

# Changes in Food Consumption Patterns in Sri Lanka: Food Security and Sustainability: A Review of Literature

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## Abstract

Food is one of the basic necessities that play a major role in human life. Over the past two decades, food consumption patterns in many countries have changed rapidly. The concern of food security has emerged as a global food crisis in recent decades. These global changes probably affect Sri Lankan food consumption habits. Sustainability is an essential component and a precondition for long-term food security. Hence, this study used an in-depth non-systematic literature review on a global scale emphasizing the Sri Lankan context, to better understand the situation of changes in food consumption patterns using comprehensive household survey data in Sri Lanka. The study found out that income growth, urbanization, structural changes in the population on demographics, and several other socio-economic changes significantly influenced transformations in global food consumption patterns. Other than these, many significant differences are evident in food consumption patterns especially geographically, in urban, rural, and estate sectors in Sri Lanka. The Sri Lankan diet shows a tendency to shift from traditional cereal consumption to meat, fish, dairy products, and fast foods and processed foods, posing a significant threat concerning the future food security and sustainability of Sri Lanka. Therefore, the study recommended a critical analysis of changes in food consumption patterns in Sri Lanka.

## Keywords

Consumption Patterns, Food Habits, Food Security, Sri Lanka, Sustainability

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## 1. Introduction

Food is an essential element for humans to live and sustain life. Every person

needs to have an adequate diet to lead an active and healthy life. At present, even though it seems as if there is adequate food available for people in the world, more than a billion people go to bed hungry every night due to problems in allocation and distribution. By 2010, 925 million people worldwide were suffering from chronic hunger (Sinha, 2014). Besides, at the global level, food supply is not constant throughout a given year, and therefore access to food is not equitable for all. In this backdrop, food sustainability is an increasingly growing concern.

#### *Changing food consumption habits*

Sri Lanka is a developing country with a population of 22 million and has been pursuing a liberal foreign trade policy since the late 1970s. Sri Lanka implemented trade liberalization economic policies in 1978 after a period of a severe trade embargo from 1970-1977. This was mainly due to low activity in the import substitution industry, low economic growth rate and high unemployment rate (Herath et al., 2013). In the closed economic era, total exports grew at a high rate. By 1970, the total export value recorded US \$ 339 million, and by 1977 it had grown more than twofold to US \$ 767 million. With the introduction of the Open Economic Policy, exports value was US \$ 845 million, and by 2020 it reaches a massive growth recording US \$ 10,047 million (Herath et al., 2013; CBSL, 2020). Furthermore, US \$ 255.93 million in export revenue was earned in 2020 through food and beverage products (EDB, 2021). A dramatic change can be seen in the import sector of Sri Lanka during both the closed economic era and the implementation of open economic policies. During the period 1970-1977, the country's total imports grew at a rate of 11.7% due to import substitution industrial strategies and nevertheless total imports have grown at a rate of 7.89% since post-liberalization that can be due to the higher importation of the intermediate goods during the closed period (Herath et al., 2013). By 2017 the volume of imports of goods and services as a percentage of GDP was 29.1 (CBSL, 2020). Accordingly, 12.96% of GDP was spent on food imports in 2017 (World Bank, 2021).

Food is intertwined with the culture of the country, personal preferences, incomes, socio-economic patterns, commodity prices, beliefs, etc. Most Asian countries usually prepare food at home rather than dining out. Historically, the Sri Lankan diet consisted of healthy foods such as jackfruit, bread, fruits, whole grains, legumes, and domestic tuber roots, which were free from artificial chemicals that are harmful to the body (Jayatissa et al., 2014). Nevertheless, a significant change in food consumption patterns in Sri Lanka can be attributed to the evolution of the economic and demographic transition of the country in recent times (Shetty, 2002). Also, private consumption (domestic consumption by households) accounts for a sizeable 70% of the GDP of the country (Rathnayaka et al., 2019). Hence, food consumption plays an important role in national income in many perspectives such as quantity/expenditure and quality/health factor of food consumed by people. The most important question is whether con-

sumers change their food consumption patterns with increasing income levels, rapidly changing global food prices, urbanization and structural transformation of countries (Pallegedara, 2019). In the above circumstances, it is important for government policymakers to analyze the consumption patterns of consumers in the country in planning the country's economic plans and determining the market for exports (Rathnayaka et al., 2019).

Rice is the staple food of most people in the world for more than half of the world's population (Pallegedara, 2019). Further, one-quarter of global per capita energy consumption comes from rice consumption (GRiSP, 2013). Countries in the Asian region account for more than 90% of the world's rice production and consumption (Abdullah et al., 2006). Economic growth, urbanization, income growth, and globalization have been instrumental in moving Asian diets away from staple foods to more livestock, vegetables, and fruits, dairy products, fats, and oils. As household income levels rise, people can be seen shifting away from traditional rice consumption to a more Westernized diet (Pingali, 2007). Globalization, rapid expansion of the global supermarket chain and fast-food outlets around the world reinforces the above trends (Pingali, 2007).

