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Mitigation of Malnutrition

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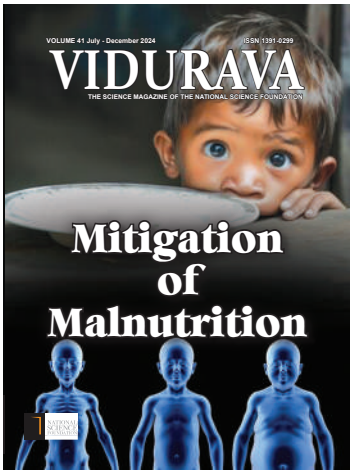

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Editorial

The expectations of Malnutrition

The article on "Improving Nutrition: A holistic approach to Health and Wellbeing complied by Dr. Vinya Ariyaratne is of high significance, especially because of the discussion on traditional knowledge. This has been a subject of great interest to me, in which I had the opportunity of undertaking extensive studies and publishing the information. I am well aware of the senior Dr. Ariyaratne, who initiated the well-known "Sarvodaya Movement". Sometime in the early 1950's. Dr Ariyaratne senior as far as I remember was in the teaching staff of Nalanda Vidyalaya, Colombo of which I myself had my secondary Education. My reflections are correct, Dr Ariyaratne (Senior) decided to terminate his teaching assignment and picked up a few enthusiastic students and established the Sarvodaya movement. This small group went in search of villages in remote areas, with the intention of providing relief to poverty ridden traditional folk.

My interest was also a traditional knowledge custom, lifestyle practices in not only in respect of agriculture but also of fisheries, indigenous medicine and cultural biodiversity. In this connection I would also like to refer to the work of G.K Upawansa, former staff member of the Agriculture Department, who introduced a form of paddy cultivation called "Nava Kekulama" in which he demonstrated how rice cultivation could be carried out without chemical inputs. He also established an ancient system called "Kurulu Paluwa" within the premises of the paddy field as a bird sanctuary with the expectations that insect pests would be destroyed that destroy paddy plants.

The next article is on "Against Malnutrition advocating for sustainable local food systems". This article discusses the impact of modern lifestyle with the consumption of rich hot, unhealthy imparted food with artificial coloring, flavoring, when we have a varied and rich non-toxic food. Such misconceptions could be handed down to us a rich tradition of local food. We are well known to have a vegetarian food porridge culture that can provide the necessary nourishment.

The article on mitigation of malnutrition gives prominence to nutrition deficiency disorders and also focus an over-weight and obesity. Nutritional disorders of importance to Sri Lanka have been Protein Energy Malnutrition, Iron deficiency anemia, Vitamin A deficiency, Iodine Deficiency and Zinc deficiency. All in all, we have a wide coverage of malnutrition and ways to overcome these problems.

The article reveals that the sustainable agriculture ensures food security in Sri Lanka. The author provides 10 reasons on whether Sri Lanka can ensure sustainable agriculture and food security. In answering this question, the writer provides the "for and against" reasons of adding food security.

In general, this article provides a rich range of options that can have an effect on mitigation of malnutrition.

M. Asoka T. De Silva

Mitigation of Malnutrition

Prof. Narada D Warnasuriya

The free medical dictionary defines malnutrition as the condition that develops when the body does not get the right amount of vitamins, minerals and other nutrients it needs to maintain healthy tissues and organ function.

The World Health Organization (WHO) views it more broadly. In their view, malnutrition refers to deficiencies or excesses of nutrient intake, imbalance of essential nutrients or impaired nutrient utilization.

The double burden of malnutrition consists of both undernutrition and overweight and obesity as well as diet related non communicable diseases.

The life-cycle approach to nutrition clearly reveals that these conditions are interlinked.

This article, while giving priority to nutrition deficiency disorders, will also address problems related to overweight and obesity. While briefly referring to the global situation, it will focus primarily on Sri Lanka.

Mitigation is the act of making milder or less intense or severe. Mitigation of malnutrition at both personal level and at community (national) level will be discussed. You may wonder why we aim for mitigation rather than eradication. In diseases of a single pathogen etiology (causation), like malaria and poliomyelitis, we aim for eradication and with poliomyelitis we have achieved it. Malnutrition has a very complex etiology and is less amenable to eradication at community level. At a personal level one may strive for its eradication but that too is difficult.

Nutritional deficiency disorders of public health importance in Sri Lanka include: Energy Protein Malnutrition (EPM), iron deficiency anemia, vitamin A deficiency, Iodine deficiency and zinc deficiency. Low birth weight is another nutrition related problem of public health significance.

Overweight and obesity are the main outcomes of over nutrition. There are several other Non-Communicable Diseases (NCD) such as diabetes, hypertension (high blood pressure), heart diseases, strokes and cancers which are the main causes of mortality (Death) in adults, directly related to overweight and obesity. They too come under the scope of our discussion.

Assessment of nutritional status of an individual can be done clinically (using externally visible physical features),

Figure 1: Non-Communicable Diseases (NCD)

anthropometrically or biochemically. Which of these methods are used depends on the disorder. EPM is usually assessed anthropometrically, though the severe forms like marasmus and kwashiorkor can be recognized clinically. Overweight and obesity are also assessed anthropometrically. Vitamin A deficiency and Iodine deficiency are assessed clinically using a gradation of eye signs for Vitamin A and goiter for iodine deficiency. However due to successful interventions, prevalence of both have come down dramatically and presently we assess their sub-clinical forms (not externally visible) biochemically. The same applies to Zinc deficiency. Iron deficiency anemia, though recognizable clinically when severe, has always being assessed by estimation of the Hemoglobin percentage in blood. Milder degrees of iron deficiency not severe enough to cause anemia, are assessed using other biochemical criteria.

Energy protein malnutrition which is due to a deficiency of the macronutrients, carbohydrate, fat and protein, is the most widely prevalent nutrition deficiency disorder in developing countries including Sri Lanka. It occurs in two forms, acute and chronic. Acute EPM causes wasting, while the chronic form causes stunting.

They are diagnosed using anthropometric criteria. Anthropometry refers to accurate measurement of various body features such as height, weight, head circumference, waist circumference, mid-arm

circumference and skin fold thickness. The individual measurements or indices based on these measurements are compared with population-based reference standards which are developed through large population studies. Currently in Sri Lanka, we use the WHO (World Health Organization) growth standards as our reference standard.

Weight for height -3SD (standard deviations) below median is considered severe wasting, also referred to as Sever Acute Malnutrition (SAM). Between -2SD and -3SD is considered to be Moderate Acute Malnutrition (MAM).

Height for age-3SD below median is severe stunting and between -2SD and -3SD is moderate stunting.

Weight for Age deficit is a combined measure which does not distinguish between acute and chronic forms, referred to as underweight it could be due to wasting or stunting or a combination of both.

Public health statistics about child malnutrition are based entirely on the above mentioned anthropometric diagnoses.

However, severe acute malnutrition can be distinguished clinically into three syndromes progressively worsening in severity, viz; marasmus, marasmic kwashiorkor and kwashiorkor.

While the correlation between morbidity (ill health) and risk of mortality (death) of the anthropometric diagnostic categories is sufficient for public

health decisions, assessment of the degree of disturbance of bodily function, which is a pre requisite for correct management, is based on a clinical assessment. Routine use of relatively cost intensive interventions like ready to use therapeutic food (RUTF) based on an anthropometric diagnosis cannot be justified scientifically.

The prevalence and trends of wasting, stunting, and under weight in children under 5 years, based on national surveys conducted by the Medical Research Institute (MRI) over the last 50 years is summarized in the graph/table shown below. This is the key target age group affected and one in which the harmful effects are most severe.

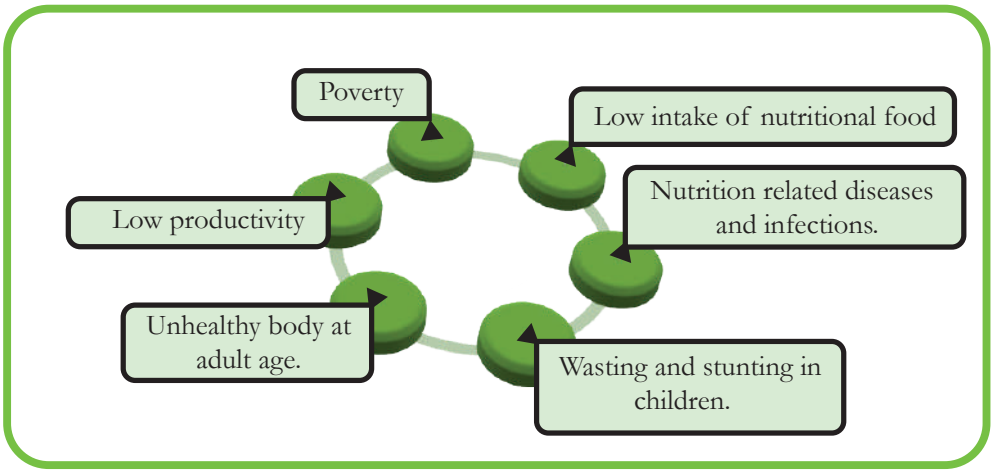
It shows that while stunting and underweight has reduced significantly over this period, wasting has remained constant and even increased slightly during the last year. Even in stunting and underweight, the pace of reduction has slowed down since 2006. However there are marked differences in the prevalence of these conditions between urban, rural, and estate sectors and between different provinces and districts. The estate sector, which was the worst affected, has shown some progress during the last 20 years.

While children under five years are the most susceptible to the serious outcomes of malnutrition there are other categories who are also vulnerable. They include adolescents/school children, pregnant and lactating mothers and the elderly (>65 years).

The prevalence of these disorders in these categories will not be discussed in this article.

There is an intergenerational vicious cycle which links these groups. The effects of malnutrition throughout the life cycle are depicted in the diagram below.

This diagram also depicts the harmful effects of malnutrition.



Further study of the intergenerational nature of malnutrition reveals that malnutrition commences from conception and occurs during the intra uterine period i.e. the period within the mother's womb and continues most rapidly during the first two years after birth. Most of the growth retardation occurs during this period now referred to as the first thousand days. The consequences of malnutrition during this period are now recognized to extend to adulthood. "Fetal origins of adult disease hypothesis" first proposed by the British epidemiologist Barker is now supported by epidemiological evidence from both developing and industrialized countries. Low birth weight and stunted babies in early life have greater chance of developing obesity and the non-communicable diseases in adulthood. The importance of directing our focus to this period i.e. the first thousand days, in mitigation/ prevention of malnutrition is well recognized. It is referred to as a window of opportunity.

