SAVING LIVES
CHANGING LIVES

Fill the Nutrient Gap
Sri Lanka

RESULTS OF THE ANALYSIS: FINAL REPORT

WFP
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Contents

Contributors

The Nutrition Coordination Division of the Ministry of Health, with particular thanks to Dr. Rasanjalee Hettiarachchi and Dr. Yasoma Kumari;

The Hector Kobbekaduwa Agrarian Research and Training Institute, with particular thanks to Dr. Duminda Priyadarshana;

The Department of Census and Statistics–Sri Lanka; the Medical Research Institute of Sri Lanka, with particular thanks to Dr. Renuka Jayatissa;

The Family Health Bureau, with particular thanks to Dr. Hiranya Jayawickrama;

The members of the technical working group for the Fill the Nutrient Gap analysis in Sri Lanka: Jayawaradana Ranbanda (Medical Research Institute), Manoj Thibbotuwa (Institute of Policy Studies), Jeevika Weerahewa (University of Peradeniya), Itziar Gonzalez (FAO), Pulani Lanerolle and Upul Senarath (University of Colombo), Safina Abdulloeva (UNICEF), and Dr. Nilmini Hemachandra (WHO);

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Introduction

The effects of malnutrition are globally recognised as being devastating and far-reaching. Malnutrition in Sri Lanka takes many forms and is widespread. While national prevalence of stunting dropped dramatically over decades, progress has stalled in recent years and wasting is at the level of a major public health issue. At the same time, prevalence of overweight and obesity is rising, nearly doubling among women in the past ten years, and micronutrient deficiencies are prevalent among children and women. The triple burden of malnutrition has thus become a critical concern. The low economic impact of the agricultural sector, high staple food consumption and low dietary diversity, climate-related shocks, and increasingly unhealthy dietary patterns contribute to the rising triple burden of malnutrition. Addressing malnutrition in Sri Lanka in a sustainable manner must take a lifecycle approach with a special focus on children under 2 years of age, adolescent girls, and pregnant and lactating women (PLW). It must include a range of context-specific, targeted interventions implemented by stakeholders across multiple sectors, such as agricultural production, processing and fortification, and social protection, including education.

The overarching objective of the Fill the Nutrient Gap (FNG) analysis was to bring together multiple stakeholders to identify and prioritise context-specific policies and programmes aimed at improving nutrition among target groups across the lifecycle, through a focus on nutritious foods and nutrient intake. Stakeholders included the health and nutrition, education, social protection, and agriculture sectors, trade and industry, academia, and the private sector. The results of the FNG will contribute to various programmes: the Multi-Sector Action Plan for Nutrition (2018-2025), revision of the National Nutrition Policy, the national food fortification work plan (currently being rolled-out), and regular Cost of the Diet (CotD) analyses to monitor affordability of nutritious diets among different population groups in different parts of the country.

Fill the Nutrient Gap: situation assessment for multi-sectoral decision-making on the prevention of malnutrition[1]

Malnutrition has two direct causes: inadequate nutrient intake and disease. As its name specifies, the Fill the Nutrient Gap (FNG) assessment focuses on gaps in nutrient intake to inform a country's national policies and actions that can be taken to improve nutrition among their population, with a focus on the most vulnerable.

The FNG assesses the extent to which people have choices. It considers the availability, physical access and affordability of nutritious foods required for adequate nutrient intake. It

[1] For more information on the concept and the method of the analysis, see Bose I, Baldi G, Kiess L, de Pee. The 'Fill the Nutrient Gap' Analysis: An approach to strengthen nutrition situation analysis and decision-making toward multisectoral policies and systems change. Matern Child Nutr 2019: 10.1111/mcn.12793

seeks to understand why people make the food choices they do. Finally, it identifies context-appropriate interventions that can be implemented by different sectors to enable and stimulate people to choose more nutritious foods, and hence fill nutrient gaps.

The assessment comprises two components:

1. A country-specific review of secondary data and information on factors that reflect or affect dietary intake. This includes malnutrition trends over time, characteristics of the food system and food environment, and population behaviour related to food and feeding.
2. An assessment of the extent to which economic barriers prevent adequate nutrient intake. This uses the Cost of the Diet linear programming software developed by Save the Children (UK), and includes modelling of the impact of possible interventions on affordability of meeting nutrient intake requirements and hence fill nutrient gaps.

Malnutrition cannot be addressed by one sector alone. FNG is designed to inform multisectoral decision-making and therefore engages stakeholders from all sectors including food, health, agriculture, education, and social protection systems throughout the assessment.

It is the stakeholders who define the scope and focus of the assessment. They contribute data and sources of information for identification of context-specific barriers and entry points, and develop a shared understanding of the issues and possible solutions. They then identify appropriate nutrition-specific and nutrition-sensitive interventions that can be implemented by different sectors using their existing delivery platforms. These could be social safety nets, food processing and markets, antenatal care, school feeding programmes and others.

The FNG assessment has been developed by the WFP with technical support from: The University of California Davis; the International Food Policy Research Institute (IFPRI, Washington DC); Epicentre (Paris); Harvard University (Boston); Mahidol University (Bangkok); Save the Children (UK); and UNICEF.

At the end of 2018, the FNG had been conducted in 17 countries and started in another 8.

Methodology and analytical process in Sri Lanka

The FNG process in Sri Lanka started in May 2017 and was concluded in September 2018. The analysis comprised a literature review of available secondary sources in combination with linear programming (LP) using the Cost of the Diet (CotD) software. The aim was to understand barriers to adequate nutrient intake and to model potential interventions to improve access to nutrients, which is a prerequisite for improving nutrition, health and development, to inform policies and programming towards improving nutrition in Sri Lanka.

The FNG analysis was led by the Nutrition Coordination Division of the Ministry of Health with technical support from the Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI) and the World Food Programme (WFP) country office, Bangkok regional bureau, and Rome headquarters. Nutrition data were provided for the assessment through the support of the department of census and statistics (DCS) and the Medical Research Institute (MRI). At the start of the process, the analysis team from WFP headquarters and the country office met with partners from government, non-government, United Nations agencies, academia and donors to introduce the FNG process, collate secondary data sources, and identify possible interventions, entry points and transfer mechanisms to model with CotD. Over 100 data sources were identified and reviewed, and several data gaps were identified. The analysis prioritised recent, nationally representative government data when available, and triangulated sources to better understand differences in data. Preliminary findings were discussed internally with the WFP country office, validated in a workshop with technical stakeholders, presented to a larger technical group who brainstormed and formulated recommendations, and finally presented in a high-level dissemination. The detailed process is illustrated in Figure 1.