The traditional diet of Sri Lanka is highly diversified and provides several benefits such as prevention of non-communicable diseases (NCDs) and protection against micronutrient deficiencies. As mentioned previously, these traditional foods are sourced from local natural sources (Weerasekara et al., 2020). There are also many protein-rich foods. Traditional foods, preparation, and consumption patterns are more heterogeneous than the current food consumption pattern. Many Sri Lankan foods are made from green leafy vegetables which carry many nutritional benefits (Weerasekara et al., 2020). Besides, traditional Sri Lankan food consists of cereals, roots, tubers, green leaves, fruits and vegetables, spices, animal fats, and fish, all of which have many health benefits (Weerasekara et al., 2018). In addition, traditional Sri Lankan food was known as "wellness food" and consisted of many medicinal properties, thus preventing people from NCDs.

People in the traditional society daily consumed fiber rich food such as kurakkan (finger millet). Besides, as a food preservation method (especially when in excess supply), jack seeds hidden under sand were consumed; this they believed would help reduce the harmful effects of overconsumption. Many green vegetables and herbs are both high in immunity and minerals and vitamins, so their consumption was high (Weerasekara et al., 2020).

People are paying more attention to their eating patterns nowadays. Due to the health and nutritional value of traditional foods, these are increasingly being recommended and provided to adults, children, patients, and pregnant women (Ravindren, 2020). However, today the traditional food system of Sri Lanka is gradually changing (Weerasekara et al., 2020). As a result of changing food patterns, Sri Lanka is already experiencing various unfavorable health implications with its magnitude amplifying in the long run.

### *Dietary transitions*

Dietary diversity is defined as a qualitative measure of food consumption that reflects household access to a variety of foods, and is also a proxy for nutrient adequacy of the diet of individuals (FAO, 2011). A variety of foods are a source of macro and micronutrients, ensuring nutrient adequacy. International and local guidelines recommend that dietary diversity should be enhanced unless otherwise it increases the risk of chronic diseases and malnutrition associated with food. Moreover, dietary diversity is essential to meet energy needs and other essential nutrients (FAO, 2014). Sri Lanka has a rich dietary diversity that dates back to ancient times (Weerasekara et al., 2018). But at present, as noted previously, urbanization, lifestyles, and food preferences have led to changes in food production, and eating habits/dietary habits and food systems are causing health and nutrition-related problems. Food diversification is positively linked to socioeconomic factors (Headey & Ecker, 2013; Arimond & Ruel, 2004). It is important to better understand the changes that are taking place in food consumption patterns along with economic growth (Wijesekere, 2015).

The dietary transition is typically known as the nutritional transition (Drewnowski & Popkin, 1997; Jakicic & Davis, 2011; Pingali, 2007; Pingali et al., 2019; Popkin, 2003, 1999; Reardon et al., 2014; Semba et al., 2008). Today, the consumption of high-fat diets, processed foods, and low fiber foods are on the rise worldwide. In comparison, the incidence of degenerative diseases has further increased (Popkin & Reardon, 2018). Currently, NCDs account for about 70% of global deaths, most of which are reported from developing countries (WHO, 2014). Chronic diseases are on the rise in Sri Lanka as well mainly triggered by changes in diet and lifestyle and rapid Westernization (Damman et al., 2008; Senanayake, 2006). Dietary changes, also known as the nutritional transition is occurring rapidly, especially in low-income and middle-income countries. Global food consumption patterns have evolved, with interactions of income, price, personal preferences, and beliefs, cultural traditions, as well as geographical, environmental, social, and economic factors (Vasileska & Rechkosha, 2012). All in all, countries which had healthy and traditional dietary habits have been moving towards unhealthy food consumption habits, thereby have faced many socioeconomic issues.

### *Food security and sustainability*

The concept of food security has emerged in a global food crisis (Berry et al., 2015). Food security was defined as a condition that exists when “all people, at all times have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 1996). Food security has evolved and gradually expanded in recent decades. In the early days, it focused primarily on the availability of food and food production (UN, 1975). It then included the ability to access food and its utilization (FAO, 1996). Finally, the concept of food security was further expanded by incorporating the dimension of stability (FAO, 2009). Food security,

currently a major issue in the development dialogue, is at the forefront of domestic economic policies in many developing countries (Kalansooriya & Chandrakumara, 2014). Household food security depends on many factors such as agricultural production, market availability of food either through national production or imports, income-earning opportunities of household members, food aid received to households, intra-household decision making, resource allocation and responsibility sharing, care practices in households, and health care given to the household members, etc. (Kalansooriya & Chandrakumara, 2014).

