Analytical and Policy Advisory Support, Research Report – No 02

Policy Research in the Area of Food Consumption, Nutrition and Health

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AGRICULTURE SECTOR MODERNIZATION PROJECT

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1.0 INTRODUCTION

The Agriculture Sector Modernization Project (ASMP) funded by the International Development Association (IDA) of the World Bank and executed by the Ministry of Agriculture aims at increasing the agricultural productivity, improving market access and at enhancing the value addition of smallholder farmers and agribusiness in the project area. The analysis of agricultural policy environment for Food Consumption, Nutrition and Health has been considered as one of the key elements of the ASMP. The sustainability of the productivity and income generation in Agriculture sector is reported to be at risk. The sector is required to improve and modernize. The sector should be directed to ensure food availability and nutritious diet, along with changes in food consumption behaviour targeting to reduce the burden of both under and over-nutrition. It is therefore useful to examine patterns of food consumption and level of nutrition literacy across the sectors population. Food literacy incorporated a broader spectrum of theoretical and practical knowledge and skills. Food literacy describes the idea of proficiency in food related skills, knowledge and behaviours that Nutrition literacy mainly described the abilities necessary to obtain and understand nutrition information of making food choices. Studying consumer behaviour and consumer information processing will improve the understanding on the process of nutritional choices by the consumers. Nutritional quality of food is been recognised as a major concern for the country, which suggests that more focus needs to be given to the nutritional security of promoting nutrition sensitive agriculture and food systems not mere self-sufficiency of food production. Agriculture policies should consider a sustainable management and efficient use of natural resources, reduce food waste and food losses along production and supply chains to manage in an environment-friendly way.

According to the Food and Agricultural Organization (FAO) of the United Nations (UN), sustainable agriculture (SA) is associated with major attributes, which consist of resource conserving, environmentally non-degrading, technically appropriate, and economically and socially acceptable (**Lee 2005**). A directive for Sustainable Food and Agriculture must dedicate to social, economic and environmental dimensions to ensure sustainability. According to FAO following principles are guiding the process of transition to greater sustainability (**FAO 2020**).

- Increase productivity, employment and value addition in food systems
- Protect and enhance natural resources
- Improve livelihoods and foster inclusive economic growth
- Enhance the resilience of people, communities and ecosystems
- Adapt governance to new challenges

In application of these principles, it is recommended to take actions to enhance sectoral as well as cross-sectoral productivity and sustainability (**FAO 2020**). The overall objectives are to be aimed at improving human livelihoods through agricultural productivity by employing conceptions to emphasize economic feasibility, social equity and community building (Lee 2005).

Research suggests that nutrition literacy along with environmental, individual, motivational factors, the level of income and education could affect the consumer behaviour demonstrates capacity in the adoption of healthier food habits. More particularly nutrition literacy plays a pivotal role in the adoption of healthy food habits (Worsley, 2002). However, al environmental, individual, motivational factors, including income and education, affect the consumer behaviour. A consumer is led by the culture, the family and availability of a wide range of quality food products throughout the year at affordable price for the ordinary consumer plays a role in improving their quality food consumption, nutrition and health.

Sri Lanka is in the demographic transition from a low-income country to a middle-income country. Sri Lanka is currently experiencing significant health and nutrition challenges including a double burden of over and under nutrition due to socio-economic and demographic changes. Epidemiologic transition is also shifting the disease pattern from communicable diseases towards NCDs, which account for about 90 percent of the disease burden. No communicable diseases (NCDs) are the result of a combination of genetic, physiological, environmental and behaviours factors. The main types of NCDs are cardiovascular diseases, cancers, and diabetes. These diseases are caused by rapid urbanization, globalization of unhealthy lifestyles and population ageing. Unhealthy diets and a lack of physical activity contribute to people in developing conditions such as high blood pressure, diabetes, high blood cholesterol and obesity.

World Health Organisation (WHO) defines malnutrition, includes under-nutrition (wasting, stunting, underweight), inadequate vitamins or minerals, overweight, obesity, and resulting diet-related non-communicable diseases (NCD) (**WHO 2020**). This report also aims to stimulate policy dialogue for malnutrition cable Diseases (NCDs) and to provide evidence base to facilitate policy decisions. NCDs are considered to be one of the leading global health issues that causes majority of human mortality and morbidity, while being not only as a social burden but also as a key factor for accelerating economic costs leading to economic crisis worldwide specially in developing countries where Sri Lanka is of no exception. Dietary behaviour has become route cause in the aetiology of NCDs including diabetes, hyperlipidaemia, hypertension, stroke, heart disease and dietary and lifestyle modifications are vital concerns in the management of these conditions which includes major modifiable nutritional risk factors (unhealthy diet). Cardiovascular diseases deaths have increased from 3 percent to 24 percent for past 50 years, while the deaths due to communicable diseases have decreased from 42 percent to 20 percent. Seventy-one percent (71%) of the total deaths in Sri Lanka is due to NCDs. The premature deaths from NCDs was accounted to be 118,700 (17%) in year 2016 (**WHO 2016**). While Sri Lanka being a developing country marching towards its developmental goals, increasing prevalence of NCDs becomes a hinderance as the country must focus more towards the health particularly in treating and managing NCDs. Although Medical services have been made available to almost all citizen of Sri Lanka and NCD clinics are being successfully setup even in rural hospitals to manage NCDs, prevention of these diseases is yet to be prioritized at the consumer level.

It is more important and urgent to implement preventive measures towards NCDs, where dietary and lifestyle modifications become the core of it. While trying to improve access to medicines and technology to treat patients with NCDs, it is crucial to prevent their incidence by addressing the root causes.

High quality food products can be produced sustainably by the smallholder agriculture sector. Sector modernization, value chain development, agriculture diversification, and undertake agriculture as a business jointly with the private sector would be essential for smallholder producers to withstand market competition. Such transformation will be the basis of the improvement of domestic food consumption, nutrition and health. These modernisation efforts will require investment improvement and capacity building of smallholder agricultural producers and thorough studies on the food systems. A food system includes all processes and infrastructure involved in feeding a population: growing, harvesting, processing, packaging, transporting, marketing, consumption, and waste management (disposal of food and food-related items). It also includes the inputs needed and outputs generated at each of these steps.

This report includes all the activities after the commencement of the work of the study on 'Policy Research in Food Consumption, Nutrition and Health' and responds specifically to the given Terms of Reference (TOR) and Procurement Plan Reference No. **LK-MOA-PMU-31832-CS-QCBS**. Multiple information collection procedures were employed through food system approach to gather relevant information from selected key stakeholders, which include desk reviews, household surveys, semi-structured interviews, focus group discussions and workshops.

This report includes,

- Literature review - the meta-analysis of the previous research and data collection on food security, consumption and nutrition.
- Discussion on Agricultural Policies on Food Consumption, Nutrition and Health towards agriculture modernization, effect of tax policies to safeguard farm producers and food industry performance.
- Overview and descriptive analysis of the surveyed data.
- Existing nutrition literacy and cultural practices across the rural and urban sectors and income classes in Sri Lanka.
- Assessment of economic potential of domestic production to meet priority food needs.
- Policy recommendations and implementation procedures

2.0 OBJECTIVES OF THE STUDY

Identification of knowledge gaps and policy & regulatory inconsistencies in the area of Food Consumption, Nutrition & Health needs of the contemporary society so that the policy makers and other stakeholders can recommend adjustments, reforms or new policies needed to make agriculture sector more competitive, responsive to the market demand, sustainable and resilient.

3.0 TASKS OF THE ASSIGNMENT

- A detailed analysis of historical changes in food consumption pattern with special emphasis on diet diversity, nutrition intake, expenditure on food and sources of food.
- An assessment of the potential of the present food production systems of Sri Lanka to meet the growing food needs of the country, respect to the demographic transition.
- Detail analysis of nutrient composition of major crops in the food balance sheet and the cost of nutrient mix with different sources of nutrients (e.g.; Protein from different sources) to meet the nutrient requirement for different income classes of the society.
- An assessment report on existing nutrition literacy and cultural practices across the rural and urban sectors and income classes in Sri Lanka.
- A report on identified factors, directly and indirectly influencing the food consumption behaviours in contemporary Sri Lankan Society.
- Overview of the effects of policies and programs implemented by the governments in Sri Lanka on food and nutrition security
- Recommended revisions and policy reforms to the existing food and nutrition policy framework or new policy formulations in order to address the identified issues.
- Proposal for an appropriate policy instrument with the implementing authorities (Relevant Ministries, Departments or other Organization) and the procedure to be followed, in order to make policy changes/policy formulation a reality and to improve agriculture sector competitiveness & sustainability.
- Final report with recommendations and implementation procedures.
- Presentation of the results / progress of the research at the policy conference that is to be organized by the ASMP.

4.0 CONCEPTUAL FRAMEWORK & RESEARCH METHODOLOGY

4.1 Conceptual frameworks

To a developing country to reach the goal of high-income status, along with achieving other development goals such as improving status of health and nutrition, agriculture plays a critical role of transformation. This includes structural and econ1omic transformation, shifts from traditional technology to modern technology and from traditional agriculture to industry and manufacturing related high-income service economy. Dietary quality status contributes to an individual's nutrition and health status, a nutritionally balanced diet provides the right nutrients in the right amounts for health and well-being.

There is an association between agricultural interventions and nutritional outcomes; and it shows that the popularising targeted nutrition-rich crops and diversification of the agricultural production systems towards fruits and vegetables which have potential of improvement in nutrient intake and nutritional outcomes. Overall agricultural sector must be modernized in order to achieve these objectives. The interventions, targeting to modernise agriculture sector, are required to follow the food in the process of production pathways. Improving the quality and diversity of the household food consumption could be achieved by increase production of a staple crop, promoting the cultivation and promoting consumption of macro and micronutrient-rich crops including fruits and vegetable. It has been recognised the importance of substituting a crop variety with that contains higher nutritional values. These interventions could increase the level of food access in overall households, meet their nutritional requirements; subsequently reach the expected nutritional and health status while achieving the higher economic goals.

It is not up to the farming families to produce all the food that would meet their daily dietary needs, or to consume all the food that they produce. They spend a significant amount of their income to purchase food and sell the balance of their consumption. Families consider many factors when producing other than the household needs and preferences, costs, market prices, land, labour, farm machinery etc. Although agriculture is a major driving force in development, just a growth in agriculture doesn't automatically improve nutritional status of the household. Literature suggest that the agriculture interventions such as home gardens can help improve family nutrition, encourage traditional varieties, improve health, produce medicinal plants and save money. Working with women is usually the key to improving nutrition through home gardens.

There are some existing important frameworks for program design and for implementing agriculture interventions that aim to improve the nutrition of vulnerable populations. These frameworks for "nutrition-sensitive agriculture" interventions help to recognise complex problems and identify pathways to solutions (FAO, 2017). Agricultural intervention activities affect several pathways and enabling environment that includes policies, the natural resource base, and cultural practices etc.

There is growing international agreement on key pathways and principles for improving nutrition through agriculture, as in Understanding and Applying Primary Pathways and Principles (UAPPP) (Herforth & Harris, 2014). These frameworks are important in exploring the current interventions that are working to achieve nutritional goals. In this study, methods were employed to demonstrate how these activities use the food production to food access and consumption pathway in pursuit of nutritional goals. The main features of the food production activities were integrated with income generation and women's empowerment pathways such as home based (home gardens etc) food production activities targeted toward improved household nutritional outcomes (**Figure 1**).

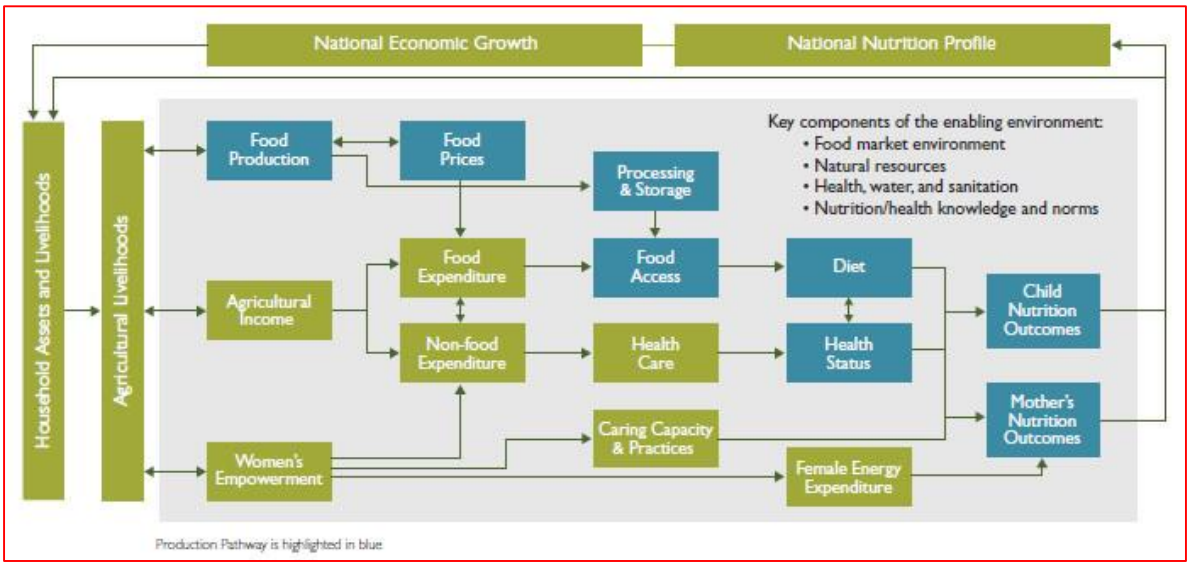


Figure 1: Steps Toward Improved Nutrition: The Food Production Pathway

(Herforth and Harris, 2014)

There are certain groups of the populations are more vulnerable in affecting malnutrition. These groups include young children, pregnant and lactating women, adolescent girls, the elderly, the immuno-compromised and people living under poverty level. Maternal and child malnutrition is vicious to the society in longer term because of irreversible consequences (**Figure 2**).

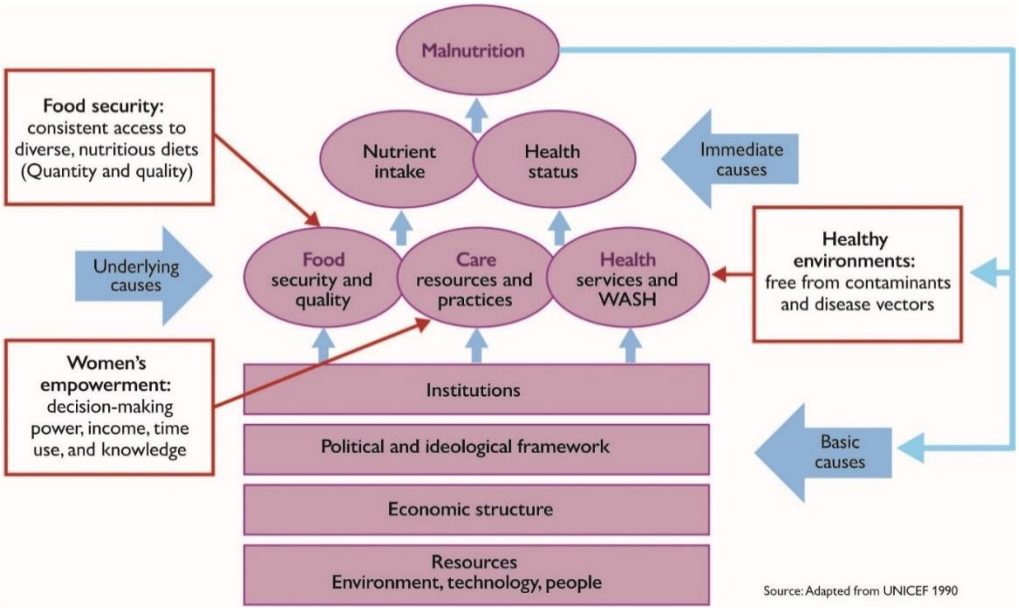


Figure 2: UNICEF's Malnutrition Conceptual Framework

(Herforth and Harris, 2014)

Conceptual framework of UNICEF for ill-health and under nutrition and pathways between Agriculture and Nutrition (**Figure 3**) is been used in conceptualising the methodology of this study.

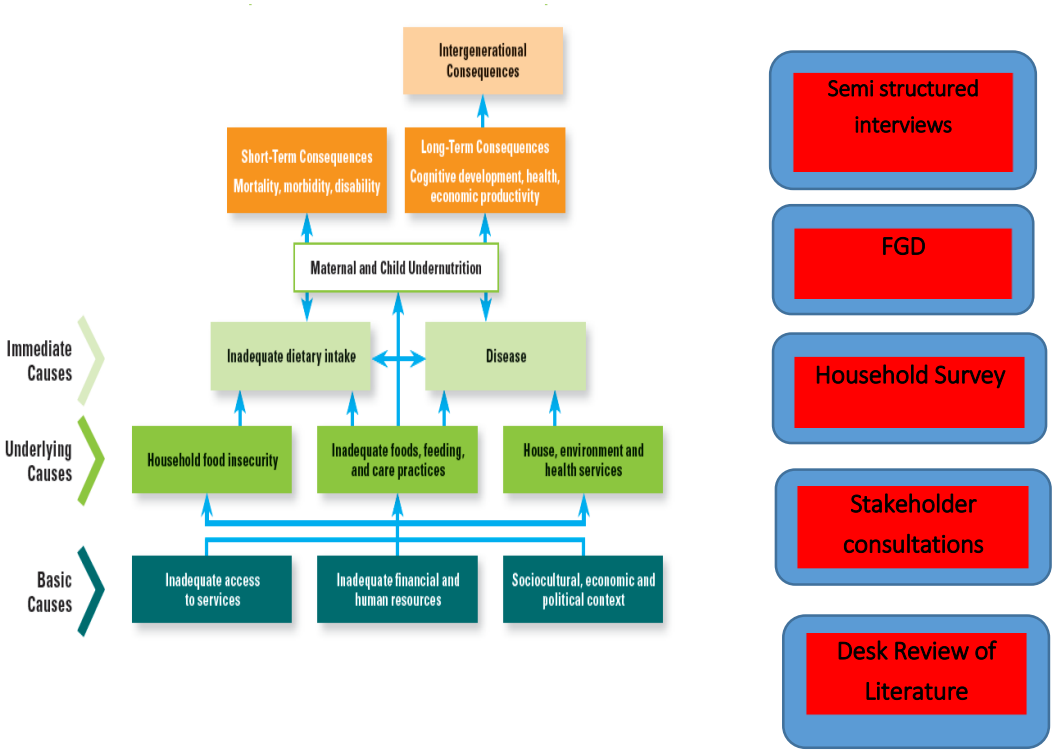


Figure 3: Conceptual Pathways between Agriculture and Nutrition

(Herforth and Harris, 2014).

The nutritional literacy is not a single deciding factor in consumer preference in food behaviors. Individual and environmental motivational factors including income and level of education could affect. The structural differences in food consumption pattern in different socio-economic sectors of population are predominantly influenced by the existing nutritional knowledge, cultural beliefs and practices. To investigate this scenario a multiple information collection strategy was employed, during the research study period, to gather relevant information from different stakeholders, across the sectors of population. Special attention was given to characterize the existing knowledge and policies, which affect the current practices as well as gaps in relation to the policies.

4.2 Research Methodology

This study was targeted at assessing the existing knowledge on nutrition and cultural beliefs across the urban, rural and estate sectors and to assess the impact on current food policies on food consumption patterns, which influence the price and availability of food. The study was aimed to identify the factors, directly and indirectly influencing food consumption behaviour and the areas to be strengthened in policy to encourage nutritional literacy among rural and urban sectors. The study involved a multi-sectoral approach that was required to understand the changes in food consumption patterns to promote sustainability in agricultural production and to promote healthy food consumption behaviour aiming at reduction of the burden of non-communicable diseases.

Several techniques were identified and used in this research methodology design as follows.

- Desk reviews of literature and policies
- Stakeholder consultations
- Semi-structured interviews
- Focus Group Discussions (FDGs)
- Targeted Workshops
- Household surveys

These techniques were used for the purpose of gathering the data and first-hand information required for this policy analysis. It includes three main approaches. Literature review was used to develop research on and relating it to existing knowledge. It can also help to provide an overview of food consumption and production data, existing food systems and relevant policies. Direct consultations with stakeholders help to identify the key areas that needs to be explored.

The consumer and stakeholder survey of qualitative and quantitative data collection methods provided the updated data of existing knowledge on nutrition and cultural beliefs across the sectors and to assess the impact on current food policies on food consumption patterns, which influence the price and availability of food. The key areas covering the process of collection of data/information were characterized by:

- Review of national policies pertaining to food, Nutrition and health available in relevant ministries, treasury, research organizations and departments to obtain insights into the present policy framework, policy inconsistencies and policy conflicts.

- Meet with the stakeholders, including public health and nutrition experts/researchers and key ministry officials at on discrepancies and constraints faced by them that contribute to the outcomes of the sector.
- Review local production and import data of agricultural food commodities and their trends.
- Use secondary data sources, including the reports published to identify the best practices that could be applied.

The research methodology includes:

1. Desk research and Literature review (**Secondary data**)
   Review of secondary data, past and current literature and policies relevant to food consumption, nutrition and health and regulations adapted in Sri Lanka to provide contextual information. Evaluation and estimation of the effects of those policies and regulations.
2. Focus group discussions/Direct consultations and semi-structured interviews (**Primary data)**
   Selected a group of participants from the food systems including following sectoral representatives.
   - Primary producers (farmers)
   - Traders/ Advertisers, Consumers and Value Chain Actors such as vendors, marketers, restaurant owners.
   - Policy planners, Statisticians/ Food, Nutrition, Agriculture and health experts

3. Household surveys (**Primary data**)
   Interviews and questionnaire of representative samples (stratified samples) of rural and urban sectors of the communities, across the range of socio-economic sectors, select study subjects to represent whole country

5.0 DESK RESEARCH AND LITERATURE REVIEW

Agricultural development is aiming to provide sufficient nutrition for health and wellbeing of all people. It is expected agriculture would be capable enough to provide not just calories but feed the people and ensuring total well-being. Food dietary habits have been changed with changes in lifestyle. Lifestyle has a significant influence on dietary habits subsequently to the physical and mental health of human being. Food production is a pathway from agriculture to nutrition which is directly influence on the quantity and quality of food available for consumption of the households associated with the prices. The main pathways from agriculture to nutrition are through food production, agricultural income and household empowerment. Food is a key outcome of agricultural activities, and key input of nutrition. Agriculture is a deciding factor in food and subsequently in nutrition. However, just availability of food from agriculture does not ensure proper nutrition. Given that the agricultural development was to provide adequate food for the health and wellbeing, it seems reasonable to expect that among the top priorities of agriculture would be to look beyond just calories to ensure feeding people well (Shekar, 2015).

An understanding of interactions of agriculture and nutrition in a context would help change influencing factors on how nutrition-sensitive agriculture could improve access to food and healthcare, promote adequate caring practices and contribute to a sustainable environment practice. These activities could eventually lead to improve the nutrition of the entire nation including individual households.

It was suggested by the national agricultural policy (NAP), drafted by Ministry of Agriculture with the assistance of FAO Sri Lanka, to promote nutrition-sensitive agriculture and food systems for Sri Lanka based on agro-ecological diversity, ensuring the concepts are well understood and the impacts of interventions are monitored under nutrition specific objectives and through the use of nutrition-specific performance indicators.

The drafted policy framework further elaborate the National Nutrition Policy of Sri Lanka (Ministry of Health, 2010), which was aimed in improving the access to, availability, utilization and stability of safe and nutritious foods, suiting the tastes and preferences of the Sri Lankan people, and sufficient to meet the individual needs of all households and individuals, ensuring sustainable consumption at all times. Agriculture play a major role in this aspect. Agriculture is responsible in producing food and generating income, creating employment and supporting livelihoods. The policy framework includes significant contribution of nutrition-sensitive food systems to eradication of all forms of nutrition related issues.
NAP identified specifically following key areas:

1) Increasing access to more healthy and nutritious food
2) Home gardening and urban agriculture
3) Integration with other sectors
4) Social and Behaviour Change Communication
5) Monitoring food security and vulnerability
6) Diversifying employment

"The causes of chronic undernutrition are multidimensional, which create many challenges in understanding the condition and finding solutions through interventions and policies. There is no single root cause of chronic malnutrition. The future strategies to address chronic malnutrition need the collaboration of multiple sectors and a variety of stakeholders in governments, non-government organizations, the donor community, and the private sector. To capture and explain the multiple dimensions of chronic undernutrition and the importance of a multi-sectoral, sustainable response to improving nutrition that incorporates perspectives from agriculture, health, environment, water and sanitation, infrastructure, gender, and education". (Kristina Reinhardt and Jessica Fanzo, Addressing chronic malnutrition through multi-sectoral, sustainable approaches: a review of the causes and consequences Frontiers in Nutrition, Published: 15 August 2014 https://doi.org/10.3389/fnut.2014.00013)

This review identified some of the major issues in the agricultural Sector in Sri Lanka as follows.

1. Agricultural Sector has **Low productivity compared to industry and service sector**- Evidently 32% of the labour employed in agriculture only produces a GDP share less than 13% (Senanayake, and Premaratne 2014).
2. Agricultural minimum of **diversification** - Diversification reduce the dependency on traditional agricultural products, increase farmer income.
3. Agricultural **Lack of marketing strategies-** Many agricultural products do not have organised marketing system/strategies.
4. **High Post- harvest losses of fruits and vegetables**- Improper handling and packing have been significant (Kalegama 2006).
5. **Poor adaptation into value chain-** Like many other sectors in Sri Lanka, agricultural productions are not fully occupied in the value chain.

5.1. Historical Changes in Food Consumption Pattern & Nutrition Status in Sri Lanka

Health and social status of Sri Lanka has shown a significant progress over the past several years. Life expectancy of Sri Lankans is 76.8 years in total (59.4 in 1960 and 69.2 in 1996), 73.4 for males, 80.1 years for females and survival to age 65 for male and female 90.5% in 2018 (United Nations Population Division 2019). According to the data, infant mortality rate has declined to 6.4 deaths/1000 live births in 2018 from 70.6 deaths/1000 live births in 1960. The existing average birth weight is 2886g for Sri Lanka whereas lowest of 2734 g recorded in Nuwara Eliya district, values are well above the low birth weight cut off level of 2500 g.

However, the overall picture is not all bright as expected since the percentage of low birth weight prevalence is still at the 12.3% and 6.4% children among under five were underweight. Infant mortality rate 10.1/1000 live births and maternal mortality rate was 32/100,000 live births (Family Health Bureau 2020). The prevalence rates of Protein Energy Malnutrition also declined over the time. There is a gradual reduction in the rates of child malnutrition from 1975 to 2000. The prevalence of underweight children has fallen from 38% in 1993 to 29% in 2000. The proportion of stunted children has declined from 25% to14%. The underweight and stunting rates have declined at annual rates of 1.3 and 1.6 percentage points, respectively, over the period 1993-2000 (Medical Research Institute, 2002 cited in Jayatissa et al, 2006). The overall prevalence of stunting, wasting and underweight was 15.7%, 12.6% and 16.3%, respectively. The nutritional status of Sri Lankan children does not match the country's achievements in child survival and per capita GDP. Marked disparities exist in the prevalence of PEM between the sectors. Prevalence of stunting in the estate sector is 3 times that of the urban sector and underweight is twice as high while in wasting, the difference in prevalence is not so wide (UNICEF 2012). According to the WHO cut-off values for Asians, the percentage of Sri Lankan adults in the overweight, obese and centrally obese categories were 25.2%, 9.2% and 26.2%, respectively (Katulanda *et al* 2010).

Overweight and obesity are emerging challenges leading to a double burden. The increase in obesity leading to rise in health conditions, such as heart disease, diabetes, and cancer–diseases, subsequently increasing burden to the health infrastructure, are something that those living above the poverty line can hardly afford. Therefore, efforts to prevent and reverse the effects of dual burden malnutrition in the country should be equally addressed toward obesity and undernourishment.

The Food Balance Sheets published by the Department of Census and Statistics (2000-2005) shown that there is an increasing trend in the production of rice, vegetables, milk, meat and fruits over the last five years. Accordingly, per capita availability of calories and proteins (g/day) has increased, an improvement in food security situation. However, Inequity of household food distribution, insufficient knowledge, inappropriate feeding and caring practices add to the problem of compromising nutrition security of the individual.

There are major shifts in dietary patterns that are occurring in food consumption and dietary behaviours with the demographic transition of the country. The population in the country is undergoing rapid transition in eating habits. This diverse nature of this transition may be the result of a complex set of economic, social, and consumer characteristics of psychological factors. These determinants include the changes in the trade policies and food industry marketing, the nutrition transition is believed to be associated with rising rates of nutrition related chronic diseases such as obesity, diabetes, cancers and cardiovascular diseases. The scenario affects to the all sections of the population, however, Individuals of low income families are considered to be most disadvantage of the society, who have a difficulty in achieving the required knowhow to change nutrition and health behaviours with the demographic transition[Mao and Oakland 2007]. Research evidence showed the correlation of low-income status with reduced access to knowledge required to incorporate nutritious foods into family diet (Rustad and Smith 2012). Nutrition transition is the process that describes shift in dietary pattern from traditional diets based on cereals and rich in fibre, to western diets high in sugars, saturated fat, and animal-based foods. Along with nutrition transition, demographic and epidemiological transitions occurred over past few years exerting a severe impact on dietary patterns among people (McCracken et al., 2017). The demographic transition describes the shifts in high mortality and high fertility rates into low mortality and fertility rates, while epidemiologic transition describes the shifts in disease pattern from communicable to non-communicable diseases (NCDs) including coronary heart disease, diabetes mellitus, cancers and hypertensive diseases (McCracken et al., 2017).