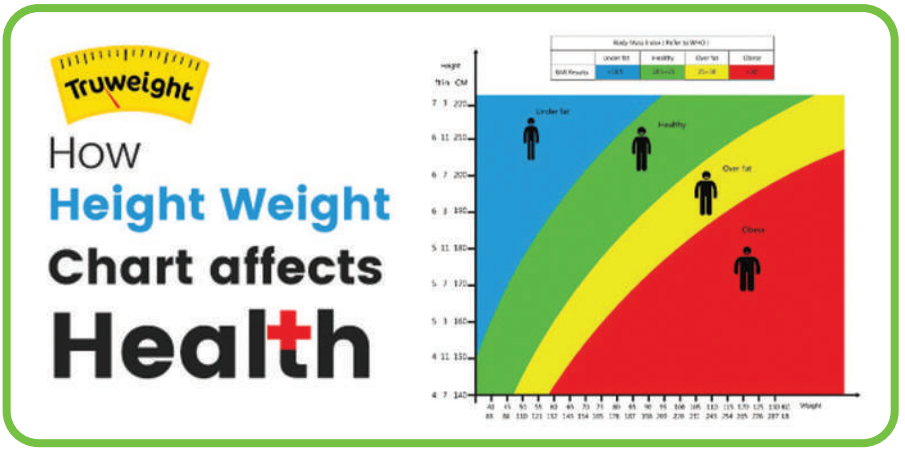
The harmful effects of malnutrition accrue to the individual and the community. They include retardation of growth, impairment of cognitive (brain) development, susceptibility to infections due to lowering of immunity, increased risk of mortality due to infection, and reduction of the productivity both physically and mentally. It also leads to a greater prevalence of obesity and non-communicable diseases in adults. By sapping the human resources it has adverse impact on social and economic development. Increased morbidity and mortality adds greatly to health care costs.

The micronutrient deficiencies such iron, iodine, vitamin A and zinc are still considered to be public health problems in spite of the severe clinical forms being

rare. Existence of biochemical deficiency is a reason for concern, as if the conditions deteriorate these diseases can re-emerge at both individual and community level. Vitamin A deficiency and Zinc deficiency are recognized causes of secondary immune deficiency and contribute to greater morbidity due to respiratory and gastrointestinal infections. Iron and zinc deficiency in infancy are recognized causes of cognitive impairment in later life. Wasting (acute EPM) also predisposes to infection and makes the chance of dying from an infection much greater. UNICEF estimates that at least one third of child deaths in the world have malnutrition as an underlying cause. Both acute and chronic EPM are also recognized as a cause of impaired cognitive development. Stunting in the female child leads to stunted adults with heights less than 145 cm which is an important cause for low birth weight babies. That is how the vicious cycle starts.

Having discussed the serious sequelae of malnutrition and its intergenerational impact, it is opportune now to discuss its causation (etiology). As indicated earlier it is complex and multifactorial. UNICEF in 1998 developed a conceptual frame work for causes of child undernutrition. An adapted version of this frame work is depicted below as a diagram.

Although the diagram is self-explanatory, a further description is provided for clarity. The final outcome is malnutrition and all its harmful effects described above. The immediate causes are inadequacy of food intake and some disease, most often



in children, it is an infection. Sometimes it could be another disease like cancer or diabetes. The interaction between malnutrition and infection is well established. Malnutrition causes a weakening of the body's immunity. And predisposes it to infection.

Infection reduces the appetite and weakens the digestion, absorption and utilization of the nutrients for bodily growth and bodily functions. Other diseases also act in a similar manner.

At a household or family level, inadequate access to food due to poverty or food not being available for purchase, money being spent for other purposes like alcohol, smoking or addictive substances like cannabis, Incorrect practices related to nutrition and child care like not breast feeding the baby, inadequate complementary feeding, wrong choice of foods, not going for public health services like growth monitoring or immunization, or not seeking health care when needed, inadequate access to housing, sanitation, water and health services. are among a long list of intermediate causes.

The ultimate or basic causes in society determined by social, economic and political systems could be due to poverty or inequitable provision of these services. Referred to as the social determinants of health, it is the responsibility of the state and the community as a whole to make these available in a fair and equitable manner to every citizen irrespective of geographical location, class, religion or ethnicity. Countries which are able to do this well are rated highly in the human development index.

I will recount a case history to illustrate the causation, using this model.

A 10 month old boy from an urban shanty in Colombo presented with high fever, cough and breathing difficulty. He was the first born of a 21 year old mother educated up to grade five who worked as a part-time domestic helper. The father was a 30 years old sanitary laborer who had dropped out of school in grade three. He consumed alcohol and smoked cannabis and used most of his earnings for this. The mother was very short and thin and had not

attended the ante natal clinic conducted by the municipality on a regular basis. Although she had received Thriposha from the clinic off and on, her weight gain during pregnancy was only 7 kg. At 38 weeks of gestation she was admitted with labor pains to the maternity hospital where she delivered this boy whose birthweight was 2.0 kg. There were no complications in the newborn period. Mother and baby were discharged home on the second day after baby was given the BCG vaccination. The mother breast-fed the baby in spite of some initial problems. As her parents lived far away there was no one to help her with the care of the baby. However an older lady from a neighboring shanty was helpful. The public health mid wife (PHM) visited once on the seventh day and advised her regarding breast feeding and invited her to the local clinic at four weeks. As the father's contribution to the household income was insufficient the mother was compelled to resume working when the baby was six weeks old. Baby was commenced on formula using the cheapest available infant formula. With her limited income she could afford only one pack per month. The neighbor agreed to look after baby during the mother's absence for a nominal fee. She prepared the formula at her house. Due to lack of water and fuel the sanitary aspects were not optimal. Breast feeding was done only at night. Although the baby was taken to the local child welfare clinic (CWC) off and on, growth monitoring and immunization had not been done in a systematic manner The baby had required hospital admission on two occasions at three months and six months respectively, on both occasions with a gastro enteritis and dehydration needing intravenous fluids. The mother had been advised at the clinic to commence complementary feeding using a homemade multimix of rice, dhal and vegetables and powdered sprats but was unable to do it on a regular basis due to lack of both finances and time. She had also been given some packets of thriposha to feed the child but not on a regular basis. On admission on this occasion the growth chart of the baby showed marked flattening of weight away from the median, with several sharp dips associated with infections. On examination the baby was severely wasted with the weight for height being in the red zone. He also had clinical evidence of a pneumonia. The admission diagnosis was Marasmus (SAM) with pneumonia.

If you analyze this case history you will be able to identify the causation of malnutrition in this child at the three levels. Using the conceptual frame work given above I suggest that you do it as an exercise. It will also enable you to understand the principles of mitigation and prevention. My analysis of causation is given as annexure one.

It is now opportune to look at the national level interventions that Sri Lanka has adopted in order to mitigate malnutrition.

Interventions can be classified as direct (nutrition-specific) or indirect (nutrition-sensitive). Direct interventions address the immediate causes of malnutrition such as improving household food security or prevention of disease, while the indirect interventions address the background issues such as

alleviating poverty, improving agricultural production or improvement in access to water and sanitation. Direct interventions could be targeted to specific groups or to the whole population.

The thriposha supplementation program, health education programs promoting breast feeding and correct complementary feeding, and the growth monitoring program using the child health development record are examples of direct interventions. The thriposha program, the school meal program, and the poshana malla for pregnant mothers program are examples of direct intervention targeted to specific categories, while the universal salt iodization program is a direct intervention to the whole population.

Indirect interventions include poverty alleviation programs such as Divineguma or Samurdhi, water supply schemes and agricultural subsidies.

While a critical in-depth analysis of these interventions are clearly outside the scope of this article, we can identify some which have achieved a measure of success.

Universal salt iodization program implemented in 1986 has achieved a significant reduction in endemic goiter and endemic cretinism. However no universally targeted program is without some negative effect. During this period there has been a slight increase of autoimmune thyroid disease in some segments of the population. While this needs close monitoring by the medical services, the advantages of the program far outweigh its negative aspects. The technical aspects of salt iodization too need to be closely monitored.

The growth monitoring program, breast feeding and complementary feeding using Infant and Young Child Feeding (IYCF) guidelines has achieved some success in improving Exclusive Breast Feeding (EBF) rates and reducing the more severe forms of SAM like marasmus and kwashiorkor. But we have a long way to go in this respect.

Mega dose vitamin A program coupled with nutrition education on increased consumption of beta carotene containing fruits and vegetables has achieved a significant reduction in eye disease due to Vitamin A deficiency, but sub-clinical Vitamin A deficiency is still prevalent.

The WHO has prepared a list of nutrition interventions for the mitigation of malnutrition using the lifecycle approach. These are depicted in the following diagram which is self-explanatory.

Many of these interventions are already being implemented in Sri Lanka with varying levels of success. Greater technical efficiency and more accurate targeting are likely to improve the outcome. Inadequate allocation of funds, lack of public awareness of these programs, and inadequate human resources for implementation have hindered their progress. Improving the general public's understanding of the causation of malnutrition and how it can be mitigated is likely to have a positive impact on the success of these interventions.

Mitigation/prevention of obesity/ overweight and NCDs like diabetes, hypertension, heart attacks, strokes and certain types of cancer which are diet-related need relatively greater individual/personal initiative. However state/community interventions are required to provide preventive and curative services in an equitable and affordable manner and in regulation of industries/ organizations which deal in products which are clearly conducive to development of obesity, and non-communicable diseases, such as sweetened beverages, fast food, tobacco, alcohol and other addictive substances.

The causation(etiology) of obesity and non-communicable diseases is also complex but is now fairly well understood. The intergenerational effect through low birth weight and stunting in early child hood is important. There is a clear familial contribution to obesity which is partly genetic and partly environmental. The two most important risk factors for obesity are excessive consumption of energy dense food and lack of physical exercise. The other risk factors for NCDs are excessive salt and saturated fat consumption, smoking and other forms of tobacco use, and consumption of alcohol.

Prevalence of overweight and obesity are increasing rapidly in Sri Lanka. Surprisingly it is not confined to the wealthy but affects the poor too. The prevalence of childhood obesity is also increasing. Obese children usually end up as obese adults. NCDs are already the most important cause of disability and death in adults. The dietary and life style changes which contribute to these have not occurred spontaneously but due to active promotion of these unhealthy practices and products through mass media, social media and other social interactions. While the state and society have an obligation to regulate these through legislation and other measures, the most important way to combat these is the creation of enlightened and empowered citizens who are knowledgeable about causation and prevention of malnutrition including obesity.

Some of the initiatives taken by the state to address these issue include.