Sustainability is also an essential component of food security and nutrition (Berry et al., 2015). Accordingly, sustainability can be considered as a necessary precondition for long-term food security. Economic and social sustainability are essential to enable access to food for all. The three main dimensions of sustainability, social, economic and environmental, ensure the stability of systems that depends on the stability of other dimensions of food security (Berry et al., 2015). Therefore, interpretation of food security depends heavily on a given context and sustainability can be broadly or narrowly defined depending on whether its use is based on a social, economic or environmental perspective (Brown et al., 1987).

The way of life/lifestyle in Sri Lanka has changed drastically over the last two decades due to economic and technological changes. Accordingly, time is appropriate to explore and better understand/be aware of the changes and determinants of food consumption patterns in Sri Lanka (Pallegedara, 2019). Given this context, analyzing the changes in food consumption patterns in Sri Lanka is relevant and of significance for several reasons (Pallegedara, 2019). These are namely, the structural transformation of the Sri Lankan economy from an agriculture to a service-based economy followed by the introduction of open economic policies (Rathnayake et al., 2004), the recent transformation of Sri Lanka into an upper-middle-income country (CBSL, 2019), and urbanization, occupational changes, increased women labor force participation and the shift to the Western fast food culture which have led to rapid changes in lifestyles of the Sri Lankans (Rathnayake et al., 2004).

Therefore, the major thrust of this study is to analyze the available literature on these concepts. This study further provides valuable insights to policymakers and regulatory authorities, thus offering a range of benefits; these include formulating strategies and policies at the national level, fine-tune the existing framework and addressing constraints, enhancing monitoring and evaluation for ensuring that standards are achieved etc.

## 2. Objective

The objective of this research is to review the existing/available literature on the discussion concerning changes in the food consumption patterns at the global and local level; the research further highlights its impact on food security and sustainability that arise through economic and social factors. In doing so, this

discussion emphasizes the significant changes to the current food consumption patterns and its impacts in the Sri Lankan setting amidst its issues concerning food sustainability.

### **3. Methodology**

This paper has used a non-systematic literature review (Frick, 2017) and literature review techniques have been applied to comprehend the situation of food and nutrition security (Cangussu Botelho et al., 2020). Non-systematic review is a critical assessment and evaluation that addresses certain issues concerning the research objective/question. It describes the findings in a collection of research studies. A non-systematic literature review usually takes an in-depth but non-systematic approach to a specific research question (Huelin et al., 2015).

### **4. Results and Discussion**

Today, there are significant changes in food consumption patterns around the world (Popkin et al., 2001). Changes in agricultural activity over the past five decades have increased world's capacity to supply food for its people due to the increases in productivity, greater food diversity, and less seasonal dependence. Also, rising income levels and falling food prices have led to an increase in food availability. This has led to significant changes in food consumption over the past 5 decades (Kearney, 2010). Further, globalization and urbanization have triggered the need to change the food supply around the world, thereby affecting food consumption patterns and lifestyles among traditional population groups (Bermudez & Tucker, 2003). At the same time, economic, technological, environmental, and demographic changes worldwide have a profound effect on food supply and food consumption patterns, especially with a tendency to increase food supplies around the world (Popkin et al., 1996, 1999, 2001; Tucker & Buranapin, 2001).

#### **4.1. Drivers of Food Consumption Pattern Changes**

In recent years, economic development, urbanization, the shift in occupational structure, the entry of more women into the workforce, the rise of processed food companies/manufacturers, and technological innovations have led to changes in human food consumption patterns (Kennedy & Reardon, 1994; Pingali, 2007; Popkin & Gordon, 2004; Regmi & Dyck, 2001; Ruel et al., 1998; Shi et al., 2005; Stuckler et al., 2012). In the early stages of the above changes, people who adopted a uniform staple diet shifted to a more varied and high-value diet consisting of animal products, dairy products, fruits, vegetables, and fats and oils (Pingali, 2007).

The interaction of demand and supply factors has strongly influenced the changes in food consumption patterns in the Asian region. Among the key factors that have contributed to the change in demand for food are income growth and urbanization. On the supply side, global economies have been closely inte-

grated, easing foreign direct investment and drastically reducing freight costs (Pingali & Khwaja, 2004; Pingali, 2007).

#### *Income Growth*

Increased consumption of animal foods and processed foods has led to higher income growth and lower commodity prices (Kearney, 2010). With the increase in income, the food consumption pattern has shifted from traditional foods like rice, wheat, vegetables to meat consumption. Besides, oil consumption has increased in all income groups. This increase in income has a direct impact on consumption, leading to inequalities in health conditions (Du et al., 2004). In addition, rising income levels in the country are likely to change the consumption pattern of cereals. That is, both urban and rural sectors are increasing their consumption of wheat flour instead of rice as incomes increase (Mottaleb & Mishra, 2017b). Hence, as incomes rise, households are shifting their food consumption to high-value food items (Mottaleb & Mishra, 2017a).

