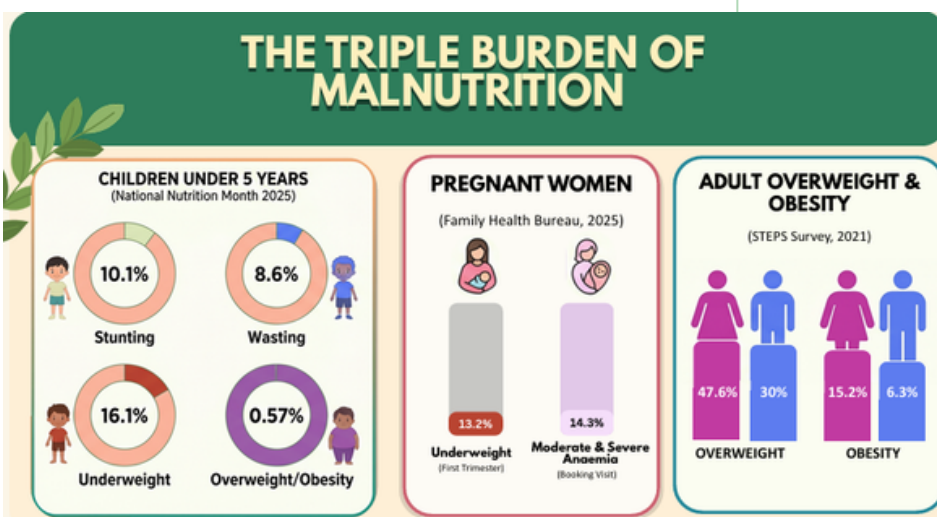
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Sri Lankan dietary practices traditionally consist of three main meals per day; breakfast, lunch and dinner: often complemented by optional snacks depending on individual preferences and lifestyle. However, within the current socio-economic context, there has been a notable shift in meal patterns and food choices. Diets that were once based on fresh, home-prepared and minimally processed foods are increasingly being replaced by processed and ultra-processed food options. One of the key drivers contributing to this nutrition transition is the rising consumption of processed and ultra-processed foods and snacks.

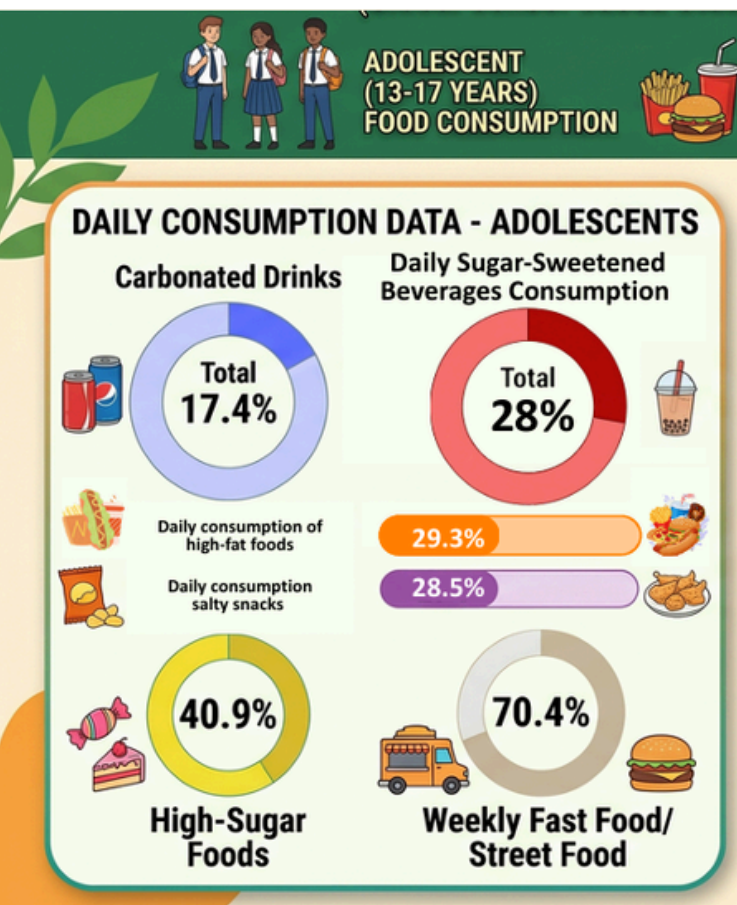
These products are typically energy-dense and nutrient-poor, containing high levels of added sugars, salt and unhealthy fats (Bandara et al., 2021; WHO, 2026). Their widespread availability, aggressive marketing and convenience have made them a common component of daily meal patterns, including as substitutes for traditional meals or as frequent snack options.

According to the Global School-based Student Health Survey conducted in 2024, a considerable proportion of school-going adolescents (13-17 years) reported frequent consumption of unhealthy foods and beverages. Daily intake of carbonated drinks was reported by 17.4%. More than one-fourth (28%) consumed sugar-sweetened beverages daily.

THE TRIPLE BURDEN OF MALNUTRITION



Similarly, 28.5% reported daily consumption of salty snacks and 29.3% high-fat foods, while 40.9% consumed high-sugar foods each day. Notably, a substantial majority (70.4%) consumed meals or snacks from fast food outlets or street vendors at least once during the preceding week, highlighting the widespread reliance on convenient, energy-dense food options (Family Health Bureau, 2024).



Emerging evidence indicates that frequent snacking is not necessary for many healthy adults with a normal Body Mass Index (BMI) and may contribute to adverse metabolic outcomes when it increases total energy intake or involves energy-dense foods (Almoraie et al., 2021). Consuming snacks frequently throughout the day can lead to excess energy intake. It can also disrupt hunger and fullness cues, increase cardiometabolic risk and contribute to insulin resistance, which may increase the risk of diabetes mellitus and cardiovascular disease (Monteiro et al., 2025).

In contrast, dietary patterns based on regular, balanced, nutrient-dense main meals with reduced eating frequency are associated with improved metabolic health, better appetite control and reduced NCDs risk (Ministry of Health, 2021). Whenever needed, for groups with increased nutritional needs, such as children, adolescents, pregnant and lactating women, people with high physical activity levels and people at risk of undernutrition, healthy, nutrient-rich snacks should be chosen over fast foods and highly processed foods.

Therefore, Nutrition Month 2026 emphasizes a balanced, evidence-based approach: reducing unnecessary snacking while promoting healthy, natural choices when snacks are consumed.

Scientific Basis for Reducing Snack Frequency

1. Weight gain and energy balance

Eating many snacks during the day often means people consume more calories than the body needs. This is specially true when snacks are high in sugar, salt and fat. Over time, this can lead to overweight and obesity (Mattes, 2018).

2. Glucose metabolism and insulin regulation

Frequent snacking, especially on high-sugar foods, can cause repeated rapid spikes in blood sugar levels. This leads to continuous insulin secretion. Over time, the body may become less sensitive to insulin, increasing the risk of diabetes (Monteiro et al., 2025). Eating less frequently and allowing longer gaps between meals can improve insulin sensitivity and help the body control blood glucose levels better.

3. Circadian rhythm and metabolic health

Our bodies work best when we eat at regular times each day. Snacking all the time or eating at irregular hours can disturb the body's natural routine, leading to poor metabolism and increased inflammation. Having proper meals at set times with reduced snacking support optimal metabolic functioning (Escobar et al., 2011).

4. Appetite regulation and hunger control

Regular, balanced meals help regulate hunger and fullness by influencing hormones such as leptin and ghrelin (Kharbanda et al., 2022). Constant snacking can disrupt these signals, making people feel hungry more often and eat more than needed.

5. Ultra-processed foods and chronic disease risk

Many snacks are ultra-processed. Frequent consumption of processed and ultra-processed foods is linked to obesity, diabetes, hypertension, heart disease, kidney disease, certain cancers, depression and other chronic illnesses. These foods are often high in sugar, salt, unhealthy fats, and additives while lacking protective nutrients, making fresh and minimally processed foods essential for a healthy life (Monteiro et al., 2025). Reducing snack frequency reduces exposure to these high-risk food categories (WHO, 2021).

Role of Healthy Snacks – When Necessary

Although snacks are not essential for most individuals, snacks may be beneficial in specific contexts when carefully selected, appropriately timed and consumed in moderation.

Population Groups Who Benefit from Healthy Snacking

- Young children
- Adolescents during periods of rapid growth
- Pregnant and lactating women
- Individuals with high physical activity levels
- Individuals at risk of undernutrition or with prolonged intervals between meals

Potential Benefits of Healthy Snacks

- Contribution to micronutrient intake and dietary diversity
- Improved satiety and appetite regulation
- Stabilization of blood glucose levels in the body
- Support for gut health
- Maintenance of energy levels and functional capacity

For most adults, snacks should generally be modest in energy, often less than 200 kcal per serving, and should complement rather than replace balanced main meals.

Recommended Healthy Snack Options

When snacks are consumed, priority should be given to natural, healthy, minimally processed and locally available foods that enhance dietary quality, while being mindful of portion sizes so that snacks complement rather than replace balanced main meals.

- Fresh seasonal fruits (e.g. banana, papaya, guava, mango)
- Fresh vegetables (raw or minimally prepared)
- A handful of nuts and seeds (peanut, cashew, gingelly, pumpkin)
- Boiled corn and pulses (eg. green grams, cowpea, chickpeas etc.)
- Boiled yams (eg. manioc, sweet potato etc.)
- Curd, unsweetened yoghurt
- Fresh Milk (without added sugar)
- Unsweetened beverages (eg. plain tea/ green tea/ coffee without sugar: for adults, king coconut water in moderation, herbal drinks such as belimal, ranawara)
- 'Kola kanda



Unhealthy Snacks that should be avoided/reduced

To improve population health outcomes by reducing excess caloric intake and reducing NCD risk, it is essential to avoid/reduce:

- Sugar-sweetened beverages and carbonated drinks (soft drinks, cordials, sweetened milk packets, energy drinks)
- Biscuits, cakes, confectionery, bakery products, packaged breads/ buns and desserts
- Ultra-processed convenience foods high in salt, sugar and unhealthy fats (eg. packaged chips, deep-fried snacks, extruded snacks)



Behavioural and Public Health Considerations

Behavioural Drivers

- Recognizing true hunger versus habitual/ emotional triggers to eat snacks.
- Maintaining structured meal patterns specifically targeting main meals.
- Avoiding distracted eating (eg. eating in front of a screen).
- Practicing portion awareness and portion control.
- Promotion of home-made, healthy food practices.

Food Environment

The widespread availability and marketing of ultra-processed snacks significantly influence consumption patterns. Strategies to improve the healthy food environment should address:

- Promote healthy school and workplace food environments (eg. healthy school canteen guidelines, healthy workplace canteen guidelines).
- Improve access to affordable, nutritious snacks (eg. engagement with food vendors and local food producers).
- Regulate marketing of unhealthy foods, particularly to children. Support local food systems and traditional healthy snacks.
- Make awareness and empower general public to read labels of packeted food at the point of purchase.

Policy and Systems Approach

Sustainable change requires multi-sectoral policy interventions, including:

- Reinforcing the utilization of the information on nutrition labeling
- and front-of-pack traffic light system at the point of purchase. Fiscal policies, such as sugar
- sweetened beverages (SSB) excise tax.
- Strengthening nutrition education across the life cycle
- Multisectoral Collaboration across all relevant sectors such as health, education, agriculture industry and other relevant sectors. Increase purchasing power of fruits, vegetables and fish mainly targeting locally available low-cost options.

Expected Outcomes

Knowledge

Improved public awareness of healthy snacking patterns and the risks associated with frequent unhealthy snacking

Behaviour

Reduced frequency of unnecessary snacking and improve the behaviour towards the consumption of natural, healthy snacks when needed

Health impact

Improved metabolic health outcomes, reduced prevalence of obesity and decreased burden of diet related NCDs

KEY PUBLIC HEALTH MESSAGE

- For most healthy adults, routine snacking is not essential.
- Consume main meals with nutritious and healthy food.
- Frequent snacking, specially on ultra-processed foods, can contribute to metabolic harm.
- When snacks are needed, choose natural, nutritious, healthy, minimally processed and nutrient-dense options in appropriate portions.
- Prioritize balanced main meals and reduce unnecessary snacking.



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Beyond Pink Ribbons

Transforming Breast Cancer Prevention Through Targeted Nutrition

In three words, “It’s breast cancer”, a thousand tomorrows suddenly hang in the balance. The graduation you planned to attend, the grandchildren you hoped to hold, the retirement dreams you whispered about, all of it now threatened by an enemy that has invaded the very essence of womanhood. Through tears and terror, families urgently search for weapons in this unexpected war, desperate to reclaim the future that cancer tried to steal.

For thousands of Sri Lankan families each year, this devastating reality becomes their urgent mission: a search for every possible avenue to healing and hope. This deeply personal journey reflects a broader public health crisis that demands immediate attention. Breast cancer stands as the leading malignancy among Sri Lankan women, representing a significant challenge with far-reaching implications for families and healthcare systems alike. According to the latest Global Cancer Observatory data from the International Agency for Research on Cancer (IARC), breast cancer accounts for 4,555 new cases annually in Sri Lanka, constituting 26.0% of all female cancers and 13.7% of total cancer cases across both sexes. The disease carries a substantial mortality burden, with 1,991 deaths recorded in 2022, representing 10.4% of all cancer-related deaths nationally ([144-sri-lanka-fact-sheet.pdf](#)).

This is where hope takes a new form: Nutrition Therapy. Emerging research reveals that what we eat can alter cancer risk, slow progression, and even improve survival. From antioxidant-rich spices in your curry to omega-3-packed local fish, Sri Lanka’s dietary traditions might hold untapped power in this fight. The question is no longer if food matters but how we can harness it to protect those we love.”



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“Think of your body like a garden: Nutrient-dense foods fertilize healthy cells, while excess sugar and fat feed weeds (inflammation).”

Three fundamental pillars

- 1. Focuses on controlled weight management:** Prevents the dangerous muscle wasting that can compromise immune function
- 2. Emphasizes nutritional density over quantity:** Choosing foods packed with cancer-fighting compounds, essential vitamins, and protective antioxidants that fuel the body’s repair mechanisms
- 3. Elimination of dietary elements that may fuel cancer growth:** By reducing simple sugars and added fats, reducing systemic inflammation that promotes tumor development



The Healing Plate

1. Load Up on Fruits & Vegetables

Aim for 5–9 servings daily (1 serving = ~150g fruit or ~75g vegetables). Colorful choices rich in **antioxidants: β -carotene & vitamin A**: Carrots, sweet potatoes, spinach, Vitamin C: Citrus fruits, bell peppers, strawberries, Vitamin E: Almonds, sunflower seeds, avocados

Why? These reduce inflammation, support metabolism, and may protect DNA

2. Power Up with Polyphenols daily: Onions, broccoli, apples (eat the skin!), berries, green tea

Why? Linked to better breast cancer outcomes by fighting cell damage

3. Choose Lean Proteins Wisely

Limit red meat & processed meats (1–2 times/week max). **Focus on lean options:** Fish (salmon, sardines for omega-3s), Skinless poultry, turkey, pork, Eggs & low-fat dairy (in moderation)

Why? Preserves muscle mass during treatment and reduces oxidative stress

4. Cut Back on Hidden Risks

Avoid added sugars and excess saturated fats (fried foods, butter). Cook with healthy fats instead: Olive oil, nuts, seeds (Dietary Guidelines for Breast Cancer Patients: A Critical Review. PubMed Central (PMC). Available from: <https://www.ncbi.nlm.nih.gov/pmc/>)

When Healing Spreads Beyond Cancer

The remarkable discovery about nutritional therapy extends far beyond cancer treatment; it's like throwing a stone into still water, creating ripples of healing that reach every corner of the body. While patients initially focus on shrinking tumors, they soon discover that their energy is returning, their skin regains its glow, and their overall vitality is restored. This isn't a coincidence; it's the profound anti-aging mechanism at work, where the same foods that starve cancer cells also strengthen healthy ones. The inflammatory fires that once burned through their systems begin to cool, creating an internal environment where healing thrives and disease struggles to survive.

Key Findings on Diet and Breast Cancer Risk

Vegetables may lower risk, especially after menopause.

Eating more vegetables could help reduce the risk of breast cancer, particularly for postmenopausal women.