- Establishing healthy life centers in all primary medical care units (PMCU) which provide medical and laboratory services for early detection and management of obesity and NCDs.
- Establishing medical nutrition clinics in all base/ provincial hospitals for management and follow-up of obesity and diet related NCDS. These are staffed by doctors specially trained in nutrition.
- Publishing national food-based dietary guidelines and disease specific food-based dietary guidelines for the public.
- Strengthening food regulations and food labelling and advertising guidelines to enforce a traffic light system of labelling for certain food categories, and to prohibit food advertising to children through mass/social media.
- Encouraging the creation of Consumer Protection Societies addressing specific categories, under the authority of the Consumer Protection Agency (CPA)
- Creation of the National Alcohol and Tobacco Agency (NATA) to strictly implement the global frameworks for control of tobacco and alcohol.

In this article we have learned that malnutrition is a widely prevalent problem in Sri Lanka. Though its causation is complex., the main underlying factors are clearly understood. Root causes are poverty and ignorance. We can mitigate these factors at an individual/community level and for both, awareness and full participation of an enlightened citizenry is the key.

Prof. Narada D Warnasuriya
Emeritus Professor of Pediatrics

Against Malnutrition - Advocating for Sustainable Local Food Systems

Dr. Danister L. P. Perera

According to the Food and Agriculture Organization (FAO) of the United Nations, around 18 million hectares of forests are lost annually. This results in 24 billion tons of soil degradation each year. Between 1970 and 2010, biodiversity on Earth decreased by 52%, leading to ongoing risks for natural, social, and physical resources. When natural resources are lost, it not only impacts ecosystems but also negatively affects human communities and the physical resources upon which they rely. The degradation of natural resources has been identified as a major issue in achieving social development. In response, sustainable development, which is aligned with the concept of a "Green Lifestyle," has been embraced as a model to safeguard both current and future generations. Sustainable development aims to cultivate environmentally friendly lifestyles.

In this approach, it is essential to reconnect people with nature and it is a responsibility in communities to protect the environment. Misuse of natural resources can harm the environment and threaten humanity's continued coexistence. Current consumption patterns, driven by a capitalist economy, have led to the depletion of global resources. The World Bank estimates that by 2050, global food production will need to increase by 60% to meet the needs of an estimated 9.6 billion people. Modern development, based on industrial and environmental metrics, has taken root within society due to public awareness. Moving away from traditional food systems, we now heavily invest in imported foods, which increases foreign exchange spending. The Green Revolution has driven agricultural industries to produce genetically modified crops that are sometimes unsustainable and harmful to the environment. Due to high input costs and artificial additives, modern agriculture has compromised traditional knowledge and sustainable practices. Sri Lanka's agriculture, with its indigenous varieties, water management systems, pest-resistant seeds, and eco-friendly pest control methods, is at risk of being overshadowed by artificial additives and modified organisms.

Globally, about one-fifth of the population consumes between 70-80% of the world's fuel and mineral resources, primarily

in industrialized countries. In contrast, the remaining four-fifths, mainly in Asia, Africa, and Latin America, use only around 20% of these resources. This inequality in resource consumption is a major factor driving environmental degradation and highlights the critical responsibility of developed nations in preserving the planet. In developing regions, nearly 1 billion people face undernourishment, with many suffering from hunger. South Asia and Africa have a significant number of people living with malnutrition and food insecurity, despite global advances in agricultural productivity.

Approximately 17% of global land area is used for agriculture, yet environmental degradation continues to affect these lands. Roughly one-third of global food production, equivalent to 1.3 billion tons, is lost due to factors like drought and floods. It's estimated that by 2025, food waste could increase to 2.2 billion tons, highlighting an urgent need to reduce food loss. According to FAO reports, food waste in developed nations alone costs around $680 billion annually, while developing nations lose about $310 billion. In countries like Sri Lanka, reducing food waste could significantly alleviate hunger for vulnerable populations.

The modern development and progress indicators are now primarily focused on industrial agriculture, green agriculture, and environmental sustainability. This focus is largely due to the increased public awareness surrounding these issues, which have become popular subjects of global discourse. We are in an era where we are spending foreign exchange on imported foods, often ignoring traditional food systems that are part of our heritage and should receive more attention. Green agriculture has become an ideal that people are beginning to embrace, despite its impact on traditional agricultural methods and local crop varieties. Reducing the expenses incurred on imports could benefit our economy, but this also demands caution about the harmful pesticides added to food, the degradation of soil, the destruction of biodiversity, and the risk of natural food systems being lost. Our agricultural heritage, traditional irrigation methods, crop varieties suited to the climate, indigenous seeds, and practices that support soil health and beneficial microorganisms have been neglected in favour of modernized green agriculture and new economic strategies. Unfortunately, we have lost much of this valuable knowledge and tradition in the process.

The media, once regarded as the voice of the people, has now been transformed into a profit-driven entity, nurturing a new culture within it. For an ancient time, our ancestors lived in harmony with green landscapes, benefiting from the earth's abundant health and well-being. However, due to various socio-economic influences, dietary habits evolved along with progress, leading to an era where artificial colourings and instant foods now dominate, replacing the once pure foundations of nourishment. The commercialization of the food industry, driven solely by profit, has led to the creation of foods filled with artificial flavours, colourings, and additives, which endanger people's lives. Through relentless advertising and media campaigns, the industry persuades the public to consume harmful foods loaded with excessive sugar, salt, and processed flours, without any consideration for the health consequences. Pharmaceutical companies, too, reap profits by alienating people from natural foods, raising doubts about potential commercial ties with various artificial food and pharmaceutical corporations.

To increase the variety of nutrients obtained from different sources, we strive for diversity and balance in nutrition. This means that local foods and imported foods, as well as foods rich in fibre and traditional foods, should be embraced with various adaptations to promote our

community's health and nutrition comprehensively. Consuming rice prepared with pulses, different types of grain-based rice dishes, and rice with locally sourced flavours all represent sociocultural values. Furthermore, today, rice dishes prepared with pulses have become a popular food trend in our local restaurants, shaped by cultural influences.

On the roadside, stalls selling rice dishes with pulses, traditional local rice meals, homemade meals, and coconut-infused rice, as well as other small vendors and restaurants, showcase our heritage. Although nowadays rice dishes with pulses and other grains are being marketed as traditional, these foods harken back to simpler times when people, often traveling in harsh conditions, relied on practical and sustaining food options to alleviate hunger. The nutritious value of these rice dishes, like rice prepared with pulses or grains, is widely appreciated today, and awareness about their health benefits is spreading, bringing advantages to people across society. These rice dishes, such as coconut-infused rice, are enjoyed in rural settings as a nostalgic link to village life by urban dwellers. Restaurants that serve coconut-infused rice may have modern decor with glass tables, electric fans, and ambient lighting, creating a unique fusion of traditional and modern dining experiences.

Plating a serving of rice with pulses typically involves placing a small heap of rice with pulses on a plate, reflecting the traditional style of authentic rural cuisine. This rural-style dish would often be complemented with ingredients like sautéed onion, green beans,

grated coconut, a piece of dried fish, a slice of lime, and a sprig of leafy greens. Additional side dishes might include beetroot, leeks, carrots, chicken, and eggs. The meal a villager enjoys with coconut-infused rice echoes the authenticity and quality of traditional fare. Sometimes, the rice with pulses itself is prepared in a Thai-inspired way, incorporating Indian flavours. Ingredients like red onions, green chilies, garlic, and ginger have origins in India. Cinnamon and cloves are used sparingly for aroma, while coconut milk hails from Thailand, and tamarind is from Malaysia. Although the spices and vegetables are locally sourced, the grains of rice, vegetables, and herbs are entirely domestic. Therefore, the term 'authentic local cuisine' is often a cultural misconception.

This misconception can be dispelled by recognizing that traditional recipes passed down from the past and created with care bring a sense of satisfaction and connection. To truly enjoy the experience, one would enter the setting where these meals are served with the understanding that coconut-infused rice, bean curry, and clay pots are part of the traditional presentation, but it may lack certain cultural symbols. For instance, it may not involve wood-fired cooking or clay vessels but rather a gas stove. Still, the rice might be served in clay dishes, embodying a mix of tradition and contemporary dining.

Our ancestors have handed down to us a rich tradition tied closely with water, which thrived amidst dew-covered landscapes. The fields once filled with the crops and rice of our agricultural diversity and cultural wealth, were adorned with grains that nourished a nation full of abundance, strength, and growth. However, today, commercial advertising, backed by various media, subtly shapes innocent consumers' minds, overshadowing the true worth and diversity of our traditional foods, diluting their quality and transforming them into mere commodities. In the wake of all this, our Sri Lankan nation, lost and misguided, seems to be sinking deeper. Today, we bow our heads, consuming adulterated

milk powder and flour at inflated prices, turning us into a nation that continues to poison itself while dumping toxins into the ocean. Essential food items like rice, vegetables, flour, sugar, and milk powder, which are essential for life, are being consumed by people who unknowingly wait for imports even while fertile lands remain uncultivated. However, it's not too late. Now is the time to open our eyes and cherish our own rich food culture, preserving what truly belongs to us.

The ability of sustainable agriculture to nourish people and safeguard their health is immense, with a hidden power in its green practices. It is essential to recognize, value, utilize, appreciate, and further innovate these aspects for a future-oriented sustainable approach. Expanding accessibility and promoting traditional food varieties and professional diets and launching initiatives at both national and local levels can further broaden health and nutrition. Rediscovering traditional knowledge and associated technical methods used by our ancestors and appreciating their significance can be achieved by studying and adapting them to meet current needs, fostering a skilled approach towards sustainable soil development for the future. In such an endeavour, professional expertise and systematic methods have considerable value. We should focus on development goals aligned with the Millennium Development Goals to ensure effective progress. Reviving and sustaining eco-friendly lifestyles to avoid environmental degradation and preserve life amid rising populations is essential, although the challenges are significant. Reducing the impact of harmful lifestyles followed by some can help mitigate the damages.

Our villagers, who used to rely on traditional means for their needs, now sell coconut toddy only to end up consuming bottled mineral water and chilled beverages. This unfortunate shift highlights how national policies have yet to reach rural areas. The time has come to mark an end to the era where milk was sold to buy powdered milk for children. There are still many parents who sell homemade jaggery to provide store-bought sweets to their kids. In our homes, we witness a society where traditional foods like hingurala, katuala, kahata ala,wel ala, and innala are sold off to eat potatoes instead. The trend of selling kithul flour and spending money on imported milk powder has sadly infiltrated rural households. Locally grown grains like cowpeas, mung beans, chickpeas, millet and sesame seeds are sold to outsiders, only to buy broiler chicken instead, changing the eating habits of villagers. The culture of selling local vegetables such as Thumba karavila, Kekiri, cucumber and ela batu to buy preserved and processed foods still thrives in villages. Our society has now reached a point where even native fruits like divul (wood apple), pomegranate, and Bael are sold to afford unhealthy snacks like fried dumplings.