#### *Urbanization*

With urbanization, labor in the agricultural sector is migrating to urban areas, thus people involved in agriculture are opting for other types of employment in urban areas. However, there is no significant improvement in technological development in the agricultural sector therefore, demand for labor in the agricultural sector is not largely changed. Owing to this fact wage rates in the rural sector are also rising. This leads to higher production costs and food prices (Stage et al., 2010). The rising food prices affect the demand structure of a country (Vu & Glewwe, 2011). Urbanization directly affects food consumption patterns. Many negative consequences take place in the urbanization process. These include paving the way for new and improved marketing through modern media, enhancing distribution infrastructure, increasing supermarket sales, and improving access to foreign suppliers through better transportation systems. These factors create a significant impact on global food consumption patterns (Hawkes, 2006). The modern marketing changes the buying intentions of the consumer generating a significantly high demand for certain goods that had no demand before while the improved infrastructure and transportation provide opportunity for the consumers to consume the goods which are even not produced in their regions. Furthermore, changes of the fast-food industry offer low-cost delivery and attractive deals, thereby influencing consumption patterns by providing quick access to cheap food. These foods meet the demand of consumers for foods high in salt, fat, and sugar. The most popular fast foods are hamburgers, pizza, and fried chicken (Smil, 2000).

#### *Processed Foods and Fast Foods*

Consumption of food outside the home, such as takeaway, take-out, fast foods, and processed foods, has increased dramatically in recent decades. The nutritional status of such food is questionable, as these have led to an increase in overweight and obesity (Janssen et al., 2018). Consumption of processed foods has increased rapidly due to urban life and dual-employment households. Moreover, mostly in such households, both the head of the household and the

spouse work in the informal sector. Therefore, the opportunity cost of food processing in the home can increase significantly, resulting in an increase in the consumption of processed food (Mottaleb & Mishra, 2020). Additionally, consuming processed foods outside of the home or dining out is an opportunity for city dwellers to have entertainment and spend time with family members (Byrne et al., 1996; Majumdar, 2016; McCracken & Brandt, 1987; Mottaleb & Mishra, 2017a). Thus, it is very important to monitor and forecast the consumption of fat, oil, and processed foods outside the home (Mottaleb & Mishra, 2020).

#### *Trade Liberalization*

Trade liberalization has been identified as another important factor leading to changes in food consumption patterns. It has led to changes in food supply and consumer decisions about food consumption. Trade liberalization has led to lower prices for unhealthy foods, especially among the poor, such as high-calorie, nutrient-poor, and increased access to unhealthy foods such as saturated fats and salt (Thow, 2009). Besides, trade liberalization has removed/relaxed barriers to foreign investment in food distribution, enabling consumers to obtain certain foods (Kearney, 2010). Changes in trade policy through trade liberalization are linked to the nutritional transition, and these changes too are linked to health problems such as obesity, an increase in cardiac/heart disease and cancer patients (Thow & Howkes, 2009). However, trade liberalization has increased the availability of processed foods in developing countries, providing high-calorie, nutrient-poor foods, and animal products at affordable prices (Thow, 2009). Trade liberalization too encourages more imports of Western food for consumption. It changes healthy consumption patterns and changes those diets in a manner that adversely affect food and health conditions (Blouin et al., 2009). Trade liberalization has contributed to a greater extent to the widespread establishment of supermarkets and fast-food outlets (Pingali, 2007).

Sri Lanka introduced trade liberalization economic policies in 1978 (Herath et al., 2013). With globalization and trade liberalization, people in Sri Lanka are turning to the habit of consuming food away from home. There is increased exposure to processed foods that contain high energy, sugar, salt, and fat. Approximately 27% of adults in Sri Lanka consume high salt processed foods. In Sri Lanka, the young population between the ages of 18 - 29 have a relatively high tendency to “eat out”, i.e., eat outside of the home. Urban people spend 18% of their total food expenditure on processed foods (Weerahewa et al., 2018). Multinational fast-food chains such as Pizza Hut, KFC, and McDonald’s entered the Sri Lankan market in the early and late nineties, locating their outlets in urban/urban suburb areas. This can be cited as another consequence of globalization (Rathnayake et al., 2012).

#### *Women Labour Force Participation and Household Decision Making Process*

In urban areas, which are identified as the hub of economic opportunities, a higher percentage of women work outside the home (Senauer et al., 1986). Spending time of preparation of food increases women’s opportunity costs, where women find appealing options to allocate time such as to earn more, relax



etc. Therefore, the demand for non-traditional fast food has increased. The rising cost of opportunity for women to prepare food has triggered an increase in the demand for bread (shifting from traditional rice to bread) in urban Sri Lanka (Senauer et al., 1986).