Fruit intake shows unexpected risks — context matters: Surprisingly, high fruit consumption was linked to an increased risk, suggesting that not all fruits are equal. The type of fruit and overall diet play a crucial role.

Dietary differences across cultures matter: The study highlights how food habits vary by region, underscoring the need for location-specific research to better understand diet-cancer connections.

Protective benefits of plant compounds: Vegetables may offer protection thanks to their antioxidants, fiber, and phytochemicals, like sulforaphane in broccoli and other cruciferous veggies.

Could Sugar in Fruit Play a Role? Some fruits high in fructose (such as apples and peaches) might contribute to inflammation and fat storage, possibly explaining their unexpected link to higher risk.

“While breast cancer tests your strength, nutrition becomes your shield — wield it with purpose, and turn every bite into resistance.”



Are Traditional Sri Lankan Diets Healthier than Modern Diets?



Walk into almost any Sri Lankan kitchen and you can still smell the story of a food culture that has nourished generations: steaming rice, a rainbow of curries, lentils, leafy greens, coconut, spices, and the comforting simplicity of home-cooked meals. For many people, this traditional way of eating feels wholesome, familiar, and deeply satisfying. But in an age of fast food, packet snacks, sugary drinks, and oversized portions, an important question has emerged: are traditional Sri Lankan diets actually healthier than modern diets?

The short answer is yes — often, they are. But the fuller answer is more interesting. The health value of any diet depends not only on what foods are eaten, but also on how much, how often, and in what combination. Traditional Sri Lankan food has many strengths that align with modern nutrition advice, yet some habits from the past can become less healthy when portion sizes grow, activity levels fall, and highly processed foods take over.

What made the Traditional Diets Strong?

Traditional Sri Lankan diets were built around local, seasonal, and mostly minimally processed foods. A typical meal often included rice, vegetables, lentils, greens, coconut-based preparations, and sometimes fish or other animal foods. This pattern created a meal that was more balanced than many people realize. It provided carbohydrates for energy, plant protein from pulses and legumes a range of vitamins, minerals, and fibers from vegetables, fruits, leafy greens and antioxidants from herbs and spices.

One of the biggest strengths of the traditional diet is its plant-forward nature. Sri Lankan meals have long included Kathurumurunga, gotukola, mukunuwenna, jackfruit, pumpkin, beans, brinjal, curry leaves, ginger and other local ingredients that add nutrients and flavor. These foods are not just culturally important; they also contribute fiber, antioxidants, and micronutrients that support digestive health, immunity, and long-term wellbeing.



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Spices also deserve credit. Turmeric, cinnamon, curry leaves, garlic, ginger, and coriander do more than make food delicious. They can help reduce the need for excess salt and encourage people to enjoy simple foods without relying on heavy sauces or processed seasonings. In traditional cooking, flavor often came from herbs, spices, and slow preparation rather than from artificial additives.

Why Modern Diets Are Changing?

The challenge today is that many Sri Lankans no longer eat the way their grandparents did. Modern diets increasingly include refined flour products, packaged snacks, sweetened tea, soft drinks, bakery items, deep-fried foods, and restaurant meals that are high in salt, fat, and calories. At the same time, traditional home-cooked meals are often becoming more limited in variety, with rice dominating the plate and vegetables, pulses, fruit, and milk foods playing a smaller role.

This shift is part of what nutrition experts call a dietary transition. It happens when societies move away from traditional food patterns toward more urban, convenient, and processed eating habits. In Sri Lanka, recent evidence shows diets are still largely rice-based, but often lack enough fruit, vegetables, legumes, and other nutrient-dense foods. That matters because poor diet quality is linked to both undernutrition and non-communicable diseases.

The problem is not tradition itself. The problem is losing the balance that made traditional meals work. A plate that once held rice, dhal, greens, and fish may now hold a much larger heap of white rice, a fried snack, and a sweet drink, while the vegetables are missing. That is not modernity at its best; it is convenience at the cost of health.

What the Evidence Says?

Recent research paints a clear picture. Literature found that Sri Lankan diets are still predominantly rice-based and often limited in variety, with insufficient intake of fruit, vegetables, and animal-source foods across many population groups. It also reported high rates of undernutrition in children and substantial levels of overweight, obesity, diabetes, and hypertension in adults.

Another recent report found that dietary quality in Sri Lanka falls well short of national dietary guideline targets. It noted heavy dependence on starchy staples, with starchy foods providing over 71% of total energy, while fruit, dark green leafy vegetables, and legumes were consumed at only about one-third of recommended levels. That is a warning sign for a country whose food heritage is rich in healthy ingredients.

So, are traditional diets healthier? In principle, yes, because the traditional model is closer to a balanced, whole-food pattern than many modern eating habits. But the evidence also shows that many Sri Lankans are not actually eating a fully traditional diet anymore. They are eating a hybrid pattern: traditional staples mixed with modern excess. That combination can be especially harmful.

The Hidden Strengths of Tradition

Traditional Sri Lankan food has several advantages that modern diets often lack. First, it tends to be more home-cooked, which means people have more control over ingredients and portion sizes. Second, it usually includes more whole foods and fewer industrial ingredients. Third, it often encourages shared meals, which can support slower, more mindful eating.

There is also a sustainability angle. Traditional Sri Lankan diets rely heavily on local crops, seasonal produce, and culturally familiar ingredients. This can make healthy eating more affordable and practical, especially when compared with expensive imported convenience foods. In a time when food prices matter as much as calories, local food traditions remain a valuable public health resource.

Some traditional foods also have protective roles. Lentils provide protein and fiber. Kathurumurunga, Murunga, Gotukola and other leafy greens offer fibers and micronutrients. Jackfruit is filling and versatile. Fish adds high-quality protein and healthy fats. Fermented foods such as curd can support gut health. None of these foods is a miracle on its own, but together they create a pattern that is far more nutrient-rich than a diet built around refined snacks and sugary drinks.

Where Tradition Can Fall Short

It would be a mistake, however, to idealize tradition without limits. Some traditional meals are very heavy in coconut, coconut milk, ghee, or oil. When these are used generously and combined with large amounts of rice, the result can become calorie-dense. In a more sedentary modern lifestyle, that can contribute to weight gain and related health problems.

Portion size matters too. A traditional food can become unhealthy if eaten in excess. Rice is not the enemy, but a plate that is mostly rice with only a small curry or two may not provide enough variety. Likewise, traditional sweets and fried snacks, while culturally important, should be occasional treats rather than daily habits.

This is why nutritionists often say the goal is not to give up tradition, but to refine it. Traditional food can be healthy when it is portioned wisely, cooked with less oil, and paired with more vegetables, legumes, fruit, and lean protein. The healthiest version of Sri Lankan cuisine is the one that keeps its soul while adapting to today's health needs.

A Better Way to Eat Today

The best answer is not "traditional versus modern." It is "which parts of each should we keep?" From tradition, we can keep home-cooked meals, local vegetables, spices, legumes, leafy greens, fish, and seasonal fruit. From modern nutrition science, we can keep the ideas of balance, portion control, and reducing excess sugar, salt, and highly processed foods.

A healthier Sri Lankan plate might look like this: a modest serving of rice, a generous portion of vegetables, dhal or another legume dish, some leafy greens, a piece of fish or egg, and fruit later in the day. Water or unsweetened drinks are better than sugary beverages. Snacks can be built around fruit, roasted chickpeas, or boiled manioc rather than packaged fried foods.

This is not a foreign model imposed on local culture. It is actually a return to the best parts of Sri Lankan eating, updated for modern life. That is what makes the traditional diet so powerful. It already contains many of the principles that nutrition experts are now promoting worldwide.

A Cultural Asset Worth Protecting

Sri Lankan food is more than fuel. It is memory, identity, hospitality, and care. When an older generation prepares a pot of dhal or a sambol with fresh ingredients, it is passing down more than a recipe. It is passing down a way of eating that can support health if it is preserved thoughtfully.

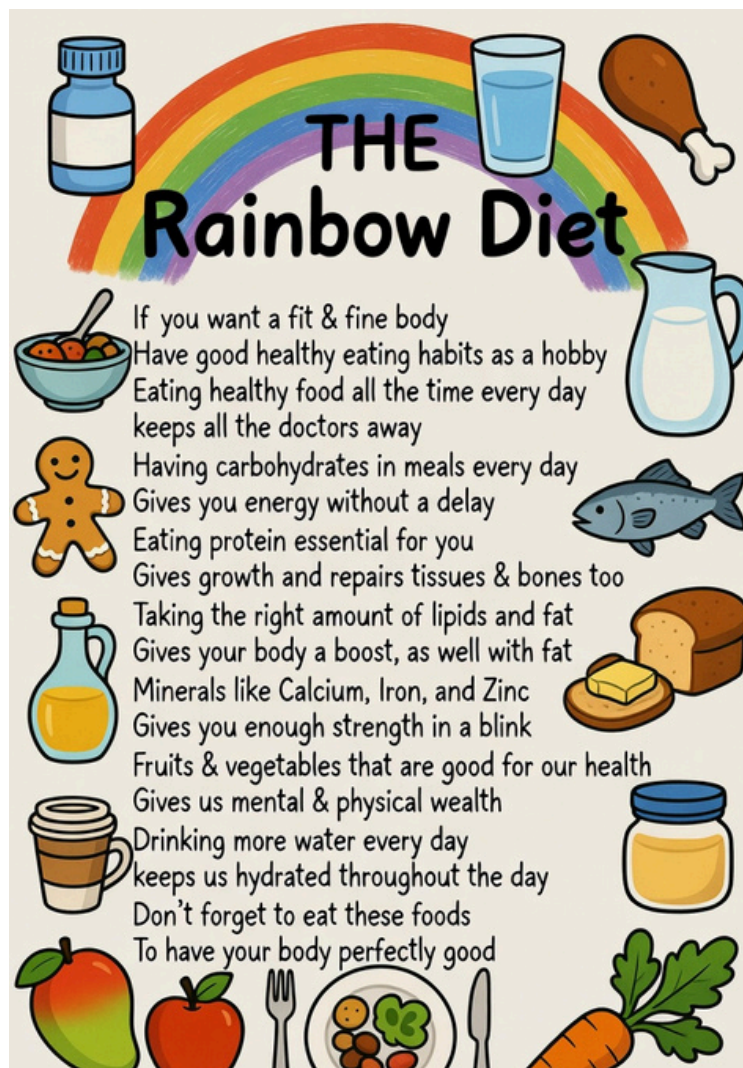
The danger is not that traditional foods will disappear entirely. The danger is that they will be replaced by easier, less nutritious options before their value is fully appreciated. If families, schools, workplaces, and communities continue to celebrate local foods while improving the way they are prepared and served, Sri Lanka can protect both its food heritage and its health.



In that sense, traditional Sri Lankan diets are not only healthier than many modern diets. They may also offer a road map for the future. The path forward is not about returning to the past unchanged. It is about taking the wisdom of the past and using it to build a healthier tomorrow.

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The Keto Diet and Its Long-term Effects

Your newest social media diet, instant weight loss and WHAT IS NEXT?



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The internet and social media are filled with different types of diets. Especially low carb diets with a limited number of food items and a restricted eating window, pledging for quick and sustained results,

But,

beyond these quick early results call it weight loss, call it reduction of HbA1c and call it reduction of Triglycerides,

Can our bodies sustain these types diet in the long run?

Most of these diets falls under the umbrella of the "Ketogenic diets"

What does the science actually say about long-term effects of these ketogenic diets? Let's get down to it!

When you restrict carbohydrate intake to fewer than about 50 grams a day (roughly the amount in two medium bananas), your body runs out of its usual fuel supply. Unable to burn glucose, it begins breaking down the stored fat into molecules called ketone bodies, which then power everything from your muscles to your brain. This state is known as nutritional ketosis.

The concept of this diet is far from new. It was developed over a century ago — in 1921 — not as a weight loss tool, but as a medical therapy for children with epilepsy that did not respond to medication. Today, keto has become one of the most discussed dietary approaches in the world, highlighted for weight loss, diabetes management, and triglyceride reduction. But here is the question that most enthusiasts do not ask: what happens to your body after following keto in the long run, specifically for a year or more?

In This article you will find a narrative based on available long-term research studies where the interventions lasted at least 12 months to give you an unbiased, honest, and scientifically grounded picture of what keto does (and does not do) over the long run.



First, What Exactly Is the Ketogenic Diet?

Not all 'keto' diets are the same. There is a spectrum of versions, each with different rules and different purposes. The strictest form "the Classic Ketogenic Diet" requires 70–80% of daily calories to come from fat, with very little protein and almost no carbohydrates. This was the original medical version, designed for epilepsy under close medical supervision.

Then there are more accessible versions: the Modified Atkins Diet relaxes the fat ratio a little; the Mediterranean Ketogenic Diet adds olive oil, nuts, and oily fish for a heart-healthier approach and the Very Low-Calorie Ketogenic Diet combines ketosis with a significant calorie restriction of 500–800 kcal per day, often used for rapid weight loss under medical care.

Then there are other versions which are popular in Sri Lankan context such as diets which are predominantly made out of meats, no grains, legumes, yams or any other carbohydrate source. And very little or no use of vegetables and fruits.

What they all share is the goal of pushing the body into ketosis — confirmed when blood levels of a ketone called beta-hydroxybutyrate reach 0.5 mmol/L or above.



Weight Loss: The Honest Truth

The first six months: keto wins

Ketogenic diet has shown some significant evidence associated with short term weight loss. In the first three to six months, keto consistently produces more weight loss than conventional low-fat diets. Several factors explain this: ketosis has a natural appetite suppressing effect, the body sheds water weight quickly as glycogen stores are depleted, and many people spontaneously eat less because fat and protein are more filling.

By 12 months, the playing field levels

Here is what the long-term studies show, and it is not what the keto community typically advertises. By the 12-month mark, the weight loss advantage of keto largely disappears. A landmark two year study by Foster and colleagues one of the most rigorous comparisons of low carbohydrate versus low fat diets found no meaningful difference in weight loss between the two approaches at 24 months.

The reason? Adherence. The body does not particularly care which diet you follow as long as you stick to it. Keto's highly restrictive nature restricting carbohydrates eliminating rice, hoppers, bread, most fruits, and many vegetables makes it genuinely difficult to maintain in the long run, especially within Sri Lankan food culture where rice is a cultural staple, not just a carbohydrate.

"BY 12 MONTHS, THE WEIGHT-LOSS ADVANTAGE OF KETO LARGELY DISAPPEARS. ADHERENCE NOT THE DIET ITSELF BECOMES THE DECIDING FACTOR."

There is a silver lining: in highly structured settings where people receive regular coaching and monitoring — such as digital health programmes for diabetes — sustained weight loss at two years has been achieved. But these outcomes depend on intensive, ongoing professional support, not simply following a meal plan from a website.

The bottom line on weight loss

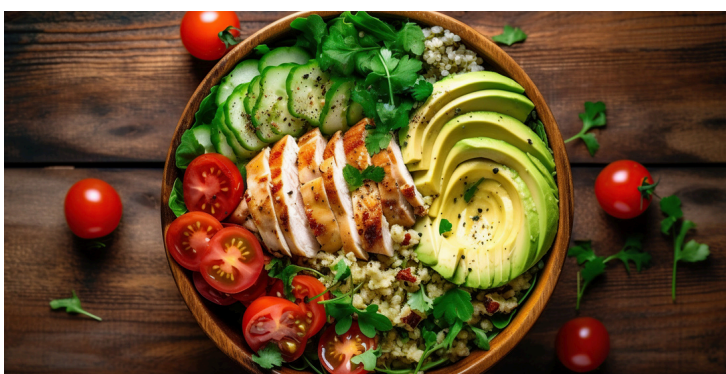
- Keto works well in the short term.
- Long-term results are similar to other diets, once adherence is accounted for.
- If you cannot stick to it, you will not benefit from it.
- For general weight management, a less restrictive approach may be more sustainable.

Type 2 Diabetes: The Place Where Keto Really Works!

If there is one area where the long-term evidence for the ketogenic diet is genuinely compelling, it is Type 2 Diabetes. And given that Sri Lanka faces a serious and growing diabetes epidemic with prevalence rates among the highest in South Asia this is particularly relevant.

The logic is straightforward: Type 2 Diabetes is fundamentally a condition of impaired blood sugar regulation. This is primarily caused by excessive carbohydrate intake in the Sri Lankan context. In the scenario, drastic reduction of carbohydrate intake in ketogenic diet makes physiological sense.