As fresh, local milk flows down the drain, we import powdered milk worth billions, a consequence of short-sighted national policies that favor industrialization over self-sufficiency. While discarding valuable local produce like gotukola and other greens, the wealthy indulge in luxury hotels, tied to these modern conveniences by thousands, revealing the flaws of our industrialized mindset. Innocent villagers bear no responsibility for this state of affairs. Due to the influence of multinational corporations, our country has sacrificed local dietary traditions, a grim reminder of the devastating effects of colonialist-influenced policies on our food sovereignty. When the symbol of self-reliance is replaced by a purely profit-driven agenda, it disrupts the natural progression of generations and endangers traditional ways of life. Unfortunately, such industrialized thinking also diminishes the lifespan and sustainability of these traditions, jeopardizing their very existence.

Malnutrition is a nutritional issue that affects development more subtly than overt hunger. Nutritional deficiencies and poor dietary absorption can cause

malnutrition even when food shortages are not present, often due to metabolism. Experience has shown us that rice porridge can provide proper nourishment when consumed correctly. We have had a porridge culture since ancient times. Ayurveda provides a scientific system to understand the benefits of porridge, while our traditional heritage has used porridge to treat and support health. Thus, porridge is a nutritious and easily digestible food that can be prepared in various ways. porridge serves not only as food but also as a therapeutic supplement for individuals who are ill, with medicinal properties beneficial for treatment and prevention of certain illnesses. Therapeutic nutrition was an essential part of our heritage, where porridge was used as a health supplement. From a modern perspective, it is classified as a functional food. Prepared porridge is a nutritionally complete food, especially valuable for addressing malnutrition due to low protein and calorie intake.

Rice porridge typically contains four main ingredients: rice, coconut milk, rice grains, and spices (like ginger and garlic). At first glance, it appears as a simple, nutritious food containing essential nutrients. However, rice porridge alone may not be sufficient to address protein deficiencies. For this reason, flour from legumes such as mung beans, chickpeas, cowpeas, or black gram can be added. Ideally, these legumes should be soaked overnight and then incorporated for easier digestion. Thus, rice porridge is a valuable food that can also act as a remedy for children suffering from malnutrition. Including other types of grains like red rice is also beneficial. Considering the nutritional value of drumstick leaves, they provide highly valuable nutrients.

Although the main ingredient in rice porridge is rice, it can also include other grains, root vegetables, legumes, and even various types of greens. Coconut milk is a highly valuable nutrient that can be added to porridge varieties in our culture. Additionally, other protein sources may be incorporated. In African communities, porridge is sometimes prepared with insects and worms as per their dietary customs. As such, researchers worldwide are currently studying the potential and effectiveness of porridge for addressing childhood malnutrition. In societies with traditional food cultures, giving porridge to children with nutritional issues is a common practice. During times of food scarcity, porridge is a highly adaptable and valuable food.

Despite protein deficiency being a significant nutritional issue, researchers should also be keen to explore the effective use of pumpkin-based porridge to address Vitamin A deficiency. The availability of beta-carotene-rich pumpkin varieties and the successful absorption of Vitamin A when paired with fat-based mediums like coconut milk can be scientifically verified. However, the focus still seems to lean towards promoting multinational corporations' vitamin supplements.

Some nutritionists assume that pumpkins, widely present in rural areas, are only used as luxury items in upscale hotels and cafes. Yet, they too could benefit from recognizing the nutritional value of green-based pumpkin porridge prepared with modern knowledge.

During the preparation of herbal porridge (kola kenda), adding garlic and ginger is essential. This not only enhances the hunger but also improves the absorption of important nutrients efficiently. Therefore, giving herbal porridge to malnourished children can improve their appetite and their ability to absorb nutrients. The water content within is more than just plain water; it's a nutritive liquid fortified with essential nutrients. Any village mother with basic knowledge understands the importance of this. No advanced science is required to understand it. To avoid unnecessary expenses on imported functional foods and nutraceuticals, it's the responsibility of every community

leader to raise awareness about our traditional foods. In addition, it's necessary to research the nutritional value of our pumpkin porridge and make it widely recognized. Developing more accessible ways to utilize these foods is also essential.

Due to various commercial trends, traditional food practices have been gradually replaced by fast foods and other convenience foods. The wholesome characteristics and positive qualities associated with traditional food, such as cultural heritage and preservation of nutritional knowledge, are being lost. Consequently, traditional food ingredients such as fresh vegetables, fruits, and meats are being substituted with instant or processed alternatives, including instant noodles, canned fish, packaged snacks, and processed meats. These changes are leading to the decline of traditional diets, which were once rich in natural, healthy, and locally sourced foods. The increasing reliance on processed and fast foods in society is a result of the growing demand for convenience and the fast-paced nature of modern life. However, there is a need for basic awareness and education about the importance of nutrition, traditional food practices, and cultural literacy. Such knowledge allows individuals to better understand the link between food choices, health, and cultural identity. The shift from a culturally rich and environmentally conscious food system to one dominated by convenience foods is due to changes in societal behavior. Today, the loss of cultural and environmental literacy, once central to our food systems, is becoming more evident. The decline of traditional food knowledge and practices, which were once deeply embedded in everyday life, is a significant concern in our modern society.

The traditional food culture is an essential part of our identity and well-being. It is deeply rooted in our cultural heritage and reflects the values and practices of our ancestors. In our rural communities, traditional food culture was once an integral and highly valued aspect of daily life. However, the rise of anti-cultural mentalities, which are opposed to the preservation of cultural traditions, has led to a disconnect from our cultural roots. This shift has created an environment where people are no longer as culturally aware or connected to their food traditions. Today, as different cultural influences become more widespread and integrated into society, we are losing touch with the traditional food practices that once nourished us. This is a consequence of a globalized world where convenience and modernity have become the driving forces. As a result, many people are now opting for ready-made, fast, and processed foods instead of locally sourced, culturally significant food. This transformation has led to the commercialization of our cultural heritage, with a focus on profit rather than preserving traditional wisdom. The true essence of our food culture has been overshadowed by mass-produced food products that prioritize profitability over nutritional value. In urban societies, "user-friendly" food cultures are being created, designed to appeal to the modern consumer who seeks convenience but lacks an understanding of the deeper cultural significance behind their food choices. These changes are not only damaging to our food culture but also to our sense of identity. The Americanized food systems, with their relatively short history, have replaced our long-standing cultural practices with new ones that have little regard for tradition. Reviving and reconnecting with our cultural heritage is a challenging task, but it is essential. To achieve this, a broader cultural literacy is needed.

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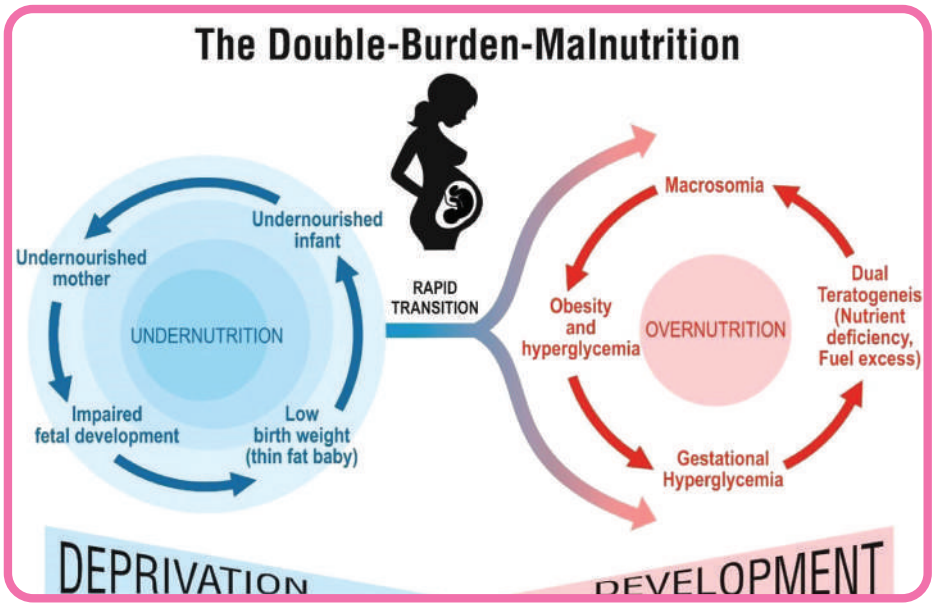
Improving Community Nutrition: A Holistic Approach to Health and Wellbeing

Dr. Vinya Ariyaratne

Good nutrition is essential to achieving a healthy society, as it forms the foundation for physical health, cognitive development, and overall wellbeing. Improving community nutrition goes beyond individual dietary choices; it requires a community-wide strategy that combines education, access to healthy foods, and support from various societal sectors.

Sri Lanka currently faces a "Double Burden" of malnutrition. High rates of undernutrition persist alongside rising concerns with overweight and obesity. For instance, stunting affects around 17% of children under five, a figure that has shown some improvement but still falls short of global targets. Wasting, however, remains alarmingly high at 15.1% Among young children, significantly above the regional average. Additionally, one-third of children under five face malnutrition challenges, affecting their physical and cognitive development potential.

Among adults, 8.9% Of women and 3.7% Of men are obese, with adult obesity levels rising alongside a high prevalence of diabetes (around 8.6%). This reflects insufficient dietary diversity, as many sri lankans do not consume adequate fruits, vegetables, or other nutrient-dense foods. On average, the daily fruit and vegetable intake falls short of the who's recommended 400 grams, partly due to limited food variety and economic constraints. This nutritional inadequacy is intensified by the economic crisis, with food insecurity impacting approximately 17% of households, forcing families to adopt coping strategies like borrowing or relying on low-nutrient staples.



A holistic approach to improving community nutrition

Sri lanka's Multi-Sector Action Plan for Nutrition (2018-2025) and National Nutrition Policy (2021-2030) are also key frameworks aimed at enhancing food accessibility, promoting dietary diversity, and tackling both undernutrition and rising diet-related non-communicable diseases.

Community Engagement and Empowerment is one of the 10 Guiding Principles of the National Nutrition Policy of Sri Lanka 2021-2030. It also recognizes the importance of community mobilization as a key strategy to address nutritional deficiencies in the country.

The following are key strategies to promote better nutrition within communities and the lasting impact such improvements can have on public health.

1. **Education and awareness: building a nutrition-literate society**

Education is one of the most powerful tools for improving community nutrition. Increasing community awareness about the importance of balanced diets and the impact of poor dietary choices helps individuals make informed decisions. In sri lanka, extensive public education material including guidelines have been developed on – low cost nutritious diets, novel approaches to community nutrition.

Community education on nutrition can be delivered through;

Community workshops: Partnering with local health staff to conduct nutrition workshops on healthy meal planning, understanding food labels, and recognizing nutritional needs across different life stages.