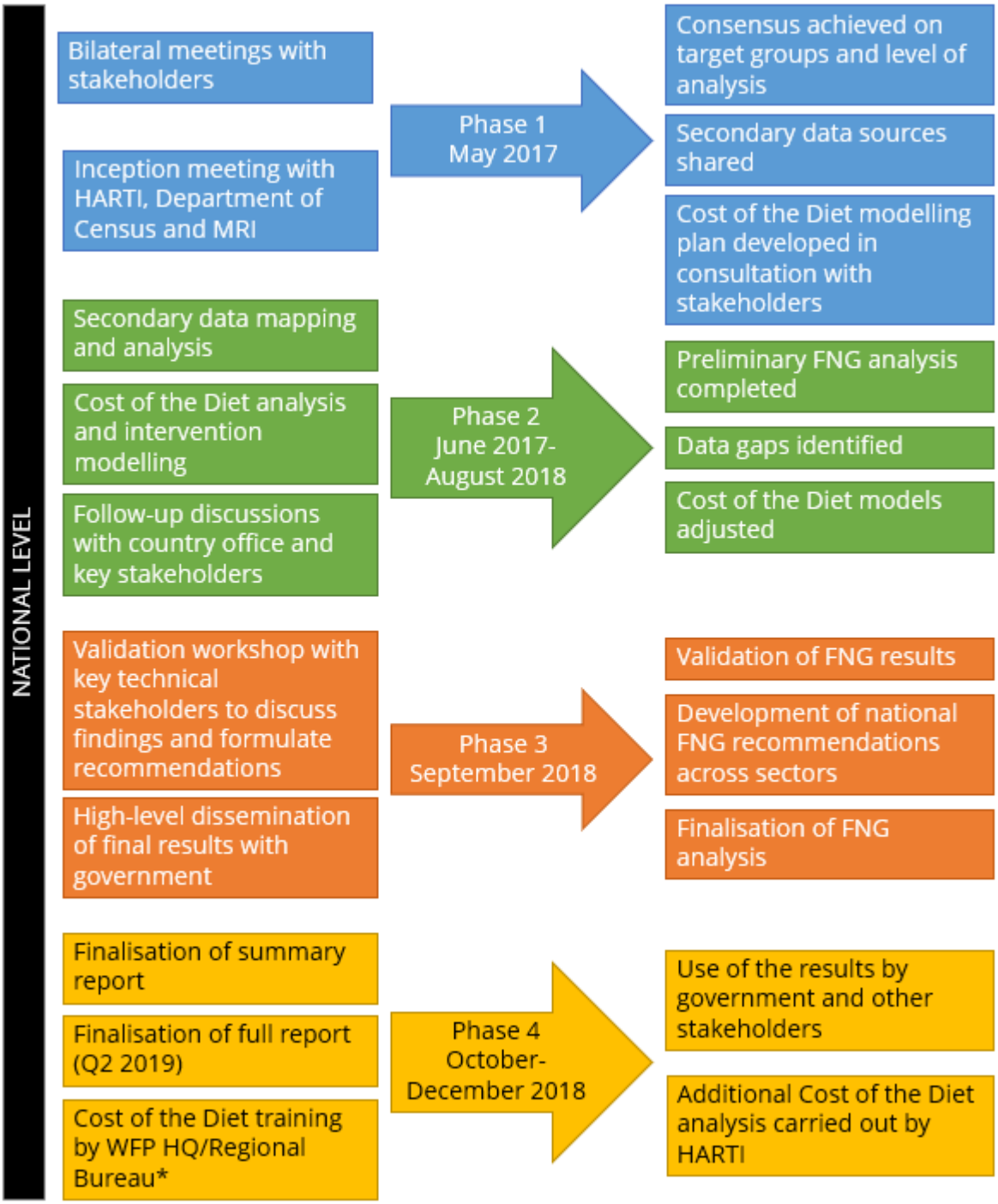


Figure 1: The Fill the Nutrient Gap process in Sri Lanka
**Participants included HARTI; the Ministry of Health including the Family Health Bureau, the Nutrition Division Unit and the Medical Research Institute; Save the Children International; the Institute of Policy Studies; and the Department of Census and Statistics*

Cost of the Diet: the cost of a nutritious diet in Sri Lanka

The CotD software uses LP to understand the extent to which poverty, food availability and prices may affect the ability of people to meet their nutrient needs. Using price data collected from markets or from secondary sources, the software calculates the amount, combination and cost of local foods that are needed to provide individuals or households with their average needs for energy and their recommended intakes of protein, fat and micronutrients.[2] These diets are calculated within defined constraints to prevent the inclusion of unrealistic types or amounts of food and the provision of excessive amounts of nutrients.

The FNG approach defines the Staple Adjusted Nutritious Diet: the lowest cost nutritious diet that includes the typical staple foods and excludes foods that are considered taboo. This diet is referred to as the 'nutritious' diet throughout this summary.[3] Population expenditure data is compared to the cost of this nutritious diet and is used to estimate the proportion of the population that would not be able to afford a nutritious diet. This non-affordability can be estimated and compared across different regions, seasons or countries.

As part of the FNG process in Sri Lanka, a separate CotD analysis was undertaken at the district level for four seasons: the two cultivation seasons, Yala and Maha, with an analysis for planting and harvesting period of each season. Limited analysis was also carried out by sector (urban, rural and estate[4]), where the available data was adequately representative. Monthly food price monitoring data from HARTI 2016 and food expenditure data from the Household Income and Expenditure Survey (HIES) 2016 were used to estimate the cost and affordability of a nutritious diet.

The modelled household had five members, slightly larger than the average household of four people in urban and estates areas and 3.8 in rural areas, according to the 2016 Sri Lanka Demographic and Health Survey (DHS). Because of this, the household expenditure data was converted to per capita and adjusted accordingly. The household composition was chosen to reasonably resemble the needs of individuals in an average Sri Lankan household and to include individuals for modelling and analysis by target groups that are of particular interest from a nutritional point of view. It featured a breastfed child of 12–23 months, a child of 6–7 years, an adolescent girl of 14–15 years, a lactating woman and an adult man. These individuals are included as proxies for wider groups, i.e. children aged 6-23 months, school-aged children, adolescent girls and women during pregnancy and lactation. Using a household size of four to more accurately reflect the average household size would have resulted in higher household costs if the primary school-aged child was excluded and in lower costs if the adolescent girl was excluded; by including both, the per capita estimate of cost is more realistic, as it is the average of the five household members across age

[2] As defined by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO). The need (RNI) for 9 vitamins and 4 minerals is included.
[3] This diet is not intended to reflect what individuals or house-holds are currently eating, nor should it be used to develop food-based recommendations or dietary guidelines.
[4] The estate sector in Sri Lanka consists of large plantations from the British colonial period, now better integrated into the country but still one of its poorest areas.

groups and sex. Thus, the household size is chosen to reach a good per capita estimate, and as both cost and expenditure are expressed per capita, actual and modelled household sizes can be different.

The nutritious diet that was estimated for a household of five members included two servings of white rice per day for all household members except the child aged 12–23 months who received one portion of white rice per day. This nutritious diet is presented in Message 3 below.

The CotD software is also used to model interventions with the objective of improving the affordability of a nutritious diet for individuals and/or households. Modelling in Sri Lanka was conducted for six districts selected in consultation with stakeholders to represent different geographical characteristics.[5] The selection of potential interventions for modelling was informed by the secondary data review and stakeholder consultations. It included:

- increased availability of local nutritious (unfortified) foods;
- availability of different types of complementary foods or specialized nutritious foods (SNF) made from the market and/or social safety nets (such as school meals);
- micronutrient supplementation;
- fortification of staple foods; and
- conditional cash transfers for vulnerable households.

The modelled interventions were theoretical and would need to be accompanied by complementary behaviour change interventions.

[5] The modelled districts were Nuwara Eliya, Badulla, Mullathivu, Kilinochchi, Batticaloa and Monaragala.

Malnutrition in all its forms is an issue across the population, and the triple burden (undernutrition, overweight/obesity and micronutrient deficiencies) is high.

Sri Lanka has seen an impressive decrease in stunting prevalence, from 50 percent of children under 5 years in 1978 to 17 percent in 2016 (Figure 2) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017). However, rates have stagnated between 15–19 percent since 2000. As of the most recent Sri Lanka Demographic and Health Survey (DHS) in 2016, national stunting prevalence was 17 percent and wasting 15 percent.

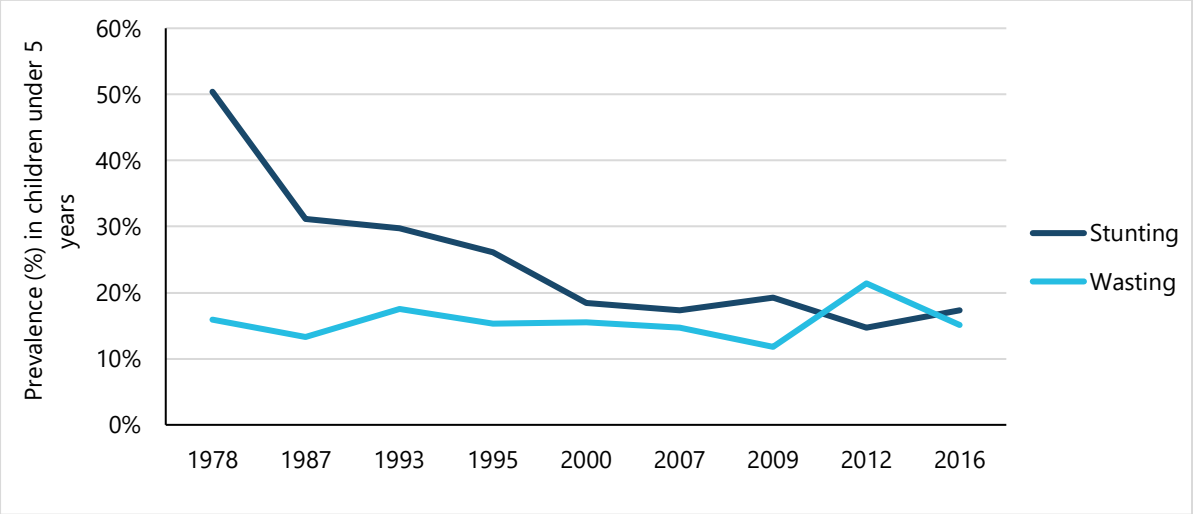


Figure 2: Prevalence of stunting and wasting among children under the age of 5, by year (World Health Organization, n.d.)

Across the country stunting prevalence ranges from 11–32 percent at the district level (Figure 3). In the estate sector, stunting has dropped since 2006 (from 42 percent to 32 percent in 2016). However, it remains twice as high in the estate sector as in rural (17 percent) or urban (15 percent) areas. Prevalence is also twice as high in the poorest quintile (25 percent) as in the wealthiest (12 percent), but while stunting is decreasing among the poor it has been increasing among the wealthy. It is lowest among children with more educated mothers, at 12 percent when mothers have a degree and 38 percent when they have no education (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017).