5.1.1 Food Balance Sheet Study (1961-2017)

To estimate overall dietary supply, availability of energy and macronutrients and overall food consumption, food balance sheets are widely used. The data is also used to assess the adequacy of national food supply to meet the nutritional requirements of the population (Wijesekere, 2015). Identification of specific changes occurred in the food consumption is vital in investigating the nutritional status of the population. In this study, per capita supply of foods was identified and food commodities present in food balance sheets were analysed using dietary analysis software, in order to tackle the changes in pattern of food and nutrient intake among Sri Lankans. This study examined the patterns of food and nutrient supply in Sri Lanka from 1961 to 2017 using food balance sheets published by the Food and Agriculture Organization. Trends in daily per capita calorie, macronutrient and micronutrient supply have been analysed using Foodbase 2000 and compared with World Health Organization (WHO) recommendations. Daily per capita supply values (g/day) of each composite food were entered into Foodbase 2000, and daily per capita supply of energy and following nutrients were obtained. Per capita nutrient supply values were compared against WHO recommendations (WHO, 2003).

- Total carbohydrate
- Total protein
- Total fat
- Fat soluble vitamins – Vitamin A, vitamin D, vitamin E
- Water soluble vitamins – Thiamin, riboflavin, niacin, vitamin B6, vitamin B12, folate, vitamin C
- Minerals – Calcium, magnesium, sodium, potassium, iron, zinc

5.1.2 Changes in Food Consumption pattern and nutrient supply

Along with changes in demographic and socio-economic factors, composition of the Sri Lankan diet has been markedly transformed into low fibre, high refined sugar and saturated fat containing high calorie diets referred to as nutrition transition. Identification of specific changes occurred in the food consumption is important to investigate whether the country's food supply adequately met the nutritional requirements of the population, and the way that changes in composition of the diet influence the growing trends of non-communicable diseases. In this study, trends in per capita supply of foods were identified, and food commodities present in food balance sheets were analysed using dietary analysis software, to tackle the changes in pattern of food and nutrient intake among Sri Lankans.

Figure 4 shows per capita supply of cereals from 1961 to 2017. Per capita supply of cereals has increased over years but not prominent. Rice and wheat are the main contributors for the trends in cereal group. The per capita availability of rice (the staple food in Sri Lanka) has slightly reduced from 261 g/day in 1961 to 244 g/day in 2017, while per capita supply of wheat is showing an upward trend. Although per capita supply of millet and maize have varied, changes in patterns were not prominent.

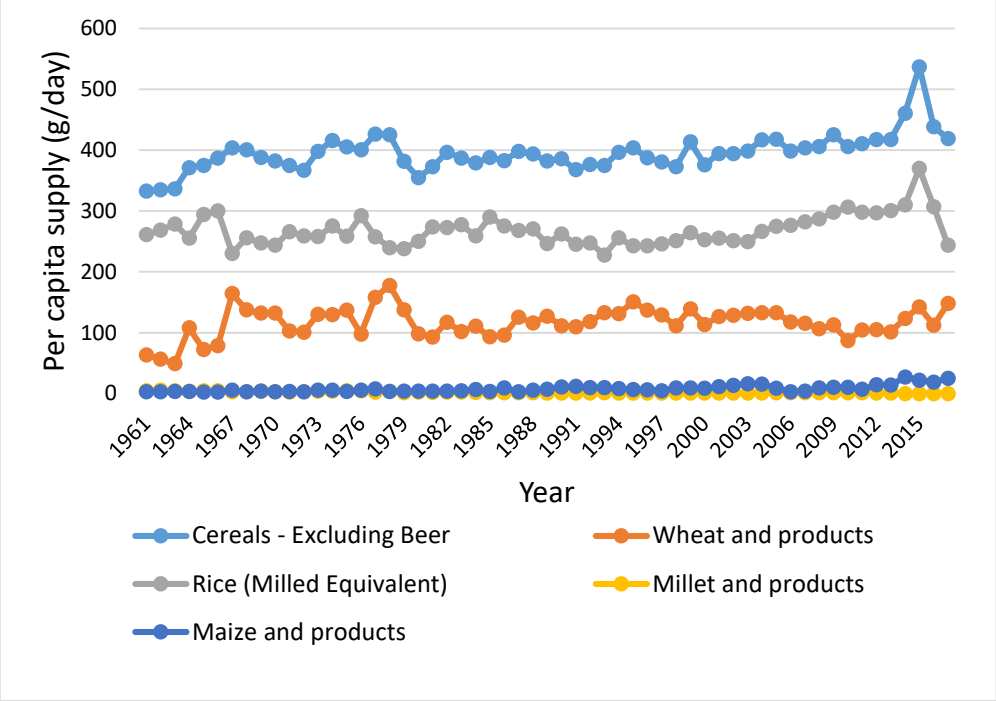


Figure 4: Per capita supply of cereals from 1961 to 2017

Figure 5 shows the contribution to starchy roots group, which has fluctuated within 48 g/day to 58 g/day during 1961–1972 period and has showed a sharp increment until 1975. It has drastically dropped since 1983 and from 2013 there is an increased trend of growth.

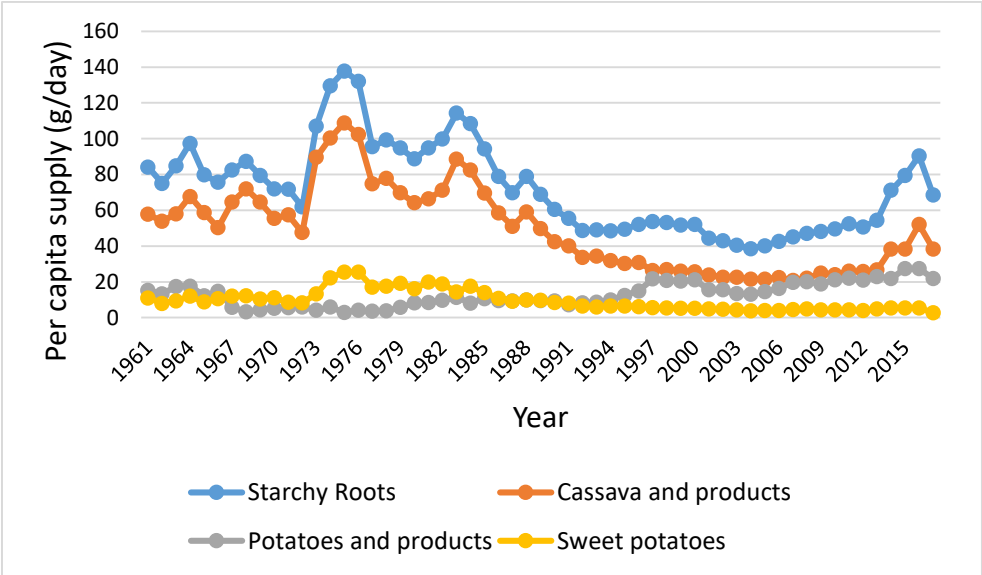


Figure 5 : Per capita supply of starchy roots from 1961 to 2017

Figure 6 shows per capita supply of sugar and sweeteners. The overall availability of sugar and sweeteners showed an upward trend through increment of per capita supply of sugars.

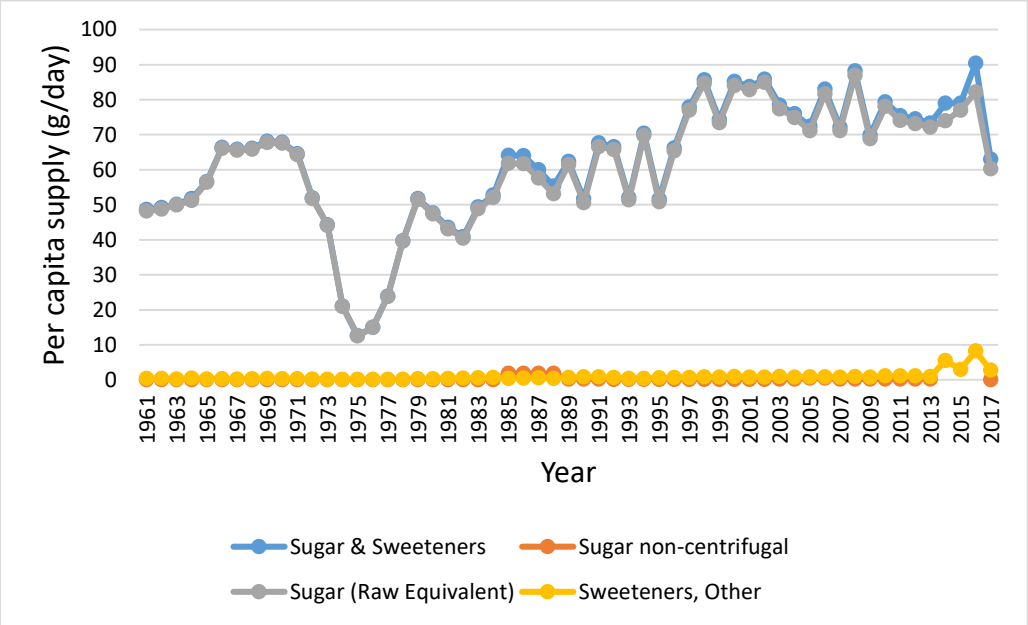


Figure 6: Per capita supply of sugar and sweeteners from 1961 to 2017

The overall availability of sugar and sweeteners showed an upward trend through increment of per capita supply of sugars. Although per capita availability of sugar has dramatically decreased from 1971, within the decade of 1970 it has again increased. This trend is highly associated with the restrictions of imports during 1970-1977 governments and taxations. In around 2015-2017 again there is a sharp drop in trend of sugary products due to government impose campaign against sugary products. Per capita supply of sweeteners has not showed any prominent trend.

Similar pattern can be observed as in **Figure 7** which shows per capita supply of pulses from 1961 to 2017. Per capita supply of pulses has drastically decreased in 1972, accompanied by decrement of all foods in pulse group (again government policy on limit imports). From 2012 to 2015, it has showed a sharp increment followed by an increment in other pulses and products (This reflects that time government initiatives of promotion of cultivation of pulses). Overall per capita availability of peas and beans showed a slight increment throughout the reference period.

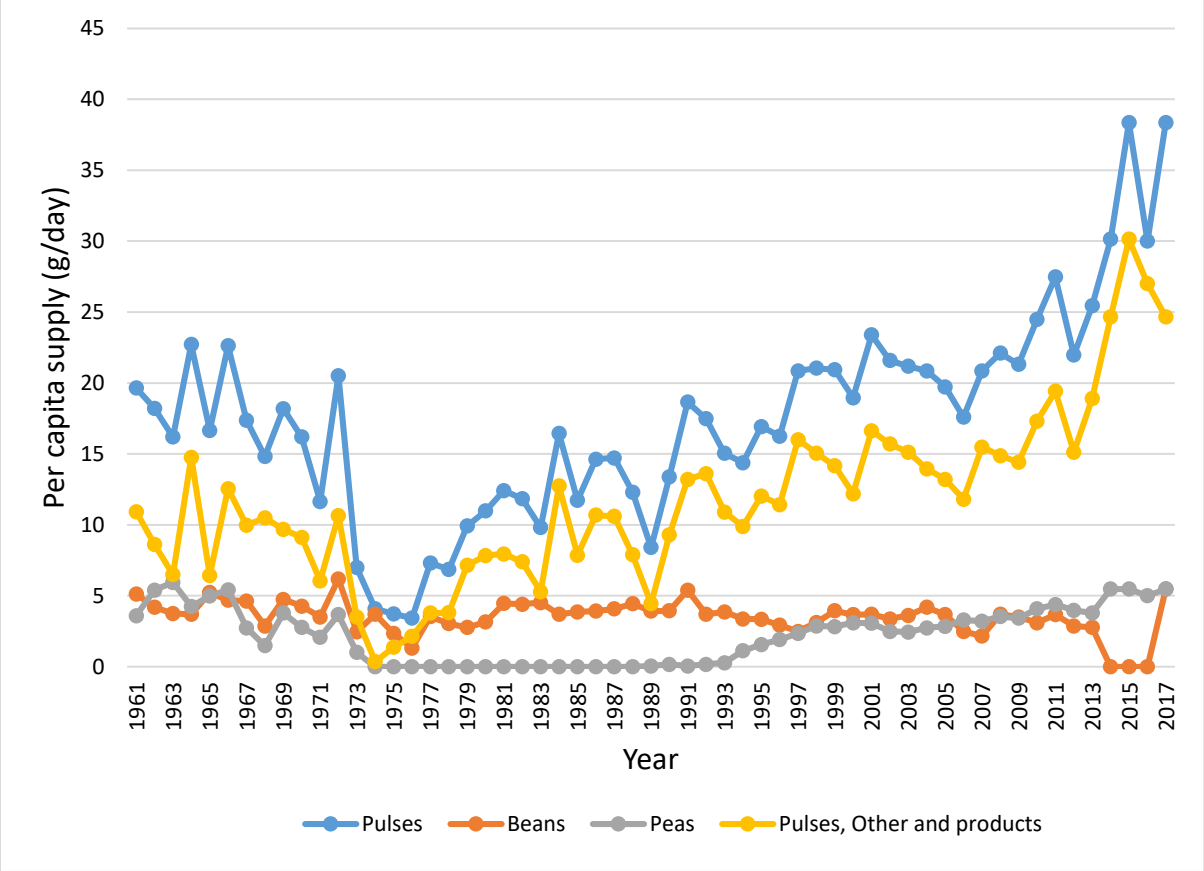


Figure 7: Per capita supply of pulses from 1961 to 2017

The **Figure 8** shows per capita supply of oil crops from 1961 to 2017. Per capita supply of oil crops has showed small fluctuations within five decades from 1961. There was a more than two-fold reduction from 197 g/day in 2013 to 77 g/day in 2014. Coconuts, which represent major contribution to oil crops group followed similar trends over the reference period. Soybeans, ground nuts and sesame seeds has not showed any distinct changes in pattern.

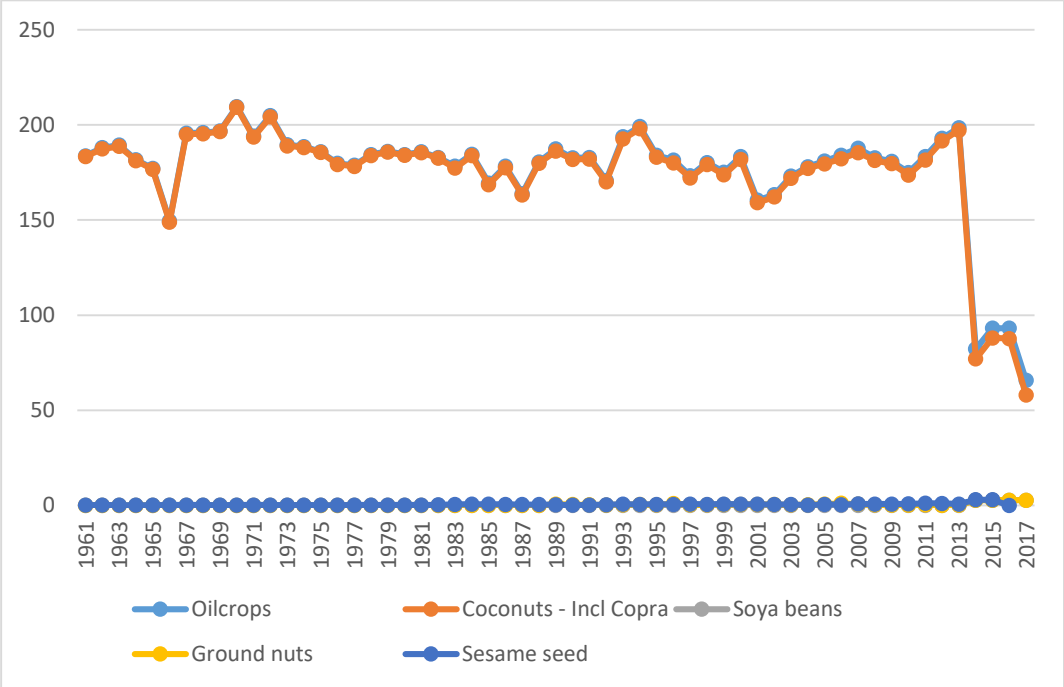


Figure 8: Per capita supply of oil crops from 1961 to 2017

Figure 9 shows per capita supply of vegetable oils from 1961 to 2017. Per capita supply of vegetable oils has fluctuated around 3–12 g/day within 1961–2014 period, showing less prominent increments and decrements. Coconut oil, the major contributor for the trends in total vegetable oil group followed the same trend until 2013 and then has dropped down. Per capita supply of palm oil has not showed any trend until 2013 but has increased after 2013.

Figure 9: Per capita supply of vegetable oils

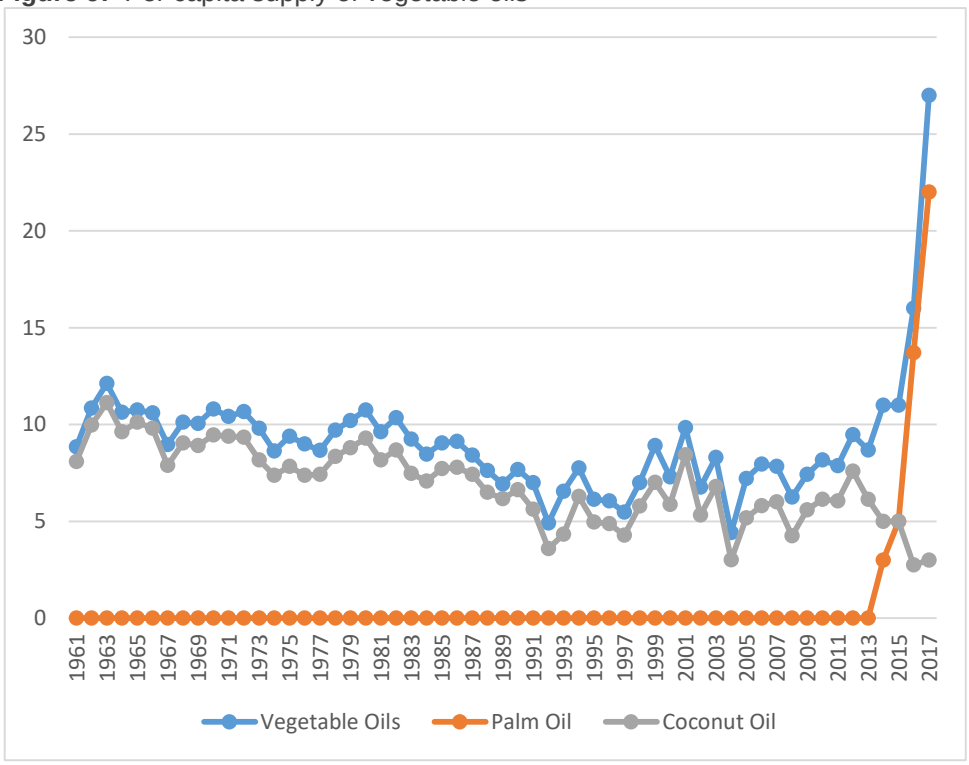


Figure 10 shows per capita supply of vegetables from 1961 to 2017. Per capita supply of vegetables has showed more than two-fold increment over the years from 1961 to 2013. It has increased from 114 g/day in 2013 to 378 g/day in 2014. Per capita supply of other vegetables showed similar trends over the reference period.

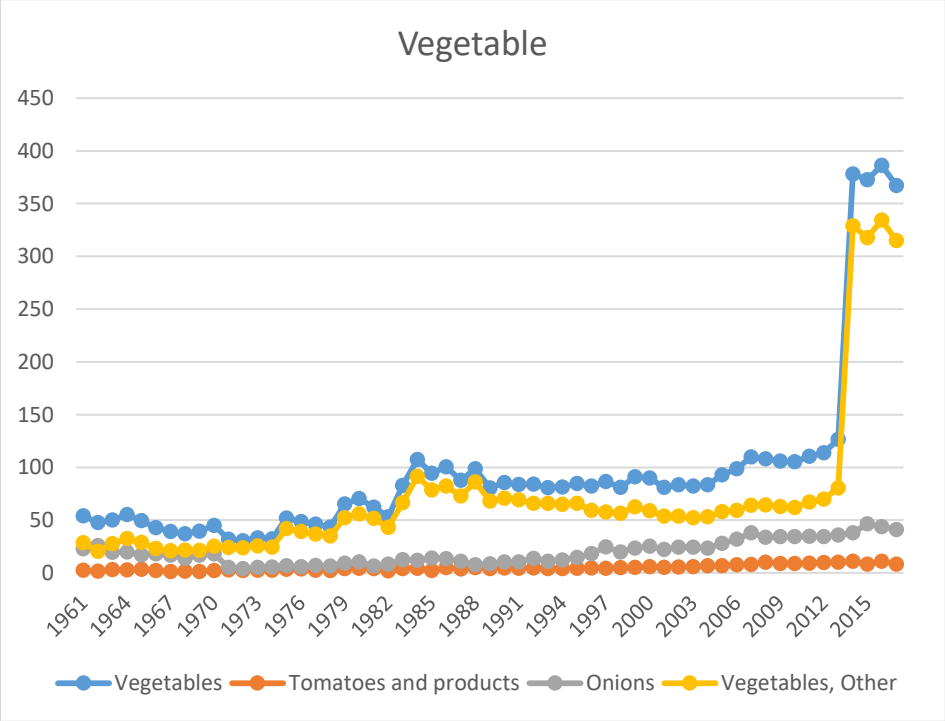


Figure 10: Per capita supply of vegetables

Figure 11 shows the per capita supply of fruits and vegetable compared with WHO recommended minimum intake. Data showed supply have not reached to the satisfactory level until year 2013. According to data country is currently exceeding the minimum intake requirement of fruits and vegetable.

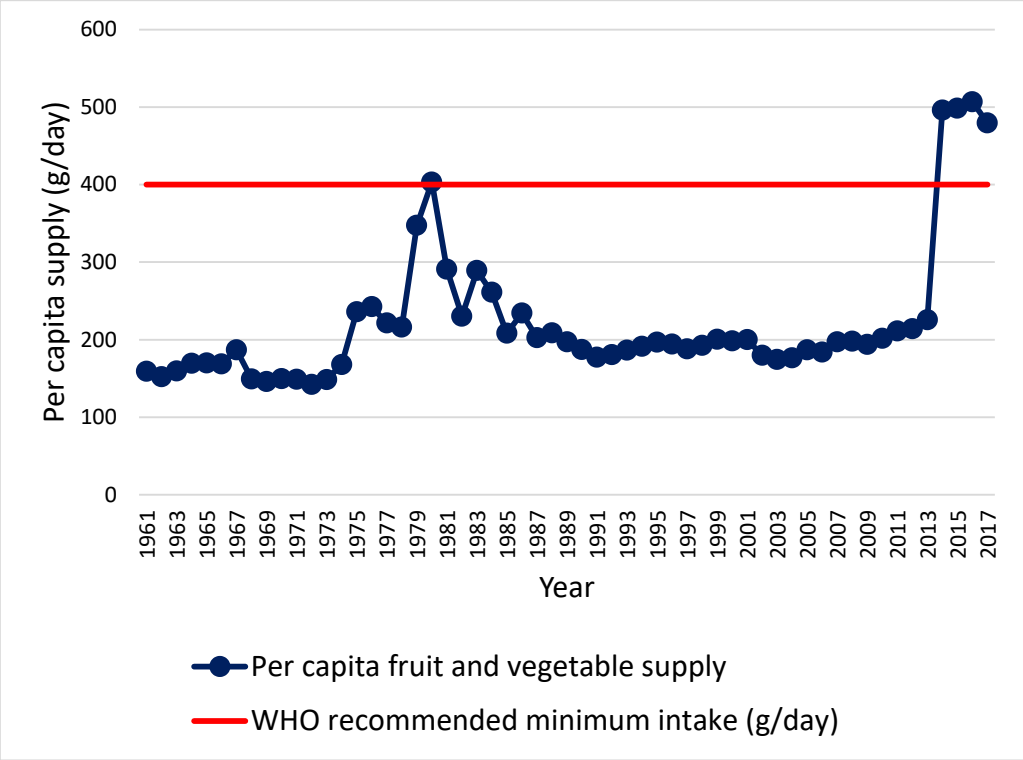


Figure 11: Per capita supply of Fruits & Vegetable

Figure 12 shows per capita supply of fruits from 1961 to 2017. Per capita supply of fruits has increased since 1961, and drastically declined in 1980's. It has showed sharp increments within 1973–1975 and 1979–1980 periods. From 1986, trends showed small fluctuations within 88 g/day to 134 g/day range. Plantains, which showed the highest contribution to total fruit group has also followed similar trends. Oranges, pineapples and products, and other fruits have not showed any prominent changes in patterns. This scenario is the reflexion of that time government drives to promote agricultural production ("Waga Sangramaya") during 1970 to 1977.

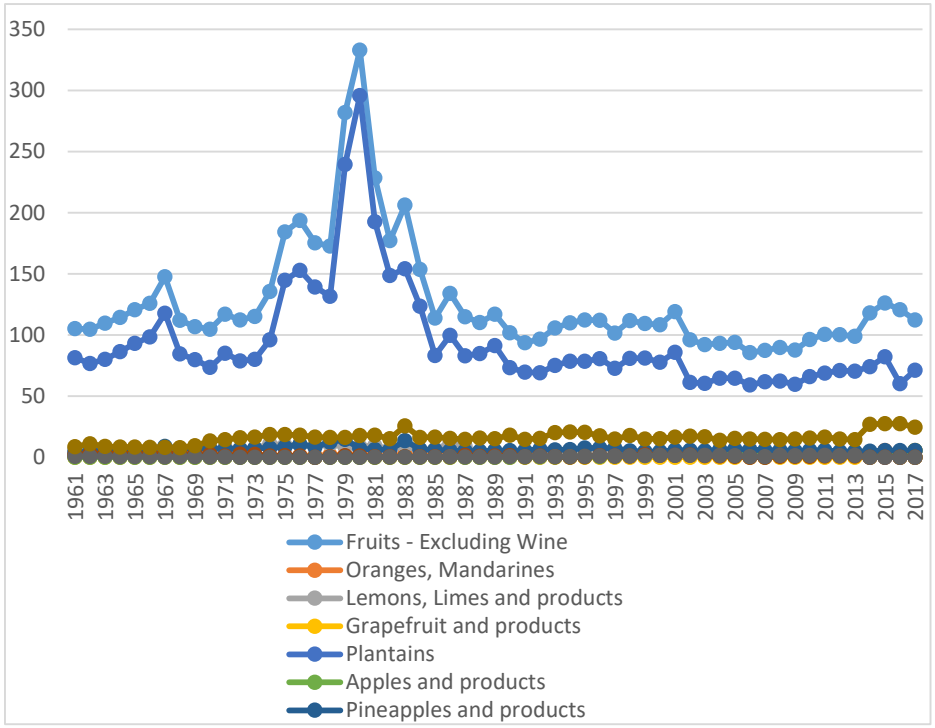


Figure 12: Per capita supply of fruits from 1961 to 2017

Figure 13 shows per capita supply of meat from 1961 to 2017. The overall per capita availability of meat showed a significant increasing trend over the years. About three decades from 1961, overall availability has fluctuated around 8 g/day - 13 g/day, and trends were not prominent. During 1989–1995 and 2014–2017 periods, it has increased remarkably. Per capita supply of poultry meat, the major contributor for total meat group has followed the same trends as above. Per capita supply of beef products has decreased over the years. Not much fluctuation of Pork, mutton and goat meat; have not showed any increasing or decreasing trend over the reference period. This reflect the boom of animal husbandry industry early 90's due to government initiatives and sale boost due to introduction of supermarket culture with more storage facilities.