School programs: Integrating nutrition education in school activities helps instill good dietary habits from a young age. Teaching children about fruits, vegetables, and the dangers of processed foods encourages lifelong healthy habits.

Media campaigns: Using media platforms to spread information about nutrition can reach a broader audience. Social media, radio, and local television programs can highlight the benefits of healthy diets and offer quick, affordable, and nutritious recipes.

2. **Improving access to healthy foods**

Access to nutritious food is essential for communities striving to improve their overall health. Unfortunately, many communities, particularly in rural and low-income urban areas, and in the estate sector, struggle with "Food Deserts" where access to affordable, fresh produce is limited. Solutions for improving access include:

Home and community gardens, and urban farming: Creating home gardens enables residents to grow their own fruits and vegetables, increasing both access to and awareness of fresh produce. These spaces also foster social interaction and can be an excellent educational tool for children.

3. **Encouraging healthy eating habits in the community**

Encouraging healthier eating habits requires a concerted effort to change existing behaviors. This can be achieved by:

Community kitchens: Organizing community meals where nutritious, affordable foods are shared can inspire people to replicate these meals at home. During the recent economic crisis, many civil society organizations set up community kitchens to provide nutritious meals to needy persons in the community. These

community kitchens can also serve as venues where local nutritionists can demonstrate simple recipes and meal preparation techniques.

Healthy food policies in public places: Implementing policies to offer healthier food options in schools, workplaces, and hospitals helps promote balanced diets.

The nutritional status of school children impacts on their health status, quality of life and learning achievement. The population of age 5 to 18 years spend more than 6 hours a day in school and the improvement of their nutritional status is an investment in achieving educational targets and development of human resources necessary for the advancement of the country. Sri Lanka has over 4.2 Million children studying in over 10,100 schools in sri lanka. School canteens play a critical role in nutrition of school children. Hence its important community leaders and community organizations also monitor the implementation of the health canteen policy particularly in rural schools, as canteen operators are usually from the local community itself.

Nutrition at work places: Many people spend most of their days at work. Employers can offer healthy food options in cafeterias, inexpensive access to a gym, and work-based health programs. Cafeterias in workplaces should include fresh, nutrient-dense options and limit high-sugar or high-fat snacks. There are guidelines available for running "Health Canteens" in work places.

Some very practical actions that can be undertaken in a work environment include; organizing a "Walking Group" at lunch, before work, or afterward, organizing a team for local runs, walks, or a challenge event, and conducting seminars on nutrition, fitness, or weight loss.

Peer support groups: Volunteer community groups focused on nutrition can motivate community members to make healthier choices. These groups can organize recipe swaps, meal-planning sessions, and even small challenges to reduce sugar intake or incorporate more vegetables into daily diets.

4. Leveraging technology for community nutrition improvement

Technology can be a powerful tool in promoting community nutrition through mobile apps, online platforms, and data collection. Specific ways technology can support nutrition include:

Nutrition apps: Apps that offer easy access to recipes, low cost options, meal planning, and grocery list management can support families in their journey toward better nutrition. Also, simple nutritional assessments such as body mass index (BMI) can be an effective tool in monitoring community nutritional status. Many apps allow users to track their nutritional intake and monitor their progress over time.

Remote health consultations: Though not very widely used in sri lanka, telemedicine and online consultations with nutritionists

can be helpful, especially for communities with limited access to in-person care. Remote consultations provide guidance for those managing specific health conditions, such as diabetes, where dietary monitoring is essential.

Data collection for better policy making: Collecting data on the community's nutritional needs can inform public policy and help local leaders address specific dietary gaps. By understanding local dietary habits, policymakers can design tailored nutrition programs that better serve the community.

5. Policy advocacy and support

Community based organizations (CBOs) play a critical role in creating a supportive environment for improved nutrition. Advocacy for nutrition-friendly policies can include:

Incentives for healthy foods: Offering tax concessions on healthy foods like fruits and vegetables can make them more affordable. Conversely, taxing sugary drinks and high-fat processed foods can discourage unhealthy eating habits.

School nutrition policies: Implementing regulations on the nutritional quality of food served in schools helps foster healthier habits in children and young adults.

Nutritional support for vulnerable populations:

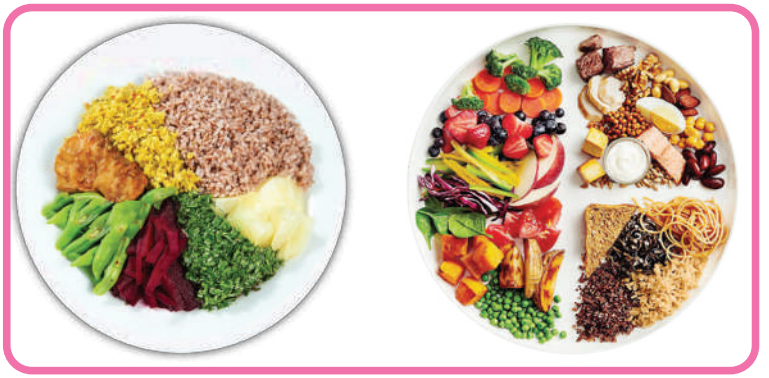
Government and civil society sponsored programs, such as supplemental nutrition assistance, can help ensure vulnerable populations, like low-income families and the elderly, have access to balanced diets.

6. Community engagement and collaboration

Improving community nutrition is most successful when the community itself is actively involved. Collaborative efforts bring together local businesses, health staff, schools, and voluntary organizations to tackle nutrition from multiple angles. CBOs can:

Provide funding and resources: Volunteer organizations and local businesses can fund nutrition programs, provide food donations, and offer cooking equipment to community kitchens.

Provision of nutritional support during emergencies: Sri Lanka faces emergency food shortages due to economic crisis but also due to natural disasters such as floods. Community organizations play a vital role in caring for the vulnerable and



the affected people during such emergency situations. During the period 2022 and 2023, UN agencies and a large number csos provided food relief to millions of people in districts which were reporting high levels of food insecurity. However, such interventions should be followed by sustainable nutrition-focused programs that build resilience among vulnerable communities while promoting broader access to nutritious food options.

Creating healthy environments: With rapid urban and suburban growth, parks and recreation facilities are quickly disappearing, taking away prime places to exercise. There's increasing evidence linking poor access to sidewalks, parks, and recreation facilities to greater obesity risk. Communities where it is easy walk, play, and exercise safely have less obesity. CBOs can lobby with local government bodies to establish walking paths, parks, gyms, bike paths, and green spaces.

Feedback loops: Establishing mechanisms for community feedback ensures programs meet the actual needs of the community. Regularly collecting input from residents helps refine initiatives to be more effective and responsive.

Community monitoring of food and nutrition: CBOs can support venders and shops in local areas to promote fresh and quality food and also advocate local eateries and restaurants to serve healthy food options. They can also support local farmers' markets such as weekly fairs (*Pola*).

Finally, a vitally important area related to nutrition in Sri Lanka is *food safety*. Food safety is about preventing contamination of food with hazardous material throughout the supply chain including production, handling, storage, transportation and ultimate preparation of food ensuring the quality of food. The presence of hazards may make food injurious to the health of the consumer acutely or in long term. Current the implementation of food safety activities is not at a satisfactory level, due to a variety of reasons which include lack of adequate laboratory facilities, human resources, monitoring, and evaluation of services. Therefore educating the community on food safety through out the supply chain is recognized as a critical area in nutrition in sri lanka.

In conclusion, when communities prioritize nutrition, they invest in the health, productivity, and potential of all their members. A well-nourished community experiences fewer health problems, enjoys higher educational attainment, and ultimately leads to a stronger, more resilient society. Improving community nutrition requires a holistic approach, bringing together education, access, policy change, and community involvement. By addressing these factors, communities can foster an environment where healthy choices are accessible, supported, and sustainable.

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Specialist in community medicine, president – sarvodaya shramadana movement

Can Sustainable Agriculture Ensure Food Security in Sri Lanka?

Prof. R.M Dharmadasa

The food production process in a country involves the provision of optimum conditions for the satisfactory existence of the plants and animals which include the crops, forests, grass lands, management of animals (cattle, goat, sheep, pigs, bees, fish, birds, etc.). However, the existing food production methods have not been successful in supplying the food in the required quantities and of suitable nutritional value to the world population which is growing rapidly day by day. The challenges listed below may be the cited as the reasons for the above crisis.

1. The limited cultivable land available
2. The difficulty in supplying the water, required for the cultivation of crops
3. The reduction in the productivity of the land due to the absence of proper land management
4. Rise in the cost of inputs required for the cultivation of crops
5. Fluctuations in the market value and challenges for selling the products
6. Marketing competitions, advertising and development of the selling process
7. Challenges associated with the management of animals
8. Quality control and regulations
9. Climate change
10. Failure of not considering traditional knowledge

Due to these specially in the developing countries in Asia and in Sub. Saharan countries the health and the wellbeing of a large number of people including children below two years age are specially affected due to not getting sufficient nutritional food on a result of food insecurity. The increase in the number of children who are malnourished, the increase in the risk of contacting various diseases due to low immunity, facing harmful health problems, decrease in body mass, birth of children who are physically and mentally retarded, wasting of muscles, shortening of the life span are among the ill effects.

The various organizations in the world, the scientists and the United Nations Organizations have thoroughly investigated this unfortunate situation and focused their attention towards developing agricultural practices which would provide nutritive and balanced

food in a continuous manner and searching for answers to the associated challenges that arise. In order to achieve this sustainable cultivation methods in agriculture have been identified on the most fruitful and the practical solution.