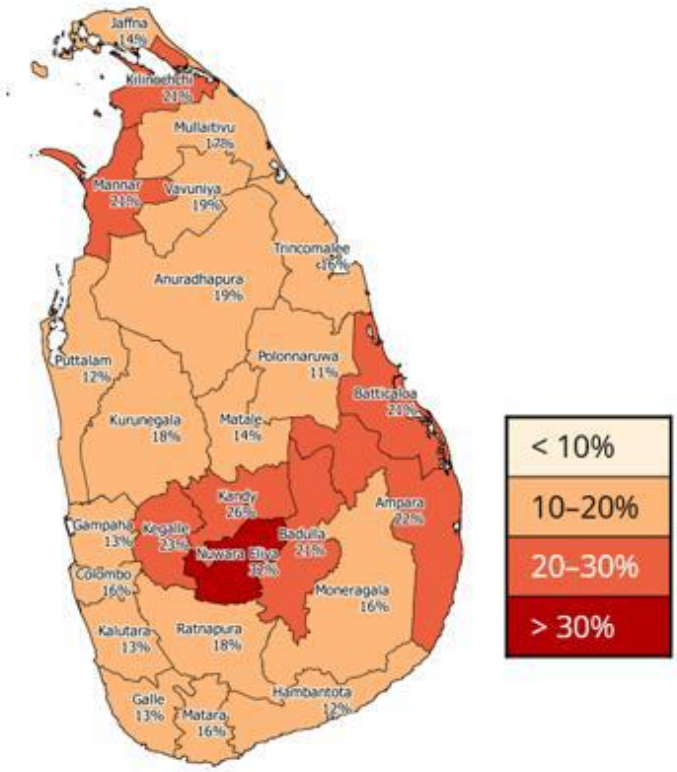


Figure 3: Prevalence of stunting among children under the age of 5, by district (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

Wasting continues to affect 15 percent of children under 5, a prevalence classified as very high by the World Health Organization (WHO), with no significant change over the past 40 years. Reaching as high as 25 percent in Monaragala (Figure 4), wasting is a major public health problem that disproportionately affects children in the poorest wealth quintile (17 percent versus 10 percent in the wealthiest quintile), children whose mothers have a very low body mass index (BMI, less than 18.5), and children whose mothers have no education (18 percent versus 9 percent of those whose mothers have a degree) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017). While prevalence of both wasting and stunting show increasing trends among children from up to 11 months of age, wasting rates begin declining after 12 months, while stunting prevalence remains steady as children grow older (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017).

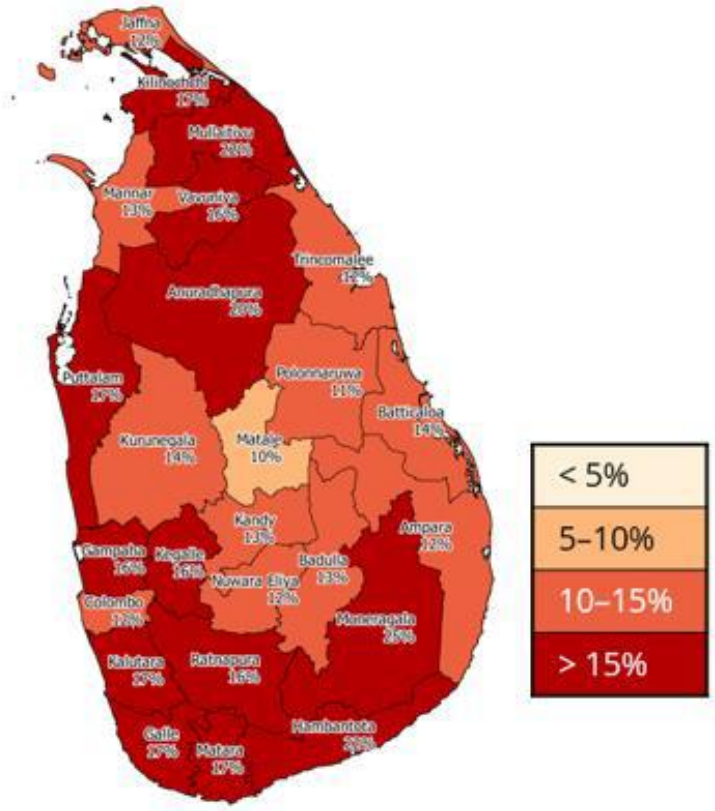


Figure 4: Prevalence of stunting among children under the age of 5, by district (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

Weight at birth is recorded for nearly all children born in Sri Lanka, of whom 16 percent have a low weight (less than 2.5 kilograms) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017). Low birth weight has previously been shown to be associated with increased risk of malnutrition, with both stunting and wasting prevalence twice as high in children with a low weight at birth than in children with a normal birth weight (Rajapaksa, Arambepola, & Gunawardena, 2011). It disproportionately affects children born to younger women (22 percent of children whose mothers were under the age of 20) and less educated women (30 percent of children whose mothers had no education), and children in the estate sector (25 percent) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017).

Given the lack of progress on reducing wasting in Sri Lanka compared to other indicators such as stunting, and in relation to wasting levels in other countries, but also the relatively low rates of child mortality in Sri Lanka, additional research is necessary for better understanding of the causes, consequences and barriers to improvement. Current data gaps around incidence and severity of child morbidity, child feeding during and after illness, and rates of recovery (or deterioration) could be addressed with monitoring prevalence throughout the year in sentinel sites and through longitudinal cohort studies.

Anaemia prevalence in children under 5 has mirrored that of stunting, with a steady decrease from 52 percent in 1970 to 15 percent in 2012 (Figure 5) (Medical Research Institute, 2012). Although there is variation by district (from 5 percent in Kegalle to 27 percent in Kilinochchi, Figure 6), children are equally affected across wealth groups (13 percent in the wealthiest quintile to 18 percent in the poorest). Thirty-three percent of children were anaemic and seven percent of children had iron deficiency anaemia, equivalent to one-quarter of all anaemic children (R. Jayatissa, Gunathilaka, Herath, & Fernando, 2014). In older school-going children and adolescents, anaemia prevalence was between 7-14 percent in different age groups, while iron deficiency rose to 27 percent of adolescents aged 15-18 (Figure 7) (D. R. Jayatissa, 2018; D. R. Jayatissa, Fernando, & Herath, 2017).

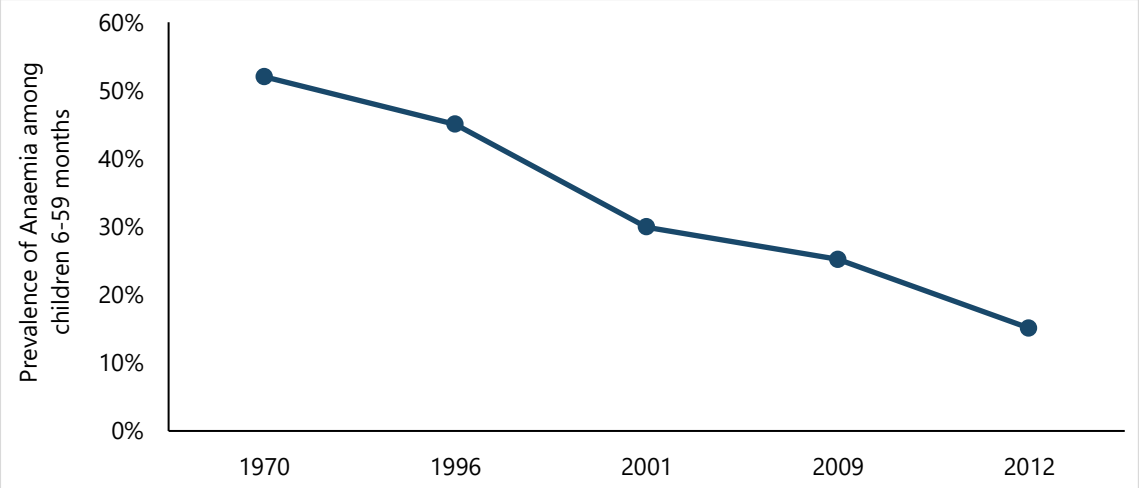


Figure 5: Prevalence of anaemia among children 6-59 months, by year (Medical Research Institute, 2012)

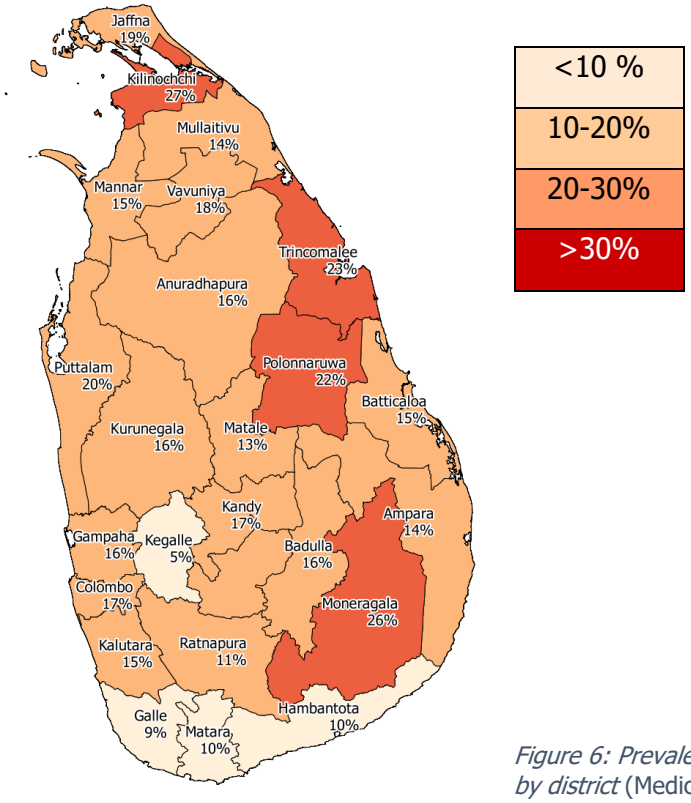


Figure 6: Prevalence of anaemia among children 6-59 months, by district (Medical Research Institute, 2012)