The role of husbands and wives in the decision-making process in the family is changing (Belch & Wills, 2002). Changes in cultural norms, increase in the number of working wives in the society, delaying marriage, and changes in social norms have changed the composition and decision-making structure of the traditional household unit (Qualls, 1987). The role of family members in the consumer decision-making process varies over time. Along with these, the nature of decision-making in the household too may have changed (Belch & Wills, 2002). At the national level, female-headed households and male-headed households allocate most of their income to food and drink, and housing. Male-headed households set aside most of their income for housing, durables, and food and drink. Considering male-headed households and female-headed households in the rural sector, both households spend most of their income on durables. Male-headed households in rural areas also spend more on food and drink than female-headed households. But nationally, both households have reduced their spending on food and drink over time (Tibesigwa & Visser, 2015).

## 4.2. Stylized Facts on Consumption of Major Food Items

### *Food Consumption of the World*

Cereals are one of the most important food sources in the world. However, with changes in food consumption habits, the contribution of cereal to energy consumption in developing and industrialized countries has changed significantly. Cereals account for 70% of energy consumption in developing countries such as Africa (Alexandratos & Bruinsma, 2012). Globally, wheat flour consumption is higher than other cereals. This tendency can be traced back to many developing countries (Kearney, 2010). Cereal consumption worldwide has significantly declined over the past few decades, whereas consumption of meat and animal products has sizably increased. For example, meat consumption in Brazil has risen sharply over the past 30 years (Monteiro et al., 2000), and in Chile consumption of meat such as beef, pork, and chicken has increased, and less portion of income is spent on cereals. Overall, fish consumption has declined (Vio & Albala, 2000).

Many Americans have changed/modified their diet and reduced their intake of nutritious foods, such as fruits and vegetables, which are essential for a healthy diet (Altman et al., 2009). Additionally, many U.S. consumers are increasingly turning/resorting to food consumption from sources other than home, such as restaurants and cafes (Dev & Sharma, 2010; Darshini, 2012; Arunachalam & Ayyappan, 2013; Chand & Jumrani, 2013). Thus, food consumption from home-based food sources declined in all three upper, middle, and lower-income groups (Smith et al., 2013).

Over time, the food supply in many Latin American countries has changed rapidly (Rosen, 1999). Cereals are the main source of energy in the Latin American diet, and a decline is observed in the consumption of roots and legumes. Nevertheless, consumption of meat, poultry, fish, eggs, milk, and dairy products has increased (Bermudez & Tucker, 2003). Consumption of vegetable products in the traditional diet of Central America has been high in fiber consumption. The people of Salvador consume more fiber-rich foods, while the people of Panama consume less fiber-rich foods. However, it is noteworthy that fiber-rich foods in every country have declined over time (Acevedo & Bressani, 1989). Beans are one of the staple food of Latin American diets and make a significant contribution to dietary fiber (Bazzano et al., 2001). The latest trend in the current diet in Latin America is to cut down the consumption of fruits and vegetables and increase the consumption of fat and sugar. Thus, reducing/cutting down the consumption of fruits and vegetables will lead to an increase in chronic diseases (Ford & Mokdad, 2001; Williams et al., 1999). Consumption of root crops and fruits in countries such as Brazil has also declined over time (Monteiro et al., 2000).

Remarkably, the UK is one of the lowest red meat-consuming countries in Europe, and its consumption has declined over the past three decades. Although globally the consumption of chicken has shown a tendency to increase, beef is the category of meat that has not shown any increase in consumption. That is, beef consumption in countries such as North America and Europe has fallen highly moderately (Kearney, 2010).

Per capita, egg consumption per day in developing countries has doubled compared to that of industrialized countries. However, many countries in sub-Saharan Africa do not show a significant increase in egg consumption, while egg consumption in countries such as Brazil and China has increased rapidly. Egg consumption has declined in the United States and Oceania in recent years (Kearney, 2010).

#### *Food Consumption of the Asian Countries*

Food consumption patterns in many Asian countries, such as Japan, Korea, and Taiwan, which are growing rapidly, have changed dramatically over the past two-three decades. The country's cereal consumption is on a declining trend and consumption of meat, fish, and dairy products is increasing (Huang & David, 1993; Huang & Bouis, 2001). Further, food consumption patterns in developing countries such as Bangladesh and India have changed over time (Rao, 2000; Kumar & Kapoor, 2014; Mottaleb & Mishra, 2017a; Mottaleb et al., 2018a, 2018b). For example, a historical analysis of per capita food consumption shows that rice consumption in Asian countries has declined and in contrast, wheat flour consumption has increased (FAO, 2016; Mottaleb & Mishra, 2017b). That is, the shift to food consumption patterns in the West has led to a shift in consumption patterns in Asian countries to wheat flour consumption.

#### *Food Consumption of Sri Lanka*

Sri Lankans have a wide variety of foods in their diet (Rathnayake et al., 2012).