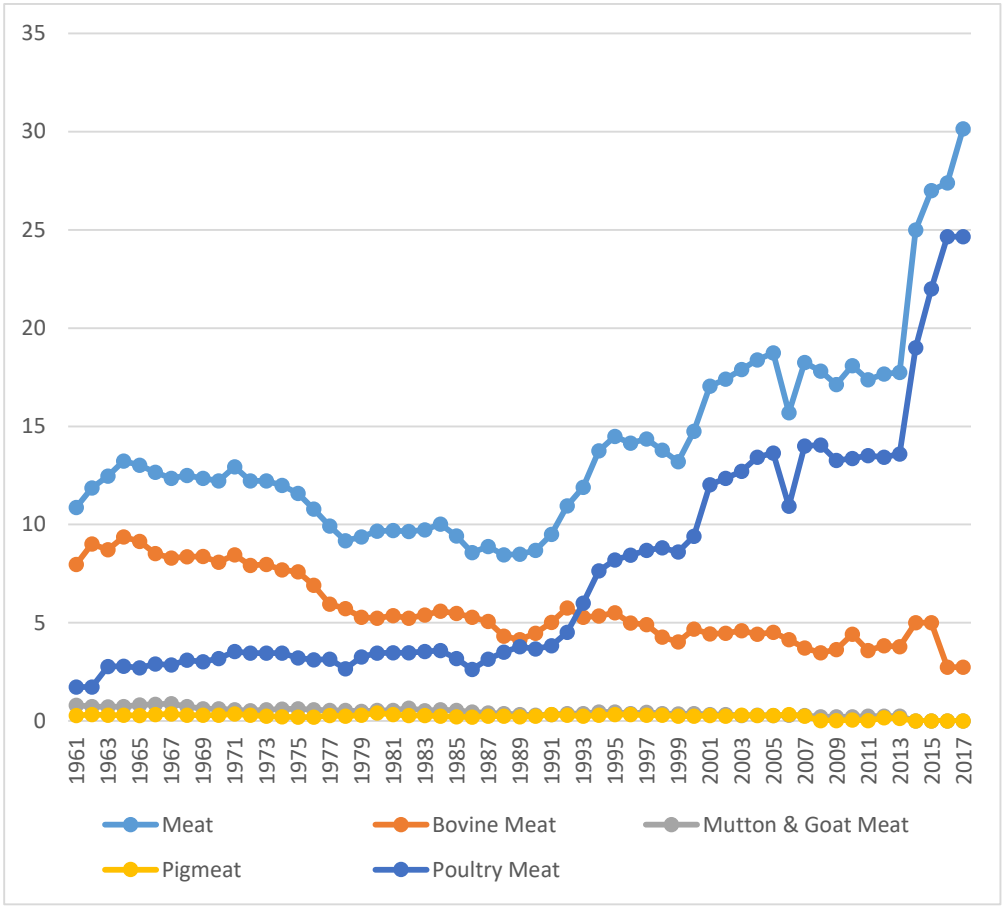


Figure 13: **Per capita supply of Meat products (1961-2017)**

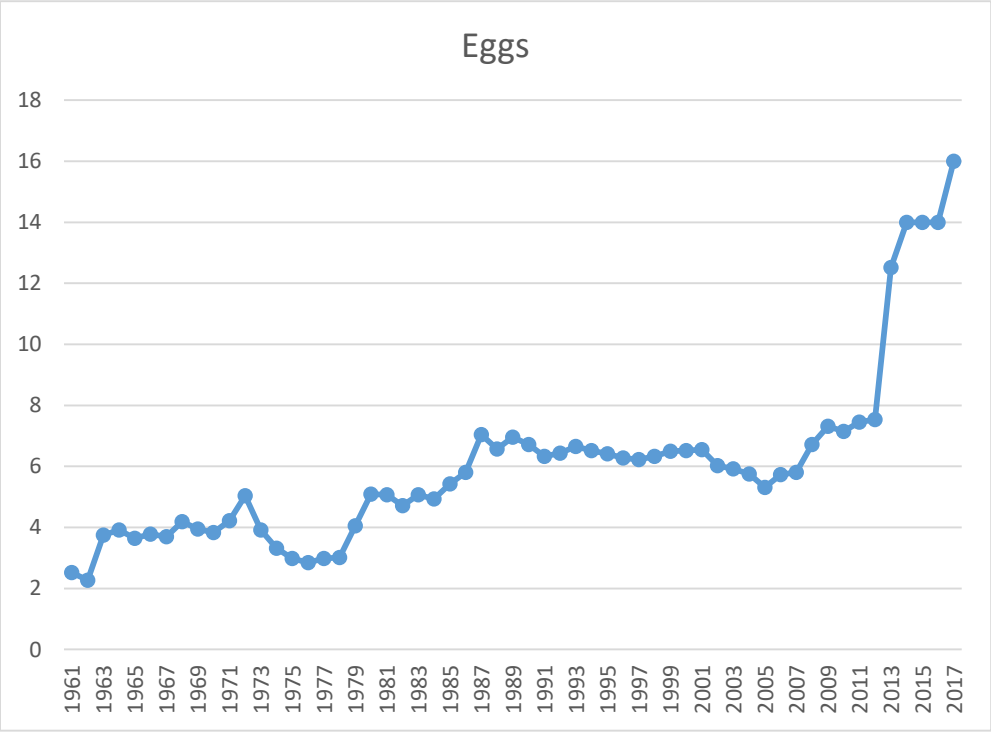


Figure 14: Per capita supply of eggs (1961-2017)

Similar scenario can be observed in egg and milk consumption pattern. The change of marketing and consumption culture (nutrition transition) is reflecting the increase of milk and egg supply data (Figures 14, 15, 16 & 17). **Figure** 17 demonstrates a rapid supply of marine fish supply. This can be explained with increased sea fishing opportunities due peaceful situation of the country after 2009.

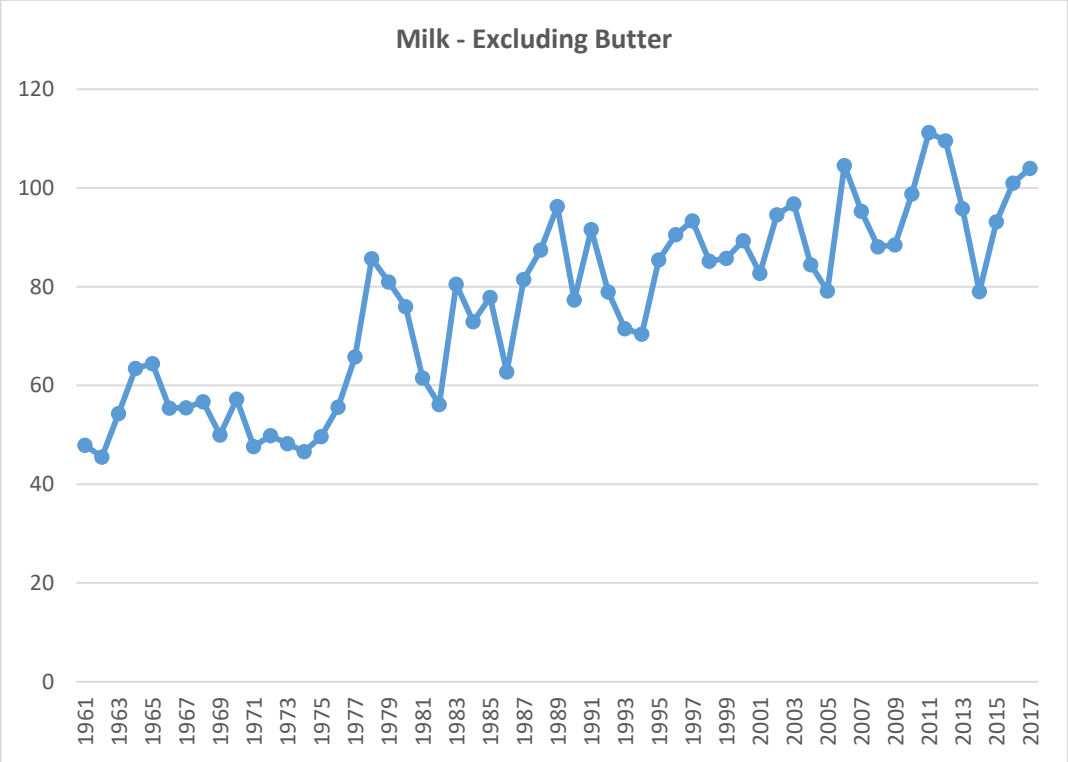


Figure 15: Per capita supply of milk products (1961-2017)

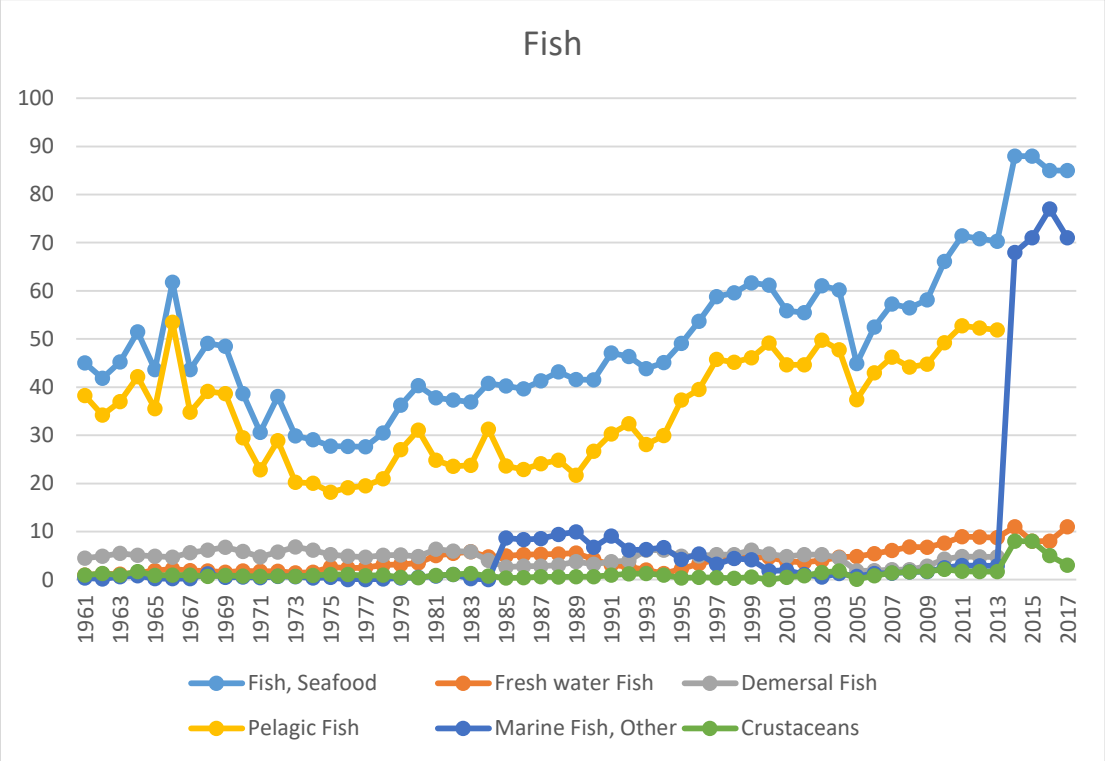


Figure 16: **Per capita supply of fish (1961-2017)**

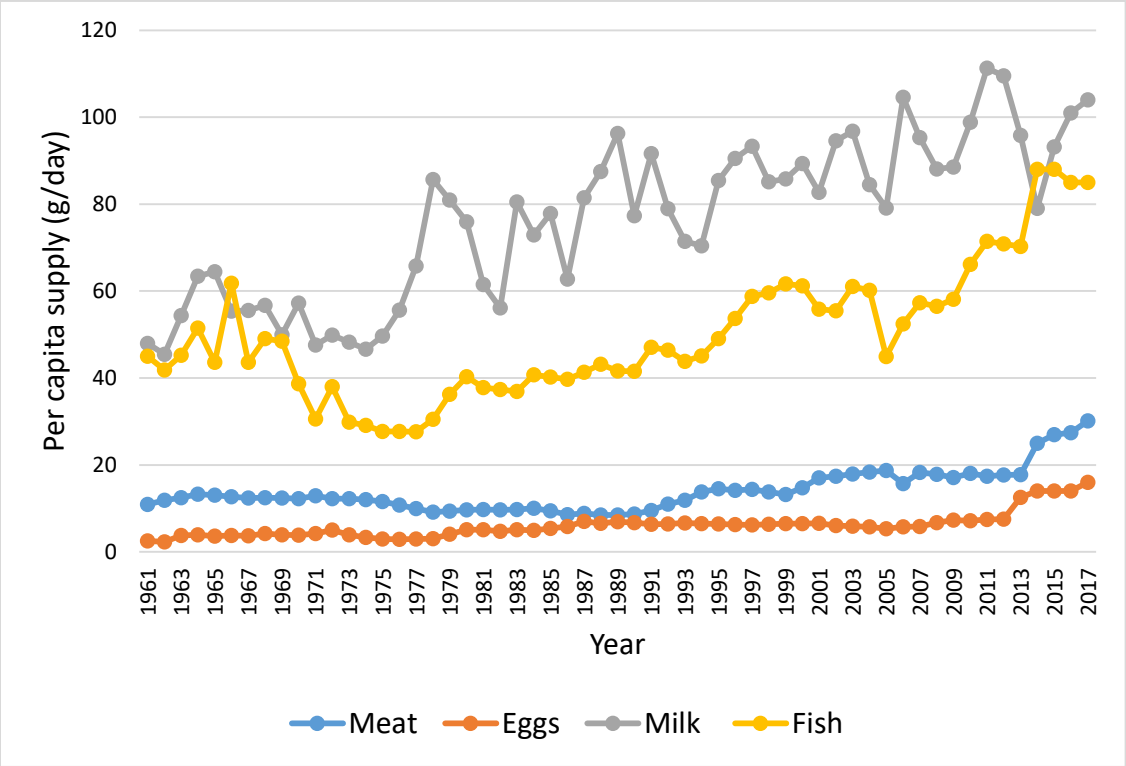


Figure 17: Per capita supply of animal-based products (1961-2017)

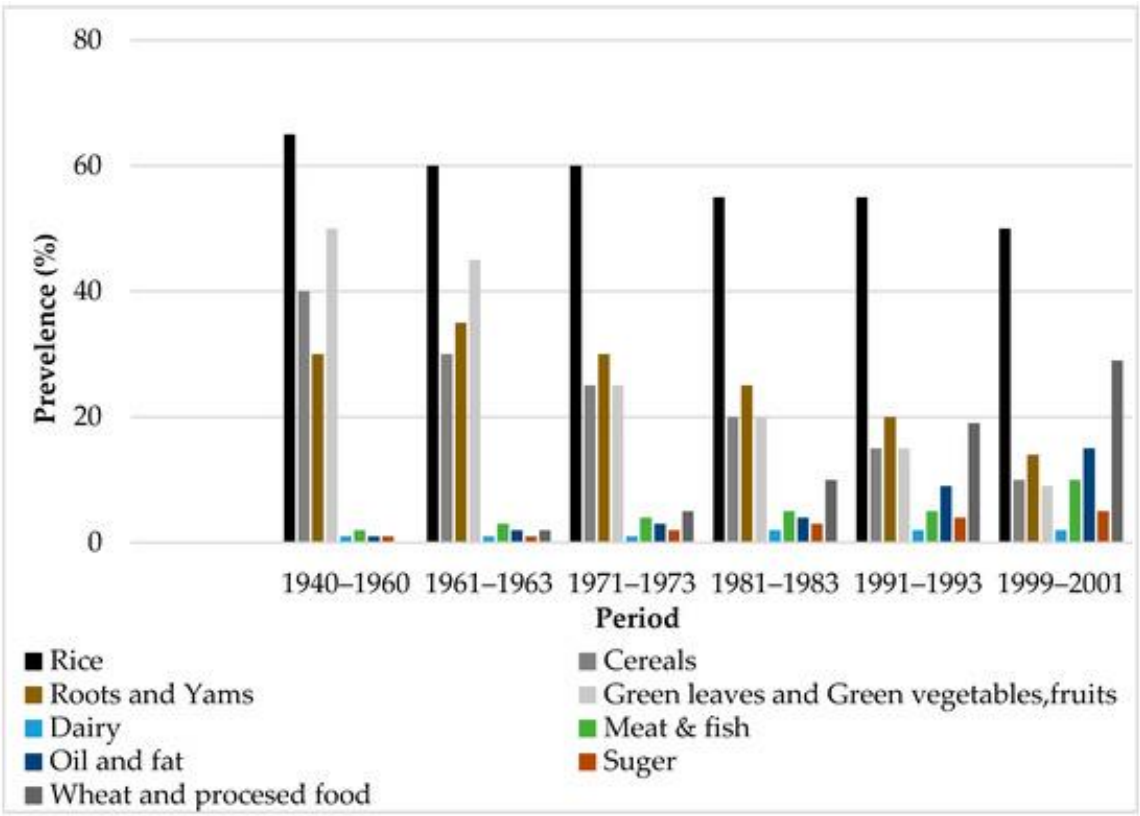


Figure 18: Growth in total food consumption in Sri Lanka.

Source: Central Bank Reports from 1950 to 2001 (Weerasekara et al., 2018)

5.1.3 Per Capita Nutrient Aupply

Results showed that rice (244 g/day in 2017) is the main source for calories, carbohydrate and protein. Per capita supply of energy, carbohydrate and protein have increased over the years from 1961 to 2017. Calories derived from protein (12.6% from total energy), per capita supply of fruit and vegetables (480 g/day in 2017), and the nutrients – iron (15.3 mg/day), folate (243.9 µg/day), vitamin B12 (0.21 µg/day) and vitamin A (704 µg/day) were well below the WHO recommendations in almost all years up to 2017. During the reference period of 1961 to 2017, per capita supply of animal sourced foods showed a sharp upward trend. However, the per capita supply of sugar and alcohol have showed prominent increments in recent years and surpassed the WHO recommendations, showing an unfavourable trend. Although there are limitations associated with the use of food balance sheets, the results have proved the lack in availability of healthy diet for Sri Lankans.

5.1.4 Energy Intake

The study results demonstrated following of energy intake patterns.

a) The quantity intake of rice (the staple food in Sri Lanka) is reducing. In 1980/81 annual household consumption of rice was nearly 46.7 kg, but this had reduced to 36.3 kg by 2009/10.

b) The consumption of meat, fish and eggs has increased in terms of quantity. This shows that the quantity of carbohydrate intake (including rice, wheat flour and bread) is reducing, while protein intake has increased slightly through the consumption of fish, meat, and eggs.
c) The consumption of animal protein (other than dairy) increases with the level of education of the mother and wealth of the household. In the estate sector, the consumption of all protein sources such as milk, meat/fish/poultry/ eggs, legumes and cheese/ yogurt is lower than in urban and rural areas.
d) The urban sector consumes a smaller quantity of staple foods, such as rice, and a larger quantity of non-staple foods, such as meat, fish, and milk, compared to rural and estate sectors.
e) According to food balance sheets, people consume adequate servings of cereal. Only 76.4%, 75.5% and 46.6% of the urban, rural and estate sector children aged between 6-23 months respectively meet the minimum dietary diversity.
f) The intake of energy by Sri Lankan men is higher than that of women by about 350 kcals.
g) When compared to people living in urban and rural areas, estate workers are getting the least energy.
h) In contrast to other Asian countries, Sri Lankan adults consume proportionally more carbohydrates (>71% of energy) and less fat (<19% of energy) and proteins (<11%).
i) The lowest percentage of milk consumption was also seen among them.
j) Lowest per capita fruits consumption is recorded among the urban shanty dwellers. In the sample area, the vegetable consumption is significantly low. At the same time coconut consumption has been very high.
k) Food consumption routine is totally different in urban shanties compared to other areas. Rice and bread, rice and gram, rice and string hoppers, rice and roti, rice and green gram or cowpea are popular among them.
l) In the current food consumption behaviour of different communities in Sri Lanka diets are specific to the location and regionalized food consumption patterns are found.
m) A high percentage of the households of Sinhalese consumed rice for three meals, while Estate Tamils and Moor community consumed rice only for two meals (lunch and dinner).

5.1.5 Carbohydrate Consumption Patterns

The study found following in relevant to carbohydrate consumption statistics.

a) Rice, wheat flour and bread are highly consumed food items in Sri Lanka.
b) According to the annual per capita, rice consumption is 114.7 kg per person. Annual per capita of wheat consumption is 40.4 kg per person.
c) The annual rice consumption in paddy and Chena cultivation areas, per capita rice consumption has been high. It is between 128.40 kg to 167.1 kg per person.
d) The annual per capita rice consumption of estate community is 111.11kg per person.
e) High percentage of per capita consumption of wheat flour is recorded among the estate community.

f) According to consumption patterns, in the North Central Province and in the North-Western Province, the most popular types of rice was parboiled and raw white.
g) In rural low-income communities, most popular type of rice was parboiled and long grain rice.
h) Households in rural sector show the highest consumption of “Kekulu” rice (red and white) and household in urban sector consumed the lowest quantity.
i) The highest consumption of Nadu rice (white) was reported from estate sector (18.5 kg) and the lowest consumption was reported from urban sector (6.5 kg).
j) The average monthly household consumption quantity of bread was 3.6 kg per month.
k) Households in urban sector consumed large quantity of bread which was reported as 5.3 kg per month per household.
l) Sri Lankan adults consumed over 14 portions of starch and 3.5 portions of added sugars daily.
m) Almost 70% exceeded the upper limit of the recommendations for starch intake
n) Sugary food and food made with oil/fat/butter are most commonly consumed by young mothers in the urban sector in comparison to the young mother’s in the rural or estate sector.

5.1.6 Dairy, Fruits and Vegetable Consumption

The study found following in relevant to Dairy, Fruits and Vegetable Consumption intake statistics.

a) Mothers in the lowest wealth quintile have less variety in their diets than those in the highest wealth quintile, a diet that is particularly deficient in the consumption of cheese/yogurt. The consumption of cheese/yogurt in the highest wealth quintile mothers is approximately 3 times of that of the lowest wealth quintile.
b) Consumption of food made from grains (88 percent) and fruits and vegetables rich in vitamin A (86 percent) is high in the children aged 6-23 months.
c) The consumption of food made from legumes and nuts (66%), food made from roots and tubers (58%), meat, fish, poultry and eggs (58%) is relatively low.
d) The consumption of food made with oil, fat and butter increased from 34 percent (2006/07 SLDHS) to 42 percent (2016 SLDHS excluding Northern Province) in this decade (2006-2016).
e) The daily intake of fruit (0.43), vegetable (1.73) and dairy (0.39) portions were well below national recommendations.
f) Only 3.5% of adults consumed the recommended 5 portions of fruits and vegetables/d; over a third of the population consumed no dairy products and less than 1% of adults consumed 2 portions/d.
g) Consumption of fruits among Sri Lankans is still relatively low compared to other developing countries and far below the required level of recommendation.
h) Per capita fruit and vegetable supplies in Sri Lanka were approximately 100g and 127g per capita per day respectively by 2013. From 1961 to 2013, Sri Lankans have never met the WHO recommended minimum intake of 400g of fruits and vegetables per day, except for one year (1980).

According to the food balance sheets, consumption of both pulses and nuts have increased over reference period. Therefore, the gap between consumption and the WHO recommended level (30g per capita per day) has been narrowing over the years. As a percentage, energy intake from sugar was 2.32% of the total energy intake in 1961 and the respective figure in 2013 is 10.47%. With this massive increase, per capita intake of sugar has surpassed the WHO recommend level (below 10% of energy intake from sugar).

5.1.7 Infant/Children Feeding Practices

The study found following in relevant to Infant/Children Feeding Practices statistics.

a) 82% of all children under age 6 months are exclusively breastfed, only 64 percent of those aged 4-5 months are exclusively breastfed.
b) Among non-breastfed children aged 6-23 months, 69 percent were given milk or milk products, 86 percent were given food from at least four food groups, and 88 percent were fed four or more times per day.
c) Forty-five percent of non-breastfed children aged 6-23 were fed in accordance with all three IYCF practices.
d) Among children aged 24-59 months, sixty-one percent of children consumed food rich in iron in the previous 24 hours with a higher percentage in urban sector than in the rural or estate sector. (70, 59 and 49 percent respectively).
e) The highest percentages of children aged 24-59 months who consumed food rich in iron are observed among older mothers (62 percent), the richest households (74 percent) and mothers with the highest educational level (69 percent).
f) Ninety two percent of children aged 6-23 months consumed foods rich in vitamin A the day or night preceding the survey. The consumption of foods rich in vitamin A increases with wealth quintile.
g) Three in five children (59 percent) consumed food rich in iron in the 24 hours prior to the survey. A higher percentage of children in urban areas consume food rich in iron than those in the rural or estates sector (69, 58 and 45 percent respectively).
h) Consumption of sugary food (34%) among children under the age of 3 years decreased drastically by 27 percent compared to 2006/07 SLDHS (61%).
i) Overall, 62 percent of Sri Lankan children aged 6-23 months met the minimum standard with respect to all three IYCF feeding practices. Ninety eight percent of all children aged 6-23 months received breast milk or other milk or milk products during the 24-hour period before the interview, and 86 percent were fed the minimum number of times in the preceding 24 hours.
j) The most common problem with feeding practices was an inadequate number of food groups; only 73 percent of children aged 6-23 months received foods from the minimum number of food groups for their age.

k) Eighty-eight percent of mothers had eaten vitamin A rich food, and 62 percent had eaten animal protein (other than dairy). Sixty-nine percent of women ate legumes or legume –based food in the previous day.

5.1.8 Maternal and Childhood Malnutrition

Considering the existing malnutrition status in Sri Lanka, there are several determinants that affect the health and well-being of the women and children, a critical indicator of the status of the community nutrition. Household income is clearly an important determinant of stunting and underweight in Sri Lanka. Low birth weight, the most important predictor of both these types of under nutrition, is also highly influenced by household income. The impact of household income on nutrition is mediated by the three underlying determinants of under nutrition: food security, caring practices and health and environment.

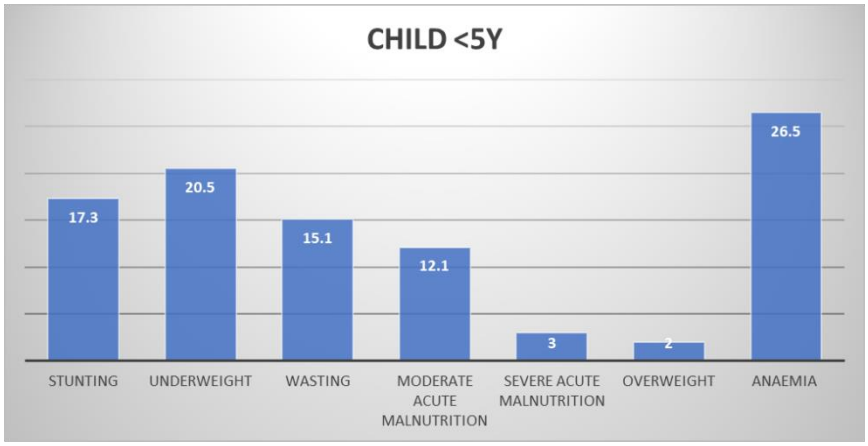


Figure 19**: Malnutrition in children**

(Source: DHS 2016)

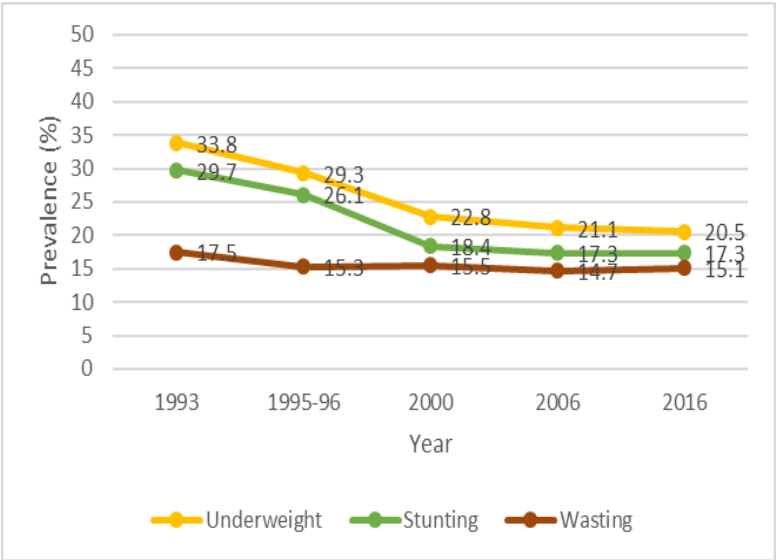


Figure 20: Malnutrition in children

(Source: DHS Survey Data standardized to WHO growth reference standards)

Table 1: Micronutrient deficiencies in the life course in Sri Lanka

Lifecycle stage	Micronutrient deficiency	Prevalence (%)	Source
	Iron deficiency		
Child 6-59 months	Iron deficiency (6-59 months)	33.6	Jayatissa et al, 2014
	Iron deficiency anaemia	7.4	Jayatissa et al , 2014
Adolescent (11-19 yrs)	Iron deficiency	19.2 (male -11.2; female-27.1)	Allen et al 2017
	Iron deficiency anaemia	3.9 (male-1.0; female -4.6)	Allen et al 2017
School drop-out girls (15-18 yr) in Western P	Iron deficiency	29.4	De Lanerolle-Dias et al, 2012
Pregnant mother	Iron deficiency	21.8	Jayatissa et al, 2014
	Iron deficiency anaemia	10.8	Jayatissa et al, 2014
	Iodine deficiency		
School child 6-10 years	Iodine deficiency (<100µg/L)	25.5	MRI, 2010
	Severe Iodine deficiency (<20 µg/L)	1.4	MRI, 2010
	Total goiter rate	1.8	MRI, 2016
Pregnant mother	Iodine deficiency (<150µg/L)	62.5	Jayatissa et al, 2017
	Zinc		
Child 6-59 months	Zinc	5.1	Jayatissa et al, 2014
School drop-out girls (15-18 yr) in Western P	Zinc	28.8	De Lanerolle-Dias et al, 2012
	Calcium deficiency		
Child 6-59 months	Calcium (<8.4mg/dL)	47.6	Jayatissa et al, 2014
	Vitamin deficiencies		
Pregnant women	Vitamin A	3.4	Jayatissa et al 2017
School drop-out girls (15-18 yr) in Western P	Folic acid	28.0	De Lanerolle-Dias et al, 2012

Lifecycle stage	Micronutrient deficiency	Prevalence (%)	Source
School drop-out girls (15-18 yr) in Western P	Vitamin B12	1.8	De Lanerolle-Dias et al, 2012

Secondary source: Jayawickrama et al 2018. Micronutrient status in Sri Lanka: A review. Nutrients, 2018, 10, 1583.

5.1.9 Issues in Food Advertising and Urbanisation on Nutrition Transition

Sri Lanka is experiencing a transformation of food supply systems due to rapid urbanization, dietary diversification, and liberalization of foreign direct investment in the food sector. More attractive supermarkets are replacing traditional marking throughout the country. Booming of Fast food chains as a result of globalisation of economy and popularisation of western lifestyles (Weerasekara et al, 2018). This transition leads towards dietary practices, which has significantly higher consumption of calorie, fat and sugar content, are expected to result in higher incidence of dietary-related non-communicable diseases, as well as micronutrient deficiencies.

A study among school children aged 9-14 years revealed that television advertising has strong relationship with the food demand by the children (Samaraweera and Samanthi, 2012). The food demand of children is determined by several factors such as pocket money, special brand choices of food items, preferred advertisements, and time of watching television, different television channels and specific programmes and the techniques used by the advertisements. The study further revealed that the most popular advertisement among students, known as “Koththu me” created the high demand for unhealthy and nutritionally substandard food.

A content analysis of 95 different food and beverage advertisements on television found that, 78% of the food advertisements were focused on children, and many of them claimed health benefits (Prathapan, Wijewardena and Low, 2015). Nearly 90% of the advertisements categorized as ‘unhealthy’ foods (based on high content of sugar and/or fat) targeted children.
The most common types of advertisements were confectioneries, and soft drinks and drinks with high sugar content. None of the advertisements contained disclaimers.

Interviews with stakeholders revealed that unhealthy fast food huts haves become a common practice in public events (such as sport events, exhibitions, fairs) giving a huge marketing advantage for advertising and selling foods with high content of sugar, salt and fat. There is no promotion of healthy fast foods in such events. Use of celebrities and sports stars in advertisement especially cricketers have been another strategy of promoting foods with poor nutrition quality. This section will be addressed further in the policy draft.