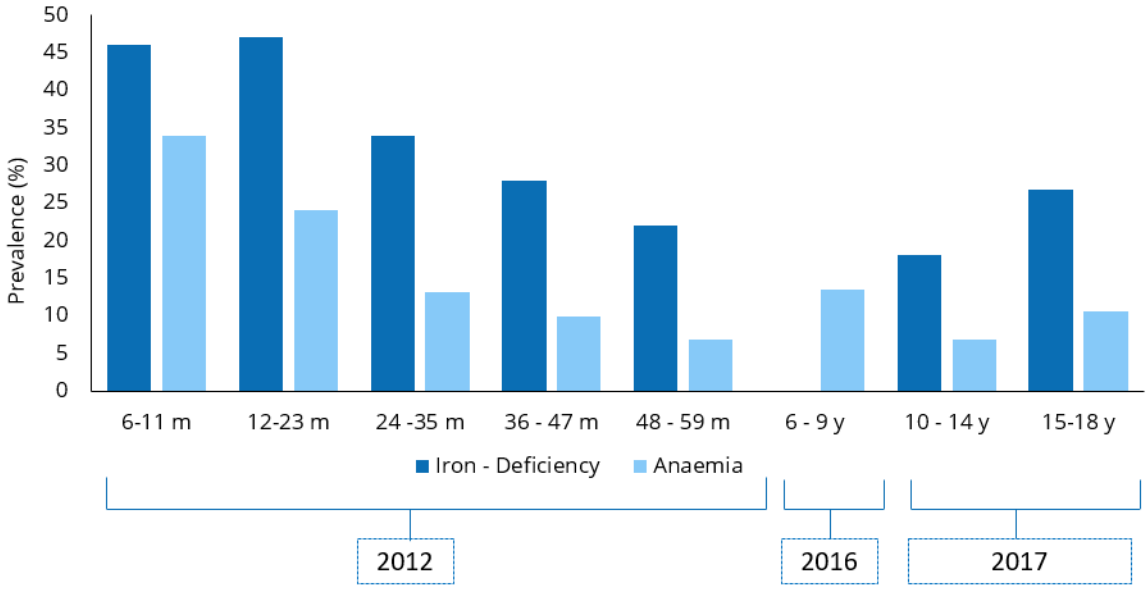


Figure 7: Prevalence of iron deficiency and anaemia among children, by age in months or years (D. R. Jayatissa, 2018; D. R. Jayatissa et al., 2017; R. Jayatissa et al., 2014)

Micronutrient deficiencies (MNDs) affect children to varying degrees. Overall, iron deficiency affects one-third of children 6-59 months, of whom most are not anaemic. Nearly half of all children had calcium deficiencies, with prevalence increasing slightly by age from 38

percent at 6-11 months to 46 percent at 48-59 months, and slightly lower prevalence among children in wealthier households. A study found that only 5 percent of children are zinc deficient, although prevalence varies widely by district, ranging from 15 percent of children in Vavuniya and Mullathivu to less than one percent in several districts including Colombo (R. Jayatissa et al., 2014).

One-third (32 percent) of pregnant women were anaemic, and 22 percent iron deficient (R. Jayatissa, Fernando, & Silva, 2017). Although data on MNDs among non-pregnant adult women was not available, given high prevalence among children and the limited dietary diversity of women, it is likely that MNDs are also prevalent among women overall.

Along with undernutrition and MNDs, rising rates of overweight and obesity contribute to the growing triple burden of malnutrition in Sri Lanka. The prevalence of obesity in adult women doubled from 2006 to 2016 (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017). Forty-five percent of women of reproductive age (15–49 years) are overweight or obese (32 percent are overweight and 13 percent obese). Prevalence is high across most of the country, and particularly in Colombo at 52 percent, although there are also lower pockets in estate districts where 22 percent of women are too thin. It is also higher among older, wealthier and more educated women, and in urban areas.

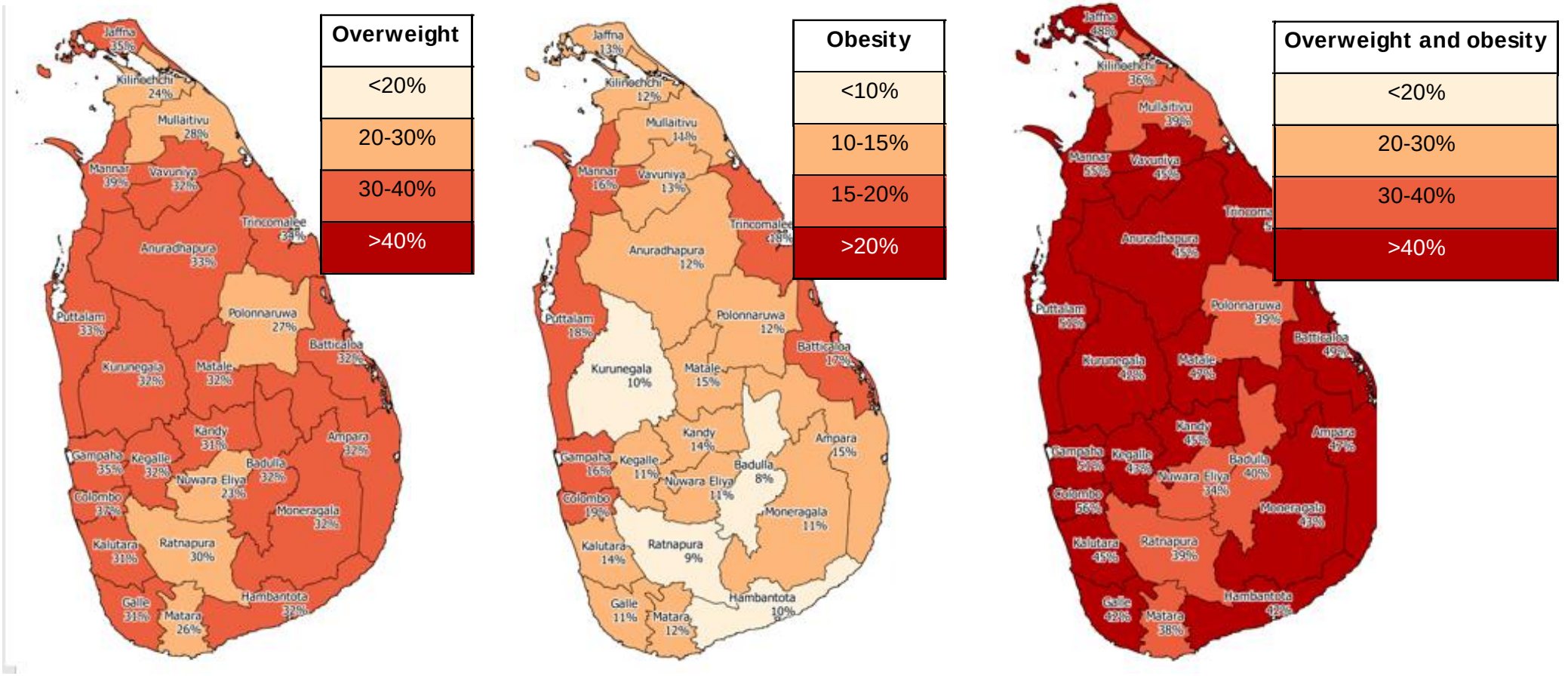


Figure 8: Prevalence of overweight (BMI of 25.0-29.9), obesity (BMI of 30.0 or higher) and overweight and obesity (BMI of 25.0 or higher) among women of reproductive age (15-49 years) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

Overweight is still low among children (14 percent of children aged 6–12) and adolescent boys and girls aged 10–18, who are more likely to be underweight (27 percent) than overweight or obese (10 percent total). However, 20 percent of girls aged 15–19 are overweight or obese, a prevalence which increases with age (33 percent of women aged 20–29, and 53 percent of women aged 40–49) (Figure 9) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017; D. R. Jayatissa et al., 2017).