The long-term evidence backs this up. A two-year non-randomised clinical trial by Athinarayanan and colleagues found that people with Type 2 Diabetes following a sustained ketogenic approach achieved a meaningful reduction in HbA1c (a key measure of blood sugar control over time), significantly reduced their dependence on diabetes medications including insulin and showed improvements in other metabolic markers including HDL cholesterol ('good' cholesterol) and triglycerides (blood fats).



A major systematic review and meta-analysis published in the BMJ in 2021 confirmed these findings across multiple trials, concluding that very low carbohydrate diets are among the most effective dietary approaches for achieving Type 2 Diabetes remission.

DIABETES BENEFIT

~1%

average reduction in HbA1c sustained at 2 years — clinically meaningful for Type 2 Diabetes management

FOR PEOPLE WITH TYPE 2 DIABETES

- Strong long-term evidence supports meaningful blood sugar improvement.
- Many patients reduce or eliminate diabetes medications under medical supervision.
- Regular monitoring of lipid profiles is important.
- This should always be done in partnership with your healthcare team, never alone.

Your Heart on Keto: A Mixed Picture

The cardiovascular effects of long-term keto are perhaps the most debated aspect of the diet and for good reason. The picture is genuinely two-sided, and both sides matter.

The good news

Triglycerides (TG) are the blood fats that act as a major cardiovascular risk factor. There is a significant reduction of TG associated with ketogenic diet, often by 16% or more in long-term studies. HDL cholesterol (the protective kind) rises meaningfully. Blood pressure tends to come down, both systolic and diastolic, likely as a result of weight loss and improved insulin sensitivity. These effects can be considered as scientifically grounded clinical benefits associated with this type of a diet.

The concern

The biggest concern regarding the heart health is the elevation of LDL cholesterol which acts as the type most associated with arterial plaque build-up and heart disease risk tends to rise on a long-term ketogenic diet, sometimes by 10% or more above baseline. Due to this effect overtaking the reduction of triglycerides, the total cholesterol rises.

Whether this rise in LDL translates into actual increased cardiovascular risk over many years is still being debated by researchers; some argue that if LDL particle size improves (larger particles are less harmful), the risk picture may be less alarming than the raw number suggests. But the long-term cardiovascular safety of a diet that consistently raises LDL remains genuinely uncertain.

The honest answer is that we do not yet have large scale, decade long studies on hard cardiovascular outcomes such as heart attacks and strokes in people following a ketogenic diet. This is one of the most important gaps in the current evidence base.

CARDIOVASCULAR SCORECARD

MARKER	EFFECT	WHAT IT MEANS
Triglycerides	↓ Decreases	Consistently lower a proven heart benefit
HDL Cholesterol	↑ Increases	More 'good' cholesterol is protective for the heart
Blood Pressure	↓ Decreases	Modest but meaningful reductions observed
LDL Cholesterol	↑ Increases	Primary concern rises in many individuals
Total Cholesterol	↑ Increases	Often rises above the pre-diet baseline

Keto And The Brain: From Seizures To Alzheimer's

Epilepsy: the original and strongest case

The ketogenic diet's most powerful and best established long term benefit is in the brain, specifically for people with drug-resistant epilepsy a condition where seizures do not respond to two or more antiepileptic medications. For these individuals, the KD is not a trendy dietary choice. It is a life-changing medical therapy.

Long-term data consistently show that in responders, the KD reduces seizure frequency by 50% or more, and a meaningful proportion of patients achieve complete seizure freedom. Remarkably, these benefits hold across multiple diet variants including the Modified Atkins Diet and MCT Diet making it accessible even without the extreme strictness of the classic protocol. The KD is now recognised internationally as a first-line therapy for drug-resistant epilepsy.

"FOR DRUG-RESISTANT EPILEPSY, KETO IS NOT A LIFESTYLE CHOICE IT IS A LIFE-CHANGING MEDICAL THERAPY WITH OVER A CENTURY OF EVIDENCE BEHIND IT."



Alzheimer's and Parkinson's: exciting but early

There is genuine scientific excitement and a lot of discussion about the potential of ketone bodies to protect the ageing brain. In Alzheimer's disease, one of the earliest detectable changes is a dramatic reduction in the brain's ability to use glucose as fuel. Ketone bodies can bypass this problem entirely essentially providing an alternative energy source to neurons that have lost the ability to utilize sugar.

Early clinical trials have shown improvements in cognitive function and quality of life in Alzheimer's patients following a ketogenic intervention. In Parkinson's disease, where a key problem involves failure of the mitochondria (the cell's energy factories) in certain brain cells, ketones may similarly provide metabolic rescue. Pilot studies have reported improvements in motor function and reductions in non-motor symptoms including fatigue and pain.

However, and this is critical these studies are small, short, and preliminary. We are nowhere near the stage where any responsible clinician would recommend the ketogenic diet as a treatment for Alzheimer's or Parkinson's in routine practice. What we can say is that the biological rationale is sound, and the early signals are promising enough to warrant much larger, longer-term clinical trials.

Side Effects and Safety: What You Should Know

The first few weeks: 'keto flu'

When you first start with the ketogenic diet, your body goes through a withdrawal phase. As glycogen stores are depleted and the kidneys excrete more sodium and water, many people experience what has been nicknamed 'keto flu' a cluster of symptoms including fatigue, headache, brain fog, nausea, and irritability. This usually passes within two to four weeks as the body adapts to burning fat. Adequate hydration and electrolyte replacement (sodium, potassium, magnesium) can ease this transition.

Longer-term risks to be aware of

Beyond the initial adaptation, overcoming the keto flu conditions, the following longer-term risks have been identified in the scientific literature:

- **Kidney stones:** Particularly calcium oxalate and uric acid stones, likely due to altered urinary chemistry and possibly low fruit and vegetable intake.
- **Nutrient deficiencies:** A poorly planned keto diet is low in Vitamin C, calcium, magnesium, B vitamins, and dietary fiber. Supplementation and careful food selection are essential. In the Sri Lankan context, supplementation remains a grey area where the product quality is seriously questionable.
- **Elevated LDL cholesterol:** As discussed, this requires regular blood testing.
- **Bone health:** Some studies suggest reduced bone mineral density with long-term very low-carbohydrate diets, though evidence is not yet conclusive.

PRACTICAL SAFETY TIPS FOR KETO

Include plenty of non-starchy vegetables (spinach, cabbage, long beans, bitter gourd) to maintain micronutrient intake.

- **Get blood lipids (including LDL), kidney function, and blood sugar tested every 3–6 months.**
- **It is very important to stay well hydrated and ensure adequate sodium, potassium, and magnesium intake especially in Sri Lanka's hot and humid climate.**
- **Work with a registered dietitian or nutritionist, not just an online calculator, app or an online doctor giving general advice.**
- **If you have existing kidney disease, osteoporosis, or cardiovascular disease, seek medical advice before starting.**
- **Can consider taking a daily multivitamin and mineral supplement, including Vitamin C under the supervision of a qualified nutrition expert.**

Is Keto Right for You? A Practical Guide

The ketogenic diet is a powerful tool — but like any tool, it works best in the right hands for the right purpose. Here is how the evidence stacks up for different groups:

WHO	VERDICT	REASON
Drug-resistant epilepsy	✓✓ Highly recommended	Strongest long-term evidence of any indication. First-line therapy with close monitoring.
Type 2 Diabetes	✓ Recommended with supervision	Sustained blood sugar benefits. Can reduce or eliminate medication need. Lipid monitoring essential.
General weight loss	~ Use with caution	Short-term benefit is real but fades. Adherence is the real challenge. Less restrictive diets may suit most people better.
Neurodegenerative disease	? Too early to say	Promising early signals for Alzheimer's and Parkinson's, but evidence is still preliminary.
Healthy adults	~ Consider carefully	No strong evidence of long-term benefit over a balanced diet. Micronutrient risks can be considered a real issue without proper planning.



The Bottom Line

The ketogenic diet is a tried and tested medical tool with over a century of clinical history and, when used appropriately, meaningful long-term benefits for specific groups. It is not, however, a universal solution or a dietary revolution that makes all other approaches obsolete.

For someone with drug-resistant epilepsy, keto can be transformative. For someone managing Type 2 Diabetes under medical supervision, it can be effective. For someone hoping to lose weight and keep it off for years without professional support and in a food culture built around a staple rice and carbohydrate rich meals, the adherence comes as the primary challenge. A culturally feasible, less restrictive, and more sustainable approach should ideally be the answer.

What the science is increasingly clear about is this: no single diet suits everyone, and the best diet is one you can actually follow safely, enjoyably, and sustainably for life. If you are considering the ketogenic diet, the most important first step is not buying a recipe book. It is talking to a qualified nutritionist, dietitian or your doctor who is specialized in nutrition.

"THE BEST DIET IS THE ONE YOU CAN FOLLOW SAFELY, ENJOYABLY, AND SUSTAINABLY FOR LIFE."

FOR NUTRITION PROFESSIONALS | Clinical Summary

- Strongest long-term evidence: drug-resistant epilepsy ($\geq 50\%$ seizure reduction; seizure freedom in a subset) and T2DM (HbA1c -1.0% at 2 years; medication reduction).
- Cardiovascular profile is dichotomous: $\downarrow$ TG, $\uparrow$ HDL favourable; $\uparrow$ LDL a consistent and clinically significant concern requiring monitoring.
- Weight loss advantage over comparator diets diminishes by 12 months in most RCTs; adherence is the key effect modifier.
- Neurodegenerative applications (Alzheimer's, Parkinson's) mechanistically sound and promising in pilot data, but insufficient long-term RCT evidence for clinical recommendations.
- Risk mitigation requires comprehensive micronutrient supplementation, regular lipid/renal/bone monitoring, and dietary counselling.

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Beyond the Training: How Ergogenic Aids Optimize Athletic Performance

A combination of genetics, training, nutrition, recovery, and psychological preparedness determines athletic performance. As competitive standards continue to rise, athletes and sports scientists are increasingly exploring evidence-based strategies that can provide a legal and safe performance advantage. Among these strategies, nutritional ergogenic aids have gained significant attention due to their ability to influence physiological systems involved in exercise performance.

The term ergogenic aid refers to any substance, device, or practice that enhances energy production, utilization, recovery, or athletic performance. While numerous supplements are marketed to athletes, only a limited number possess strong scientific evidence supporting their effectiveness. Among the most extensively researched and practically applicable ergogenic aids are caffeine, creatine monohydrate, beta-alanine, beetroot juice, and sodium bicarbonate. Each of these supplements acts through unique physiological mechanisms and offers specific performance benefits depending on the demands of the sport.



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Caffeine: Enhancing Alertness and Delaying Fatigue

Caffeine is arguably the most widely used ergogenic aid in the world and remains one of the most effective supplements for improving athletic performance. Naturally found in coffee, tea, cocoa, and various energy products, caffeine primarily acts on the central nervous system by blocking adenosine receptors. Adenosine is a neurotransmitter that promotes feelings of relaxation and fatigue. By inhibiting its action, caffeine increases alertness, concentration, and overall neural activation.

From a physiological perspective, caffeine enhances the release of neurotransmitters such as dopamine and norepinephrine, resulting in improved cognitive function and heightened readiness for exercise. It also reduces the perception of effort, allowing athletes to maintain a given exercise intensity with less subjective fatigue. Furthermore, caffeine stimulates the release of adrenaline, increasing energy availability and enhancing the mobilization of fatty acids during prolonged exercise. This may help spare glycogen stores and delay exhaustion.

Research consistently demonstrates improvements in endurance performance, repeated sprint ability, muscular endurance, reaction time, and decision-making skills following caffeine supplementation. These benefits are particularly valuable in endurance sports, team sports, and events requiring sustained concentration.

The recommended dosage is **3-6 mg per kilogram of body weight, consumed approximately 30-60 minutes before exercise**. For a 70 kg athlete, this equates to roughly 210-420 mg of caffeine. Athletes should avoid excessive intake as it may lead to nervousness, increased heart rate, gastrointestinal discomfort, and sleep disturbances.

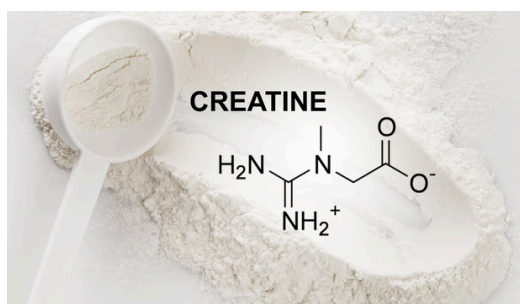
Creatine Monohydrate: Supporting Strength and Power Production

Creatine monohydrate is widely regarded as the most effective nutritional supplement for increasing strength, power, and lean muscle mass. Creatine occurs naturally in the body and is primarily stored within skeletal muscle as phosphocreatine. During high-intensity exercise, the body's immediate energy source, adenosine triphosphate (ATP), is rapidly depleted. Phosphocreatine serves as a reserve that quickly regenerates ATP, allowing muscles to sustain maximal efforts for longer periods.

Supplementation increases intramuscular phosphocreatine stores, thereby enhancing the capacity of the phosphagen energy system. This enables athletes to perform repeated bouts of high-intensity exercise with improved efficiency. In addition to enhancing energy availability, creatine promotes cellular hydration by drawing water into muscle cells, creating an anabolic environment that supports muscle growth and recovery.

Numerous studies have demonstrated improvements in sprint performance, maximal strength, power output, jumping ability, and resistance training adaptations. Long-term supplementation has also been associated with increases in lean body mass and enhanced training capacity. These effects make creatine particularly beneficial for athletes participating in power sports, sprint events, weightlifting, and team sports involving repeated explosive actions.

A common loading strategy involves consuming 20 g per day, divided into four doses, for five to seven days, followed by a maintenance dose of 3-5 g daily. Alternatively, athletes may consume 3-5 g daily without a loading phase, although muscle saturation takes longer to achieve. Extensive research confirms that creatine monohydrate is safe for healthy individuals when consumed at recommended dosages.



Beta-Alanine: Improving Muscle Buffering Capacity

Beta-alanine is a non-essential amino acid that has become increasingly popular among athletes participating in high-intensity activities. Its primary physiological role is to increase intramuscular concentrations of carnosine, a naturally occurring dipeptide that functions as an important intracellular buffer.

During intense exercise, the accumulation of hydrogen ions within working muscles contributes to a decline in muscle pH, a condition commonly associated with fatigue and reduced performance. Elevated carnosine levels help neutralize these hydrogen ions, delaying the onset of acidosis and allowing muscles to sustain high-intensity contractions for longer durations.



This buffering effect is particularly beneficial during exercise lasting between 30 seconds and 10 minutes, where metabolic acidosis significantly contributes to fatigue. Athletes participating in rowing, swimming, middle-distance running, cycling, combat sports, and repeated sprint activities may therefore experience substantial benefits from beta-alanine supplementation.

Research indicates that regular supplementation increases muscle carnosine concentrations by up to 80% over time, leading to improvements in exercise capacity, training volume, and fatigue resistance. The recommended dose is 4-6.4 g per day, typically divided into smaller doses throughout the day to reduce the occurrence of paraesthesia, a temporary tingling sensation commonly experienced after ingestion. Significant increases in muscle carnosine generally require at least four to eight weeks of consistent supplementation.

Beetroot Juice: Enhancing Exercise Efficiency Through Nitric Oxide

Beetroot juice has emerged as one of the most studied natural ergogenic aids due to its high nitrate content. Dietary nitrates undergo a series of physiological conversions within the body, ultimately producing nitric oxide, a potent signaling molecule involved in vascular function and blood flow regulation.

Nitric oxide promotes vasodilation, increasing blood vessel diameter and improving oxygen and nutrient delivery to working muscles. It also enhances mitochondrial efficiency, enabling muscles to produce energy with a lower oxygen requirement. As a result, athletes may perform the same amount of work while expending less energy, thereby improving exercise economy and delaying fatigue.

Several studies have demonstrated improvements in endurance performance, time-to-exhaustion, cycling efficiency, and running performance following nitrate supplementation. Beetroot juice may be particularly advantageous during prolonged aerobic exercise and endurance events where oxygen utilization plays a critical role in performance.