Besides, Sri Lanka has recently shifted from a lower-middle-income country to an upper-middle-income country, with a per capita GDP rising from 1189 in 1990 to 3371 in 2013 and to 4077 in 2017 (World Bank, 2017; CBSL, 2019). Per capita income influencing the purchasing power of households is an important factor affecting food consumption. Food price is a major factor in determining a household's food intake (Pallegedara, 2019). Consumers in Sri Lanka set aside more than half of their income for their food and more than 80% of their total income for food, housing, and transportation (Rathnayaka et al., 2019). Although the amount allocated for food has decreased over time, it is currently 53.6% in Sri Lankan households. In Sri Lanka, food, housing, healthcare, and transportation are considered essential commodities and services, while apparel, durables, and recreation are considered luxury goods (Rathnayaka et al., 2019). A detailed discussion on food consumption of the major food items in Sri Lanka such as rice, wheat flour, fruits, vegetable, meat, and milk are provided below to have a better idea on the food consumption patterns in Sri Lanka.

Rice is the staple food in Sri Lanka (Edirisinghe & Poleman, 1976) and rice consumption in Sri Lanka has too changed due to the growth of the middle-class population, the introduction of open economic policies and urbanization (Rathnayake et al., 2004; Walisinghe & Gunaratne, 2008). Annual per capita rice consumption in Sri Lanka is approximately 107 kg. White rice has become more popular in Sri Lanka and red rice is also gaining popularity due to its relatively high nutritional properties. In addition, traditional rice varieties such as Suwandel, Pachchaperumal, Kalu Heenati, and Mad Thavalu are too becoming popular due to their high nutritional value as well as medicinal properties, but demand is limited due to low supply and thereby, high retail prices. There is also a slight demand/niche market for basmati rice. Retail prices of rice too rose/escalated/surged over time (Galappattige, 2020). The consumption of Kekulu rice (red and white) is the highest in the rural sector of Sri Lanka, while it is the lowest in the urban sector. Nadu rice (white) consumption is the highest in the estate sector and the lowest in the rural sector (DCS of Sri Lanka, 2018).

Wheat flour is consumed locally but not produced in Sri Lanka (Galappattige, 2020). More than four out of five households in Sri Lanka buy wheat flour for consumption (Piyasena et al., 1996). Due to the changing lifestyle of the people in Sri Lanka, wheat flour-based products are now being consumed more and more (Jayasinghe, 2018). Bread and biscuits are the staple foods produced from wheat flour (Piyasena et al., 1996). In 2016, the average monthly consumption of bread in Sri Lanka was 3.5 kg (DCS of Sri Lanka, 2018). People in the estate sector buy four times more wheat flour than those in the rural and urban sectors mainly owing to their cultural practices. There are ample facilities for the urban sector households to buy wheat flour-based products like bread. Households in the rural sector consume more rice than wheat flour (Piyasena et al., 1996). The Western, Central, Uva, and North Central Provinces of Sri Lanka purchase more wheat flour than other provinces (Piyasena et al., 1996) mostly due to the so-

cio-economic conditions of these provinces i.e., high concentration of estate workers (Central and Uva Provinces). Moreover, the estate sector shows a higher wheat flour consumption than the rural and urban sectors. Jaffna, Kilinochchi, Mannar, Vavunia, and Nuwara Eliya districts have the highest consumption of wheat flour (DCS of Sri Lanka, 2018).

The per capita daily fruit consumption in Sri Lanka is 40 grams. This indicates that per capita fruit consumption in Sri Lanka is below the required level. Low consumption of fruits has led to undernutrition among Sri Lankans. Fruit consumption is affected by household income, the number of family members, occupation, level of education, etc. Factors such as gender, nationality, and religion do not affect fruit consumption (Rambukwella & Samantha, 2013). However, according to HIES data, the amount of expenditure allocated by Sri Lankan households for fruit consumption has increased steadily over the past 30 years (Weerahewa et al., 2013). Banana, papaya, apple, mangos, and pineapple are the most widely consumed fruits in Sri Lanka (Weerahewa et al., 2013). Urban households devote more of their income to fruit consumption than rural and plantation households. This is due to higher incomes in the urban sector and higher employment of highly educated people. A similar pattern of consumption is the likely reason in the upper provinces of urbanization (Weerahewa et al., 2013). Fruit consumption and spending on fruits have increased over time. Income and prices of fruit play a major role in determining the demand for fruit (Weerahewa et al., 2013).

Vegetable consumption in Sri Lanka is higher than that of fruits, while beans, brinjals, cabbage, pumpkin, carrots, and beetroot are the most consumed vegetables (Perera & Madhujith, 2012). Especially green leafy vegetables play an important role in the Sri Lankan diet, as these are rich in vitamins, minerals, dietary fiber, and anti-oxidants (Abdulazeeza & Azizb, 2014; Sobukola et al., 2010). Consumption of these green leafy vegetables has been on the rise in urban society in recent years (Sharma et al., 2009), probably due to increased health concerns of the public. Among the green leafy vegetables, Mukunuwenna (*Alternanthera sessilis*) and Gotukola (*Centella asiatica*) are the most consumed (Perera & Madhujith, 2012) possibly due to the abandoned availability of these two types of green leafy vegetables in the open market.