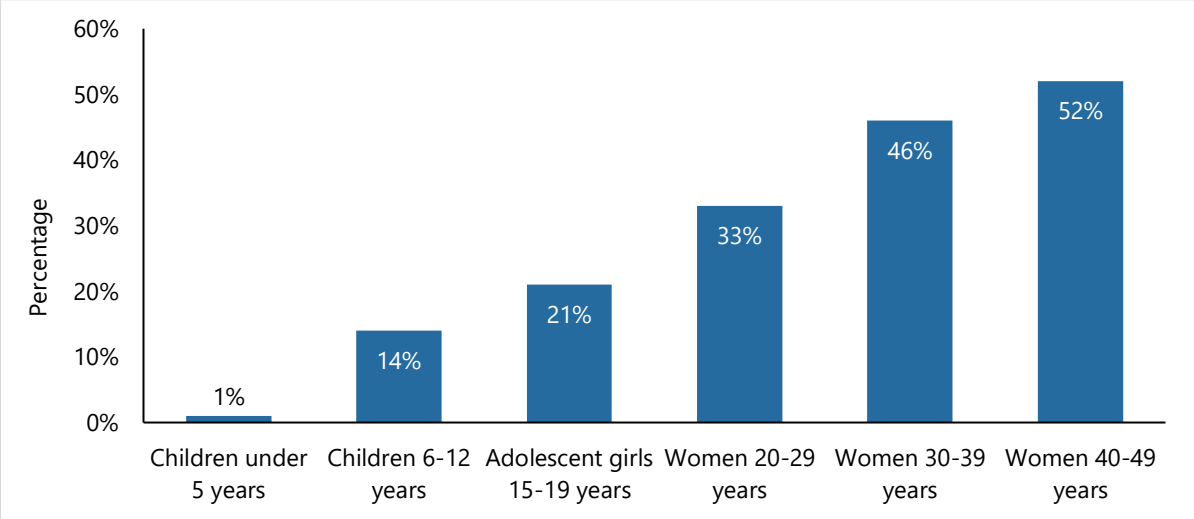


Figure 9: Prevalence of overweight/obesity among different target groups, by age in years (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017; D. R. Jayatissa et al., 2017)

Behaviours that may contribute to the increasing prevalence of overweight and obesity, including snacking and lack of physical activity, should be targeted. Only 13 percent of girls aged 13–15 reported being active for 60 minutes or more every day in the previous week, and this dropped to 9 percent of girls aged 16–17. Physical activity rates among boys in these age groups are slightly higher, although still low (21 percent of boys aged 13–15, and 15 percent of those aged 16–17). Forty percent of girls and boys between the ages of 13 and 17 reported that on a typical day they spend three or more hours engaged in sedentary activities such as watching television, playing computer games or talking with their friends (figure 10) (World Health Organization Department of Prevention of Noncommunicable Diseases, 2016).

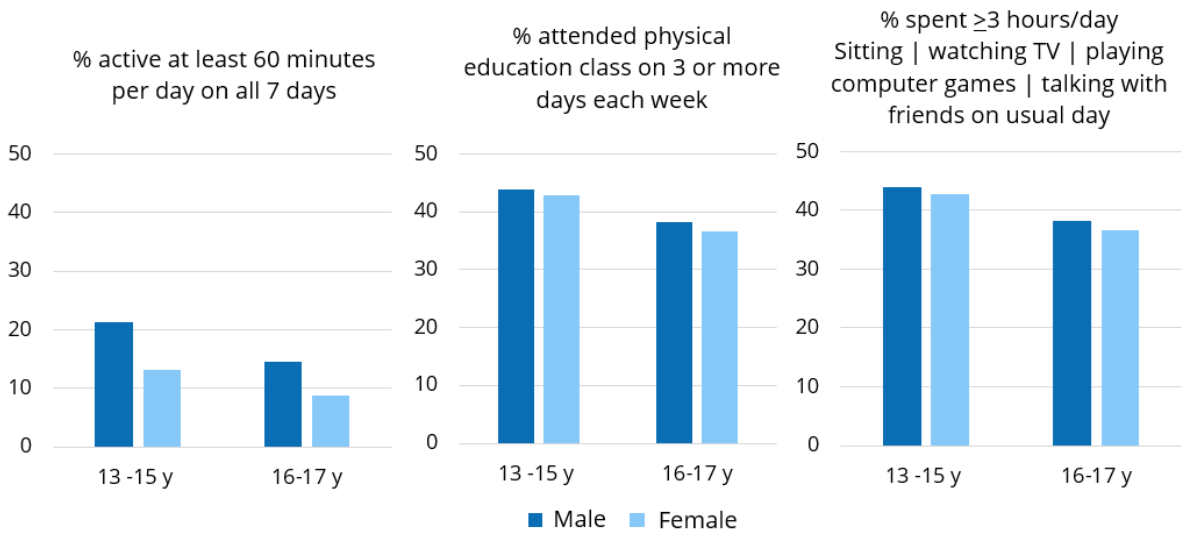


Figure 10: Percentage of school-age children engaging in different behaviours related to physical activity, by age group (World Health Organization Department of Prevention of Noncommunicable Diseases, 2016)

Rates of early, exclusive and continued breastfeeding are high, but more than one-third of infants aged 4–5 months are not exclusively breastfed.

Breastfeeding indicators in Sri Lanka are generally excellent. Nearly all children receive colostrum, and overall rates of exclusive breastfeeding are very high nationally (82 percent until six months of age and 87 percent until two years) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017). However, exclusive breastfeeding drops precipitously between months 4–5. While 87 percent of children are still exclusively breastfed at 2–3 months, this falls to 64 percent at 4–5 months (Figure 11). The mean duration of exclusive breastfeeding is 4.4 months, with 13-14 percent of children under 6 months receiving either complementary foods or plain water in addition to breastmilk.

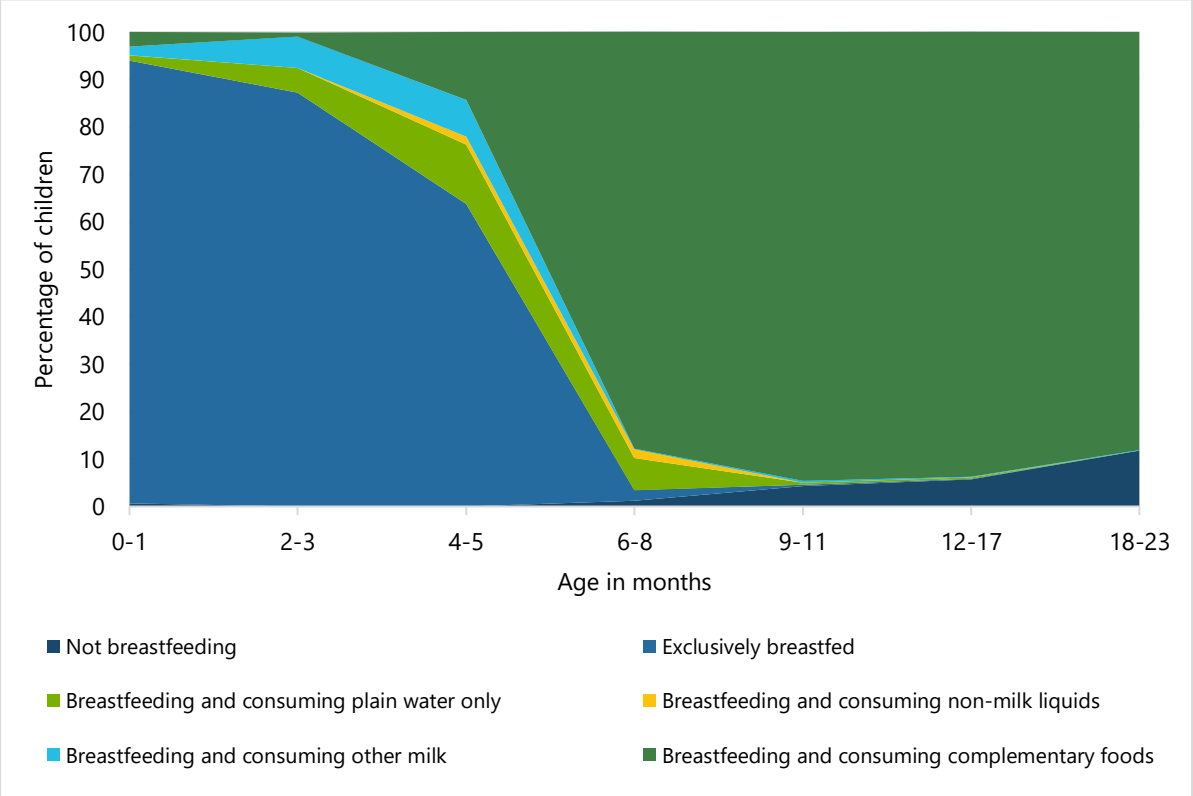


Figure 11: Breastfeeding status of children under the age of 2, by age in months (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

Breastmilk is a crucial source of nutrients for children under the age of 2, without which it is more difficult and more expensive to ensure an adequately nutritious diet. The CotD analysis found that a nutritious diet for a child aged 6-23 months costs 28 Sri Lankan rupees (LKR) per day on average. This assumes that the child is breastfed according to WHO recommendations. If the child is not breastfed the daily cost of a nutritious diet

increases by more than 40 percent, to LKR 40 per day, because the child requires a greater quantity and diversity of more expensive nutrient-dense foods, such as animal-source foods (Figure 6).[6] If a child receives some breastmilk, but not enough, she is still getting some of her essential nutrients through breastfeeding and the increase in the cost to meet her nutrient needs is less dramatic.