To achieve ergogenic effects, athletes are generally advised to consume 5–9 mmol of nitrate, equivalent to approximately 300–600 mg of dietary nitrate, two to three hours before exercise. This typically corresponds to around 500 ml of concentrated beetroot juice. Because oral bacteria are involved in nitrate conversion, the use of antibacterial mouthwash before supplementation should be avoided, as it may reduce effectiveness.



Sodium Bicarbonate: Buffering Exercise-Induced Acidosis

Sodium bicarbonate is a well-established ergogenic aid that functions as an extracellular buffering agent. During high-intensity exercise, rapid energy production leads to the accumulation of hydrogen ions in the muscles and bloodstream. This increase in acidity contributes to muscular fatigue, reduced force production, and diminished exercise capacity.

By increasing blood bicarbonate concentration, sodium bicarbonate enhances the body's ability to neutralize and remove excess hydrogen ions from working muscles. This process helps maintain acid-base balance and delays fatigue during repeated high-intensity efforts.

The performance-enhancing effects of sodium bicarbonate are most evident during activities lasting between one and ten minutes, particularly when exercise intensity is sufficiently high to induce substantial metabolic acidosis. Beneficial effects have been observed in sprinting, rowing, swimming, combat sports, track cycling, and high-intensity interval training.

The recommended dosage is **0.2–0.3 g per kilogram of body weight, consumed approximately 60–180 minutes before exercise**. For a 70 kg athlete, this equates to 14–21 g. While effective, sodium bicarbonate frequently causes gastrointestinal symptoms such as bloating, nausea, and diarrhea. Therefore, athletes should experiment with dosing strategies during training sessions before using them in competition.



Comparison of Common Ergogenic Aids

Supplement	Primary Physiological Effect	Recommended Dosage
Caffeine	Central nervous system stimulation, reduced perception of fatigue	3–6 mg/kg body weight
Creatine Monohydrate	Increased phosphocreatine stores and ATP regeneration	3–5 g/day maintenance
Beta-Alanine	Increased muscle carnosine and intracellular buffering	4–6.4 g/day
Beetroot Juice	Increased nitric oxide production and oxygen efficiency	5–9 mmol nitrate
Sodium Bicarbonate	Enhanced extracellular buffering of hydrogen ions	0.2–0.3 g/kg body weight

Conclusions

Evidence-based ergogenic aids can play an important role in optimizing athletic performance when integrated into a comprehensive training and nutrition program. Caffeine improves alertness and reduces fatigue, creatine enhances high-intensity energy production, beta-alanine increases muscle buffering capacity, beetroot juice improves oxygen utilization, and sodium bicarbonate delays fatigue by counteracting exercise-induced acidosis. Although each supplement acts through different physiological pathways, all share a common goal: enabling athletes to perform at higher intensities for longer durations.

Nevertheless, supplements should complement rather than replace sound training principles, proper nutrition, adequate hydration, and recovery strategies. When used appropriately and according to scientific guidelines, ergogenic aids can provide athletes with a measurable and meaningful performance advantage while supporting long-term athletic development.

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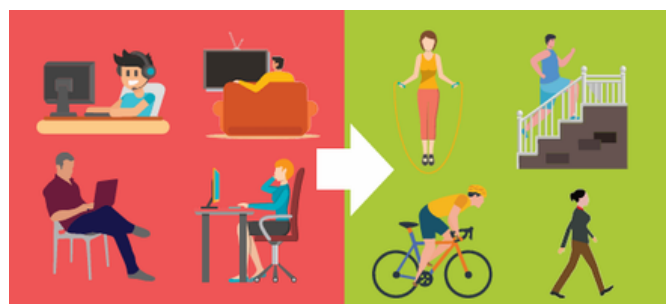


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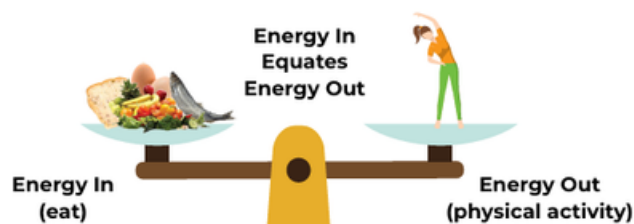
FBDG -10

“BE ACTIVE; ENGAGE IN MODERATE INTENSITY PHYSICAL ACTIVITY FOR AT LEAST 150-300 MINUTES PER WEEK”

Replace sedentary behaviours with some physical activity



Balance the amount of calories you take from the diet against the calories you burn through activity in a day



Source: Food-Based Dietary Guidelines (FBDG) Practitioner's Handbook
Nutrition Division, Ministry of Health

Too Sweet, Too Salty: Addressing Excess Sugar and Sodium Consumption in Sri Lanka for Better Public Health



The Global Benchmark: What “Healthy Intake” Really Means?

The World Health Organization (WHO) recommends that adults consume less than 5 g of salt per day and limit free sugar intake to less than 10% of total energy, ideally below 5% (WHO, 2012; WHO, 2015; WHO, 2023). These values are designed to reduce the global burden of cardiovascular diseases, obesity, diabetes, and oral diseases.

However, global dietary assessments show a persistent deviation from these targets. Average salt intake remains around 9–12 g/day worldwide, while free sugar intake in many populations ranges from 25–100 g/day, particularly in urban and industrialized diets (WHO, 2023; NCD Risk Factor Collaboration, 2022–2024). This indicates a clear global “taste drift” toward saltier and sweeter diets than biologically required.

Sri Lanka in Transition: From Traditional Plates to Processed Diets

Sri Lanka is undergoing a rapid nutrition transition, where traditional diets are increasingly replaced by processed and convenience foods.

Traditionally, Sri Lankan meals were based on:

- Rice
- Dhal (lentils)
- Leafy vegetables
- Coconut-based curries
- Fresh fish

These diets were naturally low in added sugar and moderate in salt, with flavor derived from spices, coconut, and fermentation rather than industrial additives.



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Today, however, dietary patterns are shifting toward:

- Instant noodles
- Packaged snacks
- Sweetened tea (often 2–4 teaspoons sugar per cup)
- Sugar-sweetened beverages
- Processed meats and dried fish with high salt content

This transition has significantly increased exposure to hidden sodium and free sugars, especially among adolescents and urban populations (Jayawardena et al., 2012; Jayatissa et al., 2021; WHO Sri Lanka, 2023).

The Sri Lankan Reality: How Far from the Target?

Recent evidence from national-level studies indicates that:

- Mean salt intake: 8–11 g/day
- More than double the WHO recommendation
- The majority of sodium comes from home cooking + processed foods (Jayatissa et al., 2021; Ministry of Health Sri Lanka, 2022; EconomyNext report, 2023)

Sugar intake data are less precisely quantified nationally, but dietary patterns show:

- High sugar in tea (dominant daily habit)
- Increasing sugar-sweetened beverage intake in youth
- Rapid growth of bakery and ultra-processed food consumption

Together, these patterns suggest that Sri Lanka is experiencing a dual burden of excessive sugar and salt exposure, particularly in urban and semi-urban populations.

Urban vs Rural, District-Level Differences

Although national averages mask variation, studies and surveillance reports suggest strong geographical and socioeconomic gradients:

Urban & Western Province

- Higher consumption of processed foods
 - More frequent fast-food intake
 - Greater sugar-sweetened beverage consumption
- Higher risk of obesity, diabetes, and hypertension

Rural & Plantation Areas

- Higher reliance on home-cooked meals
 - Still high salt use during cooking
 - Lower sugar beverage intake but increasing trend
- Persistent undernutrition + emerging Non-Communicable Disease risk (NCD)

Northern & Eastern Provinces

- Increasing dietary westernization in youth
- High use of dried fish and salty preserved foods
- Rising diabetes prevalence reported in recent surveys

These patterns align with national NCD surveillance showing clustering of diabetes and hypertension in urbanized districts such as Colombo, Gampaha, Jaffna, and Kandy (WHO Sri Lanka, 2023; SLHAS data reports, 2023–2024).

Age Matters: Who Is Consuming the Most?

Adolescents (School Age)

- High sugar intake via biscuits, drinks, and snacks
- Sweetened tea early adoption
- Marketing influence is strong

Adults (Working Age)

- High salt intake from home cooking + street foods
- Sugar intake via tea/coffee routine
- Time-poor diet → processed food reliance

Elderly Population

- Traditional diets still dominant
- But high salt use in cooking persists
- Higher vulnerability to hypertension and cardiovascular disease

Overall, adolescents show the highest sugar exposure, while adults show the highest salt exposure risk, creating a life course pathway toward NCDs (WHO, 2023; Jayawardena et al., 2012).

Health Consequences-Beyond Hypertension and Diabetes

Excess sugar and salt do not act independently; they interact to worsen metabolic and oral health outcomes.

Non-Communicable Diseases (NCDs)

- Hypertension
- Stroke
- Type 2 diabetes
- Obesity
- Chronic kidney disease

Sri Lanka now reports that 75% of deaths are due to NCDs, with diet identified as a major modifiable risk factor (WHO, 2023; World Bank, 2023).

Oral Health Dimension

High sugar intake creates a continuous acidic oral environment, promoting:

- Dental caries
- Enamel erosion
- Gingival inflammation

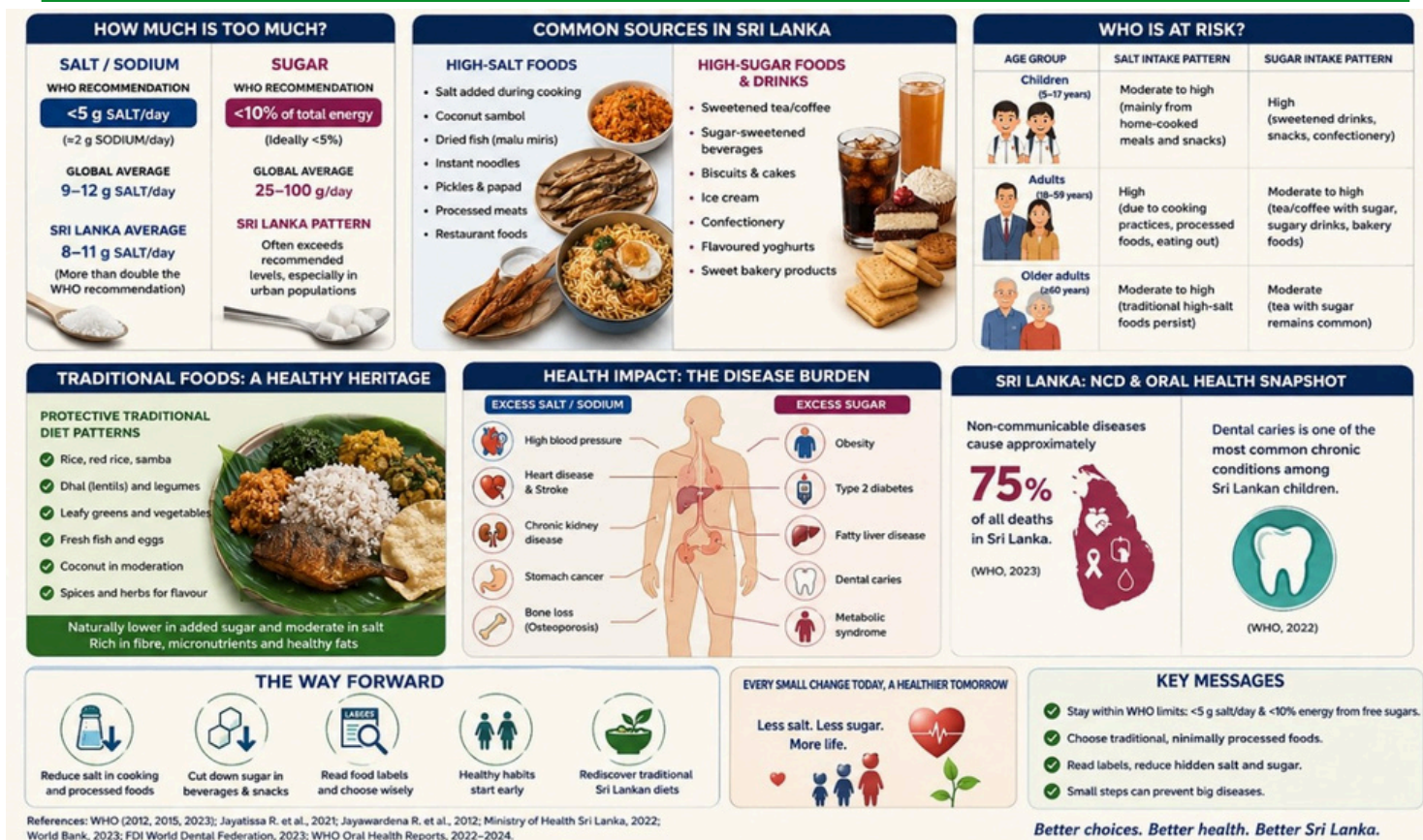
Frequent tea consumption with sugar (2–4 times daily) creates a repeated demineralization cycle, especially in children and adolescents.

Salt does not directly cause caries but contributes indirectly by:

- Enhancing preference for processed foods
- Increasing sodium-rich snack intake
- Affecting overall dietary pattern quality

This links nutrition directly with oral disease burden, which remains one of the most common chronic conditions in Sri Lanka (WHO Oral Health Reports, 2022–2024; FDI, 2023).





A Small Story from Everyday Sri Lanka

In many Sri Lankan households, the day begins with a cup of tea. Not just tea but tea with sugar, often 2–3 teaspoons, sometimes more. At school, a child may drink a sweetened beverage during break time. At lunch, rice comes with salty curries and dried fish. In the evening, biscuits and another sweet tea close the day.

Individually, each choice seems small. But together, they create a continuous sugar & salt exposure cycle, shaping taste preference from childhood and gradually increasing disease risk. This is not just a dietary habit; it is a national nutrition pattern shaped by culture, economy, and food environment.

The Way Forward: Rebalancing Taste, Health, and Policy

To align Sri Lanka with WHO dietary targets, key strategies include:

- Reformulation of processed foods (salt/sugar reduction)
 - Front-of-pack labeling systems
 - School-based nutrition education
 - Reduction of sugar in tea culture (gradual behavior change)
 - Promotion of traditional diets (legumes, greens, fish)
- Stronger monitoring of sodium and sugar intake.

These actions are essential to prevent further escalation of diet-related NCDs and oral diseases.

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Aflatoxin Contamination in Coconut Oil: Science, Risks, and Mitigation



In recent days, coconut oil contaminated with aflatoxins has been one of the most debated issues in Sri Lanka. Aflatoxins are highly toxic secondary metabolites produced by fungal species, primarily from the genus *Aspergillus*, such as *A. flavus*, *A. parasiticus*, and *A. nomius*. These fungi are well-known aflatoxin producers that thrive in dead and rotten plants and have a high potential to infect food crops, causing an estimated economic burden by destroying 25% or more of global food crops annually.



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Toxicology and Health Impacts

While over twenty aflatoxins have been identified, five are critical due to their frequent contamination of food: AFB1, AFB2, AFG1, AFG2, and AFM1. Long-term exposure leads to carcinogenic, immunosuppressive, hepatotoxic, teratogenic, and mutagenic defects. High doses can cause acute aflatoxicosis, which is often fatal due to liver damage. Consumption of food with aflatoxin concentrations ≥ 1 mg/kg is suspected of causing acute toxicity, while doses of 20 to 120 $\mu\text{g/kg}$ body weight per day are potentially lethal when consumed over 1 to 3 weeks.

Contamination Pathways

Contamination can occur during pre-harvest (common in corn and peanuts) or post-harvest stages. In coconut oil production, contamination exclusively depends on the quality of the copra (dried coconut kernels). If copra is not appropriately dried, fungi infect the kernel and release toxins that remain until the oil is expelled. Improper handling, inadequate drying. Inefficient storage is the primary driver of this colonization.

Recent Research Findings in Sri Lanka

Recent outbreaks highlight that doses of 20-120 µg/kg body weight per day can lead to acute aflatoxicosis, characterized by jaundice, lethargy, and potentially fatal liver failure.

While historical data from the 1970s showed alarmingly high contamination levels (often exceeding 500 µg/kg), modern regulatory interventions have reduced these figures. However, studies by Karunaratna et al. (2019) and subsequent market surveys in 2024 indicate that a significant percentage of "unrefined" or "village-produced" coconut oil still exceeds the European Union limit of 2 µg/kg for AFB₁, and 4 µg/kg for total aflatoxins.