5.2 Double Burden of Malnutrition

Data shows that Sri Lanka is experiencing changes in dietary behaviour characterized by the double burden of malnutrition, in which co-existence of overnutrition featured with chronic diseases, while undernutrition remained certain section of the community. There has been a rapid increase in the prevalence of chronic NCD between 1990 and 2017 reflecting epidemiological transition in parallel to the rapid urbanization, change in lifestyle and dietary practices. Accordingly, prevalence of diabetes mellitus, hypertensive disease and ischemic heart disease have increased along with increments in per capita supply of energy, carbohydrate and total fat. Prevalence of Ischaemic Heart Diseases (IHD) has increased from 1990 to 2010 period, and percentage energy supply from saturated fats showed slight decrements over the reference period. There is a substantial percentage of undetected diabetes and hypertension in the population (at least one third). The prevalence of all NCD are high causing a huge burden to the health system. Participation for screening and primary preventive measures, promoting healthy diet and physical activity, was poor especially by men. Above trends of nutrient intakes show the per capita supply of different food groups/food items and prevalence of NCDs. Accordingly, per capita supply of fruits and vegetables, and the prevalence of diabetes mellitus, hypertensive disease and ischemic heart disease (IHD) have gradually increased over the years since 1990 to 2010. According to these results, an association can be seen with per capita supply of coconuts and alcoholic beverages, and the prevalence of IHD which has also increased from 1990 to 2010 period.

Table 2: Macro-nutrient malnutrition and anaemia in the life course, in Sri Lanka

Lifecycle stage	Nutritional disorder	Prevalence (%)	Source	Comment
New-born (birth-28 days)	Low birth weight[a]	15.7	DHS 2016	Major predictor of undernutrition in childhood
Child <5 years	Stunting[a]	17.3	DHS 2016	Medium public health significance (>15%)
	Underweight[a]	20.5	DHS 2016	Very high public health significance (>15%)
	Wasting[a]	15.1	DHS 2016	Very high public health significance (>15%)
	Moderate acute malnutrition	12.1	DHS 2016	
	Severe acute malnutrition	3.0	DHS 2016	Associated with illness and risk for death
	Overweight	2.0	DHS 2016	
	Anaemia (6-23 months)	26.5	MRI 2012	Very high public health significance (>20%)

Lifecycle stage	Nutritional disorder	Prevalence (%)	Source	Comment
School child 6-12 years	Stunting	11.5	MRI, 2017	
	Wasting	39.9	MRI, 2017	
	Anaemia	11.1	MRI, 2017	
	Obesity			
Adolescent (10-19 yrs)	Overweight Gr 10 male	4.2	FHB, 2015	
	Overweight Gr 10 female	4.9	FHB, 2015	
	Low BMI - Gr 10 male	28.4	FHB, 2015	
	Low BMI - Gr 10 female	20.0	FHB, 2015	
Pre-pregnant women	Underweight (BMI<18.5)	22.6	MRI, 2014	Lead to low birth weight
Pregnant mother	Short stature (<145cm)	4.4	MRI 2014	Lead to low birth weight
	Anaemia	31.8	MRI 2014	Very high public health significance (>20%)
Lactating mother	Underweight	11.2	MRI, 2015	
	Anaemia	22.2	MRI, 2009	Very high public health significance (>20%)
Adult women (18-69 year)	Short stature (<145cm)	7.2	DHS, 2016	In the 15-49 aged
	Underweight (18-69 yr)	14.1	STEPS 2015	
	Overweight (18-69 yr)	26.0	STEPS 2015	Predisposed to NCD
	Obese (18-69 yr)	8.4	STEPS 2015	Predisposed to NCD
Adult men (18-69 year)	Underweight	16.5	STEPS 2015	
	Overweight	21.0	STEPS 2015	Predisposed to NCD

Lifecycle stage	Nutritional disorder	Prevalence (%)	Source	Comment
	Obese	3.5	STEPS 2015	Predisposed to NCD
Elderly (60-69 yr)	Underweight	16.4	STEPS 2015	
	Overweight	23.7	STEPS 2015	
	Obese	6.3	STEPS 2015	

[a] Rates have declined up to 2000, and no significant change thereafter

Trends in hospital morbidity due to diabetes, hypertension and ischaemic heart disease, 1990-2017

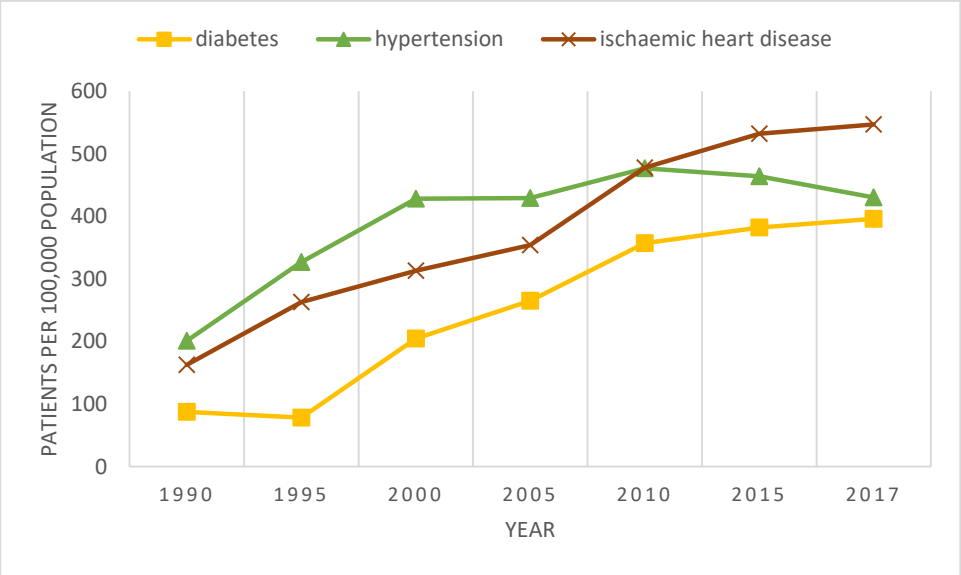


Figure 21: Hospital morbidity is the number of patients

Hospital morbidity is the number of patients discharged alive from all government hospitals with a diagnosis of the defined condition in a year per 100,000 midyear population (Source: Annual Health Bulletins, MOHNIM 1990-2017). Recent data on prevalence level are not available at national. The International Diabetes Federation has estimated the prevalence of diabetes as 10.7% for the year 2017.

Table 3: Prevalence of chronic Non communicable disease in Sri Lanka

Disease	Prevalence	Reference
Prediabetes, (≥20Years)	11.5	Katulanda et al. 2005-06
Diabetes, (≥20Years)	10.3	Katulanda et al. 2005-06
Hypertension, (≥20Years)	23.7	Katulanda et al. 2005-06
Dyslipidaemia, (≥20Years)	77.4	Katulanda et al. 2005-06
Metabolic syndrome, (≥20Years)	24.3	Katulanda et al. 2005-06
Diabetes, 18-69 years	7.4	STEPS, 2015*
Diabetes, males 35-64 year, Kalutara district	14.1	De Silva, 2018
Diabetes, females 35-64 year, Kalutara district	15.2	De Silva, 2018

*Diabetes was diagnosed on Fasting Plasma Glucose only

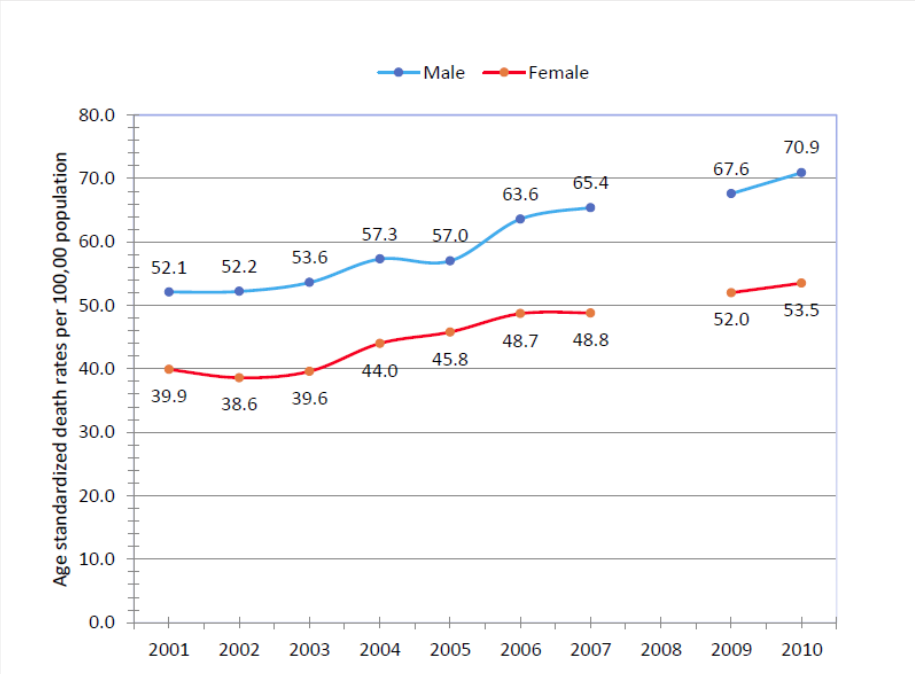


Figure 22: Age standardized death rate (per 100,000 population) due to cancer, 2001-2010

Source: Annual Health Bulletin, 2015 (National Cancer Control Program, MoHNIM)

5.3 Food Safety Issues

National policy and strategy on cleaner production for agriculture sector (NPSCPA) has been formulated with an objective of achieving sustainable agriculture for national prosperity ensuring food security of the nation through ecologically sound, economically viable and socially acceptable agricultural systems. This policy supports the environment and natural resource management in a sustainable manner.

The draft of NAP framework identified Food safety, consider it as a key concern (as in the National Nutrition Strategic Plan), suggest have a platform for inter-sectoral cooperation to accelerate efforts to achieve optimum nutrition for every Sri Lankan. E.g.: Safe water supplies of the National Policy on Drinking Water (Ministry of Water Supply and Drainage, 2010). It was required to recognise role of food safety regulations, testing and penalty systems for maintaining food safety in the interests of producer and consumer safety, for domestic produce, imports and exports. The NAP suggests having compulsory, the long-run, food safety systems such as "Hazard Analysis and Critical Control Points (HACCP). The NAP targeting several key areas of sustainable agriculture which includes reduction of use of agricultural chemicals, implementing Good Agricultural Practice (GAP) and popularising organic and low-input agriculture.

Food-borne diseases

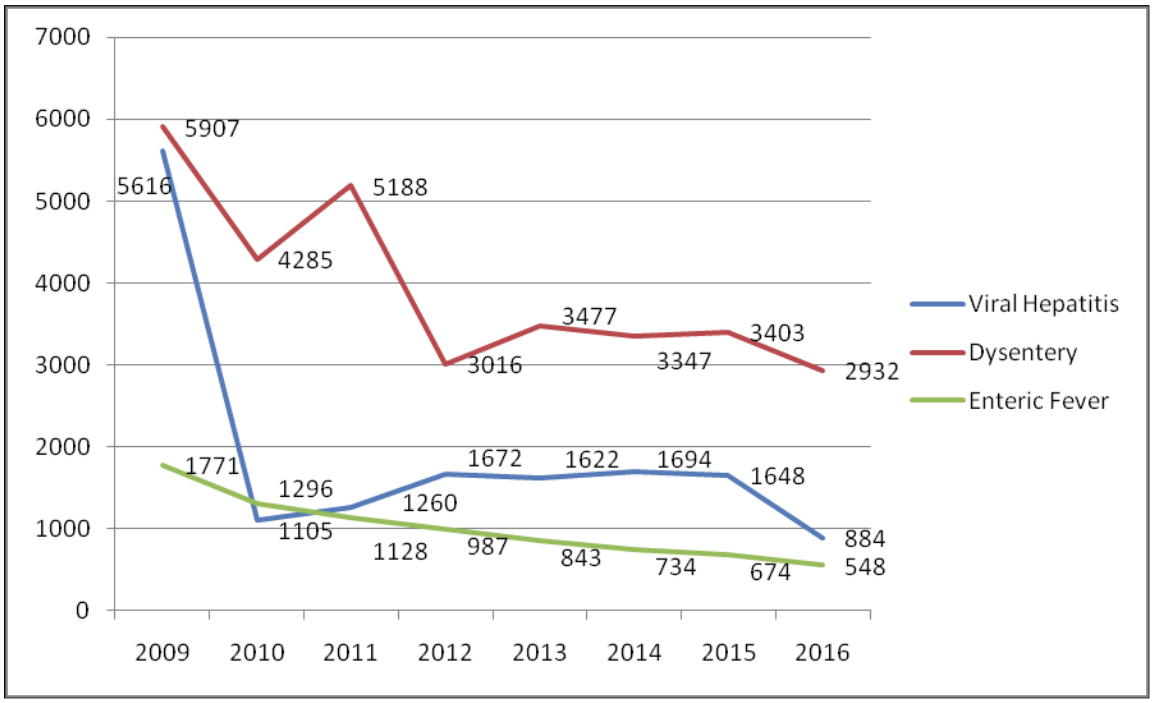


Figure 23: Food born Infectious diseases reported to Epidemiological unit, 2009 to 2016

Source: Annual Health Bulletin, 2016

- There is a declining trend in food born infectious diseases (dysentery, enteric fever and viral hepatitis during the last decade.
- The improvements attributed to improvement of general living condition, improved awareness about hygienic practices, provision of purified water, continuous monitoring of water sources and food establishments by the public health staff
- District disparities was evident in the above services
- High level of bacterial contamination was found in water supplied through community water supply projects

Policy Statement: Preserving catchment areas of water sources, purification of water sources, and strict law enforcement for food establishments could help to further reduce the food borne diseases in Sri -Lanka.

Policy recommendation

- Intensive efforts are needed to slowdown the rapid rise in incidence of NCD through promoting healthy dietary practices and lifestyle, while strengthening implementation of services as per NCD policy. Effective strategies for primary and secondary prevention should be identified and scaled up.
- Population based approach for screening, follow-up and primary and secondary prevention should be implemented in the health services
- Close monitoring of food process – farm to plate - prevent adulteration, addition of harmful and toxic substances etc. and strengthen strict enforcement of legislation (food act).
- Multi sectoral nutrition sensitive interventions should be carried out through coordination led by the MoHNIM.
- Availability of healthy dietary choices, and physical activities should be ensured at every setting
- Absence of timely population-based data indicates need of a well-designed regular survey for NCD and risk factors
- Relationship between food consumption/ dietary intake and NCD should be explored through research

5.3.1 Good Agricultural Practices (GAP)

Good Agricultural Practices method is adopted and being used by the Food and Agricultural Organization (FAO) of the United Nations across the globe. FAO develops and implement GAP principles to apply on agriculture both in production and post-production processes. GAP ensures producing foods that are safe and wholesome to consumers by applying ecologically sustainable agricultural methods. This eliminate the anxiety within Sri Lankan consumers on level safety on food products, more particularly on animal-based products, fresh fruits and vegetable. By adopting GAP methods could help bring down overall costs on labour, fertilizers, chemicals and water consumption by 50% while preserving the quality of the produce.

5.4 Lifestyle Changes and nutrition and Dietary Habits - Nutrition in Transition

During past several years, the standard of living in Sri Lanka has been changed, expanded the middle class, with more disposable income and higher purchasing power. The ability to purchase of food-based choice and quality, had dramatically increased. More and more people of Sri Lanka in the process of embracing a new way of a dietary pattern. However, this change is not necessarily a positive one. A rapid upsurge of NCDs, which includes cardiovascular diseases, diabetes and cancers in Sri Lanka in the past few decades claiming 103,500 lives each year, more particularly, 75% of total deaths are due to NCDs in Sri Lanka [WHO 2016]. Foods, dietary behaviour are major risk factors for NCDs.

Therefore, food and nutrition transition could be considered a severe public health problem of the country. The fundamental issues to be dealt with regarding food transition in Sri Lanka involve income-induced diet diversification, dietary globalization, and Westernization. Westernization is a process by which societies come under or adopt the Western culture in areas such as industry, technology, law, politics, economics, lifestyle, diet, cloth, language, religion, philosophy, and values [Pannilage 2016]. However, similarly larger portion of health-conscious people committed to a healthier lifestyle. By consider these facts it is justifiable to say that nutritional quality of available food products is in public scrutiny.

With the increasing trend of urbanization, the adoption of pre-processed and ready to eat foods are popular within the consumers, who no longer limited to traditional local food habits. By adapting to the fast food culture, the new dietary habits are quite different to the habits that developed locally over many generations. Large urban markets have space for establishing a fast-food chain as they attract foreign investment and advertising from global industries [Pingali 2007]. The traditional food supply chains are not meeting the rapid diversification of the diet (similar to “Helabojun” concept). To have successful system of traditional food supply chains, modernization of the food retail sector is required by including the diversification of agricultural systems in Sri Lanka. However, the nutrition transition is not just a result of the growth of supermarkets, evidence shows increased availability of processed and unhealthy foods in modern retail in Sri Lanka.

5.4.1 Trends for Nutrition Transition (20 years) -Literature evidence

- Per capita food supply trends in Sri Lanka during last 57-year period showed a slight increment in the share of cereals as well as in fruits and nuts. There was a trend towards an increased per capita supply from food groups such as pulses, and variety of non-grain vegetable products, mainly sugar, vegetable oils and vegetables (Sitisekara & Silva, 2019). Per capita availability of pulses increased slightly to 25g in 2013 from 20g per capita per day in 1960 (Weerahewa, et al 2018). Nut consumption increased from 1.15g per capita per day from 1961 to 2.84g per capita per day in 2013(Weerahewa, et al 2018).
- Per capita availability of animal-sourced food has also improved significantly in Sri Lanka during the 1961-2013 period. Per capita fish consumption shows a tremendous increase of 45g per day in 1961 to 70g per day in 2013. In addition, per capita daily egg consumption has increased from 2.5g in 1961 to 12g in 2013. Per capita daily meat and milk consumption also rose from 11g to 18g and 48g to 96g respectively during the same period (Weerahewa, et al 2018). The other food group which showed an increasing trend was animal food products which increased by more than two-fold over the period (Sitisekera & Silva, 2019).
- Sugar consumption by an average Sri Lankan has seen a two-fold increase within five decades which is an unhealthy sign. Having been 48.21g per capita per day (178 Kcal/capita/day) in 1961, it has risen to 72.14g of sugar per day (266 Kcal/capita/day) in 2013(Weerahewa, et al 2018).

- Per capita daily calorie supply trends in Sri Lanka during the 25-year period showed a slight decline in the share of cereals as well as in fruit and roots and tubers (Wijesekere, 2009). There was a trend towards an increased supply of calories per person per day from food groups such as pulses, and variety of non-grain vegetable products, mainly sugars, oils, vegetables and other food products (i.e. spices, tree nuts and alcoholic beverages) (Wijesekere, 2009).
- The other food group which showed an increasing trend was animal food products, which increased by 2 per cent over the period. Calorie supply from animal food products mainly increased through fish and milk products, rather than meat or eggs (Wijesekere, 2009).

6.0 FIELD SURVEYS, WORKSHOPS AND INTERVIEWS

6.1 Consultative Workshops and Semi-structured Interviews

A consultative workshop has been conducted to obtain specific directions from a multi-sectoral group of stakeholder-experts including Agricultural officers, health authorities, specialised project directors, policy specialists and other relevant specialists. To collect adequate information through discussions with heads of leading stakeholder public and private sector institutions. This activity was carried out during the consultative workshop to identify the effects of policies and programs implemented by the successive governments of Sri Lanka on food and nutrition security and to recommend revisions and policy reforms to the existing food and nutrition policy framework. Identification of policy & regulatory changes need in the area of Food Consumption, Nutrition & Health, to enhance agriculture sector more competitive, responsive to the market demand, sustainable and resilient.

A consultative workshop has been organised ('Stakeholder Consultative Workshop'), at the Hector Kobbekaduwe Agrarian Training Centre (HARTI) on 29 March 2019, to obtain specific directions.

Multi-sectoral group of stakeholders (experts) were invited to attend, including public health professionals, nutrition and health administrators, government officials, specialised project directors, policy specialists and other relevant specialists. About 50 invitees were participated to the consultation workshop (see annex 2 for the list of attendees). Representatives from MOH, MOA, PCC of the ASMP of MOA, MONP and EA, MOF, MOIT, CARP, CBSL, DOA, Agriculture Research Institutions,

EDB, ICTA, University Academics, Chamber of Commerce, other relevant national level public sector institutions attended. This Consultative Workshop facilitated interaction amongst the interested parties on the key issues that needed attention, consisted of a brainstorming session in the form of group discussions and recorded specific responses to a pre-designed semi-structured questionnaire. In the second half of the session, each resource person was, in turn, provided with a specific time to express his/her views in person to the forum. The process helped the research team to streamline those different points of views into a specific quantifiable and manageable end product in order to identify the existing gaps, barriers to act, suggestion/recommendations to improve and instruments to use to modernize the agriculture sector in Sri Lanka in the area of food consumption, nutrition and health. To collect adequate information through discussions (using specific semi-structured questionnaires) with heads of leading stakeholder public and private sector institutions. This activity was carried out during the consultative workshop to identify the effects of policies and programs implemented by the successive governments of Sri Lanka on food and nutrition security and to recommend revisions and policy reforms to the existing food and nutrition policy framework. In the second half of the session, each resource person was, in turn, provided with a specific time to express his/her views in person to the forum.

The process helped the research team to streamline those different points of views into a specific quantifiable and manageable end product in order to identify the existing gaps, barriers to act, suggestion/recommendations to improve and instruments to use to modernize the agriculture sector in Sri Lanka in the area of food consumption, nutrition and health. In addition to this workshop certain number of stakeholders including government agriculture officials were contacted to obtain direct responses. This allowed researchers to obtain relevant guidance and directions on policy research. All the responses collected in both forums were recorded in detail and summarised as in Table 5. Identification of policy and regulatory changes needed in the area of Food Consumption, Nutrition & Health, to enhance agriculture sector competitiveness and responsive to the market demand as well as sustainability and resilience are required. This activity is still ongoing through contacting individual stake holders. This activity allowed researchers to obtain relevant guidance and directions on policy research.

Table 4: **Summary of responses of the consultative workshops and semi-structured interviews**

Discussion Issues	Leading questions	Leading questions
Identify the areas where existing policies are conducive for enhancing the nutritional knowledge and strengthening nutritional literacy among rural and urban sectors of Sri Lanka.	Please indicate the relevant policy	NCD policy School canteen policy Universal health care and health strengthening policy Multisectoral action plan for NCD prevention Maternal and child health policy Food fortification (micronutrient) program National strategic plan for child health School awareness program Training programs for preschool teachers.
What are the areas to be strengthened in policies and regulations to improve food and nutrition security among the sectors of Sri Lanka?		School canteen policy Food fortification (micronutrient) program Food fortification (micronutrient) program
What barriers exist to establish home gardens systems		Priority issues No market for home producers Cheaper products availability Time constrains
Nutrition is not identified adequately	Malnutrition as a problem in	Malnutrition was not considered as a critical issue in agriculture related policies and action plans

Discussion Issues	Leading questions	Leading questions
as an objective in agriculture, acts/regulations/ strategic plans /actions plans related to agriculture and agriculture related programmes.	agriculture related policies and action plans	
	Agriculture related programmes consider nutrition status of vulnerable groups as an indicator	There is an idea about nutrition status of vulnerable groups. Food Technology Unit consider requirement of vulnerable groups such as pregnant mothers on product development (2-3 %) There is no national level approach to consider nutrition status of vulnerable groups as an indicator
Nutrition is not identified adequately as an objective in agriculture, acts/regulations/ strategic plans /actions plans related to agriculture and agriculture related programmes	Challenges /barriers faced in incorporation of nutrition objectives/outcomes in policies and programmes?	There are no nutritionists attached to the MOA. Incorporation of nutrition objectives /outcomes in programmes is not recognized as mandatory Departments have priority in areas such as agronomy, breeding, crop protection, entomology, pathology etc. Focused to increase production and productivity Climatic change and crops cultivation, high yielding varieties, pest control, nematode resistant varieties, Officers only focused on their own expertise in programmes to increase crop production Not considered nutrition value of foods or nutritional requirements and nutritional quality of the overall diet was not given due importance in Agric programmes.
	What institutional support is available from other sectors to include nutrition into your specific sector?	Not considered about support and co-ordination to include nutrition into agricultural sector
	Was there a dialogue among government, private sector and	No dialogue among government, private sector and other organizations to incorporate nutrition into the programmes conducted

Discussion Issues	Leading questions	Leading questions
	other organizations to incorporate nutrition into the programmes conducted by your institution?	
	In which level the real implementation of multisectoral action plan for nutrition?	Not enough emphasis on multi sectoral action plan for nutrition
Coherent information gap is a common problem identified in all sectors related to agriculture, namely crop, fisheries and aquaculture, livestock and natural resource management at different levels. Though some data is available, much of this information is incomplete, imprecise, and is often out of date. Information gap seems to have hindered the effective planning and implementation of activities targeting nutrition outcomes at different levels	To what level food production and food demand analysis data are available?	These data are available in socio economic division of the department
	Do food need forecasts for the population consider food diversification?	Food need forecasts for the population consider food diversification
	What barriers exist to collect contributions to food consumption from home gardens	Barriers to collect contributions to food consumption from home gardens include HG come only during time with special problems There are ups and downs of HG operations Objectives of HG is not clear to people. People do not know/poor idea what to grow Staple food is not available in-home gardens System is not there to collect data from HG
	Why is it difficult to collect actual production data separately from private and government sectors	Government farms cultivate for seed production/including some private farms. Government do not produce crops for food

Discussion Issues	Leading questions	Leading questions
	Do you use available data for planning and decision making? if so, share some of examples	Available data is used for planning and decision making especially for forecast of crop requirements
Low social and income level of vulnerable groups including communities contribute to the produce of agriculture sector in the country is considered a gap	What are programmes targeted to improve income and social level of farmers?	There are several programmes targeted to improve income of farmers. But no programmes to improve social level There are several programmes for income improvement Introduction of high yielding varieties Good agronomic practices New improved crop protection methods Fertilizer subsidies by (Agrarian service)
	Is there any specific objectives in these programmes to improve nutrition level of these vulnerable communities	There are no any specific objectives in these programmes to improve nutrition level and nutrition indicators are not considered
	What root causes for low income and social level of farmers were not addressed so far	Poor recovery of bank loans farmers get for the cultivation. They always suffer from the burden of bank loans. Destruction or low prices for the harvest make them vulnerable. They slowly recover prawned jewelleries at banks to get money for cultivation. Poor economic stability/low crop success assurance Ex paddy farmers Water /good quality seeds/fertilizer at correct time/wild animal damages Marketing problems Poor land quality/salinity/decreasing land size with generations Destruction of structure of virgin soil Moving to cash crop (mung beans/chilies) cultivation Giving up farming with generational gaps

Discussion Issues	Leading questions	Leading questions
	What barriers exist to implement programmes and to improve income and social level of farmers?	They do not have a buffer system to cope up crop losses Marketing structure for agricultural products is unfavourable for farmers
Gaps regarding lack of policy coherence, lack of multi-sector and multi-institution collaboration, overlapping of policies and actions, poor networking in coordination and horizontal integration with other sectors such as education, health, child and women affairs, water and sanitation, and social protection to achieve adequate nutritious food and nutrition services for optimum health	Does your sector identify exist of loopholes in different policies preventing proper nutrition	There can be of loop holes in different policies but cannot say directly whether they prevent proper nutrition Outside forces are more influential(glyphosate problem/unprotected chemical spraying practice/quality of life of farmers is not considered
	Have your institution attempted to identify lack of collaborations from different sectors	Agreed on having poor communication among different sectors. But not sure whether institution attempted to identify them There is no collaboration from different sectors and different sections of within the Department
	What problems you face due to the overlapping of policies from different sectors	No experience on problems faced due to the overlapping of policies from different sectors
	What barriers prevent efficient networking among different sectors	Too many categories and need to contact several sections individually At the beginning all sections were in one basket but later heavily fragmented. Now there is poor links and not connected. Each section/sector act on own agenda Need multi-sectoral action plan even for agriculture
Lack of effective management systems to maintain the natural resource base vital for the	What sustainable farming and cropping systems were	Soil /water conservation programmes are adopted But during last 5 y very low attention was given for sustainable farming and cropping systems

Discussion Issues	Leading questions	Leading questions
sustainable food and nutrition security is considered a gap	adopted during last 5 years	
	What is the institutional arrangement for giving continuous support to producers to ensure sustainable farming and cropping systems	Giving subsidies /training some encouragements were done But during recent times poor attention was given. No designated officers/no support Ex Agroforestry was given high priority earlier but at present no research or officers
	How many programmes were available during last five years to protect soil?	Only 2-3 programmes suggested need of more Programmes are available for wet zone only. Need for dry zone too
	What programmes are available to mitigate negative impact of climate on food production?	Power irrigation Rain shelters Solar power
	What system is available to address problems regarding specific farming systems such organic farming?	There is no any such system active at this time but for organic farming yes
	What programmes are available to conserve natural resource base?	Only for water and soil Others are done by environmental authority/ministry
Women are not empowered adequately in the	What kind of farming women are involving	Female participation is common in crop sector for different activities

Discussion Issues	Leading questions	Leading questions
agriculture sector of Sri Lanka	(crops, lives stock, etc)	
	Is there any women producer group registered in your area (Divisional, District and Provincial level)	Registrations of women groups was available in the past Women farmers Societies. Now they are not active
	What kind of training and market opportunities available for them? Do they have enough access to extension service, technology, inputs, and information?	Hela bojun concept is mainly for women they have access to extension service, technology, inputs, and information to some extent
	How about the opportunities especially for women on investing technology for weeding, harvesting, processing, preservation?	Lack of opportunities especially for women on investing technology for weeding, harvesting, processing, preservation
	Is there any special programs/ strategies available for strengthening women's income?	There are special programmes to increase women income but only few
	In agricultural programs related to women empowerment, have you focus and giving	In agricultural programs related to women empowerment support was not given to ensure successful training providing facility for childcare

Discussion Issues	Leading questions	Leading questions
	priority for the below factors? Provided space for the childcare during training engagement of fathers for women training programs Is there any day-care centre support available during the training period? Does your program encourage men engagement in childcare?	
	Is there any program to support for accessing financial services especially for women?	Women farmer programme are available to support for accessing financial services especially for women
	Do you have any gender-sensitive social protection tools?	There is not any specific gender-sensitive social protection tools?
	in what level do you get involved women engagement from the planning stage	There is women engagement from the planning stage to some extent
Low availability of nutritious foods in year round	Have you included the "Nutrition" as an objective in your production plan?	Nutrition" is not included as an objective in the production plan

Discussion Issues	Leading questions	Leading questions
	What is the biggest challenge of the increase of nutrient-dense foods throughout the year?	There are programmes fruit /horticultural crop production
	Do you have any special programs for horticultural corps?	There are special programs for horticultural corps
	What is the current program available to promote underutilize crops?	For certain crops attention has been given
	Is there any programs are implemented to the production of legumes to improve soil fertility?	No specific programs to the production of legumes to improve soil fertility
	Where we are now with biofortification? Are we any enough success stories or is that under research?	Not much attention is given forbiofortification. But some rice varieties (ex Neeroga) and crops are considered
Less nutrition knowledge in individuals involving in food value chain	Is there any demand for healthy foods?	There is demand for safe foods rather than healthy foods
	As a country are we produced food based on our nutritional requirements?	Do not consider production is based on nutritional requirements
	Do you have any plan or strategy for nutrient-dense food cultivation?	Rather than nutrient-dense food cultivation focus to increase crop production

Discussion Issues	Leading questions	Leading questions
	What are the available programs to minimize postharvest loss and maintain the nutrient content of foods?	Methods to reduce post-harvest losses have been introduced but not to maintain the nutrient content of foods
	Do you have any programs for environmentally sustainable food production and consumption?	There were some in the past but not recently for environmentally sustainable food
	Do you have any programs to address common food taboos?	No any specific programs to address common food taboos
	Do you have any capacity development programs especially nutrition training for your officers	No. Some programmes were done for AIs inviting medical officers from Ministry of Health Nutrition knowledge is low

6.2 Food Consumption Surveys

6.2.1 Dietary Intake - Data Survey

Current Sri Lankan dietary patterns and intakes of food and nutrients are highly varied among age groups, according to the socio-economic factors, and rural vs. urban areas. This survey was based on a sample of 3500 households, living in urban (n=1500), rural (n=1200) and estate (n=800) sectors, a compressive analysis of dietary intake data were used to identify food consumptions patterns across the regions and communities. The objectives of this study were to quantify the relation between changes in market food prices and the demand for food, consumption patterns and levels of household food and nutritional security in the urban, rural and estate sector in Sri Lanka.