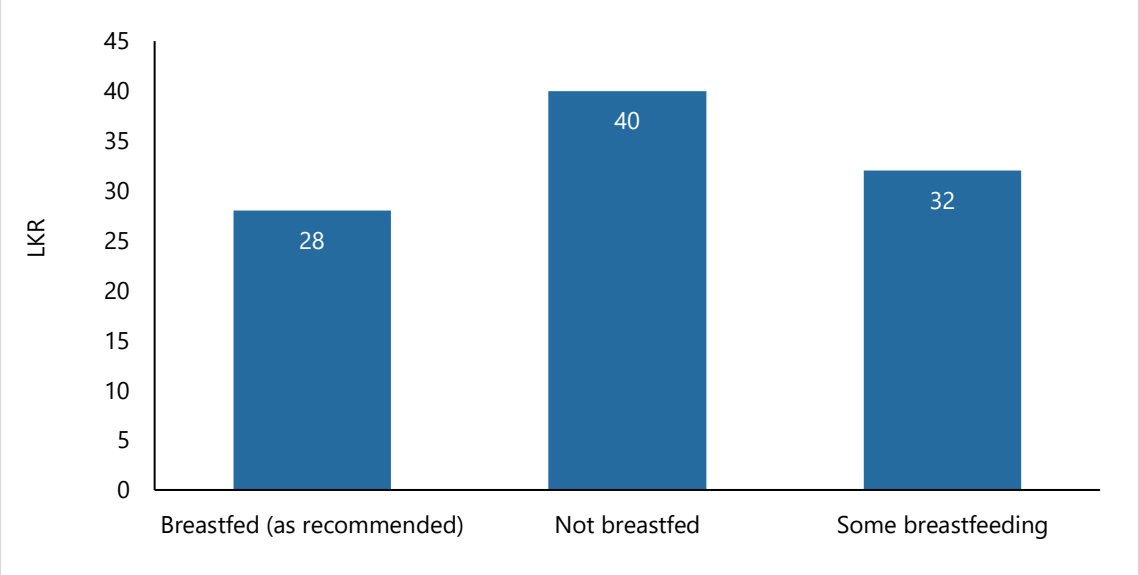


Figure 12: Average daily cost in LKR of a nutritious diet for a child 12-23 months with recommended breastfeeding, no breastfeeding, and some breastfeeding (Cost of the Diet analysis, 2018)

The diversity of complementary feeding for young children is a priority area for improving infant and young child feeding (IYCF) practices, and one where there has been little progress over recent years. Only 62 percent of all children aged 6–23 months received a minimum acceptable diet (MAD) that reaches the target on all three IYCF practices. The low proportion is mainly driven by low proportion achieving minimum dietary diversity (MDD)of four or more food groups among breastfed children and insufficient milk given to non-breastfed children.[7] MAD in breastfed children decreased slightly from 2006 to 2016 (from 83 percent to 79 percent) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017).[8] Over the same period, the proportion of non-breastfed children receiving milk or milk products dropped from 96 percent to 90 percent,

[6] The foods selected by the software include only those that were available on the market. No price data were available for formula or breastmilk substitutes. Animal source foods that were selected to meet the nutrient requirements of the non-breastfed child, across districts, included dried fish, chicken liver and beef liver.

[7] MAD is a composite indicator of minimum meal frequency, minimum dietary diversity (4 or more food groups) and breastmilk. For non-breastfed children, the third IYCF practice is consumption of milk or milk products.

[8] According to the DHS 2016 calculations consistent with the previous DHS from 2006-07.

and proportion of non-breastfed children with three IYCF practices as recommended decreased from 58 percent to 53 percent (Figure 13).[9]

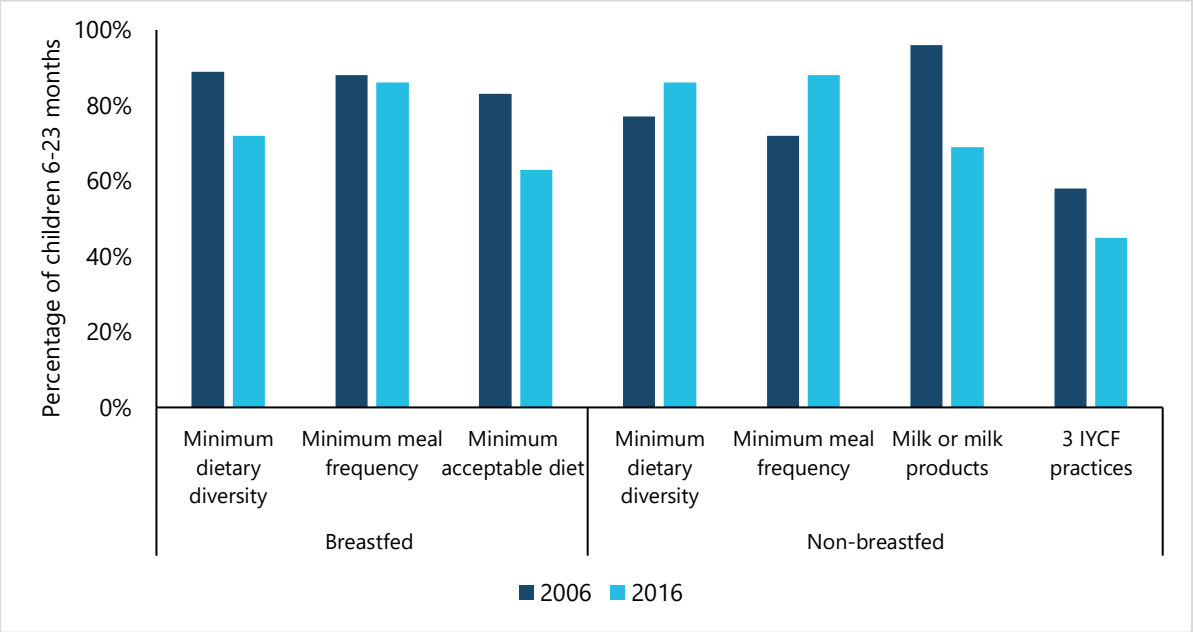


Figure 13: IYCF practices among children 6-23 months, by breastfeeding status and year (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

IYCF practices are poorest in the estate sector, where only half of children (breastfed and not breastfed) have a minimum acceptable diet compared to over 60 percent in both the rural and urban sectors (Figure 14). Again, this is driven by limited diversity, with MDD ranging from 64 percent in the estate sector to 78 percent in the urban sector; this trend can also be seen in districts with estates (Figure 15) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017). Data on household dietary diversity, which can be compared to MDD to better understand household-level influences on infant feeding practices, was not found.

[9] Ibid. It should be noted that the sample size for non-breastfed children was small, at 190 in 2006 and 152 in 2016, and therefore results from these data should be interpreted with caution.

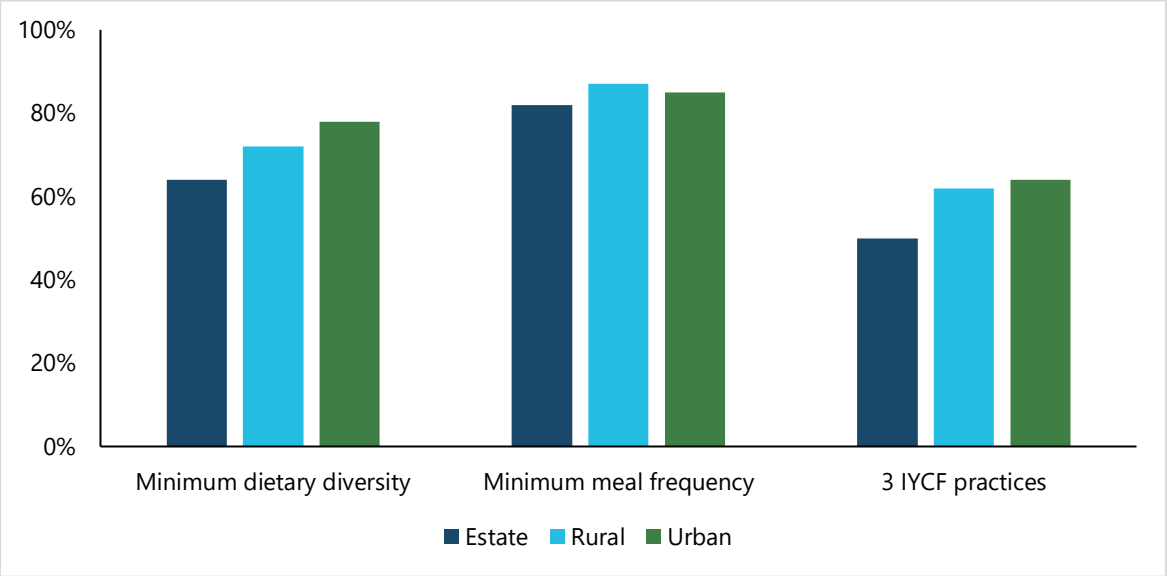


Figure 14: IYCF practices among children 6-23 months, by sector (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