Meat is a rich source of micronutrients and contains protein, vitamins, and minerals that are essential for human growth and development (Jung et al., 2015). With the increase in income, global meat consumption has continued to increase compared to the consumption of other agricultural commodities (Devine, 2003). The meat industry too plays an important role in the livestock sector of Sri Lanka. The contribution of the livestock sector to the GDP of Sri Lanka is about 1.2% (Alahakoon et al., 2016). As Sri Lanka is a multiethnic and multicultural country, socio-economic as well as religious and cultural factors affect meat consumption (Alahakoon et al., 2016). Chicken is the most popular among Sri Lankan meat consumers and such consumers also prefer pork, beef,

and mutton (De Silva et al., 2010). It is noteworthy that the majority of consumers consider chicken to be a very healthy food (Alahakoon et al., 2016). The per capita consumption of chicken in Sri Lanka is expected to increase to 8 kg over the next 5 years relative to the purchasing power of humans (De Silva et al., 2010). As women are more concerned about health, chicken consumption is more prevalent among women than men (Almas, 1999). Factors such as price, income, preference, and taste influence the purchase and consumption of meat (Alahakoon et al., 2016). The annual per capita meat and meat availability in Sri Lanka for chicken, beef, pork and mutton is 7.09 kg, 1.8 kg, 0.32 kg and 0.1 kg respectively (Alahakoon et al., 2016).

The annual milk consumption in Sri Lanka is about 700 million liters and the annual per capita milk consumption is about 35 liters. Accordingly, the consumption of milk and milk products in Sri Lanka is low compared to other South Asian countries (Krishnapillai et al., 2020). In addition, the import of milk powder from Sri Lanka has increased over the years (Nanayakkara, 2013). Therefore, the consumer surplus of milk powder consumers has decreased (Mendis & Edirisinghe, 2014). However, per capita fresh milk consumption in Sri Lanka is low. Fresh milk consumption is very/substantially low compared to full cream milk powder consumption. Further, the majority of consumers consume tetra-packed fresh milk more than three times a week. In addition, age, gender, level of education, and income are particularly important factors in determining milk consumption (Kariyawasam et al., 2006).

### 4.3. Food Consumption Patterns in Urban, Rural and Estate Sectors

Food plays a major role in the lives of consumers (Steenkamp, 1993). Therefore, households living in rural and urban areas spend on various goods and services that satisfy them (Ahmad et al., 2015). Food consumption on a rural-urban (including plantation basis) basis explains the differences between the regions of the country and provides rationality for determining the future investment plans of the country (Ahmad et al., 2015). Significant differences/variations in food consumption patterns can be observed between urban and rural residents. Households in rural areas may be limited to locally produced foods, while individuals in urban areas may also have access to a variety of foodstuffs produced outside of their area (Ajewole & Omonona, 2006). Nevertheless, people in the urban sector spend more on food outside of the home than people in the rural areas. People in urban areas consume more animal products than people in rural areas and consume less grain than those in rural areas (Meng et al., 2010). However, in both urban and rural households, there is no major difference between consuming foods like vegetables, red meat, chicken, and aquatic product outside of the home (Zeng & Zeng, 2018).

Data indicate that grain consumption is higher in the rural sector than in the urban sector. People in the rural sector spend about half of what urban dwellers

spend on eggs and milk. Additionally, grain consumption has declined in both rural and urban areas, while egg and milk consumption has increased and red meat consumption remains stable. Consumption of vegetables and white meat outside of the home too has increased in the urban sector (Zeng & Zeng, 2018). Consumption of eggs, milk, and fruits, protein-rich foods such as beans, is very/substantially low in both urban and rural areas. This is due to the high cost associated with these foods and the lack of knowledge of households about the importance of consuming these food items (Okoruwa et al., 2009). Households in rural areas have minimum food diversity compared to those in urban areas. However, rural households consume more vitamin A-rich vegetables and tubers, while urban households consume more dark green leafy vegetables and oils and fats (Chagomoka et al., 2015).

Accordingly, estate communities have high levels of protein-energy malnutrition, anemia, worm infections and vitamin deficiencies (Kandiah & Lim, 1977; Sinniah et al., 1992). It was revealed that the growth of estate children was poorer compared to the growth of children in urban and rural areas (Singh, 1992). Various nutritional deficiencies were reported in the diet of estate families (Chandrasekharan & Marimuthu, 1980). Consumption of nutritious food among children and mothers in the estate sector shows a very low/poor level. Moreover, compared to the rural and urban sectors, children in the estate sector between the ages of 1 - 3 years have lower consumption of protein-rich foods such as meat, fish, eggs, and grains. Further, children in the estate sector consume fewer essential nutrients since they consume lower number of vegetables. A similar pattern of food consumption can be observed among women in the estate sector (Jayawardena, 2014).