The geographical areas from which the data were collected from the households were initially classified into three sectors, namely:

- **Urban** (n=1500): where the households are located within a Municipal and Urban Council limit and the areas administered.
- **Rural** (n=1200)**:** outside the periphery of a municipal/urban council and characterized mainly by an agriculture-based community.
- **Estate** (n=800)**:** where the households are located within those specific areas cultivated with plantation crops (tea, rubber and coconut) and all plantations which are 20 acres or more in extent and with ten or more resident labourers (Census and Statistics, 2011).

A cluster sampling technique was applied to select the households to collect panel data to assess the status of household food security. This sampling technique involves stratifying the population by district at first level, then by divisional secretariat and finally by Grama Niladhari Divisions. Households were chosen from 103 Grama Niladhari divisions, in 12 Divisional secretariats from 9 districts (Gampaha, Jaffna, Matale, Puttalam, Kurunegala, Batticaloa, Anuradhapura, Kalutara, Nuwara Eliya). Eligible households were identified and contacted through Samurdhi officers, Assistants of Grama Niladhari and Public Health Midwives.

Data collection

Initially there were nearly 3,700 households. Later the number of households were limited to about 3,200 due to various reasons, including some households were left the area and some households did not wish to participate in survey again etc. As a result, the Panel data set was limited, after purification, to 3000, urban (n=1100), rural (n=1000) and estate (n=900) sectors, having at least one preschoolers, because they are the vulnerable population to food and nutrition insecurity .When more than one child were available in a given household, only the youngest child in the household was included in the analysis Household head was interviewed to get economic data, the food consumption, child care practices perceived food security were asked from the mother (chief woman) of the family as she is the responsible person for food preparation, shopping and child caring.

A structured interviewer administered questionnaire was developed, pretested and piloted with 100 households to assess the applicability and usage of language to administer questionnaire. Both quantitative and qualitative questions were included in the questionnaire to capture various indicators reflecting and affecting the food and nutrition security of the households.

Questionnaire consisted of following components:

- Demographic information of the members of the household (age, sex, education level, occupation and etc), housing characteristics and asset ownership

- Economic status of the households (Household income from primary and secondary sources of income) and Household expenditure (Weekly expenditure on food and drinks, Monthly expenditure for fuel, health, rent and others, biannual expenditure for clothing and durable goods and annual expenditure for fixed assets)
- Household food consumption (food consumption score, dietary recall and dietary diversity
- Household food security questionnaire and coping strategies.

Household food security was determined using questions on perceptions regarding uncertainty and worry, inadequate quality, insufficient quantity, and social acceptability of food access of the households based on the modified version of 18-item United States Department of Agriculture's (USDA) food security survey module (Bickel *et al*., 2000). This was translated into the local language and modified for the Sri Lankan context (Malkanthi *et al.,* 2007). Mothers of the children in the selected households were the respondents. Households were categorized into 4 levels of food insecurity: food secure, food insecure without hunger, food insecure with moderate hunger and food insecure with severe hunger.

Household dietary intake was assessed using a twenty-four-hour recall. The household daily intakes of energy, macro and micronutrients were derived from portions of foods recorded in diet diaries using Foodbase 2000 software (Institute of Brain Chemistry, UK) which has food composition database modified and updated for Sri Lankan food items (Thamilini et al., 2014). To estimate the nutrient adequacy of the diet, a Nutrient Adequacy Ratio (NAR) was calculated for the intake of energy, protein and 9 selected micronutrients.

- **Dietary diversity-** Diversity of the diet of the households was assessed using the Dietary Diversity Score (DDS)
- **Food consumption score-** Food consumption score (FCS), developed by World Food Programme (WFP, 2008) was used to assess the household food consumption.
- **Food basket Calculation -**'Healthy Food Basket Value' (HFBV) was used as a survey tool which is a measure of the cost of basic healthy eating that represents current nutrition recommendations and average food purchasing patterns (WFP, 2009). Food costing is used to monitor both affordability and accessibility of foods by relating the cost of the food basket to individual/ family incomes. The process of the food basket development consisted of five stages.
    1. Selection of a reference family
    2. Selection of food groups and serves required for each member (selected from 24 hour recall)
    3. Selection of a draft basket of foods
    4. Adjustment of foods selected to comply with nutritional guidelines
    5. Finalize the cost of each food and get the total.

A reference family was chosen to reflect the age and sex characteristics of residents of the family members and include individuals with varying nutritional needs. Nutritional analysis of basket and specification of quantities to meet nutritional targets involved several steps; constructing menu plans for each family members, analysing the nutritional content and adjusting food choices to comply with quantified dietary guidelines and determining the final quantity of each food to be included in the basket. The food basket was calculated using estimates of edible portions contained and the price of each food items were collected using market survey questionnaire. Composition was calculated by using commonly consumed food items (list from 24h recalls) that would provide an adequate proportion of energy, protein, iron, calcium, zinc, vitamin A and vitamin C.

6.2.2 Demographic and Dietary Intake-Data

The key demographic characteristics of the sample of households contacted to assess various attributes of household food security are summarized in **Table 7** for the three sectors of urban, rural and estate. The households in these three sectors different with education level of mother and father. Urban sector showed better education status than other two sectors. Average family size was more or less similar in all sectors.

Table 5: Demographic characteristics of the study sample (n=3000)

Characteristics	**Urban sector (n=1100)**	**Rural sector (n=1000)**	**Estate sector (n=900)**
Mean (SD) Age of the father (years)	35(6)	37(7)	34(6)
Mean (SD) Age of the mother (years)	31(5)	34(5)	31(5)
Education level of father (%)			
No schooling	0	0.3	5.6
Primary education	6.3	14.4	21.3
Secondary education	61.6	71.9	67.1
Tertiary education	24.7	12.3	5.4
Diploma/ Degree	7.4	1.1	0.6
Education level of mother (%)			
No schooling	0.1	0.4	6.1
Primary education	3.0	9.3	16.7
Secondary education	63.4	72.3	69.7
Tertiary education	25.7	16.8	6.8
Diploma/ Degree	7.8	1.2	0.7
Average family size –Mean (SD)	4.2(1.2)	4.0(2.1)	4.5(2.1)

The result shows the lower level of formal education overall in estate sector. No schooling is more than 5% for both father and mother, disparity can be seen throughout the sectors. Urban sector recorded better educational characteristics compared to rural and estate.

Table 6: Economic indicators (HH income and expenditure) of the households.

Variables	Estate	Rural	Urban
	Mean (SD)	Mean (SD)	Mean (SD)
Monthly HH income (LKR)	23492.81[a] (15220.96)	28488.54[b] (18014.16)	33887.97[c] (31772.70)
Monthly HH expenditure (LKR)	24916.35[a] (11108.67)	23797.23[c] (14156.73)	32067.40[e] (15770.92)
HH expenditure on food (LKR)	14355.95[a] (6660.57)	13496.02[c] (6768.63)	18489.01[e] (8119.09)

Table 6 showed income and expenditure on food disparity in three sectors.

Data from **Table 8** shows that estate sector is spending lowest amount of money on their food compared to other two sectors. Urban sector shows the high mean income when compared with other two sectors. There was a significant difference ($p<0.000$) observed between the sectors. It indicates that estate sector spends high proportion for food of their expenditure when compared with rural and urban sector.

Table 7: **Daily energy and nutrient intake of the women in urban, rural and estate sectors**

Nutrient	EAR	RDA	Urban *(n1200)*		Rural *(n1100)*		Estate *(n700)*	
			Mean	SD	Mean	SD	Mean	SD
Energy (kcal)	1900	1900	1578^{a*}	399	1574^{a*}	430	1569^{a*}	421
CHO (g)	-	-	265^{a}	66	281^{b}	76	272^{c}	74
Protein (g)	46	50	47^{a}	17	42 ^{b}	18	40^{b}	13
Fat (g)	-	-	44^{a}	18	38^{b}	18	42^{a}	17
% energy from CHO	-	55	63^{a*}	6	68^{b*}	7	66^{c*}	7
% energy from protein	-	15	12^{a}	3	11^{b*}	3	10^{b*}	2
% energy from fat	-	30	25^{a*}	6	21^{b*}	7	23^{c*}	6
% energy from saturated fat	-	10	17^{a*}	6	14^{b*}	5	17^{a*}	6
Calcium (mg)	833	1000	436^{a*}	262	325^{b*}	271	359^{b*}	176
Iron (mg)	29.4	29.4	11^{a*}	6	11^{a*}	7	9^{b*}	5
Zinc (mg)	4.1	4.9	7^{a*}	2	7^{a*}	2	6^{b*}	2
Vitamin C (mg)	25	45	21^{a*}	28	27^{b*}	53	14^{c*}	12
Vitamin A (RE µg)	357	500	302^{a*}	270	245^{b*}	377	178^{c*}	186

RE, retinol equivalent; CHO, Carbohydrate; EAR, estimated average requirement; RDA, recommended dietary allowance; Different superscript letters denote a significant mean difference between the sectors - Tukey's test (P<0.05); * Significant difference compared with RDA – Student's t test (P<0.05)

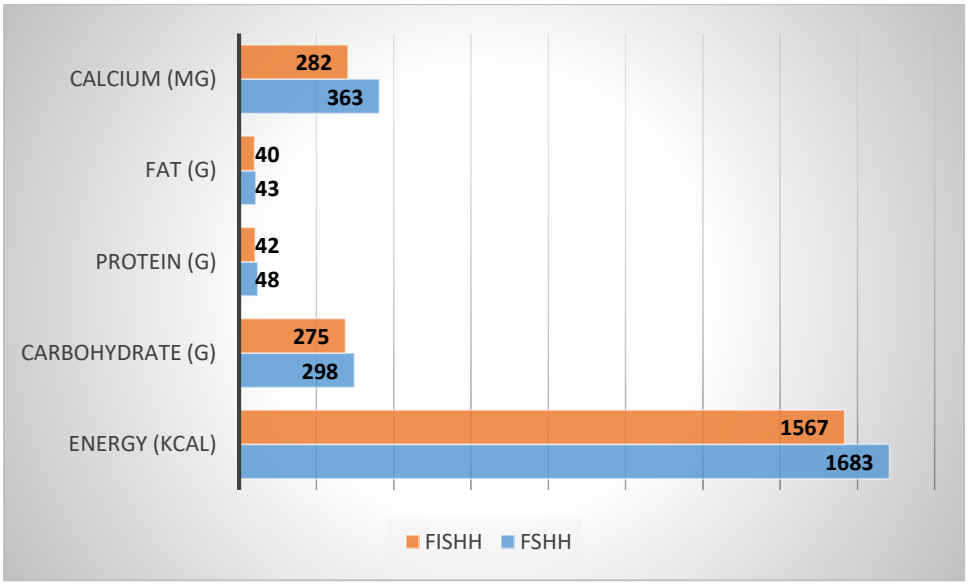


Figure 24: Daily energy and nutrient intake of the women in food secure (FSHH) and food insecure households (FISHH)

Table 8: Nutrient Adequacy Ratio (NAR) and MAR of selected nutrients of the women in urban, rural and estate sectors

Nutrient (%)	Urban (*n 1200*)		Rural (*n1100*)		Estate (*n700*)	
	Mean	SD	Mean	SD	Mean	SD
Energy	84[a]	21	83[a]	23	82[a]	22
Protein	93[a]	34	83[b]	35	81[b]	33
Calcium	44[a]	26	33[b]	27	36[b]	25
Iron	37[a]	21	36[a]	24	32[b]	17
Zinc	135[a]	49	133[a]	47	112[b]	41
Vitamin C	48[a]	63	61[a]	118	30[b]	27
Vitamin A	60[a]	54	49[b]	75	35[c]	37
MAR	0.59[a]	0.14	0.54[a]	0.18	0.51[a]	0.16

MAR - Mean adequacy ratio; Different superscript letters denote a significant mean difference between the sectors in Tukey's test (P<0.05)

Table 9: Consumption of food groups by women in urban, rural and estate sector

Food group	**Recommended serves/day[1]**	**Per person/day consumption in standard serve size**		
		Urban (*n1200*)	**Rural (*n1100*)**	**Estate (*n700*)**
Cereals	5	8.9 (2.8)[a]	9.6 (3.1)[b]	9.9 (2.8)[b]
Milk /dairy products	2.5	0.2 (0.2)[a]	0.1 (0.2)[b]	0.1 (0.1)[b]
Fruits	2	0.1 (0.3)[a]	0.2 (0.3)[b]	0.03 (0.1)[c]
Vegetables	5	1.0 (0.8)[a]	0.9 (0.7)[b]	0.7 (0.5)[c]
Fish/meat/egg/pulse/nuts and oil seeds (except coconut)	2.5	1.4 (0.9)[a]	0.8 (0.6)[b]	0.3 (0.3)[c]

[1]*Australian dietary guidelines-values given in parentheses are SDs; Different superscript letters denote a significant mean difference between the sectors in Tukey's test (p<0.05)*

Women in urban sector consumed significantly higher amount of protein, percentage of energy derived from protein and fat, calcium, folate, riboflavin, niacin and vitamin A than women in rural and estate sectors. Women in rural sector consumed a significantly higher amount and percentage of energy from carbohydrates and vitamin C and significantly lower percentage of fat and amount of fat compared with women in other two sectors. Women in estate sector consumed lower amount of carbohydrates, percentage energy from fat, niacin, vitamin C and vitamin A compared to the women in other two sectors.

There was no significant difference in the intakes of energy between women in three sectors.

Intakes of energy, protein and micronutrients except zinc were lower than the estimated average requirement (EAR) in all three sectors. Intakes of energy and micronutrients except zinc were significantly lower compared to RDA of women in all three sectors. The percentage of energy from carbohydrate, saturated fat and zinc were significantly higher than the RDA in women in all three sectors.

6.2.3 Food Security Status of the Households

Household food security was measured as indicated by the perception of the respondents (women) regarding food availability, access and consumption measured using United States Department of Agriculture (USDA) Food Security Core Module. **Table 10** shows the prevalence of food security of the households with the time based on the experience of food insecurity in the household assess the quality and quantity of food, food anxiety and coping mechanism of the household. The estate sector showed higher prevalence of food insecurity followed by rural and urban sector households. Rural and estate sector feel higher food insecurity, the status of "food insecure with moderate hunger" closer to three folds in estate sector compared to the urban sector.

Table 10: Changes to the level of food security in the households

Food Security Level	**Urban (%)**	**Rural (%)**	**Estate (%)**
1. "Food secure"	69.9	48.1	36.0
2. "Food insecure without hunger"	23.6	44.1	44.2
3. "Food insecure with moderate hunger"	6.3	7.1	18.2
4. "Food insecure with severe hunger"	0.2	0.7	1.6

Prevalence of household food security based on the perceptions was higher in urban sector followed by rural and estate sector. Intake of energy and carbohydrates (CHO) were higher in rural and estate sector compared with urban sector. The daily requirement of energy and certain important nutrients of a household consisting of 4 members (2 adults, 1 teenager & 1 pre-schooler) is summarized in Table 13.

Table 11: Total energy and nutrient requirements of family based on the recommended intake per day

Member Type	Energy (kcal)	Protein (g)	Iron (mg)	Calcium (mg)	Zinc (mg)	Vitamin A (mcg)	Vitamin C (mg)
Mother	1850	50	29.4	1000	4.9	500	45
Father	2100	50	13.7	1000	7.0	600	45
Child <5yrs	1250	25	6.3	600	4.1	400	30
Child 6-10yrs	1800	39	8.9	700	5.6	500	35
Total family/ day	**7000**	**164**	**58.3**	**3300**	**21.6**	**2000**	**155**

Calculation of healthy food basket based on actual intake shows in Table 12.

Table 12: Calculation and selection of food items based on actual intake

Food item	Calorie Sares	Calories per kg	Calories per day (assuming a diet of 1800kcal)	g/ Person/day	Price/ kg	Rs/ person/day	Rs/ Person/month
Rice	0.47	3450	862.5	250	70	17.50	525.00
Wheat flour	0.17	3480	313	90	98	8.82	264.60
Dhal	0.08	3720	178	48	110	5.28	158.40
Fish	0.026	1190	47.6	40	750	30.00	900.00
Coconut (milk)	0.047	4300	86	20	50 (1 coconut)	20.00	600.00
Oil	0.05	9000	90	10	150	1.50	45.00
Sugar	0.04	3980	79.6	20	100	2.00	60.00
Milk powder	0.04	4960	74.4	15	345	12.90	387.00
Vegetable	0.035	1580	63.2	40	80	3.20	96.00
Green leaves (mukunuwenna)	0.008	730	14.6	20	40 (1 bunch)	8.00	240.00
Fruits (banana)	0.025	1160	46.4	40	120	4.80	144.00
Total							**3420.00**

Dietary behaviour in price fluctuation

Price of healthy food basket has increased from Rs. 13,485 to Rs. 14,850 in a year of study period. The price increment in the food basket was, therefore, about 10 percent. It shows that **estate sector** households mostly consume wheat flour-based foods, lentils (dhal) and sugar. As a result, if the price of these foods increased, it would seriously affect their dietary intake of food as well as their general state of health. In rural sector, the price of healthy food basket has increased from Rs 14,047.50 to Rs 15,735.00, which was about 12 percent increment. It has been found that price of rice acts as an important factor in the rural sector as it reduce their affordability because of the fact that rural people tends to consume rice and/or rice-based food products for almost all three meals on regular basis. Price of the healthy food basket in urban sector increased from Rs 14,502 to Rs 16,504, which was about 14 percent increase. Average price of the food basket was higher in the urban sector compared to the rural and estate sectors. Compared to other sectors, a more "diversified" dietary intake was seen in the urban sector. It can be suggested that increase in food prices mostly affect the urban poor, because they are not producers and solely depend on food markets. The facts above highlight that the households with diverse energy sources have been less affected than those with single energy sources by an increase of price. During the second phase of survey, household were asked about the shocks faced when compared with last survey and how they affected them. More than 85% of the households indicated that they have affected due to food price increases and they practiced several coping strategies to overcome that shock. Figure 23 illustrates the extent to which food price have an impact on household food consumption.

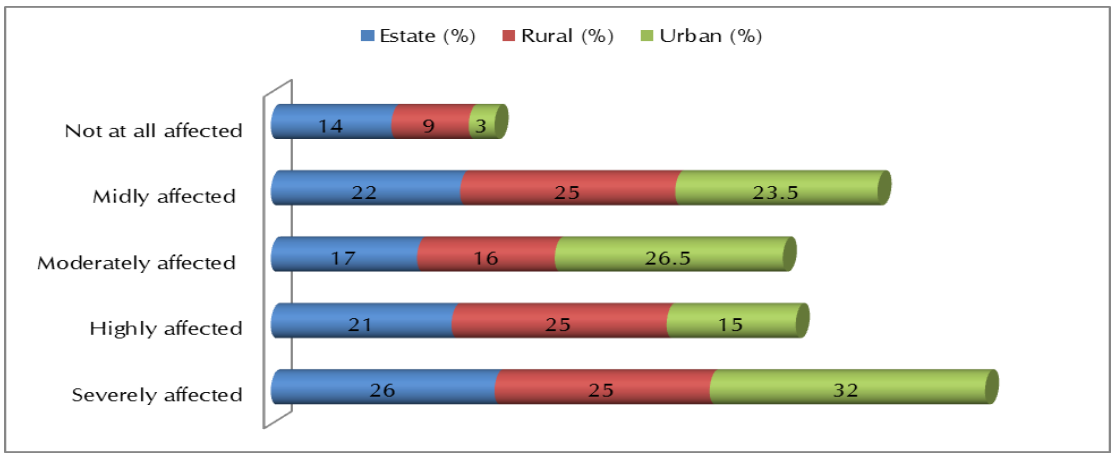


Figure 25: Perceptions on people about the Impact of Price Increase

Effect of Prices on Household Level Food Security

As discussed in the methodology section, a Tobit model is employed to relate the 'Food Consumption Score (FCS)' to prices. This capture 'actual' food utilization at the household level. The estimated coefficients from topit regression analysis were used to predict the possible changes in the FCS and hence the food security for given changes in prices. These simulations were used to study whether there is a 'shift' in the FCS, which indicate a change in food security status. The results of the Tobit analysis is summarized in Table 19.

Table 13: Estimates from the Tobit Regression

FCS	Coefficient	Std. Err.	Z	P>z
Price Index	-0.034	0.012	-2.78	0.005
Income	$4.78*10^{-5}$	$7.76*10^{-6}$	6.17	0.000
Estate	-1.423	0.622	-2.29	0.022
Rural	1.869	0.521	3.59	0.000
Constant	72.008	4.208	17.11	0.000

Table 14: Impact of food prices on food security through to fit regression analysis

Variable	Coefficient	Std. Err.	P>z
Household Size	-0.090	0.136	0.509
Price of Rice	**-0.181***	**0.058**	**0.002**
Price of Wheat	**-0.076***	**0.044**	**0.087**
Price of Pulses	0.023	0.017	0.159
Price of Meat	**-0.014***	**0.004**	**0.001**
Estate	**-5.872***	**0.986**	**<0.000**
Rural	**-3.025***	**0.883**	**0.001**
Survey round	0.117	0.286	0.684
dedu_mother2	**3.295**	**6.373**	**0.605**
dedu_mother3	**2.983***	**1.408**	**0.034**
dedu_mother4	**2.887***	**1.332**	**0.03**
dedu_mother5	**4.447***	**1.335**	**0.001**
dedu_mother6	**5.485***	**1.367**	**<0.000**
dedu_mother7	**4.643***	**2.161**	**0.032**
dedu_mother8	**4.570***	**1.615**	**0.005**
Total Expenditure	0.000	0.000	0.672
Constant	**85.732***	**4.994**	**<0.000**

The coefficient of the price index has the expected negative sign and is significant. This indicate that food price inflation reduces food security of the household keeping everything else constant. The Food Consumption Score (FCS) is the most used food security indicator and represents households' dietary diversity and nutrient intake. Thus, this reflects more than just reduction in consumption but show a real effect on food security. Impact of food prices on food security (based on food consumption score) through topit regression presented in Table 13.

Food security status of the household in estate sector is significantly less than the urban sector while food security in the households in the rural sector is significantly greater than the households in the urban sector. According to **table 14**, Price of rice, price of wheat, price of meat and education level of

mother had a significant contribution the households based on food consumption. A decline in prices improves food utilization in all three sectors which is evident by the shift of the distribution of FCS from the lower level (denoted by blue colour) to a higher level denoted by the red colour. Close examination of these graphs shows that the increase in food utilization (i.e. the shift of the distribution from blue to red) is greatest in the "estate" sector.

Summary of the results of the Dietary intake data Survey study:

Participants of three thousand (n = 3000) adult women with a child less than 5 years of age.

- Intakes of energy, protein and micronutrients except zinc was well below the recommendations in all three sectors.
- Women in food secure households consumed significantly higher energy, macronutrients and micronutrients than women in food insecure households. Urban sector significantly higher adequacy level of most of the nutrients than that of other sectors.
- The daily intake of fruit, vegetable, fish/meat/eggs/pulse/nuts and seeds and dairy portions were well below the recommendations.
- Almost all of the studied population exceeded the upper limit of the recommendations for cereal intake.
- More than 45% of the households had not consumed all foods from recommended level of food groups (eg.: only 8 food groups out of 12 food groups)
- Price of rice, price of wheat, price of meat and education level of mother had a significant contribution the households based on food consumption.
- Lower dietary intake was observed based on the sector in relation to food security status. A substantial proportion of the studied population failed to achieve the recommended intake. It is important to improve family nutrition outcomes through various intervention programmes.

6.3 Household Survey

The household Survey was carried out with over 600 farmers during July and August 2019. This study has been focused on an assessment of the potential of the present food production systems of Sri Lanka to meet the growing food needs of the country, paying special attention on demographic transition of Sri Lanka; and on detail analysis of nutrient composition of major crops in the food balance sheet and the cost of nutrient mix with different sources of nutrients to meet the nutrient requirement for different income classes of the Sri Lankan society.

Questionnaires were pretested in the field. Enumerators were trained and employed for data collection. The questionnaire administration was carried out by well-trained enumerators under the guidance and supervision of the research team. The enumerator training program was carried out at the HARTI, Colombo. The drafted questionnaire was completed from the farmers in the sample through a Face-to-Face Personal Interviews through several sections.

The questionnaire gathered specific data/information pertaining to farmers' current socio-economic parameters, nutritional literacy and "attitudes and perceptions" etc. In addition, the "constraints/barriers/problems" that they faced as well as their "suggestions /recommendations" to overcome such issues were also considered.

Data Analysis

"Foodbase 2000" software was employed to analyse data of the food consumption practices. The analysed data on household consumption is used to assess food security or vulnerability and diet diversity, assessing opportunities and as an input for the policy decision activities. The data collected will be coded and recorded in appropriate forms to facilitate qualitative and quantitative analysis on policy. Emphasis of analysis will be given to estimate structural changes in food consumption pattern and nutritional knowledge of the rural and urban communities. Statistical analysis will also be conducted to estimate the effect of structural differences of the food consumption patterns in different socio-economic sectors by the existing nutritional knowledge and cultural beliefs.

Results & Discussion

The researchers explored the official data available for the extent of cultivation and production of the main crops grown in Sri Lanka from the Department of Agriculture. Based on that information, the researchers conducted pilot visits of selected farm units before the commencement of the study.

During the data collection of the 600 questionnaires completed, at the end of fist screening for coding, it was found that 576 questionnaires (96%) provide 'valid' and 'reliable' information with regard to types of crops that they involve and extent of cultivation. Out of 576 farmers, 104 were involved with livestock (18%) and only 23 (4%) are operating with both livestock and crop. Out of livestock 93 (79%) have been involved with Cattle production, and others engage in Poultry (21) and Goat (3). The vast majority of crop farmers (360, 78%) are cultivating Paddy at least in 'Maha' season, and others, mainly in 'Yala' season, cultivate their fields with Pumpkin, Chilies and Watermelon etc. The total sample consists of 650 farmers in which the larger portion is males whereas in some specific areas such as Monaragala, Jaffna, and Mullaitivu the number of females involved in farming is either negligible or zero. However highest number of farmers come from Matale and the number specifically stands out due to the large proportion of women involvement in comparison to the other districts. Matale the female farmers make a total of 71. The second largest group of farmers are from Anuradhapura where the number of female farmers is 44 and it is second in amount to Matale.

Table 15: Description of coverage and study sample sizes

Province	District	Sample Size
Northern	Jaffna	30
	Mullaitivu	20
	Kilinochchi	35
	Vavuniya	30
North-Central	Anuradhapura	60
	Polonnaruwa	60
Uva	Monaragala	40
	Badulla	50
Eastern	Batticaloa	50
	Ampara	50
Central	Matale	80
Western	Gampaha	35
North-Western	Kurunegala	60

Table 16: Demographic characteristics of survey sample

Character	Category	Frequency	Percentage
Gender	Male	484	80.7
	Female	116	19.3
Household Size	2 – 3	208	35.0
	4 – 5	328	55.0
	6 – 7	49	8.0
	Above 7	15	2.0
Education Level	Up to grade 5	93	16.0
	Up to grade 8	142	24.0
	Up to O/L	209	34.0
	Up to A/L	97	16.0
	Degree/Diploma	59	10.0
Farming Experience	Below 5	35	6.0
	5-10	75	13.0
	11-15	54	9.0
	16-20	92	16.0
	Above 20	320	56.0
Farm Size	Up to 0.5 acres	40	7.0
	> 0.5 – 1.0 acres	136	23.0
	> 1.0 – 3.0 acres	213	36.0
	> 3.0 –5.0 acres	121	20.0
	> 5.0 –10.0 acres	56	9.0
	More than 10 acres	34	6.0

A deeper focus into the demographics of the farmers, district wise explains the education levels, age-groups, household sizes, farming experience, etc. of the farmers who have been used as the sample of the study. These attributes were identified to have a clear image of the sample so that it becomes easier to check the tendency of adoption to new technologies as proposed by the project.