Detection Methods

Safety is monitored using High-performance liquid chromatography (HPLC), enzyme-linked immunosorbent assay (ELISA), and liquid chromatography-mass spectroscopy (LCMS).

Comparative Regulatory Standards

Regulation Standard	Max Limit (AFB ₁)	Total Aflatoxin Limit
European Union (EU)	2 µg/kg	4 µg/kg
Sri Lanka Standard (SLSI)	5 µg/kg	10 µg/kg
Codex Alimentarius	-	15 µg/kg (for almonds/peanuts)

The Copra-to-oil Pathway: Mitigation Strategies

Contamination predominantly occurs during the post-harvest stage. When coconut kernels are subjected to slow sun-drying under humid conditions, moisture levels remain above the critical 6% threshold required to inhibit fungal growth.

- **Advanced Drying:** Shifting from traditional sun-drying to hybrid solar dryers or kiln drying ensures rapid moisture reduction.
- **Refining Processes:** Chemical refining (neutralization, bleaching, and deodorization) has been shown to reduce aflatoxin levels by up to 95%. However, the "Cold Pressed" trend poses a higher risk if the source copra is not strictly screened.
- **Novel Methods:** Emerging research into Photocatalytic degradation and Cold Atmospheric Plasma (CAP) treatments offers promising, non-thermal ways to neutralize toxins without altering the oil's nutritional profile.

Conclusion: A Multi-Stakeholder Mandate

Ensuring the safety of coconut oil requires a robust "Field-to-Fork" approach. Policymakers must harmonize local standards with international safety benchmarks, while small-scale millers require technical support to modernize storage and drying facilities. For the consumer, transparency through mandatory lab-certified labeling is the final line of defense in protecting public health.

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Message
from
FBDGs

FBDG -12

"EAT CLEAN AND SAFE FOOD"

Five keys to safer food

1. Keep clean
2. Store raw and cooked food separately
3. Cook thoroughly
4. Keep food at safe temperatures
5. Use safe water and raw materials



Source: Food-Based Dietary Guidelines (FBDG) Practitioner's Handbook
Nutrition Division, Ministry of Health



Precision Fermentation: A New Direction in Sustainable Production of Alternative Proteins in Sri Lanka

There's a growing demand for protein. This is because the world population is growing. People are moving to cities. They eat differently. The world population of quality protein consumers will be really high. By 2050, the world population will be 10 billion. The demand for quality protein will still be going up. The world population and the demand for quality protein are closely related. This will put pressure on the way we produce food. In Sri Lanka, there are two food-related issues. Some people do not have protein and energy in their diet. On the one hand, many are getting sick from eating too much of the wrong foods, which leads to diabetes, obesity, and heart problems (FAO, 2025).

Traditional farming of animals gives us protein. It also causes a lot of pollution, destroys land, wastes water, and hurts animals and plants. In Sri Lanka, we rely on importing milk and meat, which costs us exchange and makes us vulnerable to problems in the global supply chain. Precision fermentation is a technology that can make proteins that are just like those from animals but in a way that is better for the environment. This can help us have nutritious food locally and also help the environment (Knychala et al., 2024; Obayomi et al., 2026).



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Understanding Precision Fermentation

Precision fermentation is a way of doing biomass fermentation. The old ways of making foods like curd or coconut toddy in Sri Lanka use microbes that are already around us. Biomass fermentation is used to grow microbes for protein. Precision fermentation's goal is the production of "cell factories" using biology (Obayomi et al., 2026).

Specifically, in addition to some bacteria and fungi, microorganisms such as yeast lines such as *Saccharomyces cerevisiae* and *Pichia pastoris* can be genetically modified to yield materials such as whey protein, casein, ovalbumin (egg white protein), heme (flavor-like meat or (Cluster of Regulatory Intermediates) replicates). Microorganisms develop into bioreactors and are fed on sugar or agricultural waste. The proteins they make are then taken out of the mixture and purified for use in food products (Knychala et al. 2024).

The advantages of this precision fermentation are: it makes pure products, it is consistent, and it can be customized to make products with specific properties like being soluble or having fewer allergens. Precision fermentation is about making ingredients not like the meat that is grown in a lab. This makes it easier to add these ingredients to foods on a scale. Precision fermentation and the uses of precision fermentation will change the way food is made. Precision fermentation will make food production more efficient. It will make food production more effective. Precision fermentation is going to be a part of food production, and it will make a big difference in how food is produced.

Nutritional Advantages and Health Implications

Comparative benefits:

However, proteins synthesized via precision fermentation have an important advantage because they include all essential amino acids that are needed by humans, just as animal-based

proteins do. Also, such proteins are easily digested. Sometimes these proteins can be made better by adding extra nutrients like vitamin B12 or Omega-3 fatty acids during production (Knychala et al., 2024; Verley Food, 2025).

Some benefits of these proteins are:

- They have things that can cause allergic reactions or stop human bodies from using the nutrients like lactose or cholesterol, compared to dairy products.
- They help to use the protein consumed to build muscle, which's good for athletes, older people, and people who are sick.
- They may even prove beneficial for the digestive system since they may aid in the growth of bacteria in the digestive tract.

The diet in Sri Lanka consists mainly of rice and vegetable curries. Their diets may not consist of proteins of high biological value. These proteins may then be included in their foods as an addition. The proteins may be used to formulate foods for school children or those suffering from malnutrition. They may even be used to provide food for diabetics and obese people with low-fat content.

Proteins produced through precision fermentation may be enhanced through the addition of nutrients. Proteins created via precision fermentation could support humans in getting their nutrients (Obayomi et al., 2026).



Environmental and Sustainable Aspects

Sri Lanka, a country that is vulnerable to climate change issues such as the unpredictability of monsoons and droughts, among others, will benefit greatly from this technology since it helps to minimize imports. The technology is in line with the country's objectives concerning the sustainability of agricultural practices and the reduction of post-harvest losses. In terms of resource management, precision fermentation is useful.

- It enables a reduction of greenhouse gas emissions by up to 90%.
- Precision fermentation needs less land and water than animal farming.
- Utilizing waste materials from rice bran, coconut residue, molasses, or cassava to manufacture food products to help establish a circular economy system (Good Food Institute, 2025; Obayomi et al., 2026).

For a place like Sri Lanka, precision fermentation is really important because the country is dealing with a lot of problems from climate change, like monsoons that're hard to predict and droughts. Precision fermentation can help Sri Lanka rely on imports and be better prepared for these problems. It also fits in with what the country wants to do to make agriculture more sustainable and reduce the amount of food that is lost after it is harvested. Precision fermentation can really help with these goals for Sri Lanka.

Applications in Food Processing and Product Development

Precision-fermented ingredients are making dairy alternatives like milk, cheese, and yogurt better. They are also making egg replacements and meat analogues better. When they mix precision-fermented ingredients with plant-based things, they make the texture, flavor, and nutrition better.

Sri Lankan Adaptations:

- Make drinks or cheese from coconut milk. Add precision whey to make them better.
- Add protein to snacks or baked goods that kids eat at school.
- Make products by mixing local things like jackfruit, lentils, and millets with fermented proteins to make them taste and look better and be healthier.
- Use precision-fermented ingredients to make food for people who're hungry or sick.

People use the ways they already make food to also make precision-fermented ingredients last longer. This is important, so we can send them to places that are far away. Some companies are already showing that they can make money from precision-made products. The technology should result in precision-made ingredients such as milk, cheese, and yogurt with advanced properties (Good Food Institute, 2025).

Difficulties and chances for Sri Lanka

Challenges

- Costs for the equipment and processes needed for bioreactors and getting the end product ready
- Dealing with a lot of rules and regulations when it comes to the kinds of food and ingredients that come from genetically modified products.
- Getting people to accept this kind of food. Need to inform them about it and be transparent.
- Need people who know what they are doing and have the facilities (Knychala et al., 2024).

Opportunities

- Use the research that is already being done in biotechnology in Sri Lanka. At universities and the Industrial Technology Institute. To develop ways of making food using microbes or other materials that we are here.
- Work with companies to start small projects and see how they go on
- Make sure that policies about food and nutrition are working together
- This can be a benefit to the economy too. It supports creating jobs in bio-manufacturing and reducing foreign exchange outflow on protein imports.

Working with other countries in South Asia, we can help learn from each other and share equipment and knowledge, which can make things happen faster.

Future Directions

From 2030 to 2035, precision fermentation is going to grow fast. It is expected to be worth tens of billions of dollars. This is because of processes that use artificial intelligence products that combine different things and ways to make food that is good for each person's health (Markets and Markets, 2025; Precedence Research, 2025).

People should do some research on these things:

- Try to see if local food can help people be healthier.
- Look at how food affects the environment in places
- Ask about consumer perception of these foods.
- Integration of traditional & modern technology knowledge about fermentation for acceptable products

If we use precision fermentation with healthy tools and packaging, which is good for the environment, it will make a big difference. Precision fermentation will keep getting better and better.



Conclusions

Precision fermentation is excellent for making proteins they're good for humans. For Sri Lanka, precision fermentation is an opportunity to have more protein and be healthier, and it can also help our planet and bring new ideas to the bioeconomy. The Nutrition Society of Sri Lanka wants to make sure we use precision fermentation in a way that we need to do more research and try out small projects, and work with people who are interested in precision fermentation to use it in the best way possible.

If humans use precision fermentation with the way they farm and the food they like to eat, they can make a food system that's fair and healthy for everyone, and that will be great for the future of precision fermentation and food systems.

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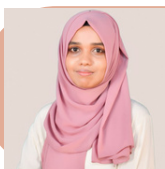
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Evidence from Polonnaruwa: The Burden of Sarcopenia in Sri Lanka and the Role of Nutrition in Healthy Ageing



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Sarcopenia is the age-related loss of muscle mass, strength, and physical function. Although it develops gradually, its effects can be substantial, making everyday activities such as walking, climbing stairs, carrying groceries, or rising from a chair increasingly difficult. As muscle strength declines, older adults become more vulnerable to falls, frailty, disability, and loss of independence. Today, sarcopenia is recognized as a major public health concern affecting millions of older adults worldwide.

Why Should Sri Lanka Be Concerned?

Sri Lanka is experiencing one of the fastest demographic transitions in South Asia. Population projections suggest that by 2040, nearly one in four Sri Lankans will be aged 60 years or older. As to become increasingly common, highlighting the need for greater awareness, prevention, and early intervention.



Is It Just Ageing... or Something More?

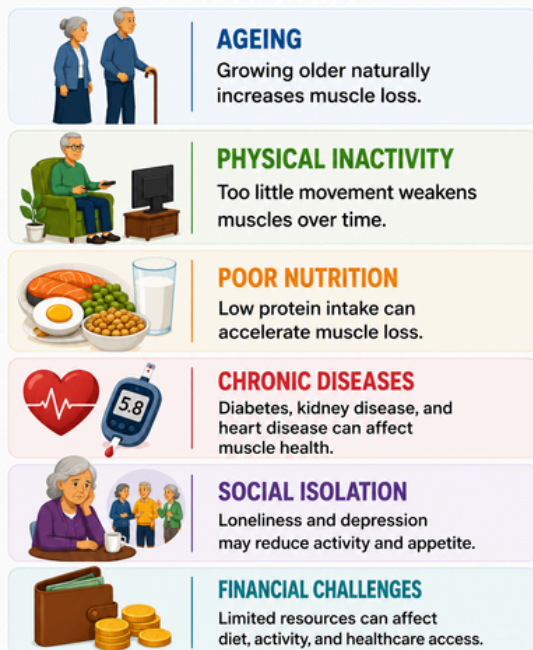
Difficulty climbing stairs.
Struggling to rise from a chair.
Walking more slowly than before.

Think it's just ageing? Think again. These changes may be early signs of **sarcopenia**, a condition that gradually weakens muscles and limits independence.

Sarcopenia develops through a combination of biological, lifestyle, and social factors. While ageing is the strongest risk factor, many others including poor nutrition, physical inactivity, chronic diseases, and social isolation can be modified through healthy lifestyle choices and appropriate support.

WHAT INCREASES THE RISK OF SARCOPENIA?

Common factors that contribute to muscle loss and weakness in older adults



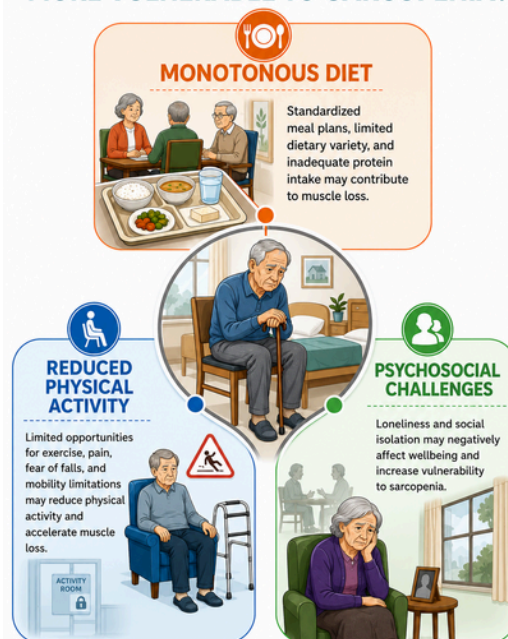
What Did We Find in Polonnaruwa?

To better understand the burden of sarcopenia in Sri Lanka, our research team conducted studies among both community-dwelling and institutionalized older adults in Polonnaruwa District. Polonnaruwa was selected because it reflects many characteristics of rural Sri Lanka, including its predominantly agricultural lifestyle and dietary practices, making it an important setting to investigate factors influencing muscle health during ageing.

Our findings revealed that more than four out of every ten community-dwelling older adults were affected by sarcopenia. The prevalence was similar among men and women, demonstrating that sarcopenia is an important health concern regardless of gender. The risk increased with advancing age and was particularly common among individuals with poor nutritional status, low physical activity levels, depression, lower body weight, and cardiovascular disease.

The burden was even greater among residents of elder care homes, where six out of every ten older adults were affected by sarcopenia. Discussions with residents and caregivers highlighted several factors that may contribute to muscle loss, including limited dietary variety, inadequate intake of protein-rich foods, reduced opportunities for physical activity, loneliness, and social isolation. The care homes included in this study also faced challenges in providing diverse and individualized meal plans due to limited resources.

WHY ARE INSTITUTIONALIZED OLDER ADULTS MORE VULNERABLE TO SARCOPENIA?



Healthy Muscles, Healthy Ageing

The good news is that sarcopenia is neither an inevitable nor irreversible part of ageing. Maintaining a nutritious diet, staying physically active, and effectively managing chronic health conditions can help preserve muscle strength, mobility, and independence throughout later life. While researchers continue to explore new pharmacological treatments, nutrition and regular physical activity remain the most effective and widely recommended strategies for preventing and managing sarcopenia.

Why Nutrition Matters?

Nutrition plays a central role in maintaining muscle health and is one of the most effective strategies for preventing and managing sarcopenia. As people age, factors such as reduced appetite, chewing difficulties, chronic illnesses, medication use, and financial constraints can affect food intake and nutritional status. As a result, many older adults may not consume enough nutrients needed to maintain muscle mass and strength.

Among all nutrients, protein is particularly important for preserving muscle health. Protein provides the building blocks required for muscle maintenance and repair, yet many older adults fail to consume adequate amounts due to reduced food intake or limited dietary variety. Regular consumption of protein-rich foods such as fish, eggs, milk, yogurt, lean meat, legumes, and soy products can help support muscle maintenance and reduce the risk of sarcopenia. Distributing protein intake evenly throughout the day may provide additional benefits.

While protein is the cornerstone of muscle health, other nutrients also play important supporting roles. Vitamin D contributes to muscle strength, balance, and physical performance, while omega-3 fatty acids found in fish such as sardines, mackerel, and tuna may help support muscle health and counteract age-related muscle loss. Antioxidants, including vitamins C and E, together with compounds naturally present in fruits and vegetables, help protect muscle cells from oxidative stress associated with ageing.

Several minerals and vitamins are also essential for maintaining muscle function. Calcium and magnesium support muscle contraction and movement, while vitamin B12 contributes to nerve function and physical performance. A balanced diet rich in fruits, vegetables, whole grains, nuts, seeds, fish, dairy products, and legumes can help provide these important nutrients.