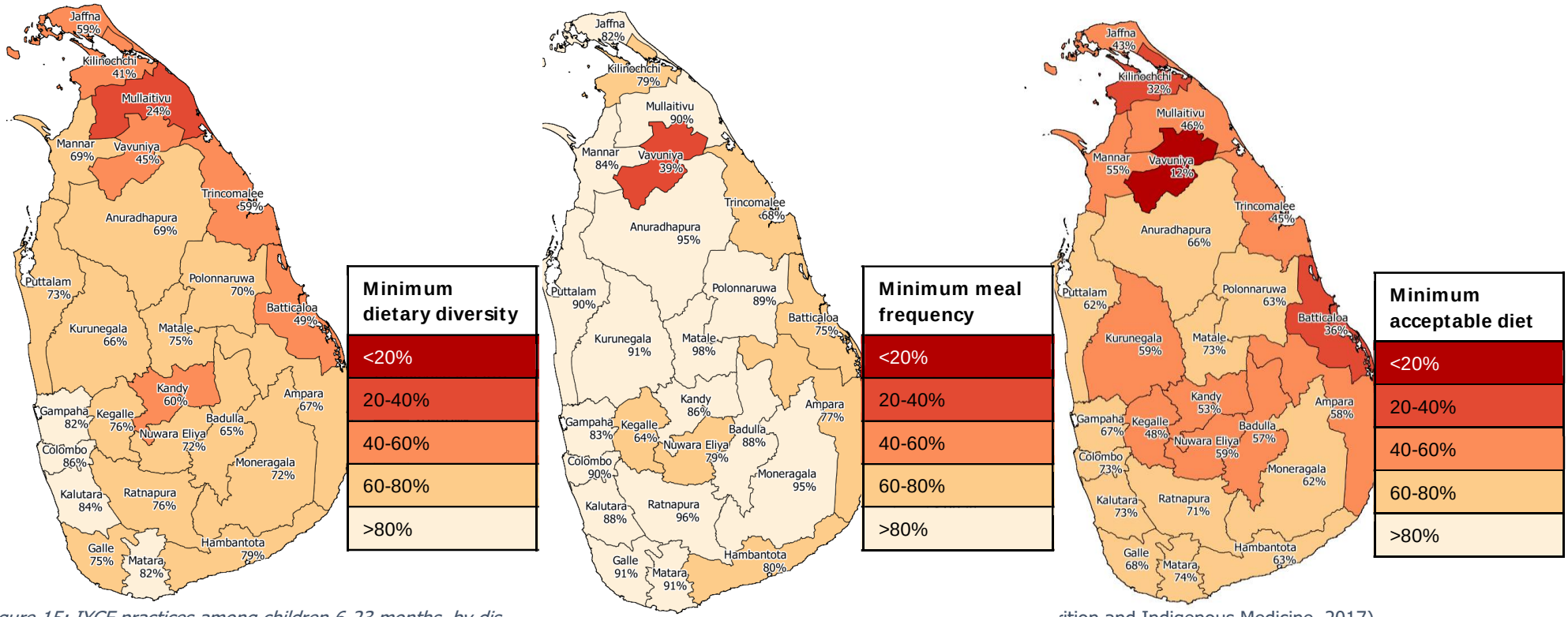


Figure 15: IYCF practices among children 6-23 months, by district (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

In addition to being diverse, complementary foods should be healthy and nutritious. This is especially important given the increasing double burden, and rising rates of overweight. Dietary diversity among children under 2 increases with age, and children 18-23 months are more likely to consume fruits and vegetables and animal source foods than are children 6-8 months. At the same time, sugar consumption also increases rapidly. Only 9 percent of children aged 6–8 months received sugary foods in the previous 24 hours, but half the children aged 18–23 months had consumed sugary foods (Figure 16) (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017).

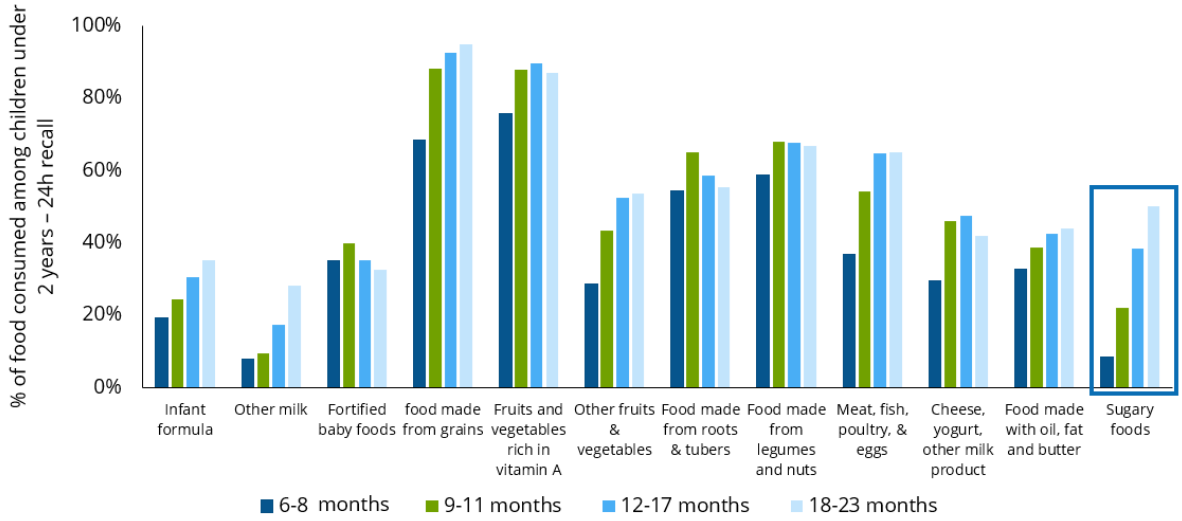


Figure 16: Foods consumed by children over the past 24 hours, by child's age in months (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

Thriposha, a specialised nutritious food produced locally by the government of Sri Lanka, is distributed at health centres to all pregnant and breastfeeding women and to malnourished children 6-59 months. A daily portion of 50 grams of Thriposha covers a significant proportion of the requirements of a child 6-23 months old, and decreases the cost to the household of a nutritious diet for this child by 57 percent (from LKR 28 to LKR 12 per day) (Figure 17).[10]

A micronutrient powder (MNP) which, unlike Thriposha, does not provide energy, fat, protein or macro-minerals, could also provide a small but potentially important contribution to ensuring adequate nutrient intake among young children. Providing one gram of MNP three times per week could decrease the daily cost of a nutritious diet for this child by 14 percent, or LKR 4 per day (Figure 17).[11]

[10] The nutrient needs of an acutely malnourished child are higher than those of a child who is not malnourished. The child modelled in this analysis is assumed to be healthy, and the contribution of the interventions including Thriposha would therefore be slightly lower for a malnourished child.
[11] Three times weekly is equivalent to 78 sachets over six months, within the recommendations of 60-90 sachets over six months.

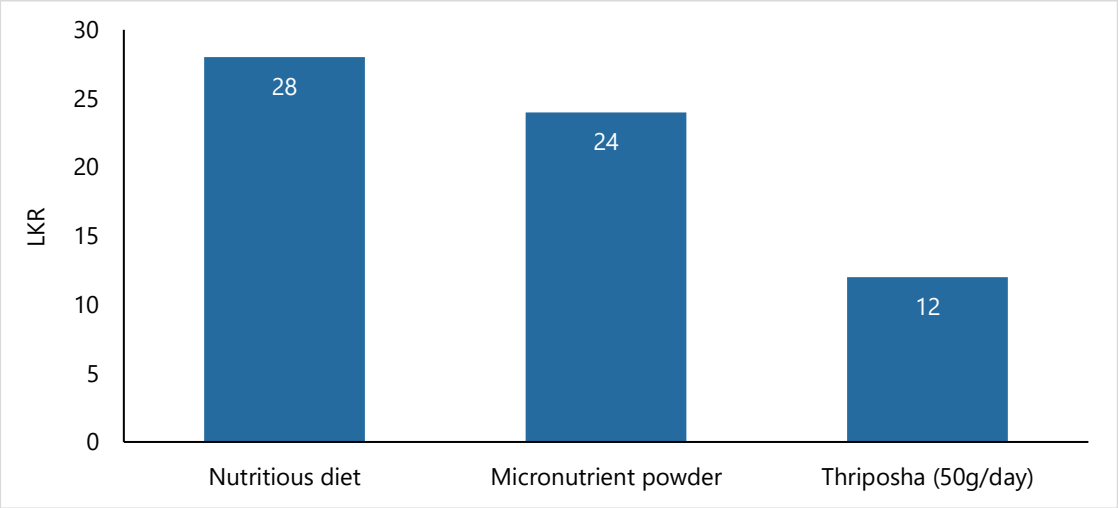


Figure 17: Average daily cost in LKR of a nutritious diet for a child 12-23 months with supplementation or specialised foods rich in micronutrients (Cost of the Diet analysis, 2018)

A nutritious diet is potentially affordable for many households which makes it important to inform consumer choice and ensure an adequate supply of nutritious food. Stunting, inadequate dietary diversity and not being able to afford a nutritious diet are geographically clustered.

The average daily cost of a diet that meets energy requirements for the modelled five-person household was estimated at LKR 209. This energy-only diet accounts only for kilocalorie needs, not micronutrients, and as such it is comprised largely of cereals and staple foods. A diet that meets nutrient requirements for all members of this five-person household would cost LKR 454 per day, more than twice as much as only meeting energy needs (Figure 18). This cost was similar across districts, ranging from LKR 394 in Jaffna and Kilinochchi to LKR 572 in Colombo (Figure 19). The nutritious diet, unlike the energy-only diet, includes more than 10 different foods in each district. It has an especially large share of vegetables and animal-source foods, each accounting for 25-29 percent of the total cost of the diet (Figure 20).