Drawing the attention to the household sizes of the farmers of the sample, the table given below gives a detailed description about each district. The family sizes were categorized into basic four groups based on the possible number of members that could be in an average family. The details were obtained from each one of the farmers in the sample. In addition to the table, to give a more vivid and elaborative picture of the family sizes the graph is presented. The graphics aim at explaining the nature of the families in each district and gives the total of families under each category.

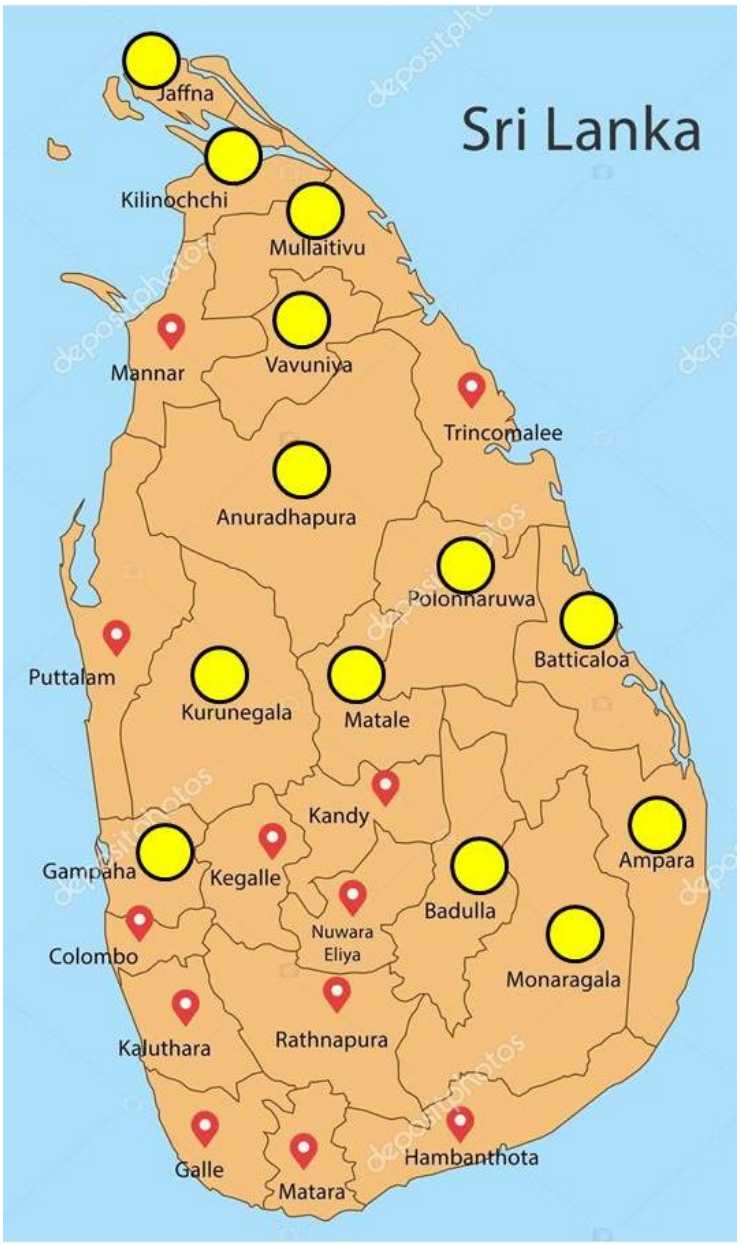

Sri Lanka
Jaffna
Kilinochchi
Mullaitivu
Mannar
Vavuniya
Trincomalee
Anuradhapura
Polonnaruwa
Batticaloa
Puttalam
Kurunegala
Matale
Kandy
Ampara
Gampaha
Kegalle
Badulla
Nuwara Eliya
Colombo
Monaragala
Kaluthara
Rathnapura
Galle
Matara
Hambanthota

Table 17: Household Size of study sample

District	2-3 Members	4-5 Members	6-7 Members	Above 7 Members
Kurunegala	12	40	6	2
Mullaitivu	7	9	3	1
Kilinochchi	6	27	-	2
Polonnaruwa	20	32	7	1
Badulla	26	30	3	1
Baticaloa	25	23	2	-
Anuradhapura	29	37	2	2
Matale	36	46	7	1
Gampaha	11	21	3	-
Jaffna	15	21	3	1
Vavuniya	13	14	1	2
Ampara	7	31	8	4
Monaragala	17	15	7	1
Kegalle	5	5	-	-

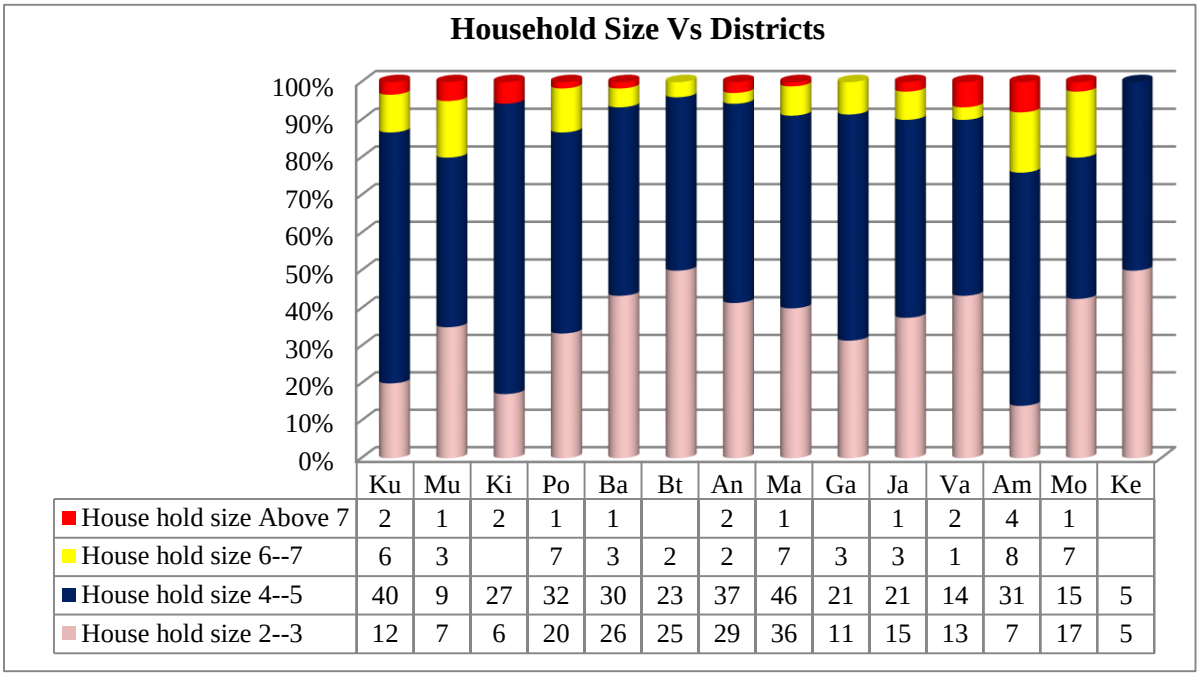
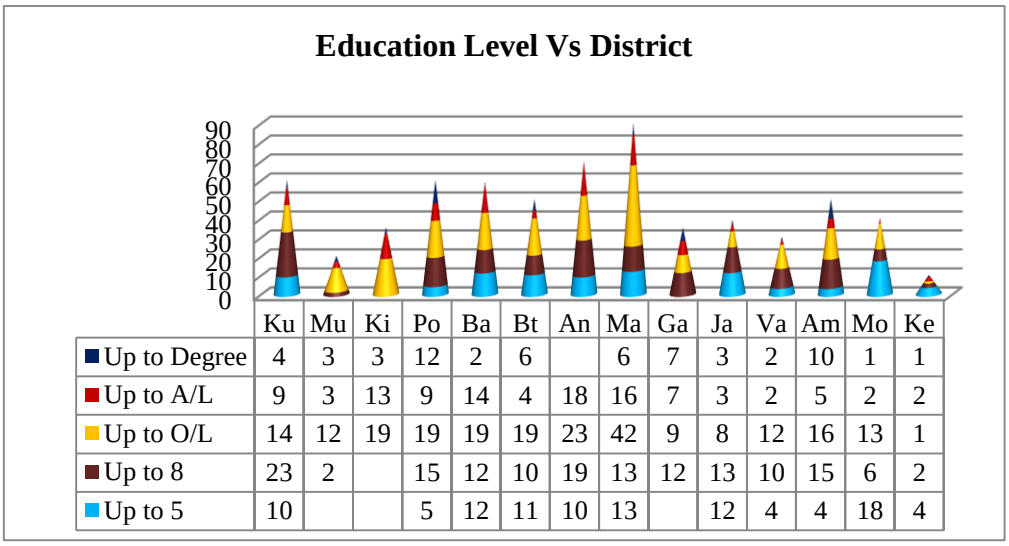


Figure 26: Household Size in districts

Table 18: Education level of the farmers

District	Up to 5	Up to 8	Up to O/L	Up to A/L	Up to Degree
Kurunegala	10	23	14	9	4
Mullaitivu	-	2	12	3	3
Kilinochchi	-	-	19	13	3
Polonnaruwa	5	15	19	9	12
Badulla	12	12	19	14	2
Baticaloa	11	10	19	4	6
Anuradhapura	10	19	23	18	-
Matale	13	13	42	16	6
Gampaha	-	12	9	7	7
Jaffna	12	13	8	3	3
Vavuniya	4	10	12	2	2
Ampara	4	15	16	5	10
Monaragala	18	6	13	2	1
Kegalle	4	2	1	2	1
Total	**103**	**152**	**226**	**107**	**60**



	Ku	Mu	Ki	Po	Ba	Bt	An	Ma	Ga	Ja	Va	Am	Mo	Ke
Up to Degree	4	3	3	12	2	6		6	7	3	2	10	1	1
Up to A/L	9	3	13	9	14	4	18	16	7	3	2	5	2	2
Up to O/L	14	12	19	19	19	19	23	42	9	8	12	16	13	1
Up to 8	23	2		15	12	10	19	13	12	13	10	15	6	2
Up to 5	10			5	12	11	10	13		12	4	4	18	4

Figure 27: Education Level of Farmers

From a total of 650 farmers altogether from 14 districts, 226 have completed GCE Ordinary Level Examination. The second highest number is 152 farmers and they have reached to an education level of "Up to grade 8". Going beyond the traditional level of education of a common farmer some have actually completed the GCE Advanced Level Examination and among these 650 farmers 60 of them have acquired a degree as the highest level of education. Many of these degree holders are from Ampara and Polonnaruwa. Knowing the education level of the farmers is a vital factor to be learnt, prior to exposing them to new technologies for the purpose of agriculture sector modernization.

As expressed in terms of acres, in the following table, the ownership of farms differs from household level as well as from district to district.

Table 19: Land ownership

Districts	Up to 0.5 acres	>0.5-1.0 acres	>1.0-3.0 acres	>3.0-5.0 acres	>5.0-10.0 acres	More than 10 acres
Kurunegala	5	22	26	2	4	1
Mullaitivu	0	0	6	6	7	1
Kilinochchi	4	23	2	4	2	0
Polonnaruwa	0	13	31	11	4	1
Badulla	4	21	25	9	0	1
Baticaloa	0	1	18	13	12	6
Anuradhapura	0	17	22	20	7	4
Matale	13	29	34	10	0	4
Gampaha	0	2	8	16	2	7
Jaffna	12	14	10	1	3	0
Vavuniya	1	2	12	6	6	3
Ampara	0	4	26	12	5	3
Monaragala	4	0	10	18	5	3
Kegalle	0	2	6	0	2	0

There are farmers who grow a single crop, or many crops or even engaged in livestock farming. So explained below is the background of the farmers and their engagement in farming. When considering the sample, for all the districts, a summarized table is given describing the number of farmers and how they are involved in farming.

Table 20: Types of produce of the farmers

Types of Products	No of Farmers
Paddy only	135
Paddy + one crop	68
Paddy + More than one crop	119
Other crops only	221
Livestock only	15
Paddy + Livestock	52
Other crops + Livestock	29
Paddy + Other crops + Livestock	8
Total	**647**

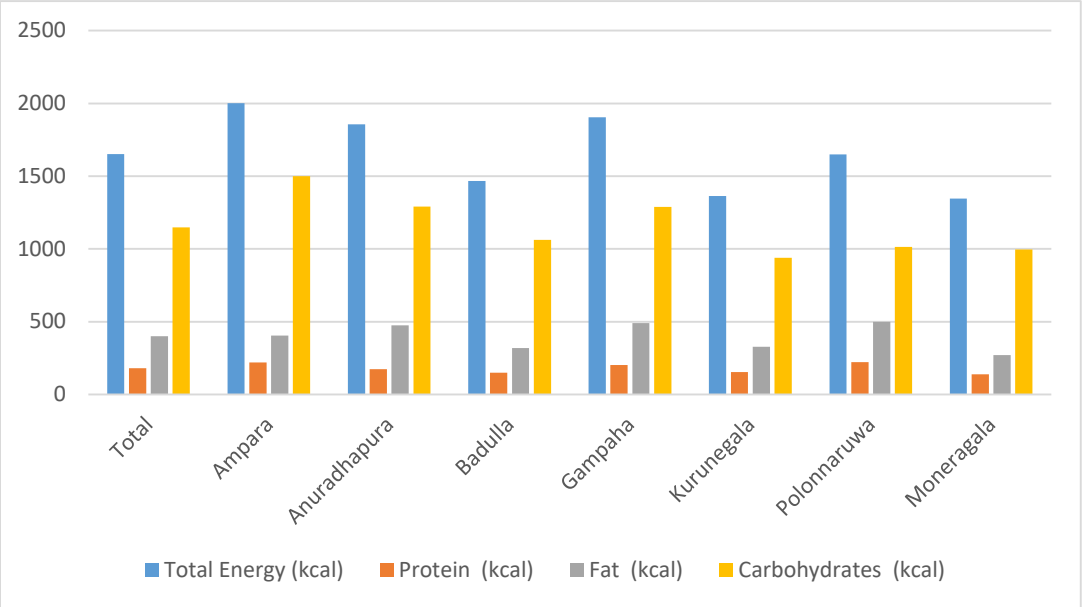


Figure 28: Food consumption of total energy and macronutrient intake (n=354)

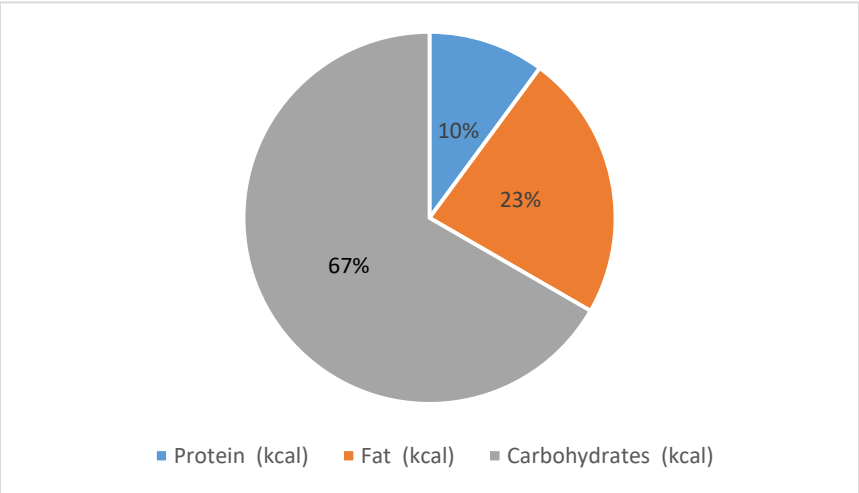


Figure 29: Food consumption of total energy and macronutrient intake (n=354)

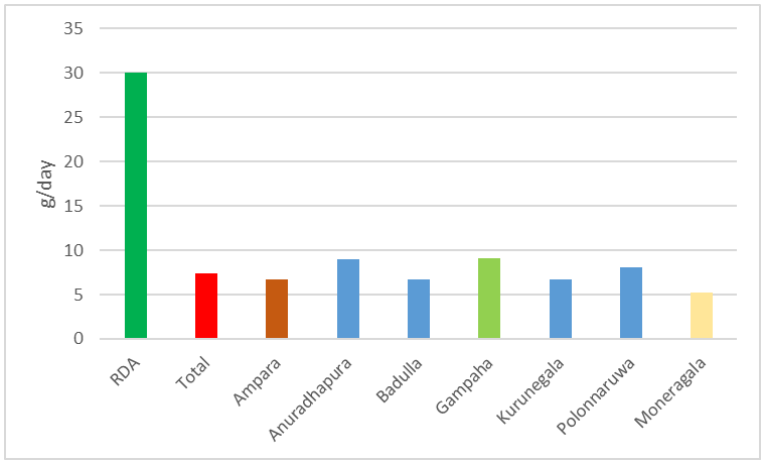


Figure 30: Individual dietary fibre intake/day against recommended dietary intake by districts (Based on 24h dietary recall)

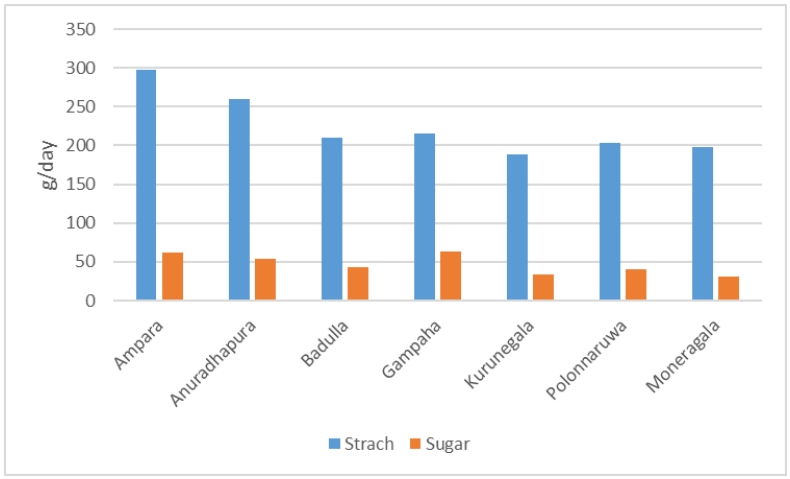


Figure 31: Individual dietary starch and sugar intake/day by districts

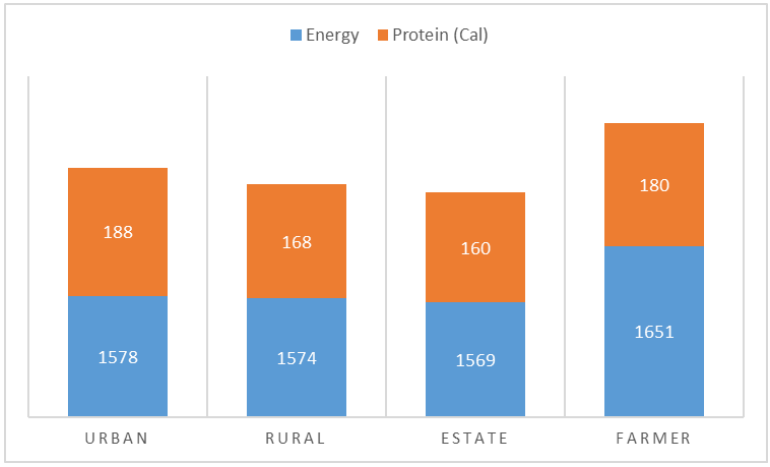


Figure 32 : Individual total energy and energy from protein intake/day by sectors (Based on 24h dietary recall and compared with previous dietary intake data survey)

Results of dietary intake data of 24 h dietary recalls farmers of the study group are consuming higher calory intake compared to individual of previous dietary intake data of 3 sectors (urban, rural and estate). They are consuming higher percentage (67%) carbohydrate as energy. However, their consumption of sugars is well above the recommended level of 36grms per day. Their fiber consumption is alarmingly low 30g/day (total average is 7.4g/day).

6.4 Focus Group Discussions

Focus group discussions were carried out with 20 families in February 2020. Contact subjects were adult women who engage in cooking activities at their homes. Number of participants were about 10 people per each discussion. This study has been focused on an assessment of the views of nutrition literacy among households and composition of major crops in the food balance sheet and the cost of nutrient mix with different sources of nutrients to meet the nutrient requirement for different income classes of the Sri Lankan society (See Annex 4: focus group discussion guidelines and questionnaire). In order to gather information for planning aforementioned activities, a descriptive qualitative study was carried out to examine the dietary behaviour, diet related issues, nutrition related knowledge (food literacy), healthy diets and culturally specific local food dishes among the communities living in Eastern Province including three districts (Ampara, Batticaloa and Trincomalee) and Polonnaruwa district in North-Central Province in Sri Lanka.

Focus questionnaire included following discussion directives.

- What do you understand by a healthy / nutritious diet?
- What do you feel are the greatest barriers to frequent healthy meals?
- Do you feel lack of cooking skills contributes to not having frequent healthy meals? If so, how does it contribute?
- How do you make your family meals healthy?
- In your opinion, what has been the most helpful strategy to make family meals healthy?
- What are the means of receiving nutrition-related information in your family?

Focus group discussion (FGD) guide was developed including 10 main questions and probes (Annex 4). It included four main questions:

1. Participants' understanding of a healthy diet, including soliciting descriptions of food, food environment, and dietary patterns
2. Participants' perceived barriers to eating healthy food individually, as a family and as a community
3. Recommendations of how they could eat healthier
4. Means of receiving nutrition-related information in your family

The scripts were translated into Sinhala and Tamil.

The FGD were conducted by trained moderators. A total of eight FGD included 8-10 participants during each session, two in each district were conducted.

The selected districts were Ampara (Ampara District Secretariat office – Sinhala participants; Pottuvil – Muslim and Tamil participants), Batticaloa (Kathankudy – Muslim participants; Puthukudiyiruppu – Tamil participants), Trincomalee (Selvanayagapuram - Tamil participants; suburbs of Trincomalee town - Sinhala participants) and Polonnaruwa (Sinhala participants). In each district, volunteer participants were selected by the filed officers from local non-governmental organizations (NGOs). The moderator explained the importance of contribution of all participants in the discussion and emphasised that there are no “correct” answers. Discussions were conducted in Sinhala and Tamil. FGD lasted approximately 45–60 minutes per focus group. All the FGD were audio recorded with the permission of the participants. At the end of each question, the moderator verified the discussion points, summarized responses using themes identified throughout the discussion, and welcomed input from participants on any missed points. The audio records in Tamil and Sinhala were transcribed to English. Analyses were conducted with the qualitative data analysis software NVivo 12.

Focus Group Discussion in the Community

Results of the FGDs

In total, 70 people participated in 8 FGDs. Characteristics of participants are summarised in the Table. All participants were females, aged 30 years or more (75%), belong to Sinhalese (43%), Tamil (36%) and Moor (21%) ethnic group. Most participants had school education between 6-11 years (68%) and over a third reported a monthly family income of 20,000 LKR (106.4 USD) or more (37%).

Table 21. Demographic and socio-economic characteristics

Characteristics	n (%)
Age (years)	
<30	18 (25)
30–39	29 (42)
40–49	12 (17)
50–59	5(7)
≥60	6(8)
Ethnicity	
Sinhalese	30 (43)
Tamil	25 (36)
Moors	15 (21)
Level of school education	
5 years	2(3)
6–11 years	48 (68)
12–13 years	20 (29)
Level of employment	
Unemployed (mostly housewife)	62 (88)
Employed	8 (12)
Family income (LKR[1]/month)	
<20,000	20 (29)
20,000 - < 30,000	24 (34)
30,000 - < 45,000	15 (21)
45,000 - <60,000	7(10)
60,000 or more	4(6)

Following key themes emerged from the participants' responses.

1) A healthy diet
2) Nutritional values of foods
3) Nutrition-related issues in the community

Theme 1: Healthy Diet

Respondents expressed about their perceptions on a healthy diet. Majority of respondents use the synonym "balanced diet" when we asked them to express their understanding about a healthy diet without much explanation. Some others indicated that 'foods free from agrochemicals (inorganic fertilizers, pesticides and herbicides) and home-grown fruits and vegetables' are the healthy foods. Hygiene of the foods and foods that improve health condition were the other responses. They elaborated by giving examples: cereals, fruits, vegetables, leafy vegetables, pulses, fish, meat, egg, milk, porridge and so on. Some of them have mentioned that the same food should not be consumed daily because all the nutrients cannot be achieved by the same food. Following are some of the responses supporting the perceptions on a healthy diet.

- "Foods contain all the nutrients. Cereals are consumed as a carbohydrate source. So should consume fruits and vegetables, fruits especially indigenous fruits" (Participant 01-Tamil/Muslim community, Ampara district)

- "Chickpea and cowpea are nutritious. What we think is, we should not eat the same food always. There should be a change. For example, we can't eat chickpea daily because we can't get all nutrients. So, we should eat chickpea one day and cowpea on another day. Then we can get all the nutrients. So, food will become nutritious when there are all nutrients available in it" (Participant 01-Tamil community, Batticaloa district)

They believed that agrochemical free foods (mainly fruits and vegetables) can be obtained from their own home garden. Majority have backyard cultivations. Following are some of the responses supporting the agrochemical free foods as a healthy diet.

- "All the vegetables now available are full of chemicals, so we cultivate our own vegetables at home. We do home gardening. For that, we add cow dung manure. So it is a healthy food, what I am trying to say is that there are no diseases. It is a non-poisonous food" (Participant 04-Tamil community, Batticaloa district)
- "Healthy food mean…… what we are growing in our home garden, without adding chemicals. Now a days they (growers) add more chemicals which are not good for the children" (Participant 07-Tamil community, Trincomalee district)

Rice, yams, other cereals and cereal based products are considered as healthy foods. They listed varieties of yams that they consume: sweet potato, potato, cassava, elephant yam and so on. Apart from rice, corn is also consumed as a cereal.

- "Potato, sweet potato, manioc, elephant yam, "Mothakavalli kizhangu", "Rasavalli kizhangu" (Participant 02-Tamil community, Trincomalee district)

The participants had an idea that a healthy diet means a diet improve the health condition of a person, such as prevent from cancers, diabetes, hypertension, improves the immunity and give a healthy and a strong body.

- "The foods that help us to prevent from diseases. That means foods that give immunity. Healthy food is also good for diabetes, cholesterol and (blood) pressure" (Participant 02-Tamil community, Trincomalee district)

There were some misclassifications between cereals and pulses, cereals and nuts, cereals and oil seeds. A majority considered vegetables should be included in a healthy diet. Overall, they said all food groups should be included in a healthy diet. Participants perceived that vegetables and leafy vegetables should be included in a healthy diet. Furthermore, they listed some of the vegetables and leafy vegetables as healthy foods: okra, long beans, brinjal, beans, leeks, carrot, cabbage, radish, ladies finger, murunga (drumstick), ash pumpkin, tomato, gourds, mukunuwenna (Alternanthera sessilis), gotukola (Centella asiatica), agunakola (Wattakaka volubilis), Kathurumurunga leaves (Sesbania grandiflora) and so on. Almost all the participants in each district indicated that fish, eggs, meat and pulses should be included in a healthy diet. They considered those as a protein source. Mainly freshwater fish are consumed in Polonnaruwa district. Chicken is the more popular meat type among people in every district. They named chickpea, cowpea and mung bean as pulses which they add to their meal.

- "Meat, fish, egg and so on, foods which are rich in protein" (Participant 05-Sinhala community, Ampara district)
- "…….Chickpea, cowpea and mung bean" (Participant 03-Tamil community, Trincomalee district)

Majority consumed home-grown fruits such as banana, papaya, mango etc. People know that fruits are important for a healthy diet. Banana is the most common fruit consumed in Ampara district.

- "In a nutritious diet, fruits should be included" (Participant 02-Sinhala community, Ampara district)
- "Fruits are important. Banana, papaya, pineapple, jack (ripened), mango" (Participant 01-Tamil community, Trincomalee district)
- "Grapes, apple, pomegranate, pineapple, papaya are the fruits we consume" (Participant 06-Tamil community, Batticaloa district)

Milk and milk products also played a major role in the participants' diet. Majority are fond of liquid cow milk. Tamil communities are much keen to consume curd. Cheese is not frequently consumed because of the higher price.

- "We can get fresh milk. Both cow milk and buffalo milk" (Participant 08-Tamil community, Batticaloa district)
- "We consume curd, yogurt and cheese. But cheese is not much frequently consumed" (Participant 02-Tamil community, Trincomalee district)

Some of the participants mentioned that chemicals are added in the process of making white sugar. Therefore, brown sugar is healthier and safer than white sugar. Fats/oils are used when preparing the curries. Only Ampara and Trincomalee districts have mentioned about fats and sugar.

- "Fats are also healthy" (Participant 08-Sinhala community, Ampara district)

- "Sugar, there is white sugar and brown sugar. Brown sugar is good" (Participant 04-Tamil community, Trincomalee district)

Only two participants in Batticaloa district has mentioned about nuts and oil seeds (peanuts and gingelly).

Participants gave a list of barriers to eat a healthy diet: being ill, busy lifestyle, consumption of alcohol, lack of cooking skills, health issues, laziness (ignorance), lack of knowledge, myths and beliefs, pest damages on cultivations, affordability, unavailability and variation in the preferences. Busy lifestyle was the most respondents' barrier to get a healthy diet. While some of the individuals responded that there are no barriers.

Majority of the participants perceived that busy lifestyle is a barrier to get a healthy diet. When they are busy, they do not think about the healthiness or the nutrient content of the diet. Mainly in urban areas both husband and wife go to work. Therefore, easily prepared foods are consumed.