Ultimately, good nutrition is about more than preventing hunger, it is about preserving strength, mobility, and independence. Ensuring adequate nutrient intake and preventing malnutrition are therefore key strategies for supporting healthy ageing and reducing the burden of sarcopenia among older adults.

Stay Active, Stay Strong

Regular physical activity is essential for maintaining muscle strength, mobility, and independence as we age. Activities such as walking, gardening, household chores, and community participation help keep muscles active while supporting overall physical and mental wellbeing. Resistance exercises, including chair rises, stair climbing, resistance-band exercises, and light weight training, are particularly effective in slowing age-related muscle loss, improving strength, and enhancing balance.

Importantly, physical activity works best when combined with good nutrition, particularly adequate protein intake. Staying active throughout later life can help older adults remain stronger, healthier, and more independent, while reducing the risk of falls, disability, and loss of independence.



Investing in Muscle Health for Healthy Ageing

Maintaining muscle health is essential for preserving independence, mobility, and quality of life as people age. As Sri Lanka's older population continues to grow, greater attention must be given to strategies that prevent and manage sarcopenia in both community and residential care settings.

Improving meal quality and dietary diversity, while encouraging regular consumption of protein-rich foods, should be key priorities, particularly among older adults living in care homes. Equally important is the promotion of safe and structured physical activity programmes that improve muscle strength, mobility, balance, confidence, and mental wellbeing while minimizing the risk of falls and injuries.

Nutrition and physical activity are the cornerstones of sarcopenia prevention and management. Together, they help preserve muscle mass, maintain physical function, and support healthy ageing. Investing in muscle health today is an investment in healthier ageing tomorrow because stronger muscles support greater independence, wellbeing, and dignity in later life.

Acknowledgements

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The Importance of Nutrient-Dense Foods in a Balanced Diet

In an age where convenience often takes precedence over health, the significance of nutrient-dense foods cannot be overstated. The health landscape is littered with processed ingredients and artificial additives, swaying consumers toward quick-fix meals that promise satisfaction without considering nutritional value. Dietitians and health professionals emphasize the vital role of nutrient-dense foods in maintaining overall well-being, reminding us that the quality of what we eat is just as important, if not more so, than quantity.

Nutrient-dense foods are defined by their high nutrient content relative to their caloric content. Foods such as fruits, vegetables, whole grains, lean proteins, and healthy fats fall into this category. For instance, leafy greens like spinach and kale are packed with vitamins A, C, K, and several important minerals, all while being low in calories. Similarly, salmon is not only a source of high-quality protein but also a rich provider of omega-3 fatty acids, essential for heart health. By focusing on these types of foods, individuals can maximize their nutrient intake without exceeding their caloric needs.



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One significant benefit of consuming nutrient-dense foods is their role in weight management. Foods rich in nutrients tend to be more filling compared to their calorie-dense counterparts. For instance, a bowl of mixed vegetables with lean protein can satisfy hunger more effectively than a serving of chips or processed snacks. This satiation reduces the likelihood of overeating and can aid in weight loss or weight maintenance goals. Given the rising obesity rates and associated health consequences, such as diabetes and heart disease, the importance of incorporating nutrient-dense foods into daily diets becomes clear.

Moreover, a diet rich in nutrient-dense foods can play a pivotal role in chronic disease prevention. Studies have shown that individuals who consume a higher proportion of fruits and vegetables exhibit a lower risk of developing chronic illnesses, including cardiovascular diseases, type 2 diabetes, and certain types of cancer. Antioxidants, which are abundantly present in nutrient-rich foods, help combat oxidative stress in cells, potentially reducing the incidence and severity of these diseases. For instance, berries, packed with antioxidants, can effectively assist in minimizing inflammation, a known contributor to chronic health conditions.

Another compelling aspect of nutrient-dense foods lies in their ability to improve energy levels. Many people report feelings of fatigue or sluggishness, which can often be attributed to diets devoid of essential nutrients. For example, a breakfast high in sugars and low in fiber can lead to rapid spikes and subsequent crashes in blood sugar levels. In contrast, starting the day with

Oatmeal topped with nuts and fruits provides a sustained release of energy throughout the morning. High-fiber foods not only support digestive health but also promote a consistent energy flow, keeping individuals more alert and productive.

The connection between diet and mental health is also gaining increasing attention in the field of dietetics. Research suggests that certain nutrients can significantly influence mood, cognition, and overall mental well-being. Diets rich in omega-3 fatty acids, found in fatty fish and flaxseeds, have been associated with reduced symptoms of depression and anxiety. Similarly, vitamins and minerals like B vitamins, magnesium, and zinc play crucial roles in brain health. A nutrition-rich diet is vital for neurochemical balance, contributing positively to mental health outcomes.

Incorporating more nutrient-dense foods into one's diet doesn't have to be a daunting task. A few simple strategies can make a significant difference. For instance, starting the day with a wholesome, nutrient-rich breakfast can set a positive tone for the rest of the day. Rather than sugary cereals or pastries, consider oatmeal topped with fresh fruits, nuts, or a dollop of yogurt, combining fiber, healthy fats, and protein for a well-rounded meal.

Snacking is another opportunity for incorporating nutrient-dense foods. Instead of reaching for chips or cookies, have fresh veggies on hand, possibly dipped in hummus, or grab a piece of fruit. This simple swap not only increases nutrient intake but also helps combat cravings for unhealthy snacks. Meal planning can streamline this process, allowing individuals to prepare nutrient-rich meals in advance, ensuring they always have healthier options available.

To further encourage the consumption of nutrient-dense foods, it's crucial to educate individuals about the value and benefits of these foods. Community workshops, cooking classes, and health campaigns can play instrumental roles in shifting perceptions about nutrition. When individuals understand the link between food choices and health outcomes, they are more likely to make informed dietary decisions.

Additionally, it's essential to consider individual needs and preferences. While nutrient-dense foods are generally beneficial.

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Effect of Meat-Based Junk Food on Child Cancer

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Cancer is a prevalent disease in the world and the leading cause of death for children in the world. The definition of cancer is uncontrolled cell division, which may lead to tumor formation. Cancer occurs from one single cell, and it is usually a result of a mutation caused by cancer-causing agents called carcinogens.

Children suffer from different cancers:

- Leukemia
- Brain cancer
- Lymphoma
- Solid tumors

Junk food industry mainly target young generation customers. Therefore their products are much tasted, smell and beautiful meals. Modern generation children are addicted to eat junk foods. Pizza, burger, hot dog, bacon, sausages, pepperoni, salami is famous meat based junk foods are among the most commonly consumed junk food in children. Junk foods contain with different additives and these are harmful to children affecting their health.

Effect of meat on children's cancer

Meat components and analytical category	Types of cancer	Effect of cancer
• Processed meat	• Colorectal cancer • Colon cancer • Rectal cancer	Blockage of the colon area The space inside the colon is large The colon wall is fairly thin
• Processed meat	• Colorectal cancer	Damage colorectal tissues
• Processed Meat and red meat	• Colorectal cancer • Rectal cancer	Blockage of the colon area The space inside the colon is large The colon wall is fairly thin
• Processed meat and red meat • Heme iron • N-nitroso Compounds • Heat-induced heterocyclic amines • Polycyclic aromatic hydrocarbons	• Esophageal cancer • Lung cancer • Pancreatic cancer • Prostate cancer • Endometrial cancer, Stomach cancers • Colorectal cancer • Gastric cancer	In colorectal cancer damage the colon epithelium causing hyper-proliferation and hyperplasia
• Processed meat and red meat • Heterocyclic amines (HCA) • Polycyclic aromatic hydrocarbons (PAH) compounds • N-nitroso compounds • Heme iron	• Lung cancer	Acting as apro-oxidant causing DNA tissue damage.

Effect of additives in meat on children's cancer

Types of preservatives	Types of cancer	Effect of cancer
Salt	- Gastric cancer - Stomach cancer	Damage to stomach tissue Change the cell DNA and grow tumor cells.
- Sodium nitrite and nitrate are mostly used in processed meat like that bacon, hot dog, deli meats, pepperoni, sausages, salami, smoked fish and corned beef. - Sodium nitrite and nitrate inject to meat and cooked in high temperature when forming nitrosamine and it is a carcinogen.	- Leukemia - Stomach cancer - Colon cancer - Bladder cancer - Pancreatic cancer	Nitrates bind with hemoglobin when the amount of hemoglobin in the oxygen transport decreases. Then impair the oxygen delivery to tissues.
Saccharin is used in meat products.	- Tumor - Bladder cancer - Stomach cancer	Proteins in the stomach react with nitrites and produce carcinogenic nitrosamines.
Formaldehyde is especially used in meat and seafood. It is classified as a potential human carcinogen.	- Nose cancer - Sinuses cancer - Stomach cancer - Respiratory system cancer - Leukemia - Lymphoma	Human exposure to formaldehyde can cause cancer.

Effect of additives in meat on children's cancer

Used processes	Types of cancer	Effect of cancer
Fried meat	Lung cancer	Damaged lung tissues from exposure to chemical substances Damage the trachea, bronchi, bronchioles and alveoli Affect respiration
Irradiated meat (sausage, hot dog)	Leukemia	Some blood cells acquire changes in their genetic material or DNA. Blood cell production becomes out of control.
Irradiated meat	Gastrointestinal cancer	Stromal tumors of the stomach begin in the supporting connective tissue and are treated differently from gastric cancer.

Conclusions

Meat may lead to cancer by creating or transforming carcinogenic cells, which can result in various cancers such as leukemia, lymphoma, colorectal, breast, stomach, colon, rectum, pancreas, lung, ovary, prostate, testis, kidney, bladder, and brain. Many harmful substances are present in meat. Heme iron, lipids, N-nitroso compounds (NOCs), polycyclic aromatic hydrocarbons (PAHs), and heat-generated heterocyclic amines (HCAs). These substances act as carcinogens. In industrial preservative solutions, substances such as chemicals, flavors, sweeteners, and antioxidant aroma enhancers are added to meats and various foods. High levels of salt, preservatives like sodium nitrate, nitrite, formaldehyde, and saccharin can lead to various forms of cancer. Currently, advanced technologies and contemporary methods are employed to produce processed meat. Fried meat, irradiated meat, grilling, roasting, and barbecued meat may lead to cancer.

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Understanding Hybrid Meat

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In recent years, the global food industry has witnessed growing interest in alternative protein systems, driven by increasing concerns surrounding human health, environmental sustainability, and food security. Consumers are becoming increasingly conscious of what they eat and how food production impacts both personal well-being and the planet. Among the many innovations emerging in this evolving food landscape, hybrid meat products are gaining significant attention as a practical and balanced approach to future protein consumption.

What is Hybrid Meat?

Hybrid meat refers to products that combine conventional animal meat with plant-based or alternative protein ingredients. Unlike fully plant-based meat substitutes, hybrid meat products retain a portion of real meat while partially replacing it with ingredients such as soy protein, pea protein, mushrooms, legumes, grains, and mycoproteins.

These products aim to deliver the familiar taste, texture, and sensory experience associated with meat while improving nutritional quality and reducing environmental impact. Common examples of hybrid meat products include blended burgers, sausages, meatballs, nuggets, and burger patties.

In some formulations, mushrooms or plant proteins are incorporated into ground meat systems to reduce the overall meat content while maintaining juiciness and flavour. This approach allows consumers to gradually transition toward more sustainable eating habits without completely changing their dietary preferences.

Why is Hybrid Meat Important?

Health Benefits

One of the major reasons hybrid meat products are attracting global attention is their potential health benefits. Many hybrid formulations contain lower amounts of saturated fat and cholesterol compared with traditional processed meat products. At the same time, the incorporation of plant ingredients can increase dietary fibre and introduce beneficial bioactive compounds that are generally absent in conventional meat products.

As nutrition-related non-communicable diseases continue to rise worldwide, food innovations that promote healthier dietary patterns are becoming increasingly important.

Sustainability

Conventional livestock production requires large amounts of water, feed, and land resources and contributes substantially to the emission of greenhouse gases. By partially replacing meat with plant-derived proteins, hybrid meat systems may reduce the environmental footprint, depending on the formulation and replacement level.

Even modest reductions in meat consumption at the population level may contribute positively to climate change mitigation, biodiversity conservation, and sustainable resource utilization.

Consumer Acceptance

Consumer acceptance also plays a critical role in the growing popularity of hybrid meats. While fully plant-based meat alternatives have gained considerable market attention, some consumers remain hesitant because of differences in taste and texture or unfamiliarity.

Hybrid meat products offer a middle-ground solution by preserving the sensory characteristics of traditional meat while introducing plant-based components more acceptably. This approach particularly appeals to “flexitarian” consumers who are interested in reducing their meat consumption without eliminating it from their diets.

Food Science Behind Hybrid Meat

From a food science perspective, the development of hybrid meat products presents several technological challenges and opportunities for improvement. Protein functionality is especially important in determining texture, water-holding capacity, juiciness, emulsification, and overall sensory quality. Food scientists use various technologies, such as extrusion, protein structuring, emulsification, and fermentation, to improve the quality and stability of hybrid meat systems. Achieving the right balance between taste, nutrition, functionality, and clean-label expectations remains a key area of ongoing research and innovation.

The interaction between animal and plant proteins can significantly influence the texture and sensory characteristics of food products. Therefore, careful ingredient selection and processing optimization are essential for developing successful hybrid meat products.



Current Trends in Hybrid Meat Innovation

Globally, the hybrid protein market continues to expand as the food industry responds to changing consumer demands. Some companies have introduced blended meat products containing combinations of beef, chicken, mushrooms, pea protein, and other plant-based ingredients.

Restaurants and food service sectors are increasingly exploring hybrid menu options as part of sustainability initiatives and health-conscious product development. The increasing popularity of flexitarian diets has accelerated the demand for products that offer both familiarity and sustainability.

Researchers are also exploring novel protein sources, including microbial proteins and sustainable ingredients derived from food processing byproducts, for future hybrid protein applications.

Current Products in the Market

Hybrid meat products are beginning to appear in the market in formats such as burgers, sausages, meatballs, and nuggets. These products typically combine meat with plant-based ingredients, such as soy, peas, mushrooms, or grains. Although their availability remains limited in many regions, these products demonstrate the transition of the hybrid concept from research and development to practical food applications.



Challenges and Consumer Concerns

Despite their potential advantages, hybrid meat products are not without challenges. Consumer perceptions regarding processed foods, pricing, labelling transparency, and ingredient familiarity may influence market acceptance.

Regulatory and labelling issues are important considerations for hybrid meat products. Because these foods combine animal and plant ingredients, clear naming and ingredient disclosure are required to avoid consumer confusion. However, regulatory approaches differ across countries, and rules may address product composition, fortification, advertising, and the use of meat-related terms on product labels. Therefore, regulatory clarity is important for the wider commercial adoption of hybrid meat products.

Texture and flavour optimization remain important considerations, particularly when incorporating higher levels of plant-based ingredients. In addition, regulatory frameworks and nutritional standards for emerging protein products continue to evolve across different countries.

Maintaining affordability while delivering acceptable sensory quality is essential for wider adoption in both developed and developing markets.

Potential Opportunities for Sri Lanka

For countries such as Sri Lanka, hybrid meat products may offer promising opportunities for food innovation and sustainable nutrition. Locally available protein-rich ingredients, such as soybeans, mung beans, lentils, jackfruit, and mushrooms, could potentially be utilized in the development of hybrid protein foods suited to regional preferences and culinary traditions.

Such innovations may support local agriculture while reducing dependence on imported protein ingredients. In addition, hybrid meat systems could contribute to the development of healthier processed meat products with improved nutritional profiles.

The growing interest in food innovation and sustainability also creates opportunities for researchers, startups, and the local food industry to explore new product development pathways.

Future Outlook

Hybrid meat represents an important step in the transition toward a more sustainable and diversified food system. Rather than completely replacing traditional meat products, hybrid systems aim to create a balanced and practical solution that aligns with modern nutritional, environmental, and consumer requirements.

As research and innovation continue to advance, hybrid meat products may become increasingly important components of future diets and global food sustainability efforts. Continued collaboration among food scientists, nutritionists, policymakers, and industry stakeholders will play a key role in shaping the future of this emerging food category.