Excessive alcohol consumption is a major socio-economic problem in the plantation sector. About 40% of the households in the estate sector are exposed to alcohol consumption. Noticeably, women in the estate sector too are addicted to alcohol (Jayawardena, 2014). Isolation, poor road access, ignorance, harsh work environment, lack of rest, lack of mobility, lack of connectivity to surrounding cities, and lack of recreational facilities have been identified as main reasons for excessive alcohol consumption (EML Consultants, 2005). Alarmingly, despite their low-income levels, estate sector people spend between 25% - 50% of their daily earnings on alcohol (Silva, 2001). Another point is that the highest level of poverty in Sri Lanka is reported from the estate sector, whereas these people spend twice as much on alcohol and tobacco as the average Sri Lankan (Jayawardena, 2014).

The energy consumption of the estate sector is very/considerably high whereas most households consume three meals a day and the quality of food is poor in terms of nutritional balance (Aheeyar, 2013). In addition, protein deficiency has been a significant cause of child and maternal malnutrition in the estate sector. It can impede the growth of children. Therefore, it is important to identify food shortages, unhealthy diets, and dietary variations in this low-income community with a limited or poor educational background. In addition, nutrition

education programs need to be strengthened on the importance of proper nutrition (Jayawardena, 2014).

Modern food production and consumption cannot be considered sustainable and therefore, raises issues with the broader scope involving different/various activists. Moreover, population sustainability, and global population growth, will exacerbate sustainable problems related to the food systems in the future. For example, with the impact of climate change, increasing land-use conflicts and rising health and social costs at the individual and social levels, agricultural production is likely to continue (Reisch et al., 2013). Sustainability is being eroded by the industrialization and globalization of agriculture, processed food, shifting consumption patterns towards more dietary animal protein, creating modern diets for processed food products, and the widening gap between rich and poor globally (Reisch et al., 2013).

At present, two of the major problems in terms of food consumption faced by people are in achieving global food security while minimizing environmental impacts and providing a healthy diet for all people (Ibarrola-Rivas & Galicia, 2017). Thus, in addition to improving the quality of the diet, we can identify a tendency to increase the consumption of organic food with the aim of improving the environment and reducing pollution (Lazaridis & Drichoutis, 2005). Today, the use of natural resources for human consumption is reaching planetary limits, and global food production remains a major driver (Rockström et al., 2009). The world population and the affluent are projected to increase over the next few decades. Therefore, the number of people consuming luxury food is on the rise who demand more resources for their consumption. The diet of the rich consists of animal feed products, and the rich consumer needs relatively more resources to consume than resources required for the basic diet. Therefore, rich diets have a greater impact on the environment (Kastner et al., 2012; Hoekstra & Mekonnen, 2012; Leach et al., 2012; Ranganathan et al., 2016; Shibata et al., 2016). Thus, the issue of global food security evokes/ includes two key issues: the use of environmental resources in food production and the greater environmental impact and nutritional status of the global population (Foley et al., 2011; Ranganathan et al., 2016; Godfray et al., 2010; Godfray & Garnett, 2014).

## 5. Conclusion

According to the literature review, food is one of the basic necessities essential to sustain human life. Over the past two decades, food consumption patterns in many countries underwent rapid changes. Accordingly, traditional diets which mainly consist of grain consumption are declining rapidly and there is a tendency to move towards meat, fish, dairy products and prepared/instant and fast foods. In this scenario, the main factors that contributed to the shift from a traditional diet to a Westernized diet were income growth, rapid urbanization, structural changes in the demographics and the economy, health and environmental concerns, changes of the labour force, and food market changes etc.

Especially the traditional diet in the South Asian region was high in nutritional value and for the reasons mentioned above, it has led to people adapting to a diet high in energy, fat and oil. This food consumption pattern has a massive impact on global health, leading to an increase in global chronic diseases and NCDs. The majority of victims are children, women, and adults. It can be noted from these trends that the world's diet shifts to one that is unsafe and unhealthy, affecting global food security and sustainability. Therefore, future food security is at the risk of decline, and a rapid surge in the spread of disease is observed.

There are many significant differences in food consumption patterns, especially geographically, urban, rural, and estate sectors. The majority of the people in the estate sector show a lack of access to adequate and healthy foods. Further, due to the westernization of the diet in the urban and rural sectors, there is a tendency for undernutrition to increase in those sectors as well. Considering the traditional Sri Lankan diet, there is a tendency to shift from cereal consumption to meat, fish, dairy products, and fast foods and processed foods. These transformations pose a great threat to the future food security and sustainability of Sri Lanka. Moreover, the allocation of most of the per capita income to non-nutritious consumption has led to a sizeable increase in chronic diseases and NCDs. Therefore, this study recommended a comprehensive analysis of changes in food consumption patterns in Sri Lanka over the last two decades using an available and reliable database such as the HIES.

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## Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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