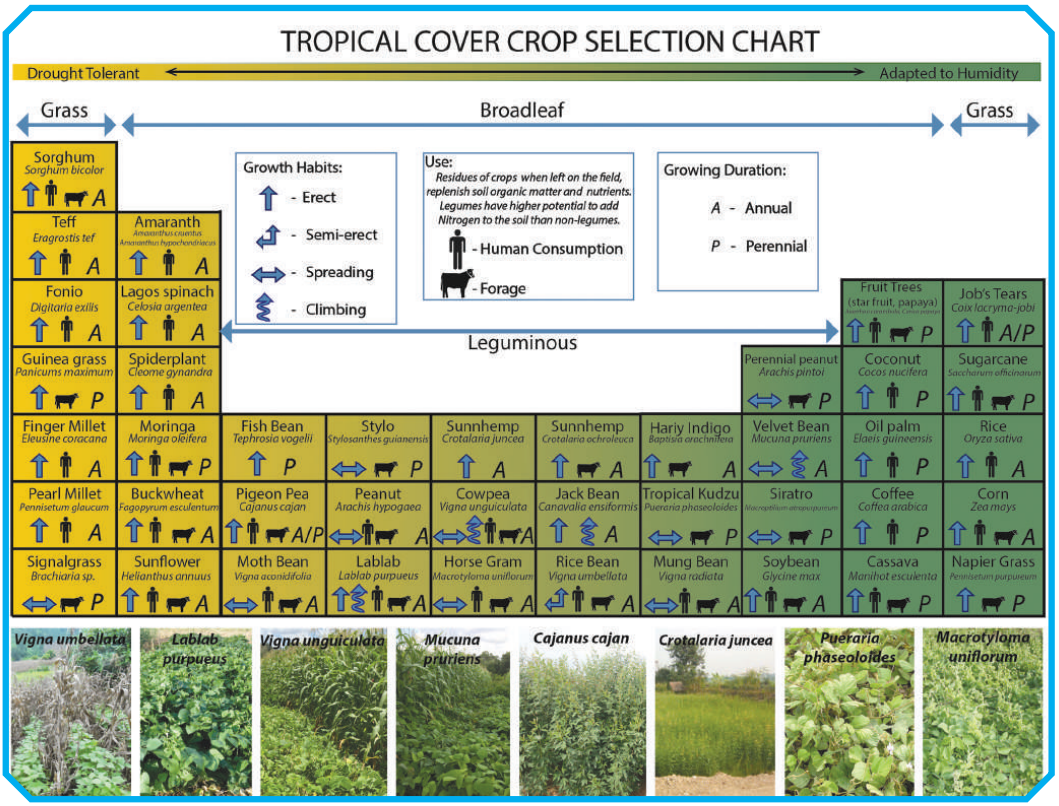
Sustainable agriculture is a food production process which at the same time maintains environmental, social and economical interrelationships at an optional level, during this process cultivation of crops is carried out while safeguarding the sustainability of the physical, chemical environment and its proper maintenance. Therefore, it is a cultivation method which while maintaining the coexistence of the environment and the society in an optimal manner, simultaneously making it economically profitable to cultivate. In order to propel the sustainable agriculture towards a successful level all factors of the agricultural process such on the cultivated medium-soil, soil, selection of seeds, supplying the irrigation water, weed control, disease and pest control, harvesting, processing of harvest, transport until it reaches the consumer, storage, being watchful of the changes in weather and climate. The environment in which the cultivation is carried out should be carefully investigated and steps taken to ensure the long-term sustainable security of all the steps and factors.

1. The cultivation medium/ soil

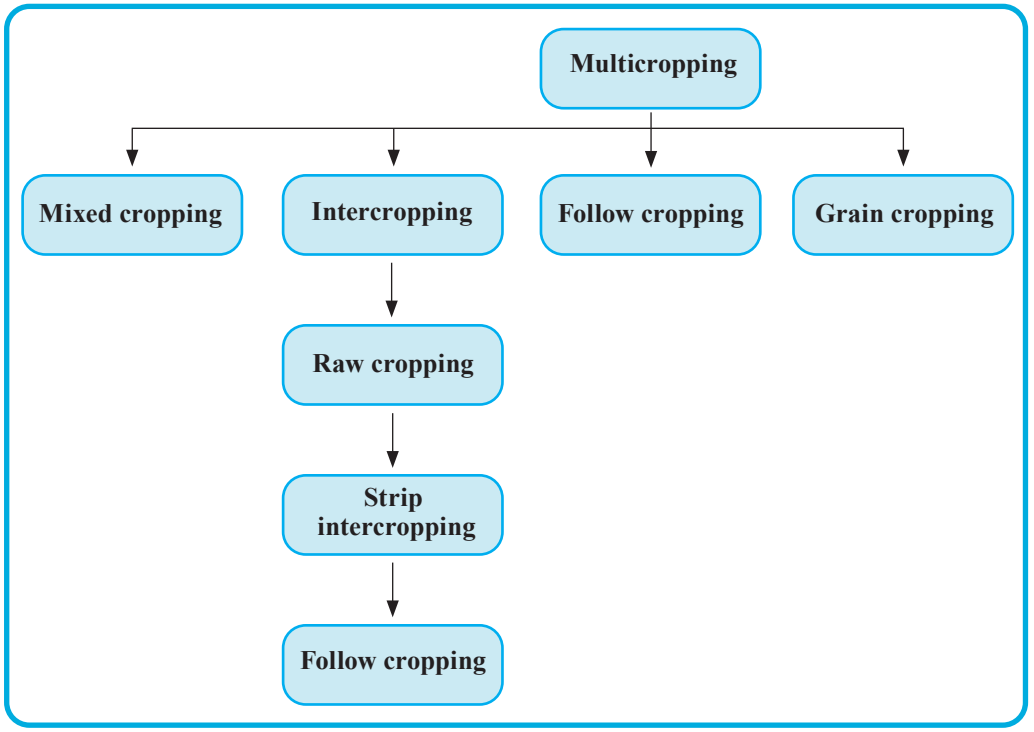
For sustainable agriculture, the first thing to do in to build the soil (which in the cultivation medium) to an optimum state to promote the cultivation of the crop and maintain it, for this the physical, chemical and the biological properties of the soil has to be improved. Specially when the soil structure soil texture and soil are in suitable state that the soil is also well aerated. Then because the pH of the soil, its cation exchange capacity and the activity of the soil organisms are optimum the soil nutrients are made soluble so that the plants can absorb them easily. In other words when the soil that is "non-living" or "pantically alive" become a "fully alive soil" the crops can absorb the nutrients easily. As a result, an economically profitable harvest is obtained then propelling the food production to a higher level.

2. Crop selection

In order to make cultivation economically profitable it is necessary that the selected crop should be well adapted to face the challenges existing in the relevant environment. The challenging factors are the weather and climatic conditions, diseases and pests and the weeds that compete with the crop. It is possible to reduce the risk to the crop brought about by weather changes such as floods, drought and strong winds. Also, because the selected crops are resistant to the diseases and pests in the region and to the weeds that grow in competition with the crops grown the risk to the crop can be reduced. Therefore, the use of agrochemicals such as insecticides is reduced. This in turn makes it possible to prevent the diseases and get rid of the pests with the minimum of expenditure. Also, the damage to the environment by the



artificial agrochemicals is kept at a minimum. As there is no hindrance to the existence of beneficial organisms. The natural environmental equilibrium is maintained. In addition, biodiversity provides habitats for the main predatory organisms of the organisms which cause diseases and pests of crops thereby protecting crops through biological control. Also, as there is no hindrance to the increase in the population of pollinating organisms. The pollination of the crops is enhanced resulting in a better harvest. Pollution of the environment as a whole is minimized because those is reduction in the pollution of air, water resources, soil and soil water. A maximum harvest is made possible from the crops which are well adapted to the environment and receiving the necessary inputs.



3. Crop cultivation method

In sustainable agriculture monocropping is not carried out. Instead, many crops are grown along with animal husbandry simultaneously in some extent of land. Thus, the concepts of crop rotation and mixed cropping are of special significance in sustainable agriculture.

In crop rotation leguminous crops are grown in one part of the field. As the leguminous crops for atmospheric Nitrogen as infertile soil is made fertile. In another section of the field grassing crops with a high marketing value helps to improve the economic status as well as the living standard of the farmer. Also, by cultivating yam crops in yet another section of the field helps to improve the physical properties of the soil. Using another section of the field for animal husbandry provides fertilizer for the crops and proteins for the food of human. Crop rotation and mixed cropping make it possible for the crop to obtain the nutrients and water in the different layers of the soil and to make use of the light falling off the field in an efficient manner. The growth of the weeds is also minimized in a natural way and therefore the expenditure by the farmer for weed control is reduced. This maximizes the profits that the farmer gets for his inputs. These practices therefore supply the economic, social and the environmental benefits and the farmer also receives a "Balanced diet containing the required nutrients.

Harvesting and post-harvest activities

It is possible to maintain the post-harvest obtained from the sustainable agriculture in a good condition because the crop has been grown in a suitable environment with less diseases and pests, it has been harvested on reaching the correct stage of maturity and containing the necessary nutrients. The steps

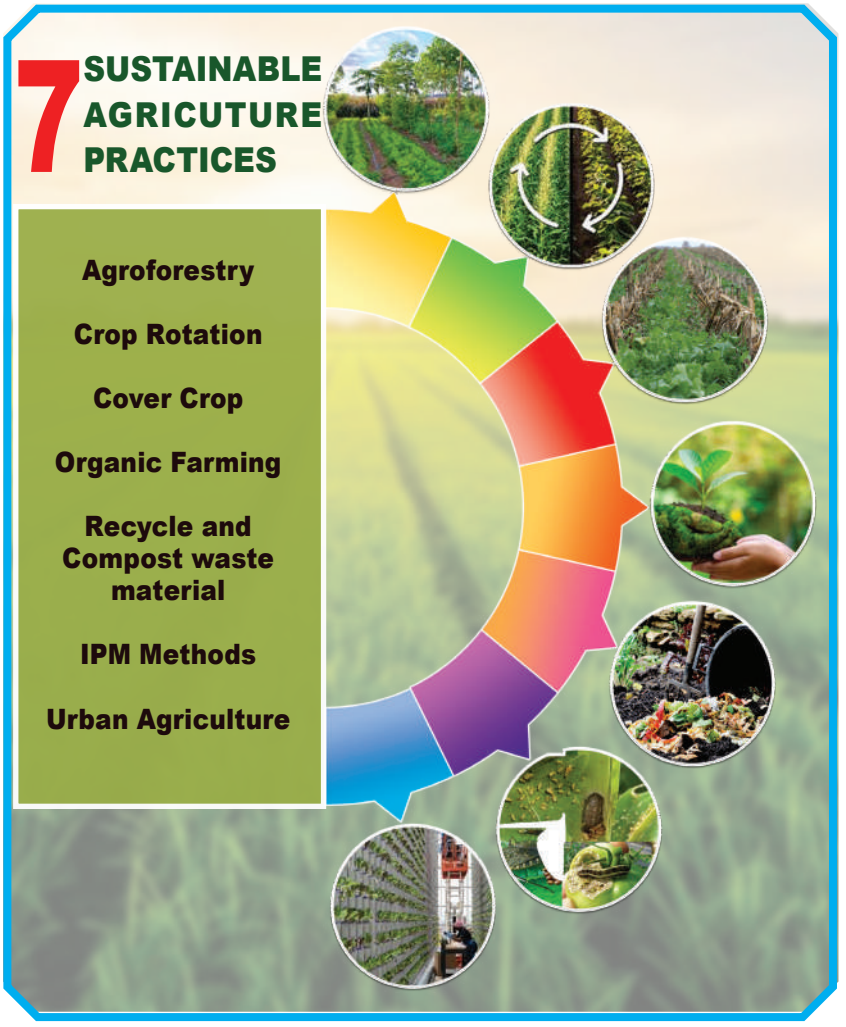
and methods of delivering the harvest to the consumer has to be environmentally friendly. The primary and secondary methods of population have to be done under poor sanitary conditions. Storage a transport should also be carries out properly so that the food is safe for health. Following the correct practices reduce the post-harvest losses and the conservation of food is maximized. Consequently, the profit to the farmer is maximized and his living standard is brought to a higher level. All individuals /people involved in this value addition chain have to be made aware of the modern technological methods, the indigenous and traditional knowledge regarding agriculture which reduce harm to the crop and the harvest. They also have to be provided with the infrastructure (Knowledge and material requires). So that they become confident. This way the process of supplying a nutritious and a balanced diet to every body is secured.