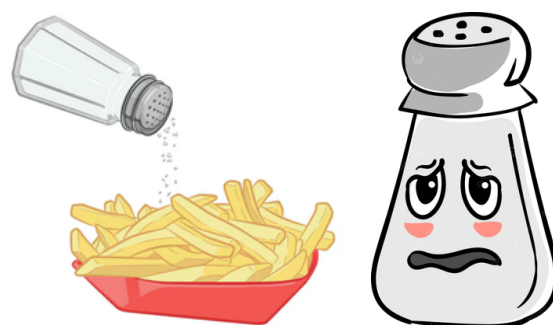
Hybrid meat products may not entirely replace conventional meat; however, they represent an emerging and potentially promising pathway toward healthier, more sustainable, and consumer-friendly food systems in the future.

Message from FBDGs

FBDG -7

“LIMIT SALTY FOOD AND ADDING SALT TO FOOD”

- Take less than one tea spoon (5 g) of iodized salt per person per day
- Limit salty food



FBDG -8

“LIMIT SUGARY DRINKS, BISCUITS, CAKES, SWEETS AND SWEETENERS”

- Limit intake of sugar: Do not exceed 25g / 6 teaspoons per person per day
- Limit adding sugar to food and beverages



Source: Food-Based Dietary Guidelines (FBDG) Practitioner’s Handbook
Nutrition Division, Ministry of Health



Are Our Food Safe Enough for Consumption?

Food safety remains an absolute cornerstone of global public health and socioeconomic stability. This article synthesizes the current landscape of foodborne pathogens, emerging microbiological threats, epidemiological trends, and diagnostic advancements in relation to safe foods for human consumption. Globally, an estimated 600 million individuals nearly 1 in 10 people experience illnesses annually from consuming contaminated food, resulting in approximately 420,000 preventable deaths and an economic loss exceeding US\$ 110 billion in low- and middle-income countries (LMICs).

Further, pediatric populations under five years of age disproportionately shoulder 40% of the aggregate foodborne disease burden, suffering 125,000 annual fatalities. Unsafe food consumption is a devastating biological cycle of gastrointestinal infection, malabsorption, acute malnutrition, and immunological stunting. This article evaluates major bacterial, viral, parasitic, and chemical hazards, detailing their pathogenic pathways, vectors, and clinical manifestations. Furthermore, it analyzes how macro-environmental vectors such as climate change, modern supply chain globalization, shifting consumer behaviors, and the proliferation of antimicrobial resistance (AMR) reconfigure the global risk matrix.

Finally, the article explores state-of-the-art diagnostic paradigms, including Whole Genome Sequencing (WGS), metagenomics, and quantum-dot-based nanosensors, while highlighting the systemic implementation of the World Health Organization (WHO) Global Strategy for Food Safety (2022-2030) under a unified One Health framework.



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Access to safe and nutritionally adequate food is an essential determinant of human life and sustained metabolic health. Despite rapid modernization, advanced cold-chain infrastructures, and stringent legislative mandates, unsafe food represents a persistent threat to global clinical public health. The global food matrix has evolved into a highly complex, interconnected network where a single localized contamination node can rapidly cascade into a transcontinental epidemiological emergency. According to epidemiological matrices validated by the World Health Organization (WHO/FERG, 2026), approximately 600 million people nearly 1 in 10 globally fall ill each year following the ingestion of unsafe, contaminated food. This staggering incidence generates an annual mortality toll of roughly 420,000 individuals and precipitates the loss of 33 million Disability-Adjusted Life Years (DALYs) worldwide.

Economically, the impacts are deeply destabilizing to national architectures. A seminal World Bank report confirmed that productivity losses and medical care expenditures directly tied to foodborne morbidity cost low- and middle-income countries (LMICs) roughly US\$ 110 billion annually (WHO/FERG, 2026). Consequently, mitigating food safety vulnerabilities has transformed from a localized sanitation requirement into a global geopolitical priority.

Taxonomy and Pathophysiology of Major Foodborne Pathogens

Foodborne illnesses are infectious or toxicological syndromes triggered by a diverse spectrum of biological pathogens or persistent chemical compounds that infiltrate the human gastrointestinal tract via ingestible vehicles.

Bacterial Health Hazards

Salmonella enterica

The *Salmonella* genus, particularly non-typhoidal serovars such as *Salmonella enterica* serovar Typhimurium and Enteritidis, displays exceptional epidemiological ubiquity due to its capacity to colonize a wide array of agricultural animal hosts. The primary biological reservoirs are avian poultry vectors and eggs. Avian genetic variations, structural feed compositions, and ecological housing conditions directly modulate the integrity of eggshells, rendering them vulnerable to trans-shell micro-penetration by bacteria. Upon ingestion, *Salmonella* utilizes its Salmonella Pathogenicity Islands (SPI-1 and SPI-2) along with Type III Secretion Systems (T3SS) to actively inject virulence effector proteins directly into human intestinal epithelial cells. This subverts host cytoskeletal machinery, driving cellular invasion, profound inflammatory enteritis, severe abdominal cramping, pyrexia, and systemic bacteremia in immunologically vulnerable individuals.

Campylobacter jejuni

Campylobacter species, overwhelmingly dominated by *Campylobacter jejuni*, represent a leading bacterial cause of global diarrheal zoonoses. The primary transmission vectors include unpasteurized raw milk, undercooked poultry tissue, and contaminated open-source drinking water. Pathophysiologically, *C. jejuni* relies on its flagellar motility to penetrate the thick mucus layer of the human colon, where it secretes Cytolethal Distending Toxin (CDT) to induce cell cycle arrest and apoptosis in host enterocytes. Autoimmune molecular mimicry between the lipooligosaccharides on the *C. jejuni* cell wall and human peripheral nerve gangliosides can trigger Guillain-Barré syndrome an acute, demyelinating polyneuropathy causing flaccid paralysis.

Escherichia coli (STEC/EHEC)

While most strains of *Escherichia coli* are non-pathogenic, Shiga toxin-producing *Escherichia coli* (STEC), or Enterohemorrhagic *E. coli* (EHEC), features dangerous strains such as *E. coli* O157:H7. These strains harbor specialized virulence plasmids and lysogenic bacteriophages encoding potent Shiga toxins (Stx1 and Stx2). Ruminant livestock serve as the primary environmental reservoir, with transmission occurring via undercooked ground beef, unpasteurized juices, and fresh produce irrigated with contaminated runoff water. STEC binds to host enterocytes using intimin proteins to induce attaching and effacing (A/E) lesions. Systemic translocation of Shiga toxins into the bloodstream leads to binding at globotriaosylceramide (Gb3) receptors in the human renal glomerulus and central nervous system, halting ribosomal protein synthesis and causing Hemolytic Uremic Syndrome (HUS).

Listeria monocytogenes

Listeria monocytogenes is a psychrotrophic environmental pathogen capable of proliferating at refrigeration temperatures (4°C), making it a persistent threat in ready-to-eat (RTE) meat formulations, unpasteurized soft cheeses, and delicatessen products (Jayamanne and Samarajeewa, 2001; Jayamanne and Samarajeewa, 2010). While its' overall incidence is low, the case-fatality rate ranges between 20% and 30% among highly vulnerable demographics. *L. monocytogenes* utilizes internalin surface proteins (InlA and InlB) to invade host cells, producing listeriolysin O (LLO) and phospholipases to escape phagosomal vacuoles. By hijacking host actin filaments via the ActA protein, the bacterium propels itself directly into neighboring cells, evading extracellular humoral immune detection to breach intestinal, blood-brain, and placental barriers.

Staphylococcus aureus

Staphylococcus aureus acts through an intoxication pathway, introduced into the food matrix by asymptomatic human handlers. Under temperature abuse, it synthesizes highly heat-resistant staphylococcal enterotoxins (SEs). SEs function as potent superantigens, bypassing conventional processing by directly cross-linking Major Histocompatibility Complex (MHC) Class II molecules with T-cell receptors. This triggers a massive, systemic release of pro-inflammatory cytokines, inducing rapid, projectile emesis and acute diarrhea.

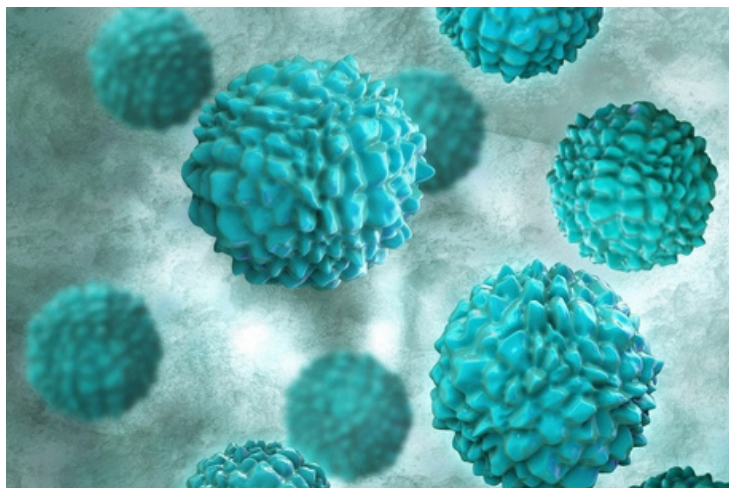


Viral and Parasitic Hazards

Viral and parasitic pathogens contribute heavily to the global foodborne disease burden (Table 1). Major viral agents include Norovirus, which causes acute, hyper-contagious gastroenteritis, and Hepatitis A Virus (HAV), which targets the liver to induce hepatocellular inflammation. Further, Rotavirus in foods caused millions of infant deaths under 5 years of age worldwide. Parasitic threats include *Toxoplasma gondii* (associated with undercooked meats and causing congenital damage), *Cryptosporidium parvum* (transmitted via wastewater and causing severe diarrhea), and *Taenia solium*, whose larval migration triggers neurocysticercosis and epilepsy.

Table 1. Viruses and parasites that cause foodborne illnesses in the world

Pathogen Class	Representative Organism	Primary Food Vehicles	Key Pathological Impact
Virus	<i>Norovirus</i>	Bivalve mollusks (oysters), fresh salads, contaminated drinking water	Acute, hyper-contagious gastroenteritis, severe vomiting, rapid outbreaks in communal settings.
Virus	<i>Hepatitis A Virus (HAV)</i>	Contaminated water, raw shellfish, and handled RTE items	Hepatic targeting, acute hepatocellular inflammation, jaundice, prolonged debilitating malaise.
Parasite	<i>Toxoplasma gondii</i>	Undercooked porcine/ovine meats, unwashed agricultural produce	Tissue cyst encystment, congenital ocular/neurological damage, severe systemic toxoplasmosis.
Parasite	<i>Cryptosporidium parvum</i>	Wastewater-irrigated produce, contaminated drinking water	Oocyst-mediated infection, severe, profuse watery diarrhea; life-threatening in HIV/AIDS patients.
Parasite	<i>Taenia solium</i>	Undercooked or contaminated pork products	Intestinal taeniasis; larval oncosphere migration causing neurocysticercosis and epilepsy.



Chemical Contaminants and Biotoxins

Food safety systems must continuously mitigate non-biological hazards. Secondary toxic fungal metabolites known as mycotoxins, such as Aflatoxin B1 synthesized by *Aspergillus flavus*, contaminate staple grains and act as potent carcinogens by forming DNA adducts in the liver. Persistent Organic Pollutants (POPs) bioaccumulate within animal adipose tissues and impair reproductive, endocrine, and immune functions. Additionally, heavy metals (lead, cadmium, methylmercury) introduced via industrial discharge accumulate in rice and predatory marine fish, inducing oxidative stress, neurotoxicity, and renal tubular necrosis.

MACRO-ENVIRONMENTAL AND ANTHROPOGENIC DRIVERS

Climate Change and Microbial Ecology

Environmental climate change reconfigures the geographic boundaries and seasonal survival patterns of foodborne pathogens. Rising global temperatures and erratic precipitation alter localized microclimates, accelerating the replication dynamics of pathogens like *Salmonella* and facilitating the proliferation of pathogenic *Vibrio* species in warmer coastal waters. Furthermore, severe flooding events overwhelm municipal wastewater infrastructures, causing raw sewage to contaminate agricultural irrigation waters and introducing enteric pathogens into fresh produce fields.

Globalization of Supply Chains

The modern food supply chain is a highly interconnected global network. While globalization grants year-round access to diverse products, it extends the distance food travels, introducing vulnerabilities at every point. A single batch of contaminated ingredients processed in a centralized facility can be distributed across international borders within hours. This complexity makes epidemiological traceback investigations exceptionally difficult and means local sanitary failures can quickly escalate into international public health emergencies.

Consumer Demographics and Antimicrobial Resistance (AMR) Modern dietary patterns have shifted toward the regular consumption of raw vegetables, minimally processed foods, and convenient ready-to-eat (RTE) options. Consuming unheated produce eliminates a critical control point—the thermal kill step—allowing pathogens to enter the digestive tract directly. Concurrently, the widespread overuse and misuse of antimicrobial agents in veterinary medicine and livestock production have accelerated the evolution of Multidrug-Resistant (MDR) foodborne pathogens. Exposed bacterial populations experience selective pressure, driving the acquisition of resistance genes via horizontal genetic transfer.

Pathogens such as *Salmonella* and *Campylobacter* frequently exhibit resistance to critical first-line human therapeutics, limiting clinical treatment options and leading to higher mortality rates.

ADVANCED DIAGNOSTICS AND GLOBAL GOVERNANCE

Diagnostics and Surveillance

Food safety systems are moving away from traditional culture-based techniques toward rapid, high-throughput technologies. Whole Genome Sequencing (WGS) decodes the entire genome of a microbial isolate, providing Single-Nucleotide Polymorphism (SNP) resolution to link clinical isolates with contaminated food sources across different geographic regions. Nanotechnology is also driving the development of rapid, field-deployable screening tools. Further, Perovskite Quantum Dots (such as CsPbBr₃ PQDs) are used as fluorescence-based nanosensors. When functionalized with specific monoclonal antibodies or DNA aptamers, these nanomaterials bind to targeted pathogens, altering the fluorescent signal and allowing for sensitive, real-time detection without extensive and expensive laboratory processing.

Global Food Safety Governance: The One Health Framework

Managing contemporary foodborne risks requires integrated, multi-sectoral governance rather than isolated agricultural or clinical interventions (WHO/FERG, 2026). The World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Organisation for Animal Health (WOAH) advocate for a unified One Health approach (WHO/FERG, 2026). This framework recognizes that human health is intrinsically linked to animal health, plant health, and the shared environment.

The WHO Global Strategy for Food Safety 2022–2030 outlines five strategic priorities designed to help member states build robust, future-proof national food control systems (WHO/FERG, 2026; Zheng, et al., 2026):

1. Strengthening National Food Control Systems: Modernizing regulatory frameworks and enforcing compliance across the entire food chain.

2. Identifying and Responding to Food Safety Challenges: Deploying predictive surveillance, WGS networks, and rapid-alert mechanisms like International Food Safety Authorities Network (INFOSAN).

3. Mandatory introduction of food safety plans such as Hazard Analysis Critical Control Points (HACCP) plans to the food industry across the globe.

4. Improving the Use of Food Chain Information: Enhancing risk communication and tracking capabilities from farm to fork.

5. Continually Improving Risk Communication: Fostering transparent dialogue between scientific bodies, industry stakeholders, and the public.

6. Enhancing Food Safety Capacity-Building: Promoting international collaboration and technical knowledge transfer, particularly to assist Low and Middle Income Countries (LMIC).

Conclusions

Food safety is a dynamic and evolving public health challenge in the whole world. Traditional sanitation practices, while foundational, are no longer sufficient to manage a global food system shaped by climate change, antimicrobial resistance, and intricate international supply chains. Minimizing the global burden of foodborne diseases requires a sustained commitment to integrating advanced diagnostic technologies like whole genome sequencing and nanotechnology-based biosensors into routine surveillance ensuring real-time detection and rectification. At the governance level, implementing the One Health framework is essential for breaking the transmission pathways of pathogens across animal, environmental, and human interfaces. By investing in resilient food safety infrastructures and fostering cross-border collaboration, the international community can better safeguard global food systems, protect vulnerable populations, and reduce the heavy burden of preventable foodborne illness worldwide.