- "When we are busy, don't think about a nutritious diet. Quickly cook whatever is there and eat" (Participant 09-Sinhala community, Trincomalee district)
- "Yes. In some families both husband and wife are working. So they can't cook all these foods. They make easy to prepare foods everyday" (Participant 03-Tamil community, Batticaloa district)

Affordability was another major barrier in all districts to get a healthy diet. In some areas, most of the people engage in labour work. Therefore, their daily wage is not enough to consume a healthy diet. In Ampara area, they reported that although they have such kind of problems, most of them cultivated and fulfil the nutrient requirement. Freshwater fish are popular among Ampara and Polonnaruwa areas. Participants mentioned that vegetables and marine fish are high in price.

- "Prices of vegetables are high in the market" (Participant 08-Sinhala community, Ampara district)
- "Labourers are not going to eat marine fish because of the price, when we are going to buy Bala fish (Skipjack tuna), it is around 800-1000 rupees per kilogram. Kelawalla (Yellow fin tuna) is expensive than that" (Participant 07-Sinhala community, Ampara district)
- "Prices are high. Fruits and vegetables come from outside. So, the prices are high" (Participant 03-Sinhala community, Trincomalee district)

Participants pointed out that laziness (ignorance) of the people also a barrier to consume a healthy diet. Sometime all the facilities and resources are there, but do not feel like to prepare foods. Laziness also directs to consume less variety of fruits and vegetables as well. Mothers also do not have dedication on cooking.

- "Yes, all resources are there but don't feel like to cook. They don't think too much" (Participant 05-Sinhala community, Ampara district)
- "Some pretend to be not knowing to cook because of laziness" (Participant 07-Tamil community, Batticaloa district)
- "They are not cooking because of the laziness. There are some people just eat something for breakfast and stay" (Participant 10-Sinhala community, Polonnaruwa district)

Almost all women participated in FGD can cook, as well as men also cook when there is a need. However, proper cooking methods for certain dishes were not known. They have revealed that Ampara district has higher incidences of teenage marriages and eventually end up with not knowing the household work as a mother as well as a wife. Lack of availability of fresh fruits and vegetables was another barrier to get a healthy diet. In Trincomalee area most of the people do not engage in cultivations. Therefore, they have to buy vegetables and fruits from market. People complained that those fruits and vegetables are not fresh.

- "Many vegetables are bought from outside, Dambulla like areas" (Participant 02-Sinhala community, Trincomalee district)
- "Fresh vegetables and fresh fruits are not available" (Participant 01-Sinhala community, Trincomalee district)
- "Unavailability of seasonal foods is a problem" (Participant 02-Muslim community, Batticaloa district)

Some of the individuals responded that there are no barriers for healthy eating. Most of them practice home gardening. Mainly in Ampara area, people reported that plenty of fruits and vegetables are available in their garden. Furthermore, they told that if the foods are not cultivated then foods also not available in the area. Ampara Sinhala community is much keen on home gardening compared to communities in other districts. Tamil community in Batticaloa also engages in home gardening together with raring of backyard poultry (country fowl). Examples for home gardening:

- "Fruits are available in-home garden. Fruits are cultivated. Fruits like banana, guava, pomegranate, sweet orange. All are there" (Participant 07-Sinhala community, Ampara district)
- "We also don't have a big land. Ridge gourd, long beans, leafy vegetables have been grown in the home garden. If there is more space, then cultivation can be done" (Participant 10-Sinhala community, Ampara district)
- "We rare hens at home. The country fowls. So we can get eggs" (Participant 04-Tamil community, Batticaloa district)

Participants were asked to give their strategies to make family meals healthy. Majority said they eat some dishes in raw form, mainly by making salads and sambol. The second most followed method was use clay pots to cook instead of aluminium pots. The slightly cooked dishes were the third most followed strategy. There were few other methods such as maintaining home garden (own cultivations), follow different cooking methods, wash vegetables before cutting, adding lime juice, adding salt (at what time salt should be added to the curry to preserve iodine content), keeping cleanliness of the food, reduce sugar consumption, reduce wheat flour consumption and adding spices are indicated as methods to maintain healthiness of the foods. Majority of the population said they consume all the food groups every day. Seasonal fruits and vegetables only available in a particular season, those are eaten every other day during that season. Among cereals, rice is eaten every day and corn, kurakkan are eaten once a week. Coconut oil is used to cook foods every day. Mostly fish are consumed daily while meat is consumed once a week.

Fruits which are grown in their home garden are eaten daily basis while grapes, apple, oranges like fruits are eaten once a week. Most of the people eat leafy vegetable every day. Yams and Pulses (chickpea, mung bean and cowpea) are eaten two, three times per week.

- "Rice is eaten everyday" (Participant 03-Sinhala community, Ampara district)
- "Most of the time, we consume egg and fish daily" (Participant 04-Tamil community, Trincomalee district)
- "We consume fruits daily" (Participant 04-Sinhala community, Ampara district)
- "When we consider leafy vegetables, at least one leafy vegetable is eaten daily and we change the varieties" (Participant 02-Tamil/Muslim community, Ampara district)
- "Daily, 2 tablespoon of oil is consumed…." (Participant 01-Tamil/Muslim community, Ampara district)

Theme 2. Nutritional values of foods

Participants gave reason for why they think each food group is nutritious. Majority of the population consider fish, pulses, meat and eggs provide proteins for body growth while improve bone health, brain development, provide energy, provide immunity against diseases and organ health were the other reasons. The major reason of eating fruits is to gain vitamins and minerals while digestion, eye health, prevent from diseases and avoid nutrient deficiencies were other reasons. Rice, bread, other cereals and yams mainly help growth of the body. Vegetables enhance the immunity, and some considered them as an energy source and provide micronutrients (vitamins). Most of the participants considered leafy vegetables to enhance the immunity system. Furthermore, it provides iron, improve cognitive ability, act as an energy source and prevent from diseases.

- "Leafy vegetables enhance the immunity functions" (Participant 04-Sinhala community, Ampara district)
- "It (leafy vegetables) improves our immunity" (Participant 03-Tamil community, Trincomalee district)
- Participants perceived that rice, bread, other cereals and yams as an energy source, helps for the proper body growth.
- "It's a meal Include carbohydrate" (Participant 06-Sinhala community, Ampara district)
- "Rice like foods are important for growth" (Participant 01-Muslim community, Batticaloa district)

Majority of the people considered fish, meat, eggs and pulses as an energy source. Improve bone health, enhance the immunity, improve organ health and brain development were other reasons for being nutritious.

- "Fish, meat and eggs are foods which are rich in protein" (Participant 01-Sinhala community, Ampara district)
- "To get energy we consume them" (Participant 01-Sinhala community, Ampara district)

Most of the participants considered fruits help to maintain proper bowl function while provide minerals and vitamins, maintain eye health, reduce nutrient deficiency (anaemia) and prevent from diseases were other reasons.

- "To facilitate the food digestion process" (Participant 08-Sinhala community, Ampara district)
- "Facilitates the bowl function" (Participant 05-Muslim community, Batticaloa district)

Participants perceived that fruits contain vitamin such as vitamin A and C as well as minerals.

- "Fruits contain high amount of vitamins" (Participant 03-Muslim community, Batticaloa district)
- "Fruits contain vitamin A and C" (Participant 05-Tamil community, Batticaloa district)

Milk and milk products provide calcium and ensures teeth and bone health and provide fats to ensure gastric health.

- "Milk and milk products give calcium" (Participant 02-Tamil community, Trincomalee district)
- "In order to ensure health of teeth and bones" (Participant 01-Tamil community, Trincomalee district)

Participants perceived that fat and sugar are more important as an energy source. It helps to body growth and to enhance the appetite.

- "When work hard it sweats, for that lipid is a necessity" (Participant 05-Sinhala community, Ampara district)
- "In order to fulfil the glucose requirement, we need sugar" (Participant 03-Tamil community, Trincomalee district)

Theme 3. Nutrition-related issues in the community

Nutrition-related issues in the community where respondents are living were discussed. Issues in weight (low birth weight, underweight pregnant mothers and children, weight loss) was the most commonly mentioned issue. Anaemia and non-communicable diseases (cancers, diabetes and kidney diseases) were the second most highlighted nutrition issues followed by vision problems (Blindness and related problems in eye health). Lack of brain development, issues in fertility, goiter, lethargy, low immunity level, calcium deficiency (Issues in dental health, Osteoporosis) and stunting were other nutrition related issues indicated by the participants. Most of the participants in all four districts said that so called malnutrition is not an issue in their area.

- "Malnutrition condition isn't here" (Participant 09-Sinhala community, Ampara district)
- "In this area, no one is having malnutrition" (Participant 01-Sinhala community, Trincomalee district)

Nevertheless, later in the discussion the participants accepted that underweight children, underweight pregnant mothers and low birth weight babies as the prominent nutrition issues in the community.

- "Underweight children" (Participant 03-Muslim community, Batticaloa district)
- "Underweight pregnant mothers" (Participant 06-Muslim community, Batticaloa district)

- "Underweight issues in school going children and there are under weight babies too" (Participant 07-Tamil community, Trincomalee district)

Anaemia was considered as a serious nutrition issue. Participants from Ampara district over and over again perceived that anaemia is a major nutrition issue in their area.

- "Iron deficiency, both mothers and children are having that" (Participant 06-Sinhala community, Ampara district)
- "Haemoglobin deficiency" (Participant 03-Muslim community, Batticaloa district)
- "Anaemia" (Participant 03-Sinhala community, Trincomalee district)

People perceived that higher incidence of non-communicable diseases such as diabetes and cancers. In Polonnaruwa area, people told that there were many cases of kidney diseases.

- "When we ask from people most of them are having cancers" (Participant 04 - Sinhala community, Trincomalee district)
- "Diabetes" (Participant 02-Sinhala community, Trincomalee district)
- "Kidney diseases are high in this area" (Participant 03-Sinhala community, Polonnaruwa district)

Participants were asked about the healthiness and un-healthiness of the dish. Majority responded that they are healthy dishes because of high nutritional value of the dish. Reduction of health consequences, prevention from non-communicable diseases (NCDs) and organically produced food were the other reasons.

- "We consider them (culturally specific food dishes) as nutritious foods" (Participant 01-Sinhala community, Trincomalee district)
- "Nutrition value of wawmalu (freshwater fish) is high and they are given for breast feeding mothers" (Participant 03-Sinhala community, Ampara district)

There were special concerns such as myths and beliefs in relation to consumption of culturally specific food dishes. Nevertheless, most of the people do not depend on those myths and beliefs.

- "Earlier there was a myth that pregnant mothers should not be given leafy vegetables. But now it is not there because of the awareness by the midwife.

People believed that when leafy vegetable is given it can stick to uterus wall. Earlier they didn't know the stomach and the womb is two different things" (Participant 06-Sinhala community, Ampara district)

- "Jadi fish (fermented fish) is somewhat hot, it is not good for gastritis" (Participant 01-Sinhala community, Trincomalee district)
- "Some people don't eat 'malu-thel-vinakiri' because of the allergies" (Participant 05-Sinhala community, Trincomalee district)

Participants were asked for barriers to eat culturally specific food dishes. Unavailability of food ingredients, lack of cooking skills, lack of time, financial issues, laziness, low quality products, no value of local foods in the society and individual preferences were the barriers. Lack of time and lack of cooking skills were ranked as the most prominent two barriers. Unavailability of foods was ranked as the third barrier. Laziness and financial issues were ranked as the fourth and fifth barriers, respectively. Women participants across all communities agreed that a healthy diet meant eating a balanced meal.

Women in this study demonstrated a basic grasp of nutrition knowledge, recognizing that fruits, vegetables, and animal sources of foods were healthy while high calorie low nutrient foods were unhealthy. However, participants also held some misconceptions about nutrition including equating "organic" with healthy. They were aware that a variety of foods provide a nutritious and balanced diet. They were able to list major food groups, rice, bread, other cereals and yams. All participants mentioned how their knowledge about food was derived from a variety of sources including schoolteachers, health professionals, agriculture officers and the media. Most adult participants referred to television as a knowledge source. They also spoke of health professionals as sources of knowledge. Most of the people appreciate the service of the midwives. Among mass media TV (e.g. cooking sessions) is the most popular mean to gain nutrition related knowledge. They have mentioned that school curricular contain subjects related to health and nutrition. As well as parents also get knowledge by attending parents' meetings at schools. People were asked whether they follow those instructions and advices. Almost all people were willing to follow the instructions especially because of the prevailing of non-communicable diseases.

Overall, the study showed that the communities have adequate knowledge on nutritional aspects of foods. Additionally, the discussions identified important barriers and facilitators to healthy eating in rural and peri-urban communities. The study participants identified the cost of healthy food, lack of time, ignorance or carelessness or lack of motivation emerged as major barriers of practicing healthy eating. Several facilitators such as availability of fruits and vegetables grown in their places of residence or home gardens, inexpensive food options such as freshwater fish, trustful health messages received from various reliable sources were identified as facilitators to healthy eating.

Findings in the study indicate that food literacy related to knowledge domain is adequate. However, applying knowledge into practice has several barriers including poverty, ignorance or lack of motivation, high cost of heathy foods, lack of time, lack of childcare and seasonality of some heathy foods. There were knowledge gaps on prevailing nutrition issues in the community. Participants were willing to engage in home gardening and consuming locally available foods. Several recipes of traditional dishes were available but lack of time and lack of cooking skills act as barriers to prepare culturally specific food dishes.

6.5 Policy Review

A comprehensive desk review was conducted to study the available policy documents and regulatory measures related with food, nutrition and health. Existing policy documents, regulatory functions related Acts and Ordinances, draft National Policies, Annual Research Reports, research and extension annual proceedings, sectoral papers, progress reports and publications in related institutions and authorities, customs, quarantine stations, other regulatory bodies and any other documents that (stimulate or constrain) influence the final outcome were used as reviewing materials of this exercise.

Supporting information was also be browsed from web site and internet for this endeavour to identify focus areas/issues and existing policies / regulations relevant to each issue identified. A literature review has been undertaken regarding the policy documents. Analysis of existing policies to identify knowledge gaps, policy and regulatory inconsistencies in the area of Food Consumption, Nutrition & Health. The objectives of this study were to identify the impact, relevance, efficiency and effectiveness of agricultural policies on Food Consumption, Nutrition and Health towards agriculture modernization and identify the policy constraints which affect the food consumption, nutrition and health of people. It is also aimed to make recommendation for reform and new policy initiatives; review the regional policy environment and regulations which supported food Consumption, nutrition and health better and adoption for agriculture modernization and assess the potential for integration into the Sri Lankan setting, and develop a policy framework for creating conducive environment for improving food consumption, nutrition and health of people and to attract investments and sustainable growth of agriculture sector including smallholder farmers and private sector.

The research team has reviewed the documents that can be used effectively for comparison, prediction and interpretation while giving emphasis to the specific areas of food consumption, nutrition & health. A literature review was undertaken to study the policies and plans initiated by the government and the authorities on agricultural reforms to promoting food availability /security and to create inclusive growth. In this activity, existing policy documents and drafts of relevant National Policies were collected after consultation with the relevant authorities. The documents are being reviewed. They will be used in facilitation of valid and reliable qualitative and quantitative analysis on policy.

A literature review was conducted to study the policies and plans initiated by government and authorities on agricultural reforms to minimise food insecurity and to create inclusive growth. The research team explored the documents that can be used effectively for the purpose of comparisons, predictions and interpretations. The respective sectors, components of the food systems as applicable and emphasis will be given to the specific areas of Food Consumption, Nutrition & Health. In this activity several existing policy documents and drafts of relevant National Policies (as listed below) were collected after consultation with the relevant authorities and saved in to facilitate a valid and reliable qualitative and quantitative analysis on policy.

Following policies and programs were under reviewed.

- Development of a National Agricultural Policy for Sri Lanka (Not Cabinet approved) 2018
- Food Production National Program 2016
- Ministry of Agricultural and Agrarian Services (2007) Sri Lanka National Agricultural Policy
- Ministry of Agriculture - Cooperate Plan 2011-2015, 2011
- Ministry of Health (2010) National Nutrition Policy of Sri Lanka
- Ministry of Land and Land Development (2014) National Policy on Protection and Conservation of Water Sources, their Catchments and Reservations in Sri Lanka.

- Ministry of Plantation Industries (2009) National Plantation Industry Policy Framework.
- National Agricultural Research policy and Strategy 2018 – 2027 2018
- National Export Strategy for Processed Food and Beverages 2018
- National Food Policy 2004
- National Policy and Strategy on Cleaner Production for Agriculture Sector 2012
- Overarching agricultural policy (Draft) 2019
- Socialist Republic of Sri Lanka (2015) Vision 2025, A Country Enriched
- Socialist Republic of Sri Lanka (2015), Food Production National Programme 2016-2018.
- Sri Lanka Agricultural Trade Policy
- Sri Lanka Biosafety Framework 2005
- Sri Lanka Council for Agricultural Research Policy (2018) National Agricultural Research Policy and Strategy 2018-2027. Ministry of Agriculture: Colombo.
- Sri Lanka E-agriculture Strategy 2010
- Sri Lanka National Agricultural Policy – Ministry of Agriculture and Agrarian Services 2007
- National Health Policy, 2016-2025
- National Nutrition Policy 2010
- Food Act, No 26 1980 and regulations
- National Maternal and Child Health Policy of Sri Lanka 2012, and different strategic plans under the MCH policy
- Sri Lanka code for the promotion, protection and support of breastfeeding and marketing of designated products, 2004
- Multi Sector Action Plan for Nutrition 2018-2025
- The National Policy and Strategic Framework for Prevention and Control of Chronic Non-Communicable Diseases, 2009
- National multisector action plan for the prevention and control of NCD 2016-2020
- National Health Promotion Policy, 2010

6.5.1 Policy Review Discussion

Sri Lankan food supply has gradually increased over last 25 years. However, it remains lower than the level deemed optimal for NTD prevention. Unless a mandatory fortification is implemented, or other effective ways for increasing folate status of women in childbearing age were identified, Sri Lankan women will continue to be having risk of NTD affected pregnancies. Vitamin B12 is also important for infants, and signs of a vitamin B12 deficiency include growth retardation, failure to thrive, problems with movement, and megaloblastic anaemia. Among fat soluble vitamins, vitamin A per capita availability was not adequate to meet the WHO recommendation until 2015. This result can also prove the less availability of iron since 2014, as animal sourced foods are the major source of both vitamin A and iron. Therefore, more attention should be paid to increase availability of animal-based foods including fish, meat, poultry, milk and other dairy products in the country's food supply.

Simultaneous occurrences of these favourable and unfavourable changes in food availability create an ambiguity as to where Sri Lanka stands in the stages of nutrition transition. Similarly, both under nutrition together with micronutrient deficiency, and over nutrition exist in Sri Lankan Society. The implication of this is beside the country- wide programs and policies that are implemented in a country to combat malnutrition, as well as over nutrition, country is still suffering from dual burden of malnutrition and over nutrition. This could be mitigated by formulating food strategies in a way that the people's food security is enhanced through adequate consumption of safe and good quality food, so that, both burdens will be addressed. Specifically, interventions are required to curtail relatively higher supply levels of sugar, alcohol and saturated fats, through proper regulatory measures on import policies and fast and processed food industry. Meanwhile, different interventions are required to further escalate the availability of fruits, vegetables and nuts. Gaps in knowledge with respect to the nutritional benefits of these foods and market inefficiencies which result in higher prices or low availability need to be additionally tackled.

Overall, it is evident from the present study that there are long standing imbalances in Sri Lankan food supply, in comparison with WHO recommendations. More realistic and sustainable agricultural policies will be needed to prevent the adverse consequences of these inappropriate food and nutrient supply patterns. To explore the potential of the food and agriculture sector to meet the demands and challenges, it is useful to examine trends in food and nutrient supply patterns in the country, which this study tried to find out.

Relevant Policies in Agriculture Sector Five major policies were analysed. Table 33 shows the variability of major policy trust areas of five National Agriculture Development Policies formulated and implemented under the Ministry of Agriculture Development.

Table 22: Food & nutrition related major policies

Policy	Major Goals	Responsible institution
Sri Lanka National Agricultural Policy of MOA and Agrarian Services (2006)	Promote sustainable agriculture development and increase productivity Promoting integrated agriculture Introduction of modern technologies to rural agriculture Ensure production and supply high quality seed and planting material Promote mechanization through private sector involvement	Ministry of Agriculture and Agrarian Development

Policy	Major Goals	Responsible institution
	Reorganize and strengthen agriculture system to disseminate innovations and information to the farming community through modern information and communication technology Capacity building of agricultural scientists Involve private sector in agriculture research and development and entrepreneurship	
Cooperate Plan (2011-2015).	Current agricultural policy reforms and legal framework for agriculture development Ensure food security Value added products for exports Post-harvest loses prevention Transforming subsistence agriculture to commercial agriculture Conservation of natural resources for sustainable land use Capacity building for M&E to achieve high standards of service delivery	Ministry of Agriculture
Overarching Agricultural Policy (2019)	Energizing market linkages Revitalizing rural economy Reaching to Global Value Chain Ensuring food and nutrition security and food safety Promote appropriate agricultural innovation and technology transmission through investments in research, education, training and partnerships for sustainable agricultural production Subsidies for value chain actors to enhance agriculture production, including provision of seeds, fertilizers and machinery at affordable prices. Provision of incentives for initiating product diversification. Price and market interventions for enhancing the value chain development. Develop a comprehensive human resource and capacity building program covering all national and provincial agricultural institutions	Ministry of Agriculture

Policy	Major Goals	Responsible institution
Sri Lanka National Agricultural Research Policy & Strategy (2018-2027) -CARP	Export Agricultural Crops – crop improvement, mechanization and value addition for global competitiveness OFC – productivity improvement, input efficiency, enhance land and water efficiency Vegetable sector – crop improvement, value addition and increase consumption of vegetables Fruit crops – increase availability of fruits value chain development Livestock and poultry – increase production	Ministry of Agriculture / CARP
The Development of Agricultural Policy for Sri Lanka -2018	Increased Sustainable Agricultural Production and Productivity Research, Development and Innovation Environment: Vulnerability and Resilience Market Development Private Sector Involvement Extension and Empowerment of Farmers Information Systems and Communication	Ministry of Agriculture
National Health Policy, 2016-2025	Strengthen service delivery to achieve preventive health goals To address malnutrition through specific strategies Appropriate and accessible high quality curative care for all Sri Lankan citizens Promotion of equitable access to quality rehabilitation care Strengthen evidence-based service delivery to support journey along the continuum of care Develop new strategies to reduce Out Of Pocket Spending (OOPS) and reduce financial risk	Ministry of Health

Policy	Major Goals	Responsible institution
	To ensure a comprehensive health system through a better re- structuring including HRM Develop strategic partnership with all providers of health care	
National Nutrition Policy 2010	To ensure optimal nutrition throughout the life cycle To enhance capacity to deliver effective & appropriate interventions To ensure effective management of adequate nutrition to vulnerable populations To ensure food and nutrition security for all citizens To strengthen advocacy, partnerships and networking To strengthen research, monitoring and evaluation	Ministry of Health
Food Act, No 26 1980 and regulations	The food act is concerned about the safety and quality of food for human consumption. The Act prohibits the manufacturing, import, sale or distribution of food unfit for human consumption, as well as the labelling, packaging and advertising of food in a false or misleading manner. preparation, storage, sale or distribution of food is subject to the issue of a licenses	Ministry of Health
National Maternal and Child Health Policy of Sri Lanka 2012, and different strategic plans under the MCH policy	This policy has 12 policy goals targeting different stages of life course ensuring the highest possible levels of health of all women, children and families through provision of comprehensive, sustainable, equitable and quality Maternal and Child Health services.	Ministry of Health
Sri Lanka code for the promotion, protection and support of breastfeeding and marketing of designated products, 2004	To contribute to the provision of safe and adequate nutrition for infants and young children by protection, promotion and support of breastfeeding and by ensuring the proper use of infant formulae when these are necessary on the basis of adequate information and through appropriate marketing and distribution.	Ministry of Health
Multi Sector Action Plan for Nutrition 2018-2025	Strengthen and enable environment for optimal nutrition, including policies, strategic planning, multi-	National Nutrition Council, and 17

Policy	Major Goals	Responsible institution
	sector coordination and building capacity at national and sub-national levels Improve quality and coverage of nutrition-specific interventions to enhance status of children under 5 years, school children and adolescents, pre-pregnant and pregnant women Improve quality and coverage of nutrition-sensitive interventions to enhance nutritional status of the population throughout the life cycle Strengthen community empowerment to optimise nutrition at household level Strengthen the National Nutrition Information System (NNIS) to utilize for the planning and monitoring purpose.	relevant Ministries
The National Policy and Strategic Framework for Prevention and Control of Chronic Non-Communicable Diseases, 2009	The overall goal is to reduce the burden due to chronic NCDs by promoting health lifestyles, reducing the prevalence of common risk factors, and providing integrated evidence-based treatment options for diagnosed NCD patients.	Ministry of Health
National multisector action plan for the prevention and control of NCD 2016-2020	Strategic action area 2: Health promotion and risk reduction 2.3 Promote healthy diet high in fruit and vegetables and low in saturated fat /trans fat, free sugar and salt	Ministry of Health
National Health Promotion Policy, 2010	Overall goal is to enable all the people to be responsible for their own health and that of others in addressing broad determinants of health through concerted health promotion actions in all settings	Ministry of Health
The National Policy and Strategic Framework for Prevention and Control of Chronic Non-Communicable Diseases, 2009	The overall goal is to reduce the burden due to chronic NCDs by promoting health lifestyles, reducing the prevalence of common risk factors, and providing integrated evidence-based treatment options for diagnosed NCD patients.	Ministry of Health
National multisector action plan for the	Strategic action area 2: Health promotion and risk reduction. Promote healthy diet high in fruit and	Ministry of Health

Policy	Major Goals	Responsible institution
prevention and control of NCD 2016-2020	vegetables and low in saturated fat/trans-fat, free sugar and salt	
National Health Promotion Policy, 2010	Overall goal is to enable all the people to be responsible for their own health and that of others in addressing broad determinants of health through concerted health promotion actions in all settings	Ministry of Health

Addressing malnutrition is given high priority in the health sector, as outlined in the National health Policy of the Sri Lankan Government (2016-2025). There is a separate national nutrition policy (2010), which is being revised currently. The goal is to ensure optimum nutrition of all Sri Lankan, through the life course. Although the revised national nutrition policy is not available at the time of this report, it was revealed through the stakeholder discussions that the new policy would be effective till 2030, and is aligned with the Sustainable Development Goals (SDG) and the Maternal, Infant and Young Child Nutrition (MIYCN) targets adopted by Sri Lanka.

The food act (1980) with subsequent regulations provides a legal framework to ensure the safety and quality of food from manufacturer to consumer. Sri Lanka is a member of the *Codex Alimentarius* Commission, which is an international body facilitated by the FAO and WHO aiming at protecting consumers' health and ensuring fair practices in the food trade. The *Codex Alimentarius* is a collection of internationally adopted food standards and related texts presented in a uniform manner. The publication of the Codex Alimentarius is intended to guide and promote the elaboration and establishment of definitions and requirements for foods to assist in their harmonization and in doing so to facilitate international trade.

The National Maternal and Child Health Policy (2012) together with strategic plans under it focussed on different stages of life course providing directives to ensure nutrition in all stages of the life – from conception to adulthood. Major provisions under the MCH policy are focused on nutrition specific interventions which are implemented through the maternal and child health programme. These include nutrition interventions for pre-pregnant women, food and nutrition supplementation for pregnant and lactating mothers, promoting early and exclusive breastfeeding and appropriate infant and young child feeding practices, growth monitoring and promotion of children, food ("Thriposha") and micronutrient supplementation (multiple micronutrients and vitamin A megadose), deworming of children, management of moderate and severe acute malnutrition of children, and guidelines for school canteen policy, and healthy eating behaviour of adolescents.

With the emerging problem of the non-communicable disease, a national policy (2009), and an action plan for prevention and control of NCD (2016-20) is available, and the promoting healthy diet is a key policy objective. The national health promotion policy (2010) supports Information, education and communication activities related to nutrition and health.

The multisector action plan for nutrition (2018-2015) which was revised recently, facilitates the multi-sector coordination across several ministries. The objectives and roles of each sector are given in detail. It is required to look for possibilities of strengthening the activities of this project which involved in food and nutrition related course of actions directed by both the ministry of agriculture and ministry of health.

Suggestions to strengthen the public health sector

- Population based approach for screening, follow-up and primary and secondary prevention should be implemented in the health services
- Health sector should strengthen interventions (existing and new) to improve birth weight and ensure pre-pregnancy BMI of ≥18 kgm-2 in future mothers.
- Implement community-based intervention to improve infant and young child feeding practices, specially focusing on nutrition in the first 1000 days of life (from pregnancy until the age of 24 months). Appropriate feeding during illness, feeding for children of working mothers, and control of unhealthy food promotions should be priorities. Healthy food choices and correct information should be available for public through a proper channel.
- Make efforts to reach the nutritionally vulnerable groups, closely monitor them and initiate early interventions. Food and nutrition supplementation programmes should be targeted on vulnerable groups.
- Community-based fortification can help to increase availability and affordability of fortified staples for rural dwellers; other strategies include, among others, micro-franchises and linkages between manufacturers of fortified foods and traditional retailers/street vendors, as well as doorstep distribution and partnerships with non-profit organizations.
- Specialized nutritional products are specifically used to prevent and treat malnutrition, notably in response to humanitarian situations. This includes, for example: supplements for young children (e.g. Ready-to-Use Foods, Lipid-based Nutrient Supplements) in order to prevent or treat moderate acute malnutrition and to prevent micronutrient deficiencies and stunting; fortified blended foods; and micronutrient powders for home fortification of foods

Suggestions to improve nutritional literacy

- Improve nutrition literacy among school children, adolescents and both parents.
- Multisectoral approach is needed to enhance food security and reduce poverty.
- Develop strategies for dietary diversification, availability of low-cost nutritious food throughout the year via agriculture modernization. Promote adequate intake of proteins including animal proteins and increase availability of fruits and vegetables with adequate quality.
- Preserving catchment areas of water sources, purification of water sources, and strict law enforcement for food establishments could help to further reduce the food borne diseases in Sri -Lanka.