The future prospects of sustainable agriculture

It has been predicted that by 2050 the global population would increase to 9 billion. The necessity to provide the infrastructure such as housing and other facilities for the increasing population, its reduction in arable land due to urbanization, use of absolute methods in agriculture failure to build up a living/fertile soil, the cultivation of crops which are genetically modified (GMO) with the expectation of increasing the harvest (these GMO crops may show higher response to fertilizers), incurring a higher expenditure to control diseases and pests and not protecting the biodiversity due to practicing of monoculture has threatened the progress of agriculture.

Therefore, the existing traditional agriculture patterns have to be organized such that they fall in line with the basic/primary concepts of sustainable agriculture. It is important to select seeds which bring in more harvest which are resistant to weather changes such as flooding, long lasting drought, winds, resistant to damage caused by diseases and pests. Seeds which are traditionally used because of their adaptability to the environment should be selected. Attention should be paid to protecting the equilibrium of the environment by reducing the unnecessary use of agrochemicals and maintenance of the natural biological cycles.

Adhering to the basic principals of sustainable agriculture is very crucial to supplying nutritive food in sufficient quantities and at affordable price to the daily increasing population, using the existing resources to the maximum. To achieve this more attention has to be paid to the naturally available energy resources, taking steps for soil conservation and prevention of soil pollution. Use mobile inputs for smart agricultural production which deliver with high accuracy example data from satellite, GPS technology, drone technology ad inputs attained through sensors.



It is useful to correctly incorporate or combine the traditional agricultural practices handed down, with modern sustainable technology. By selecting the crops which are well adapted to the environment and the climate of the region, practicing crop rotation, mixed cropping, using natural fertilizers, preventing soil erosion, improving the desirable properties of the soil and having discussions with possible to grow crops which will yield more profits.

How should the future of sustainable agriculture in Sri Lanka be planned

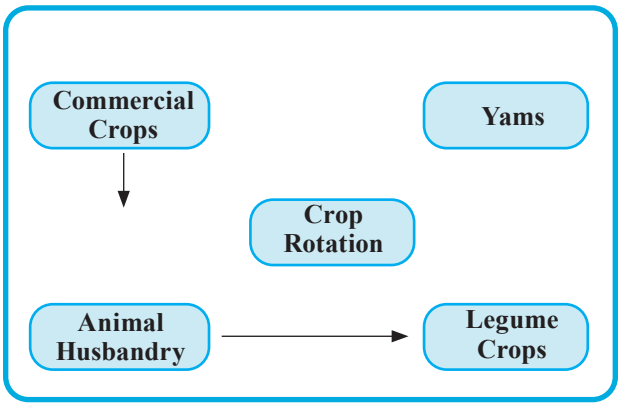
Sri Lanka is a small island in the Indian ocean having a rich biodiversity. Sri Lanka has been divided in to 46 distinct agricultural zones based on weather, climate, soil properties and nature of the plant population. Sri Lanka has more than 4170 flowering plant species which are adapted to the various agrochemical zones. Of these species 24% are endemic to Sri Lanka. More than about 2000 of the plant species processing medicinal properties are used in traditional and indigenous medicine. Sri Lanka has a unique status due to the historical agricultural practices that have been handed down from generation to generation, very special knowledge regarding irrigation, methods of preparation of traditional balanced food and the existence of indigenous medical practices which are successful in the cure and prevention of diseases. For improving the sustainable agriculture in Sri Lanka which has the natural resources, traditional knowledge, suitable Weather, climate and soil resources, sustainable agricultural methods have to be organized using modern technology and existing natural resources and traditional knowledge.

1. **Selection of crops adapted to the region**

   Profits of agriculture depend on and vary with weather and climate, temperature, rainfall, diseases from pathogens and other variable factors. Therefore, to find sustainable solutions to obtain the maximum harvest it is necessary to employ short term, mid-term and long-term methods to develop the agriculture. The selected agricultural crops to suit the 46 agroclimatic zones in Sri Lanka should be suitable to the respective soil, water availability, and climate conditions. Eventhough our country has nearly 2000 different plant species which can be grown as crops, the number actually used as crops is less than 100 species. Therefore it is necessary to introduce traditional grain species, indigenous yams, legume , vegetable and fruits to the cropping system and identify the more beneficial/ profitable crops and also make value added products from them. Though this process the income of the farmer can be enhanced. However crop plants which are genetically modified but not adapted to the environment or crop plants dependent on increased/ high inputs should not be selected simply with the aim of increasing the harvest.

2. **Use of intercropping, crop rotation, animal and crop rotation which are sustainable methods** instead of single species cropping. This is the growing of different types of crops (mixed cropping) in the same field. Eg: growing food crops and medicinal plants simultaneously.

   Through mixed cropping the sunlight necessary for plants, the fertilizers and other inputs provided to the crops are optimally used by all the crops



thus yielding a maximum harvest. Therefore maximum use can be made of the soil, water and sunlight.

3. selecting crops that do not require large inputs of agrochemicals but depend on maximum inputs. Therefore through the reduction of the adverse effects on the environment, the pollution of the soil, water and air is minimized.

4. Implementing the following activities /methods to identify the required inputs for the farming of crops and supplying them at the correct time and in the correct amounts inorder to improve the farming in an efficient and a profitable manner. Use of traditional water management methods natural methods of disease and pest control and methods of food conservation. Use of modern technology such as mobile inputs, data obtained using satellites, GPD technology and sensors to identify water and fertilizer requirements. The status of the crop, soil quality, weather and climatic conditions. By theses mwthods it is possible to improve the soil conditions by supplying water,fertilizer and other agrochemicals. These will contribute to the production of food in an economically profitable manner using a very limited land area.

5) Diversification of the existing agricultural process

By including the plants with medicinal properties in the suitable agricultural process by the diversification of the agricultural practices, using modern methods of soil conservation it is possible to obtain additional income and to produce various value added products. Most medicinal and other plants produce chemicals for their benefits. These chemicals may inhibit the germination of seeds of other plants or inhibit the growth of other plants. These chemicals are called allelopathic chemicals. Allelopathic plants can be used in weed management. These growing allelopathic plants can reduce the use of chemical weedicides. That is effective to reduce the expenditure on weedicides. Allelopathic plants will decrease the weeds which are resistant to chemicals, weedicides, reduce the residues from agrochemicals, decrease environmental pollution and ensure the proper natural cycling. In order to improve this it is necessary to identify the allelopathic plant species in Sri Lanka and use them in mixed cropping along with the crops. Also it is necessary to carry out hybridization research to enhance the allelopathic properties of these plants.

6. Controlling disease and pests through the cultivation of trash crops

If a crop is harmed by animals/ insects then by growing in the same field another crop- Trap crop which attracts such animals/insects the damage to the main crop is reduced. If the trap crop also produces a useful harvest . Then there are two benefits. Trap crops reduce the use of pesticides,decrease the expenditure, are beneficial to the ecosystems, increase the quality of the main crop and help in the production of the environment/soil. As examples the following can be cited

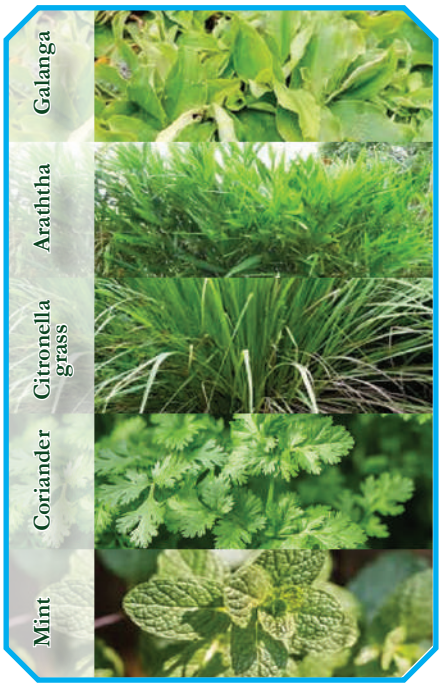
Ocimum sanctam (Maduruthala)
Tagets (Dhaspethiya)
Allium Sataivum(Garlic)
Viternegundo (Nika)

Gracing garlic with *Ocimum sanctam* and Tagets reduces the damage caused by thrips

Growing asaamodagam and coriander with vegetable crops reduces the damage by snails.

Aromatic plants

Galanga	: (*Alpinia galanga*)
Araththa	: (*Alpina calearata*)
Citronella grass	: Cymbopogon nardus,
Coriander	: Corriandrum safirus
Mint	: Minchi mentha spp



Selecting and cultivating varieties which are resistant to diseases and pests reduces the expenditure on disease and pest control. Cultivating plants with reduced water and fertilizer needs and adapted to the environment.

Eg: Traditional yam species have less requirements for water and fertilizers and therefore it is possible to increase the profits.

Diversification of the crops species used in agriculture

Introduction of plants containing essential oils and crops of economic value. The direct benefits are saving of the large amount of money spent on the control of diseases and pests, protecting the ecological balance, preventing the pollution of water and soil. In addition, these plants can be used to provide raw materials used in *sidhdha* and indigenous systems of medical practice, which are the traditional systems practiced in this country. Growing those plants will cut down huge expenditures incurred in importing these medicinal plants, in addition to the production of medicines with higher quality.

Carry out experiments to identify the crop species which can withstand natural disasters and weather changes (long periods of drought, floods, sudden emergence of pests, windy conditions and encourage the farmers to cultivate them.

Some of the crop materials used are very expensive and some are also susceptible to diseases and pests.

When selecting the growing material substitute them with locally produced matrials as far as possible. Also it is advisable to identify (After confirming by necessary records economically profitable and traditionally used crops and introduce them to the farmers.

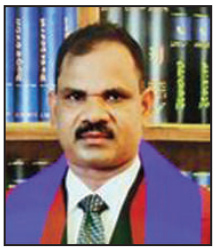
Jak (*Artocarpus heterophyllus*) indigenous yams and durion (*Durio zibethinus*) are considered to be underutilized plants. These plants can easily be made popular and will provide a suitable solution to food deficits and malnutrition.