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Nutrition and Mental Wellbeing: Nourishing the Mind through Healthy Diets in Sri Lanka



Ms. H P E Dee Zoysa
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Mental wellbeing is an important part of overall health. It affects how people think, feel, and function in their daily lives. In Sri Lanka, rising stress levels, rapid urbanization, and changing lifestyles have contributed to an increase in mental health issues such as anxiety and depression. While psychological and social factors are widely discussed, the role of nutrition in mental health is often overlooked.

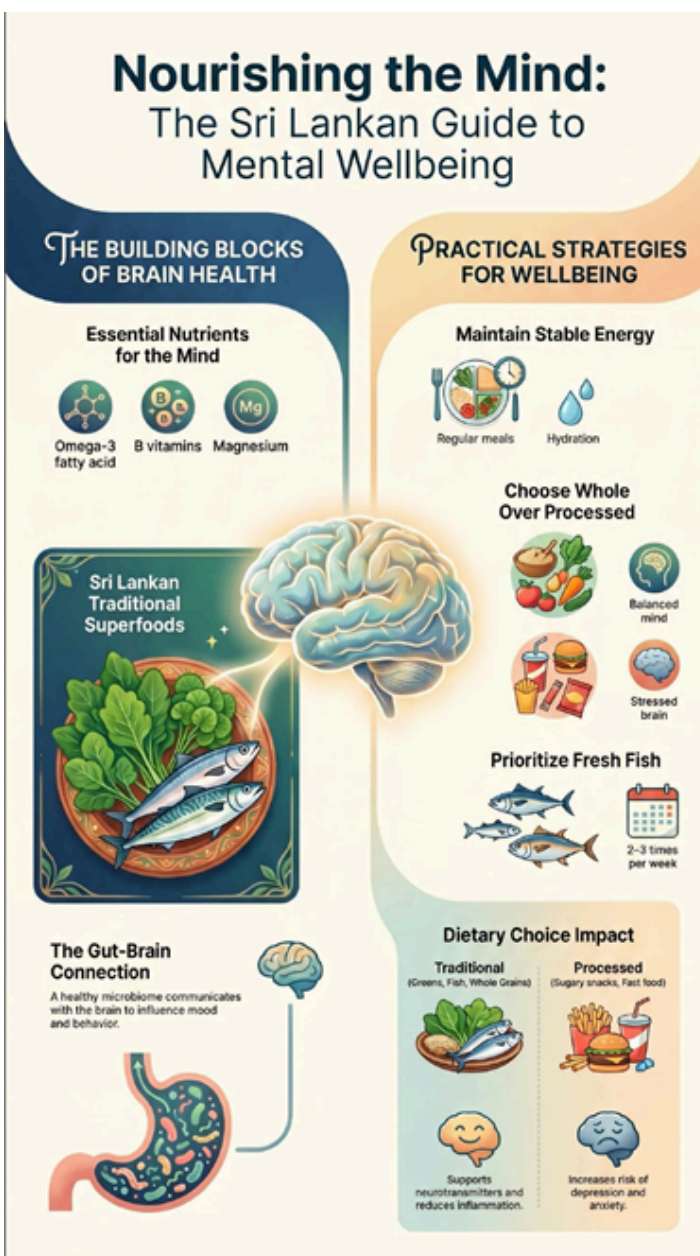
Recent research shows that the quality of our diet can influence brain function, mood, and thinking ability. Therefore, good nutrition offers a practical and affordable way to support mental wellbeing at both individual and community levels.

The Link Between Nutrition and Mental Health

The brain needs a steady supply of nutrients to function properly. Macronutrients such as carbohydrates, proteins, and fats provide energy, while micronutrients like vitamins and minerals help the brain work efficiently.

Nutrition affects mental health in several ways. Certain nutrients are needed to produce brain chemicals such as serotonin and dopamine, which help regulate mood. Diet also affects inflammation in the body; eating too many processed foods can increase inflammation, which has been linked to depression. In addition, the gut and brain are closely connected. The gut microbiome can influence mood and behavior through what is known as the gut-brain axis.

A balanced diet helps support these systems, while unhealthy eating habits may disturb them and negatively affect mental health.



Key Nutrients for Mental Wellbeing

Omega-3 Fatty Acids: Omega-3 fatty acids are important for brain health. They are found in fish such as sardines and mackerel and are linked to a better mood and improved thinking ability.

B Vitamins: Vitamins such as B6, B12, and folate help the body produce important brain chemicals and maintain energy levels. Low levels of these vitamins may lead to tiredness and mood problems.

Minerals (Iron, Zinc, Magnesium): Iron helps carry oxygen in the blood and supports concentration. Zinc plays a role in brain function and immunity, while magnesium helps the body manage stress and supports relaxation.

Antioxidants: Fruits and vegetables contain antioxidants that protect the body from damage caused by oxidative stress, which is linked to mental health problems.

Dietary Patterns and Mental Health Outcomes

Overall eating patterns are more important than single nutrients. Diets that include plenty of fruits and vegetables, whole grains, legumes, nuts, fish, and healthy fats are linked to better mental wellbeing.

On the other hand, diets high in sugar, processed foods, and unhealthy fats are associated with a higher risk of depression and anxiety. Encouraging healthier eating patterns is therefore important for both physical and mental health.

Sri Lankan Context: Opportunities and Challenges

Sri Lanka has a rich food culture with many traditional foods that support good health. Green leafy vegetables, pulses, coconut-based dishes, and fresh fish are all nutritious and beneficial for brain health.

However, dietary transitions are evident in Sri Lanka. Many people are moving away from traditional home-cooked meals towards processed foods, fast foods, and sugary drinks. This trend is especially common among younger people and those living in urban areas. These changes may negatively affect both physical and mental health.

In addition, awareness about the link between diet and mental wellbeing is still limited. Promoting this knowledge can help improve overall health outcomes.

Practical Dietary Strategies for Mental Wellbeing

Improving mental wellbeing through nutrition does not require major changes. Simple steps can make a big difference. Eating regular, balanced meals helps maintain steady energy levels. Including a variety of fruits and vegetables daily provides important nutrients for the brain. Eating fish two to three times per week can supply beneficial omega-3 fatty acids. Choosing whole grains instead of refined foods, drinking enough water, and reducing sugar and processed foods are also important. Practicing mindful eating—such as paying attention to hunger and fullness—can help develop a healthier relationship with food and support mental wellbeing.

Nutrition in Mental Health Promotion

Including nutrition in mental health programmes can improve overall wellbeing. Schools, workplaces, and community programmes can help promote healthy eating habits and raise awareness.

Healthcare professionals, including dietitians and nutritionists, can support this by providing advice, working with mental health professionals, and creating educational materials. Working together across different fields is important for effective mental health promotion.

Recommendations

To improve mental wellbeing through nutrition in Sri Lanka, several key actions are needed. Public awareness of the link between diet and mental health should be strengthened through national and community-based programmes. Nutrition education should also be integrated into mental health services, school curricula, and primary healthcare systems.

The promotion of traditional, nutrient-rich foods such as green leafy vegetables, pulses, and fish should be encouraged to support both physical and mental health. In addition, more locally relevant research is needed to better understand the relationship between diet and mental wellbeing in the Sri Lankan context. Strengthening collaboration between nutrition professionals and mental health practitioners is also essential to provide more comprehensive and effective care.

Conclusions

Nutrition is an important but often under-recognized factor in mental wellbeing. In Sri Lanka, promoting healthy eating habits and traditional diets can make a meaningful contribution to improving mental health outcomes. Simple and practical dietary changes, along with increased awareness, can help individuals and communities support both their physical and mental wellbeing.



FuturePlate

Shaping Healthier Generations Through School-Based Nutrition Awareness in Sri Lanka



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Why I Started With a Plate

Every clinical day I spend with patients, I am reminded of a quiet truth: most of the chronic illness I treat in adulthood was written, in pencil, somewhere in childhood. Over the past few decades, the world has watched non-communicable diseases — diabetes, cardiovascular disease and obesity — climb into the ranks of our most pressing public health concerns. And again and again, the trail leads back to one origin: the dietary habits we form early in life.

Today's children and adolescents are growing up inside food environments that nudge them toward the wrong choices, leaving them short on the nutrients that matter most — fruits and vegetables above all. These early habits rarely stay in childhood. They follow us, quietly raising our health risks for the rest of our lives.

In Sri Lanka, this concern carries a sharper edge in our rural communities. We have made real strides in general education, yet access to nutrition education has not kept pace. Awareness campaigns do exist, but they tend to arrive in fits and starts — too inconsistent and too thin to move the needle on the lasting behaviour of a school-aged child.

This is precisely why I keep returning to schools. To my mind, there is no more powerful platform for shaping habits that last a lifetime. A school offers what so many other settings cannot: a structured space where knowledge, attitudes and behaviour can be shaped not one child at a time, but together.

It was this opportunity — the sense that we were leaving something obvious untouched — that led me to build the FuturePlate: School-Based Nutrition Awareness Project, an initiative created to close the gaps in children's nutrition knowledge and to make healthier eating feel natural to a generation of adolescents.

FuturePlate did not begin as an idea on paper. It grew out of evidence. My undergraduate research — Assessment of adolescent behaviour on fruit and vegetable consumption in a rural area of Anuradhapura, Sri Lanka — laid bare how significant the gaps in fruit and vegetable consumption truly were among the adolescents I studied. I could not unsee those numbers. So I designed FuturePlate to be everything a research finding usually is not: practical, engaging and built to last. Its aim reaches beyond teaching. It is to empower — students, teachers and families alike — to choose healthier lives for themselves.

The Case for Meeting Children Where They Learn

Adolescence is one of the most consequential windows in the whole of human development. Growth is rapid, nutritional demands run high, and the lifestyle patterns of the adult-to-be begin to set like concrete. Yet so many adolescents simply do not have the basics — what a balanced diet looks like, what a sensible portion is, why certain nutrients matter at all. And even where the knowledge is present, it does not always cross the bridge into practice, blocked by the environmental and social pressures that surround a young person every day.

In rural Sri Lanka, those obstacles are higher still. With little exposure to structured nutrition education, students lean on convenience foods and unbalanced meals, and fruits and vegetables slip to the margins of the plate. This gap — between what young people might know and what they actually do — is exactly where good intentions go to die. It is also exactly why interventions must do more than recite theory.

The evidence on school-based programmes is encouraging, and it matches what I have seen with my own eyes. Schools let us engage children again and again, harness the gentle gravity of peer influence, and fold healthy choices into the rhythm of an ordinary day. When we draw teachers and parents into the effort as well, we surround the child with a consistent message — one that holds firm both in the classroom and at the kitchen table.

I built FuturePlate around exactly this understanding: to carry children across the bridge from knowing to doing, through approaches that are interactive and centred on the students themselves.

What FuturePlate Actually Is...

FuturePlate is a school-based nutrition awareness initiative running in selected government schools across the Anuradhapura District of Sri Lanka. We focus our efforts on Grade 8 and 9 students and their teachers, because early adolescence is the moment when lifelong dietary habits are still soft enough to shape.

The initiative rests on three pillars that I refuse to separate: education, engagement and empowerment. This is deliberately not a programme that lives and dies inside a textbook. It spills out of the classroom into hands-on activity, peer-led initiative and the wider life of the community.

As the project founder — and as a registered nutritionist and dietitian — I started FuturePlate with a clear vision: a sustainable model that could one day stretch across Sri Lanka. We do not work alone. The project is backed by academic institutions, fellow health professionals and educational authorities, which gives us both the technical rigour and the community footing the work demands.

What We Set Out to Achieve

At its heart, FuturePlate exists to plant healthy eating habits that endure for a lifetime. We want children eating more fruits and vegetables each day, and — just as importantly — we want them feeling genuinely positive about nutritious food rather than dutiful about it.

Beyond the plate, we are working to lower the long-term risk of non-communicable diseases by delivering meaningful nutrition education while children are still young enough for it to take root.

There is a second, quieter aim that matters just as much. We are strengthening teachers' ability to weave nutrition education into their everyday teaching, and bringing parents into the fold so that healthy habits are reinforced at home rather than abandoned at the school gate. It is this layered, multi-level approach that creates the conditions for behaviour change that actually sticks.

How We Bring It to Life

If FuturePlate works, it is because of how it feels to take part in it. We made an early decision to step away from the lecture and toward participation, building the programme out of methods designed to draw students in rather than talk at them.

Learning That Doesn't Feel Like a Lesson

Our workshops run on quizzes, games, storytelling and vivid visual aids — because a child who is enjoying themselves is a child who is learning. These sessions cover the essentials: balanced diets, why fruits and vegetables matter, the importance of hydration, and the habits of a healthy lifestyle. When learning is genuinely fun, students hold on to it, and they carry it home into the choices of their daily lives.

The School Nutrition Ambassador Programme

Of everything we do, the School Nutrition Ambassador Programme is the part I am proudest of. We select and train students to become peer leaders — young champions of nutrition awareness inside their own schools.

These ambassadors are far from passive. They organise nutrition-themed campaigns, run healthy cooking sessions and stage poster competitions. They step up during school assemblies to deliver short speeches, and they fill the school knowledge boards with creative, nutrition-focused content of their own making.

This peer-led design is no accident. A message lands differently when it comes from a classmate rather than an adult, and students are simply more open to one another. As a happy second harvest, the ambassadors themselves grow — in leadership, in confidence, and in a real sense of responsibility for the wellbeing of their peers.

Reaching the Home

I have never believed that a child's nutrition can be solved at school alone. Because the home environment carries such weight, FuturePlate also offers parental awareness sessions on request — opportunities to help parents understand the value of a balanced diet and to encourage them to nurture healthy eating habits under their own roof.



From the Field: What We Have Seen So Far

In this first phase of implementation, FuturePlate has already been carried out successfully in five schools across the Anuradhapura District. These early days in the field have taught us a great deal about what works and how readily the programme adapts.

The response from students has been, quite simply, overwhelming. They have thrown themselves into the workshops, lighting up during the interactive moments — the quizzes, the competitions, the games that turn a lesson into an event.

Teachers, too, have welcomed the programme warmly, and many have been candid about a gap they had long felt but rarely named: the absence of structured nutrition education in their existing curriculum.

Perhaps the most telling observation of all is how little many students knew about basic nutrition before we arrived. Far from discouraging me, this confirms exactly why a programme like FuturePlate is needed — and why it belongs, above all, in our rural schools.

Measuring What Matters

Good intentions are not enough, so we hold ourselves to a structured monitoring and evaluation framework. We begin with baseline assessments to capture where students stand — their knowledge, their attitudes and their practices around nutrition — and follow up with endline assessments to measure what has shifted after the intervention.

Numbers, however, only tell part of the story. We gather qualitative feedback from students and teachers to understand their lived experience and to surface where we can do better. Observation checklists and the activity logs our student ambassadors keep add another layer of insight, helping us trace progress as it unfolds. Everything these evaluations reveal flows straight back into the programme, sharpening it and strengthening it for the phases still to come.

The Honest Difficulties

No initiative that lives in the real world escapes friction, and FuturePlate is no exception. The crowded school timetable sometimes leaves us less time than our activities deserve. Resource constraints and the ordinary logistics of fieldwork throw up their own occasional hurdles.

The challenge that occupies me most, though, is sustaining parental involvement — because the change we are after at home is the change that ultimately decides whether any of this lasts. Even so, the programme has proven remarkably adaptable, and we keep refining it, lesson by lesson, against what the field teaches us.

Those very lessons have become some of our most valuable assets, reshaping how we implement the work and readying us for the expansion ahead.

Where We Are Headed

I never designed FuturePlate to be a brief intervention that flares and fades. It is meant to be a foundation. Our path forward leads first to more schools across the Anuradhapura District and in time to other regions of Sri Lanka entirely.

A Healthier Generation, One Plate at a Time

The FuturePlate: School-Based Nutrition Awareness Project is, I believe, a timely and meaningful answer to the rising tide of poor dietary behaviour among our adolescents. By holding education, engagement and empowerment together, it creates the kind of supportive environment in which lasting behaviour change can finally take hold.

Through its innovative strategies — peer-led initiatives and teacher training chief among them — FuturePlate reaches past the limits of traditional education to leave a lasting mark on its school communities. The encouraging results of this first phase point clearly toward something larger: a programme that can scale and succeed over the long term.

In the end, FuturePlate is more than a project to me. It is a step toward a healthier, more informed generation. When we invest in the nutrition of today's young people, we are quietly shaping the health of tomorrow's society — and that, plate by plate, is a future worth building.





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