- Intensive efforts are needed to slowdown the rapid rise in incidence of NCD through promoting healthy dietary practices and lifestyle, while strengthening implementation of services as per NCD policy. Effective strategies for primary and secondary prevention should be identified and scaled up.

Suggestions to strengthen agricultural sector

- Maintaining a data bank on food composition, as well as data on yields, for different species and their varieties/cultivars and breeds (including underutilized foods) to ensure that nutrient content becomes a priority criterion in cultivar promotion and research.
- Popularize crop varieties based not only on yields but also on nutrient content (concept of nutrient productivity), thereby enhancing the nutrient supply of agricultural products, especially for micronutrients.
- Establishing community seed banks and smallholder seed enterprises to enhance availability of and access to genetic resources and strengthen local food systems.
- Implementation of market-based approaches to stimulate production and consumption of – bio-diverse nutritious foods.
- Existing material on biodiversity (e.g. Voluntary Guidelines for Mainstreaming Biodiversity into Policies, Programmes and National and Regional Plans of Action on Nutrition; Food Composition Database for Biodiversity) can be used to mainstream biodiversity into nutrition and agriculture, i.e. starting from the scientific basis going to advocacy and implementation suggestions, including identifying promising entry points, champions and potential barriers.-
- Raising awareness of the general public and of different stakeholders on the importance of bio-diverse foods for nutrition, as well as incorporating biodiversity in extension systems, are also key elements for enhancing nutrition-sensitive agriculture.
- Close monitoring of food process – farm to plate - prevent adulteration, addition of harmful and toxic substances etc. and strengthen strict enforcement of legislation (food act).
- Multi sectoral nutrition sensitive interventions should be carried out through coordination led by the MoHNIM.
- Availability of healthy dietary choices, and physical activities should be ensured at every setting
- Absence of timely population-based data indicates need of a well-designed regular survey for NCD and risk factors
- Relationship between food consumption/ dietary intake and NCD should be explored through research

Suggestions on food advertising

- Schools should encourage children towards adopting healthy eating habits – school canteen policy should be strictly enforced with availability of a wide range of healthier food choices with good taste and attraction. Ministry of Education to prohibit all types of undesirable food promotion activities in schools.
- The food industry must be more socially responsible and refrain from all types of unethical food and beverage advertising.
- It is equally important that the media and advertising agencies must conform to stringent ethical standards regarding food and beverage advertising and refrain from claims being made which are not scientifically tenable. Media, advertising agencies, and celebrities should identify their social responsibility of creating better future for the children rather than only being profit oriented
- Regulatory mechanisms should be strengthened, and strictly enforced with regards to uncontrolled food advertisement. Strengthen legislation that will restrict food advertising and promotion aimed at children and bring in new provisions in the statute to prevent the use of children in advertisement of foods and beverages.
- A multisectoral national advertising policy that outlines the promotion of food products needs to be in place in Sri Lanka. This strategy should pay special attention to the interpretation of such advertisements. A Committee at the Ministry of Health needs to be set up to inspect all food and beverages–related advertisements and for the formulation and implementation of an advertising policy.
- The public to be vigilant and report unethical food advertisements aimed at children to the Consumer Affairs Authority and the Ministry of Health. Parents should pay attention to the health and nutrition qualities of food than the mere demands of their children when they buy food for children.

7.0 SUMMARY AND POLICY RECOMMENDATIONS

Overall, it is evident from the present study that there are long standing imbalances in Sri Lankan nutrition in general, qualitatively and quantitatively in comparison with recommended standards. More realistic and sustainable agricultural policies will be needed to prevent the adverse consequences of these inappropriate food and nutrient supply patterns. The WHO recommends a few policy principles that should be considered when developing national strategies to reduce the burden of diet related NCDs (WHO, 2003). These policy principles include the need for government to work together with private sector, health professionals, different consumer groups, academics, researchers and other non-governmental bodies in addressing immerging risk factors, adopting a life course perspective on chronic disease prevention, and in diminishing inequalities in society by focusing on poor communities. Strategic actions recommended by the WHO for promoting healthy diets include carrying out ongoing nutrition surveillance, which provide effective communication of information about food composition and quality, applying strict policies in food labelling and advertising, encouraging inter sectorial alliances to ensure availability and affordability of healthy diet components to all population groups.

Therefore, agriculture and food sector must be given due importance for promotion of healthy diets for all community groups in the population. Strategies should not merely be aimed at ensuring food security, but also for ensuring nutrition security, which represents the right of people to consume healthy and culturally appropriate foods through environmentally sustainable methods, while maintaining a robust agricultural system.

To explore the potential of the food and agriculture sector to meet the demands and challenges, it is useful to examine the issues and trends in food consumption, nutrition & health in the country, which is the focus of this study.

7.1 Focus Areas

7.1.1 Malnutrition

Sri Lanka is experiencing double burden of malnutrition, in which co-existence of overnutrition featured with chronic diseases, while undernutrition remained to a certain section of the community more particularly within the children. Undernutrition is more prevalent in children below 5 years of age, and its chronic form (stunting or short stature) is a problem of medium public health significance, and the acute form (wasting or thinness), a problem of high public health significance. Both stunting and wasting in children have declined over many decades, remained in similar level for last 2 decades. Trends in adults showed a decline in underweight while having a rapid increase in overweight/ and obesity in the last 2 decades. Anaemia is prevalent in all stages of life course and alarmingly high in pregnant and lactating women and young children. There is high prevalence of zinc, calcium, folate, and vitamin A deficiencies too.

7.1.2 Chronic Non-communicable Disease

There has been a rapid increase in the over nutrition and co-morbidities during the last 25 years reflecting epidemiological transition in parallel to the rapid urbanization, change in lifestyle and dietary practices. The increased prevalence of chronic non communicable diseases (NCDs) between 1990 and 2017 reflecting change in lifestyle and dietary behaviour. The main types of NCDs are cardiovascular diseases (heart attacks and stroke), cancers and diabetes. However, increasing trends in in chronic kidney and liver diseases have added more to the burden of NCDs. The results of this study revealed that, the prevalence of NCDs have increased (in the period of 1990 to 2010) concurrently with increments in per capita supply of energy, carbohydrate and total fat. There is a substantial percentage of undetected diabetes and hypertension in the population (at least one third). This higher prevalence of NCDs are causing a huge burden to the existing health system.

7.1.3 Food Consumption Pattern

Sri Lankan adults consume proportionally more carbohydrates, less fat and less proteins. Almost 70% exceeded the upper limit of the recommended starch intake. In contrast daily intake of fruit, vegetable and dairy portions were well below national recommendations.

Dietary diversity of young children is inadequate, especially intake meat, fish and eggs. The food consumption pattern varies according to geographical areas (urban, rural and estates) and socio-cultural attributes such as ethnicity, education, and wealth.

7.1.4 Food Security

Overall, Sri Lankan food supply has gradually increased over the last 25 years. Per capita supply of cereals has increased, with rice and wheat being the main contributors for this trend. Per capita supply of pulses and tree nuts have also steadily increased. In contrast, per capita supply of vegetables and fruit was almost half of the WHO recommended levels in most of the periods (except last few years). There is a reduction in the supply of coconuts, which is reflected in a decreasing trend of all oil crops. The overall per capita availability of meat showed a prominent increasing trend over the years, with poultry meat being the main contributor, while bovine meat was gradually decreasing. The overall availability of sugar and sweeteners showed an upward trend. Per capita supply of alcoholic beverages has gradually increased.

7.1.4 Nutrition literacy

People need skills to change nutrition and health behaviours. Because low-income status has been shown to correlate with reduced access to educational resources, learning how to incorporate nutritious foods into household budget may be challenging. Practices such as planning meals and communicating at mealtime by parents provide examples to their children and parents' behaviours are often replicated by their children [24]. The promotion of family meals has been suggested as a possible protective factor for obesity because of the positive associations with Nutrition education plays an important role due to its 'effect towards students' food choices and ultimately health and performance. Findings of the present study revealed that food literacy related to knowledge domain is adequate at least for certain communities. There were knowledge gaps on prevailing nutrition issues in the community. However, applying knowledge into practice has several barriers including poverty, ignorance or lack of motivation, high cost of heathy foods, lack of time, lack of support (childcare) and unavailability of nutritious foods of due to several reasons (seasonal). Participants were willing to engage in home gardening and consuming locally available foods. Several recipes of traditional dishes were available but lack of time and lack of cooking skills act as barriers to prepare culturally specific food dishes.

The discussions revealed six main themes i.e. perceptions of healthy diet, healthy/nutritious food, barriers for a healthy diet, strategy to make family meals healthy and frequently; nutritional values of foods; nutrition-related issues in the community (perceived susceptibility and the severity of consequences of unhealthy eating behaviours); perceived determinants of nutrition issues; sources of nutrition information and their practices; and knowledge about culturally specific food dishes. School based nutrition education programs play an important role in improving nutrition knowledge and behaviour of the families.

School-based nutrition education policies and programs are conducted in many countries such as school-wide policies that support healthful eating, comprehensive health education curriculum, coordination between school nutrition education, training for school staff, food service and family and community involvement and program evaluation.

7.2 Summary of the Agricultural Food Production Process

- Insufficiently addressed developing agriculture crops of higher protein content in rice (varieties)and other cereal crops and on development of high yield environmentally sustainable pulses
- Insufficiently addressed postharvest losses in fruits and vegetable –to increase the purchasing power of the low-income consumers
- Some policies create an incentive to produce and sell in the domestic market instead of exporting.
- Consumers pay more and given the large price wedge domestic producers are under less pressure to match international quality standards.

7.3 Process of Developing Actions and Strategies

The WHO recommends several policy principles that should be considered when developing national strategies to reduce the burden of diet related health problems including NCDs (WHO, 2003). These policy principles include the need for government to work together with all stake holders such as health professionals, different consumer groups, academics, researchers, private sector and other non-governmental bodies to address following issues.

- Addressing emerging risk factors,
- Adopting a life course perspective on chronic disease prevention.
- Diminishing inequalities in society by focusing on poor communities.

Strategic actions recommended by the WHO for promoting healthy lifestyle include,

- carrying out ongoing nutrition surveillance, which provides effective communication of information about food composition and quality,
- applying strict policies in food labelling and advertising,
- encouraging inter sectorial alliances to ensure availability and affordability of healthy diet components to all population groups.

To achieve expected outcomes, agriculture sector must be given due importance for promotion of nutritious foods for all community groups of the population. Strategies must not merely be aimed at ensuring food security, but for ensuring food sovereignty, which represents the right of people to produce healthy and culturally appropriate foods through ecologically sound and sustainable methods, and their right to define their own food and agriculture systems.

When addressing the issues of food and nutrition sector, the achievements are not dependent only on agriculture and food policy, but better economic management and social policies. Since most of the households in the country are subjected to the double burden of nutrition of new set of policies are necessary for the improvements. Agriculture sector should be modernised by including broad policies that have the strategies to ensure food and nutrition security to the all sectors of the community while empowering the farmers to have sustainable economy, poverty reduction, increasing the productivity of agricultural crops and price stabilization.

The Sustainable Development Goals established by the United Nations are the blueprint to achieve a better and more sustainable future for all. These SDGs addressed challenges of the country as discussed previously, including those related to poverty, inequality, climate change, environmental degradation, peace and justice. In this exercise this study has links with three of those SDGs; “No Poverty”, “Zero Hunger “and “Good Health and Wellbeing”.

7.4 Recommendations of Actions and Policies

In reviewing existing policies and proposing new recommendations it is essential to take following main aspects into consideration:

- Total food system approach
- Improving nutrition literacy among all stakeholders
- Ensuring nutrition security, food security and food safety
- Ensuring culturally appropriate food availability
- Empowering farming community
- Management and administration capacity development of farming community
- Prioritization of poverty reduction strategies
- Food price related issues
- Developing a proper implementing mechanism
- Introducing and maintaining a proper delivery mechanism
- Allocate necessary budgetary requirements
- Formulating a transparent mechanism with the cooperation of all stakeholders

7.5 Proposed Policy Statements

Following policy statements are targeting improvement of the Sri Lankan consumers and agricultural food production sector.

- Ensure appropriate and adequate nutrition and related services for all.
- Promote behaviour change communication to all sections of population enabling them to make right food choices and care practices.
- Strengthen capacity building of agriculture sector staff and community–based workers for effective behaviour change communication with regards to nutrition promotion in all sections of the community.

- Empower the community by reorganizing grass root level community organizations, in programme planning, implementation and monitoring of nutrition intervention programmes.
- Ensure dissemination of appropriate nutrition messages and Media promotion programmes in a responsible and ethical manner.
- Ensure access to adequate, nutritious, safe and quality food at affordable price throughout the year.
- Promote consumption of a wide variety of foods ensuring intake of all macro and micronutrients to prevent deficiency disorders and diet related chronic diseases.
- Promote and facilitate improvement of quality of commonly consumed food items (eg. food fortification) to ensure micronutrient supplementation for vulnerable groups.
- Enact and implement of appropriate legislations and other regulatory mechanisms to ensure provision of safe nutrition to all citizens of Sri Lanka.
- Establish a mechanism for regular consultation and dialogue between political leadership, policy planners and other stakeholders to ensure sustainability of programmes in coherence with other nutrition related policies.
- Strengthen partnerships and networking with relevant sectors and stakeholders including private sector for undertaking collaborative programmes to improve nutrition at community level.
- Promote establishment and operation of National Nutrition Surveillance System providing policy makers, programme managers, and nutrition care providers with evidence needed for better programme management.
- Prioritise and support research-oriented multi-sectoral activities and utilize evidence for regular monitoring and periodic evaluations of food and nutrition security.

Recommendations of actions

1. Maintaining a data bank on food composition, as well as data on yields, for different species and their varieties/cultivars and breeds (including underutilized foods) to ensure that nutrient content becomes a priority criterion in cultivar promotion and research.
2. Popularize crop varieties based not only on yields but also on nutrient content (concept of nutrient productivity), thereby enhancing the nutrient supply of agricultural products, especially for micronutrients.
3. Establishing community seed banks and smallholder seed enterprises to enhance availability of and access to genetic resources and strengthen local food systems.
4. Implementation of market-based approaches to stimulate production and consumption of – biodiverse nutritious foods.

5. Existing material on biodiversity (e.g. Voluntary Guidelines for Mainstreaming Biodiversity into Policies, Programmes and National and Regional Plans of Action on Nutrition; Food Composition Database for Biodiversity) can be used to mainstream biodiversity into nutrition and agriculture, i.e. starting from the scientific basis going to advocacy and implementation suggestions, including identifying promising entry points, champions and potential barriers.
6. Raising awareness of the general public and of different stakeholders on the importance of biodiverse foods for nutrition, as well as incorporating biodiversity in extension systems, are also key elements for enhancing nutrition-sensitive agriculture.
7. Close monitoring of food process – farm to plate - prevent adulteration, addition of harmful and toxic substances etc. and strengthen strict enforcement of legislation (food act).
8. Multi sectoral nutrition sensitive interventions should be carried out through coordination with ministry of health.
9. Availability of healthy dietary choices, and physical activities should be ensured at every setting
10. Absence of timely population-based data indicates need of a well-designed regular survey for NCD and risk factors
11. Relationship between food consumption/ dietary intake and NCD should be explored through research
12. Schools should encourage children towards adopting healthy eating habits – school canteen guideline should be strictly enforced with availability of a wide range of healthier food choices with good taste and attraction. Ministry of Education to prohibit all types of undesirable food promotion activities in schools.
13. The food industry must be more socially responsible and refrain from all types of unethical food and beverage advertising.
14. It is equally important that the media and advertising agencies must conform to stringent ethical standards regarding food and beverage advertising and refrain from claims being made which are not scientifically tenable. Media, advertising agencies, and celebrities should identify their social responsibility of creating better future for the children rather than only being profit oriented
15. Regulatory mechanisms should be strengthened, and strictly enforced with regards to uncontrolled food advertisement. Strengthen legislation that will restrict food advertising and promotion aimed at children and bring in new provisions in the statute to prevent the use of children in advertisement of foods and beverages.
16. A multisectoral national advertising policy that outlines the promotion of food products needs to be in place in Sri Lanka. This strategy should pay special attention to the interpretation of such advertisements. A Committee at the Ministry of Health needs to be set up to inspect all food and beverages–related advertisements and for the formulation and implementation of an advertising policy.

17. The public to be vigilant and report unethical food advertisements aimed at children to the Consumer Affairs Authority and the Ministry of Health. Parents should pay attention to the health and nutrition qualities of food than the mere demands of their children when they buy food for children.
18. Community-based fortification can help to increase availability and affordability of fortified staples for rural dwellers; other strategies include, among others, micro-franchises and linkages between manufacturers of fortified foods and traditional retailers/street vendors, as well as doorstep distribution and partnerships with non-profit organizations.
19. Improve nutrition literacy among school children, adolescents and both parents.
20. **Multisectoral approach** is needed to enhance food security and reduce poverty. Special attention must be paid for pregnant mothers and children under 5 years of age in poor households and programs implemented to break the cycle of malnutrition and poverty.
21. Develop strategies for dietary diversification, availability of low-cost nutritious food throughout the year via agriculture modernization. Promote adequate intake of proteins including animal proteins and increase availability of fruits and vegetables with adequate quality.

Bridging the gap between food and agriculture- Establishing a common centre for administering food and nutrition related action plan and policies

"Agriculture" and "Health" share a common key point of food and nutrition. Food is a key outcome of agricultural activities, in turn, is a key input into good nutrition. Without agriculture there is little food or nutrition, but availability of food from agriculture does not ensure good nutrition. Good nutrition is vital in ensuring health and well-being. However, there is often a significant disconnect between health and agriculture and administrative bureaucracy does not recognised sufficiently the requirement of intersectoral coordination that would facilitate relationship between the two fields of agriculture and health. Agricultural sector development is meant to provide food sufficiently to ensure food security as well as nutritional security," the agriculture sector should focus beyond just calories but also to provide healthy and nutritious foods. Health sector should focus on lifestyle management of the consumers by administering and evaluating actions and outcomes. Therefore, we suggest to establishment of common centre to plan similar to currently existing "Multisectoral Action Plan" to administer and evaluate food and nutrition related policies and activities, which bridge the gap between health and agriculture sectors.

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Annex 1: Key Stakeholder Consultation Workshop Questionnaire

Agriculture Sector Modernization Project

Policy Research in Food Consumption, Nutrition and Health

Key Stakeholder Consultation Workshop

Name of the Stakeholder:

Position & Institution:

We recognise you as a key stakeholder with an expertise knowledge, exposure and perceptions on the workings of the agriculture sector in Sri Lanka, and with a special focus on the phenomenon of "*Food Consumption, Nutrition and Health Policy Framework*":

Please Think about`` *Food Consumption, Nutrition and Health Policy Framework*`` for creating a conducive policy environment that supports:

- meeting priority food needs of the country
- food security at all levels
- agriculture sector more competitive, responsive to the market demands, sustainable & resilient

Think about food and nutrition security policies in Sri Lanka

1. Please identify the areas where existing policies **are conducive for enhancing the nutritional knowledge and strengthening nutritional literacy** among rural and urban sectors of Sri Lanka (please indicate the relevant policy if possible).

Area 1:
Area 2:
Area 3:
Area 4:

2. Please indicate key "**Policy/Regulatory Constraints/Barriers"** exist that might affect the performance relevant to "**Food Consumption, Nutrition and Health** "in Sri Lanka.

3. Please suggest recommendations on policy revisions, adjustments, improvements, reforms, new policies, and policy instrument that you wish to elaborate in enhancing the **food and nutrition security** status by boosting competitiveness & sustainability in the Agricultural sector. (Please write the relevant authorities responsible to undertake your proposed changes)

Recommendation	**Relevant Institutions**

1. Please comment on following questions relevant to the Food and Nutrition security.

What have been the significant nutrition-related interventions in the country over the last ten years?
Have there been any important changes in policy or strategy regarding food and nutrition? If so, please indicate.
Has there been any clear progress in in improving national nutritional status? Please comment.

What has been the main challenges relevant to progress in in improving national nutritional status and food security?
What are the areas to be strengthened in policies and regulations to improve food and nutrition security among the sectors of Sri Lanka?
General Comments

Annex 2: List of participants at the consultative workshop

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WORKSHOP ON AGRICULTURE SECTOR MODENIZATION PROJECT

Date : 29. 03. 2019

Venue : Hector Kobbekaduwa Agrarian Research and Training Institute

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WORKSHOP ON AGRICULTURE SECTOR MODENIZATION PROJECT

Date : 29. 03. 2019

Venue : Hector Kobbekaduwa Agrarian Research and Training Institute

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WORKSHOP ON AGRICULTURE SECTOR MODENIZATION PROJECT

Date : 29. 03. 2019

Venue : Hector Kobbekaduwa Agrarian Research and Training Institute

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Submitted by MG CONSULTANTS

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WORKSHOP ON AGRICULTURE SECTOR MODENIZATION PROJECT

Date : 29. 03. 2019

Venue : Hector Kobbekaduwa Agrarian Research and Training Institute

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Annex 3: Survey questionnaire

Agriculture Sector Modernization Project

Policy Research in Food Consumption, Nutrition and Health

Semi-Structured Questionnaire for Farmer Survey

Name:							
Address:							
DS Division:			District:				
Tele no.:			Age:				
Gender:	Male ☐ Female ☐		Household Size:	2 - 3		4 - 5	
				6 - 7		Above 7	
What is the highest level of Education?	Up to grade 5		Farming Experience (Years):	Below 5			
	Up to grade 8			5 - 10			
	Up to O/L			11 - 15			
	Up to A/L			15 - 20			
	Degree/Diploma			Above 20			
Farm size:	Less than 1 acres		Small Description on the Farmland:				
	1 - 3 acres						
	4 - 7 acres						
	8 – 10 acres						
	More than 10 acres						

SECTION 1: NUTRITIONAL LITERACY ASSESSMENT

1. Do you think people should be eating more, the same amount, or less of the following foods? (tick one box per food)

	More	Same	Less	Not Sure
Fruits	☐	☐	☐	☐
Vegetables	☐	☐	☐	☐
Soft drinks (added sugar)	☐	☐	☐	☐
Meat	☐	☐	☐	☐
Processed meat (sausages etc.)	☐	☐	☐	☐
Rice	☐	☐	☐	☐
Powdered milk	☐	☐	☐	☐
Fresh milk and curd	☐	☐	☐	☐
Eggs	☐	☐	☐	☐
Cakes and biscuits	☐	☐	☐	☐
Bakery products (breads)	☐	☐	☐	☐
Fish	☐	☐	☐	☐
Sweets (toffee +chocolates)	☐	☐	☐	☐
Green leaves	☐	☐	☐	☐

2. How many servings of fruit and vegetables per day do experts are advice people to eat as a minimum?

(needs to explain serving sizes in general)

2	☐
3	☐
4	☐
5 or more	☐
Not sure	☐

3. Do you think these foods are a good source of protein?

	Good Source	Not a good source	Not sure
Meat	☐	☐	☐
Fish	☐	☐	☐
Fruits	☐	☐	☐
Rice	☐	☐	☐
Wheat flour	☐	☐	☐
Green leaves	☐	☐	☐
Butter/Margarine	☐	☐	☐
Nuts	☐	☐	☐
Green leaves	☐	☐	☐
Soya meat	☐	☐	☐
Milk	☐	☐	☐

4. Which of the following foods do experts count as starchy (carbohydrate) foods?

	Starchy	**Not starchy**	**Not sure**
Cheese	☐	☐	☐
Rice	☐	☐	☐
Potatoes	☐	☐	☐
Nuts	☐	☐	☐
Banana	☐	☐	☐
Bread	☐	☐	☐
Jack/Bread fruit	☐	☐	☐
Nuts	☐	☐	☐

5. How many tea spoons of sugar are added a day by a person? ……
6. Salt consumption: size of packet _____(g) How many days _____ (days) consumed by _____ number of persons excluding children < 2 yr
7. How many coconuts consumed per week _____
8. Type of oil used for cooking:
    - Coconut
    - Palm oil
    - Other
9. Do you restrict any food/ type of food due to some reason? Y/N food ……
10. Give the most relevant reason to restrict that food?
    - food is not available
    - we cannot bear the cost
    - It is harmful for health
    - It is available in poor quality (adulterated)
    - It is culturally not acceptable
    - Other
11. If for health reasons, mention whether the restriction is due to prevent or control one of these heath conditions?
    a. heart disease or related condition such as high blood pressure / fat / cholesterol / obesity
    b. diabetes or high blood sugar
    c. kidney disease, urinary problems
    d. cancer
    e. gastric pain, indigestion or diarrheal disease
    f. respiratory illness, phlegm or cold food
    g. hot food causing inflammation, rheumatoid (raktha) or joint disorders
    h. overall health in general

12. What type of food do you produce in your home garden or at commercial scale? (answer can be structured – broad food groups)

Type of food	home gardening	commercial scale
Pulses		
Meat/fish/eggs		
Fruits		
Vegetables		
Oils/seeds		
Starchy food		

SECTION 2: FOOD CONSUMPTION PRACTICES

1. 24-hour diet recall

Time	Food items	Amount	Description

2. Food frequency questionnaire

	Food item		Average use									
		amount	Per day			Per week			Per month	Less than 1 month	Rarely/never	remarks
			1	2	3	1	2-3	>4-5				
1	Rice cooked											
2	Bread/bakery products											
3	Other starchy food											
4	Eggs											
5	Fish											
6	Meat											
7	Pulses											
8	Milk-Fresh											
9	Milk - curd											
10	Milk - Powder											
11	Processed meat											
12	Fruits											
13	Vegetables (non-starchy)											
14	Green leaves											
15	Soft drinks											

Annex 4: Focus Group Discussions

Focus Group Discussion Questions

1. What do you understand by **a healthy / nutritious diet?**
   Probe after getting the initial responses:
   - Which foods you think are nutritious / healthy? (participants may give a list of foods)
   - Why are they nutritious / healthy? (Get at least one answer for each food group)
   - How often you usually eat such foods at home? (Try to get consensus among participants regarding food groups)

2. What do you feel are the **greatest barriers** to frequent healthy meals? (allow to list them and prioritize)

3. Do you feel lack of **cooking skills** contributes to not having frequent healthy meals? If so, how does it contribute? [Note: This has to be asked if this is not listed as a response to Q2)

4. How do you make your family meals healthy? (allow them to list different means)

5. In your opinion, what has been the **most helpful strategy** to make family meals healthy? (prioritize the answers received for Q4)

6. Do you believe there are nutrition related issues in the community?
   Probe:
   - Which ones?
   - Can you prioritize?
   - Why they exist? Do food/eating patterns contribute?

7. What are the means of receiving nutrition-related information in your family?

Probe:
- Do you follow the instructions or advices given?
- Why? / Why not?
- From who do you trust it the most?

Foods available in your area (name the District)

8. What are the most culturally specific food dishes / preparations unique to this area? [Allow them to list]
   Probe:

- Fruits, Vegetables, Cereals/Grains, Legumes, Milk products, Fish and meat
- Can somebody briefly explain a recipe? (hint: get information about selected special recipes, but not the common ones such as Upma, Pittu, Rice etc)
- Do you prepare these foods?
- Are they served day to day or associated with a special occasion?

9. Do you think them as healthy foods? [Allow the participants to discuss the healthiness / un-healthiness of these foods]

Probe:

- Why are they healthy or unhealthy? Any nutrition values?
- Do you or others in your family/village have special concerns about these foods? [Good or bad beliefs, effect to health, religious issues]

10. What do you feel are the **greatest barriers** to eat these foods? (allow to list them and prioritize)

Now we have come to the end of our discussion. Would you like to say any other important information that we have not discussed?

Probe:

Did you miss any important recipe or a food item that is unique your area?

Annex 5: Revisions in the policies in import and export policies

Suggestions for revisions in the policies in export policies

Tea	Coconut	Spices	Fruits & Vegetables	Organic products
Phytosanitary & Health Certificate	Microbial & Physic-chemical testing for both kernel and non-kernel products	Cinnamon and paper for consumption need SLSI standards	Quality certificate – SLSI standards	Global GAP Certification
ISO standards for Black & Green tea	Virgin coconut oil ISO22000	Factory HACCP standard	ISO, HACCP & EU standards	Quality certificate SLSI standards
Minimum residue levels for pesticide (EU & Japan has own levels)	Desiccated coconut –quality certificate, SLSI standard	Fumigation requirements – lack of harmonization among countries	Phytosanitory Certificate (PSC)	Organic standards required by importing county: USDA, EU,
Heavy metals	Physical quality and Sulphur dioxide certificate			ISO, HACCP, Eu standards
Microbial requirements (Salmonella, etc)	Product standards- levels of aflatoxin, limits on polycyclic Aromatic Hydrocarbons			Traceability

Suggestions for revisions in the policies in import policies

High Risk category (Fish, Meat, Milk, Eggs & their production)	Medium Risk category (Processed meat, canned fish, or animal products)	Low Risk category (cereals, pulses, fruits, confectionary, primary agriculture products)
Health Certificate Analytical	Certificate of country of Origin	Certificate of country of Origin
Certificate of country of Origin	Health Certificate	Sanitary & Phyto Sanitary Certificate
Melamine & DCD Free Certificate	GMP Certificate	GAP Certificate
Analytical Report from Atomic Energy Board (AEB): radio activity	Certificate of BSE Status for beef products	Organoleptic Properties
Microbiological Standards	Microbiological Standards	Testing volatile matter
Chemical Analysis	Temperature Monitoring Chart	Chemical Parameters
Fat content Origin of Fat, D. C. D Contamination	SLSI Standard	Formaldehyde
Health Certificate	Organoleptic Properties	Pesticide Residues
Certificate of BSE free Status	Certificate Sanitary & Phyto-Sanitary Certificate	AEB analytical Certificate
Formaldehyde Contamination with Level	Identify GM Organism	Chemical Parameters
Temperature Monitoring Chart	Non-GMO Certificate	Radio activity, Heavy Metal
		Sanitary & Phyto-Sanitary
		Pesticide residues
		Non-GM certificate
		AEB analytical Certificate