Farm management has to be made sustainable and using modern technologies agriculture can be made profitable and its sustainability ensured. This will result in successfully strengthening the methods of food conservation too. Failure to conserve food leads to food shortage.

It is possible to ensure food security in Sri Lanka by improving the sustainable agriculture industry. To achieve this end it is necessary to identify the existing agricultural, climatic, economic and social conditions in Sri Lanka and also suitable agricultural principles. Thereby through the production of quality agricultural products which satisfy the local and foreign demand it is possible to ensure the food security in Sri Lanka and improve sustainable agriculture.

Jak (*Artocarpus heterophyllus*)

Durion (*Durio zibethinus*)



Prof. R.M Dharmadasa
Director
Herbal Technology Division
Industrial Technology Institute

Nobel Laurates in 2024

Ms. Apeksha Herath

Nobel prize is annually awarding for the scientists in recognition of their immortal contribution towards the humankind. The prize is awarded since 1901, according to the will of the Alfred Nobel who was an inventor, entrepreneur and businessman. His will has stated that his fortune was to be used to reward "those who, during the preceding year, shall have conferred the greatest benefit to humankind." The prize is specially devoted for the categories of physics, chemistry, physiology or medicine, literature and peace. 1969, a new prize was established – the Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel.

The Nobel Prize in Physics 2024

The prize was awarded for ***John J. Hopfield Princeton University, NJ, USA*** and ***Geoffrey E. Hinton University of Toronto, Canada*** for their service on or foundational discoveries and inventions that enable machine learning with artificial neural networks. The contribution of John Hopfiels was recognized for creating an associative memory that can store and reconstruct images and other types of patterns in data. Geoffrey Hinton contributed for inventing a method that can autonomously find properties in data, and so perform tasks such as identifying specific elements in pictures.

John J. Hopfield

Geoffrey E. Hinton

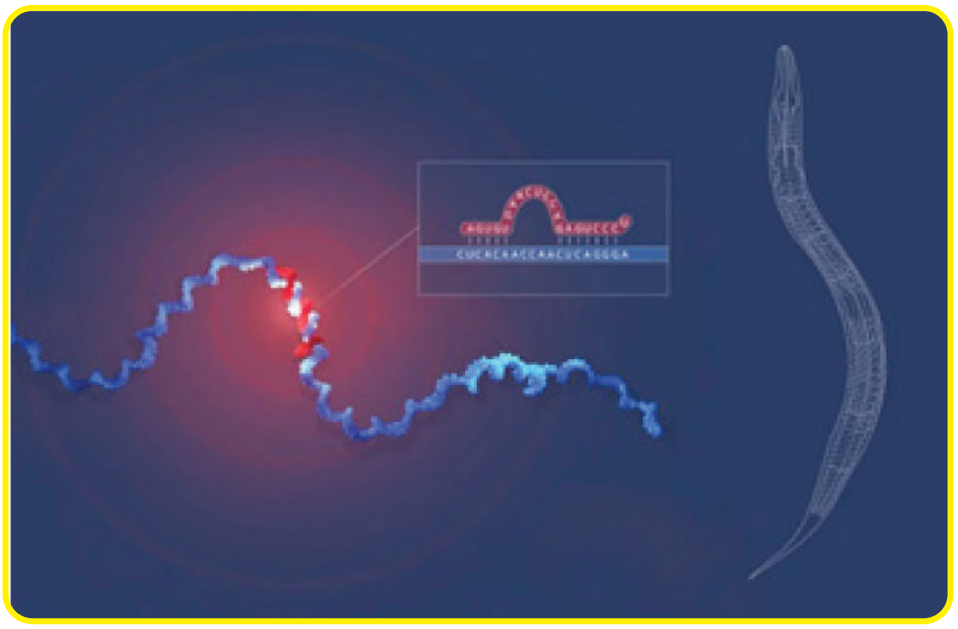
Nobel Prize in Physiology or Medicine

Victor Ambros, professor at the University of Massachusetts Chan Medical School, and ***Gary Ruvkun,*** professor at Harvard Medical School was recognized as the Nobel prize winners in Physiology or Medicine. They were recognized for their service on discovery of a fundamental principle governing how gene activity is regulated.

Their discoveries focused on microRNA, a new class of tiny RNA molecules that play a crucial role in gene regulation. It revealed a completely new principle of gene regulation that is very essential for multicellular organisms specially humans.

The Nobel prize in Chemistry 2024

David Baker, Professor of University of Washington and **Demis Hassabis** and **John Jumper**, two scientists from Google DeepMind were recognized for their for pioneering work on Protein Structures. Prof. David Baker was identified for this



David Baker

Demis Hassabis

John Jumper

contribution for building entirely new kinds of proteins.

Professor David Baker used computer-based methods to design a new protein that was unlike any other protein leading to possibilities to create enormous diversity of new proteins. Those new proteins can be used for the development of drugs, vaccines and other relevant materials.

Demis Hassabis and John Jumper have developed an Artificial Intelligence (AI) model to predict proteins' complex structures. They predicted a three-dimensional structure of a protein from a sequence of amino acids. It led for the prediction of the structures of all most all 200 million known proteins. Their AI programme was known as AlphaFold Protein Structure Database. It was used by large number of scientists all around the world. It provides an easy access to predicted models of protein.

The Nobel Prize in Literature

The South Korean author "Han Kang" was awarded for The Nobel Prize in Literature. She began her career in 1993 as a poet. Currently she has authored many of the novels and short stories. In her writing, she confronts historical traumas and invisible sets of rules and, in each of her works, exposes the fragility of human life. It was known that she has a unique awareness of the connections between the body and soul. She has become an innovator in the contemporary prose. The Vegetarian, Human Acts and We Do Not Part are the best pieces of work that she has contributed.

Gary Ruvkun

Victor Ambros

Han Kang

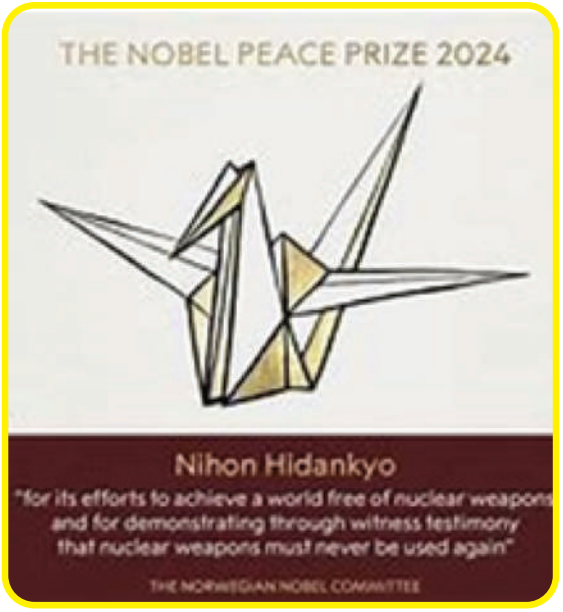
The Nobel peace prize

The Japanese organization Nihon Hidankyo was awarded the Nobel peace prize considering the efforts made to achieve the world free of nuclear weapons witnessing the that nuclear weapons must never be used. The project is known as **"Hibakusha"** A huge global movement was arising with the consequences of the atomic bomb in 1945 and they work immensely to aware the hazardous effects of using nuclear weapons. This cause for the gradually development of a powerful international norm to refuse the nuclear weapons which is known as "the nuclear taboo"

Daron Acemoglu

Simon Johnson

James Robinson



The Nihon Hidankyo has provided many of the witness accounts indicating the suffers and disasters made due to the usage of nuclear weapons. They have collected those appeals and witness records and sent annual delegations to the United Nations and other peace conferences pressing need for nuclear disarmament. They have strongly elaborated the hazardous effects and convince the message to stop the nuclear weapons.

The Sveriges Riksbank Prize in Economic Sciences in Memory of Alfred Nobel 2024

European economists Daron Acemoglu, Simon Johnson and James Robinson were awarded for the Nobel prize in economics. Both Daron and Simon are professors at Massachusetts Institute of Technology (MIT) where the James Robinson is attached to University of Chicago, IL, USA. Their studies of how institutions are formed and affect prosperity is recognized for their prize. The study was valuable in understanding the difference in the prosperity between the nations. According to their studies, it is impossible to generate growth or change for the betterment of future for the societies with a poor rule of law and institutions that exploit population.

Apeksha Herath
Scientific Officer
National Science Foundation

What have you learnt from the Vidurava 2024 July - December Q_2 Issue? Scan your own memory!

1] Mitigation of Malnutrition

True or False?

1. The life cycle approach to nutrition clearly reveals that these conditions are interrelated
2. Assessment of nutritional status of an individual can be done clinically using externally visible physical features
3. The harmful effects of malnutrition accuse due to the individual and the community
4. The ultimate or basic causes of society determined by social economic and political systems could be due to poverty or inequality provision of these services
5. Indirect interventions, undue poverty alleviation programmes such "Divinagauma or samudri" water supply schemes and agricultural subsidies.

2] Against Malnutrition-Advocating for Sustainable Local Food System

True or False?

1. Globally about one -fifth of the population consume 70-80% of the worlds fuel and mineral resources
2. The media once regarded as the voice of the people, has now been transformed into a profit-driven entity.
3. Plating or serving rice with pulses typically involves placing a small heap of rice with pulses on a plate.
4. Our villagers who used to rely on traditional means for their needs, now sell coconut toddy only to end up consuming bottled water and chilled beverages.
5. Although the main ingredient in rice porridge is rice, it can also include other grains, roots and vegetables and legumes.

3] Improving community Nutrition: A Holistic Approach to Health and Wellbeing

True or False?

1. Community engagement and empowerment is one of the guiding principles of the National Nutrition Policy of Sri Lanka (2021-2130)
2. Access to nutritious food is essential for communities striving to improve their nutritional status, is an investment in achieving educational targets, through mobile apps, powerful online platforms and data collection.
3. Improving community nutrition is most successful when this community itself is already involved.

4] Can Sustainable Agriculture Ensure Food Security in Sri Lanka?

True or False?

1. Sustainable agriculture is a food production which at the same time maintains environmental, social and economic interrelationships at optimal level.
2. In order to make cultivation economically profitable, it is necessary that the selected crop should be well adapted to face the challenges existing in the relevant environment.
3. In crop rotation, leguminaseous crops are grown in one part of the field.
4. It is possible to maintain the post-harvest from sustainable agriculture in a good condition because the crop has been grown in a suitable environment
5. The existing practices in agricultural patterns have to be organized such that the fall in line with the basic concepts of sustainable agriculture.

Answers

01) 1. False, 2. True, 3. True, 4. False, 5. True
02) 1. True, 2. False, 3. True, 4. False, 5. True
03) 1. True, 2. False, 3. True, 4. False, 5. True
04) 1. True, 2. True, 3. False, 4. True, 5. False

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