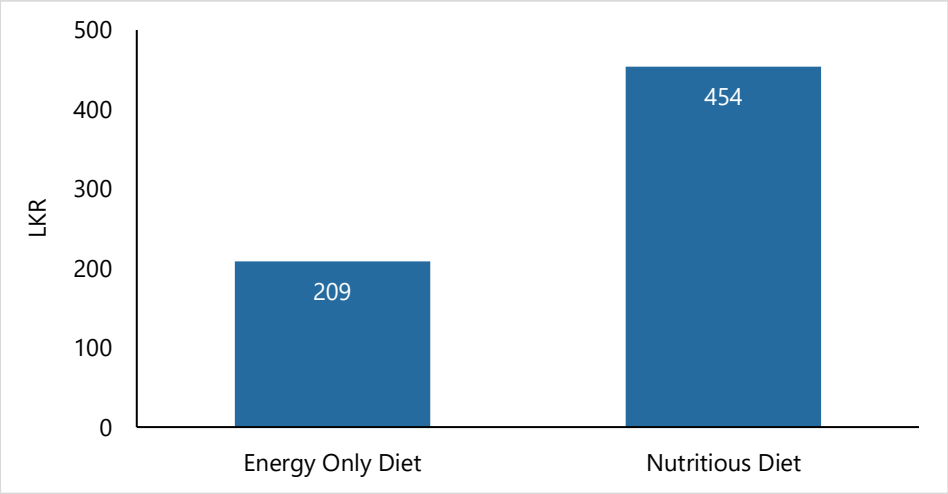


Figure 18: Average daily cost in LKR of a diet that meets energy requirements and one that meets nutrient requirements for the modelled 5-person household (Cost of the Diet analysis, 2018)

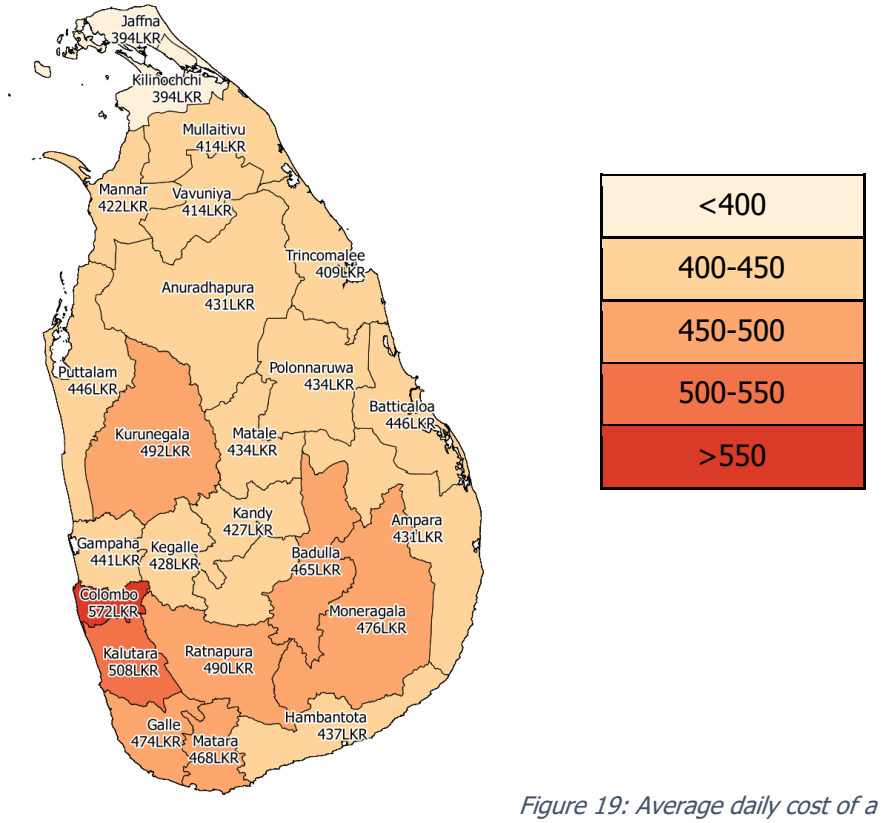


Figure 19: Average daily cost of a nutritious diet for the modelled 5-person household, by district (Cost of the Diet analysis, 2018)

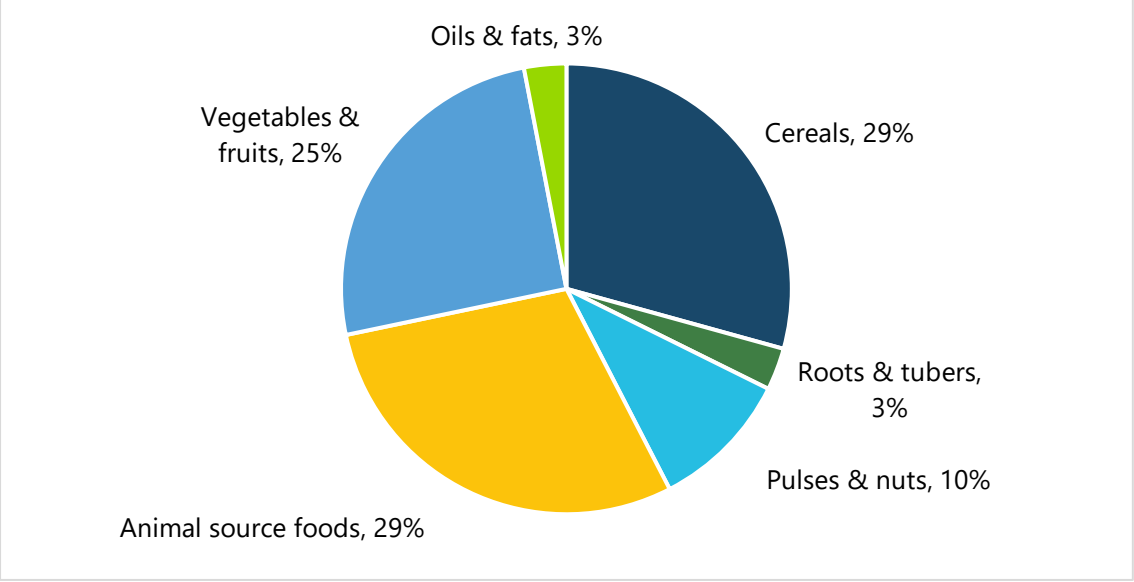


Figure 20: Percentage cost of a nutritious diet for the modelled 5-person household, by food group (Cost of the Diet analysis, 2018)

Although a diverse diet with many fresh foods is more expensive than one high in staples, the average monthly cost of a nutritious diet (LKR 13,798) is still lower than the average monthly food expenditure for a household of five people, as derived from per capita

expenditure (LKR 19,114), which suggests that this diet should be affordable for most households. Indeed, nationally only 11 percent of households would be unable to purchase a nutritious diet, and fewer than 20 percent of households in most districts.[12] Non-affordability is, however, slightly higher in the Central region, with 22–23 percent of households unable to afford a nutritious diet in Monaragala and Rathnapura (Figure 21).

A recent World Bank analysis calculated the cost of a diet that is in line with Sri Lanka's national food-based dietary guidelines (FBDG), which includes more servings of fresh foods than the (minimum cost) nutritious diet calculated for the FNG analysis (Dizon & Herforth, 2018).[13] This recommended diet would cost on average LKR 835 per day for a household with the same composition as the FNG analysis, nearly twice as much as a minimum cost nutritious diet, with correspondingly higher rates of non-affordability: between 40–64 percent of households nationally would not be able to afford a diet that meets the FBDG (Figure 22).

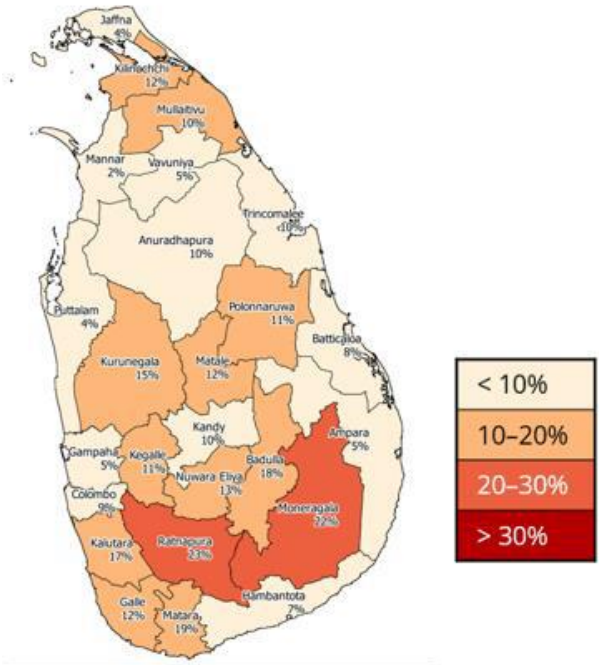


Figure 21: Non-affordability of a nutritious diet, by district (Cost of the Diet analysis, 2018)

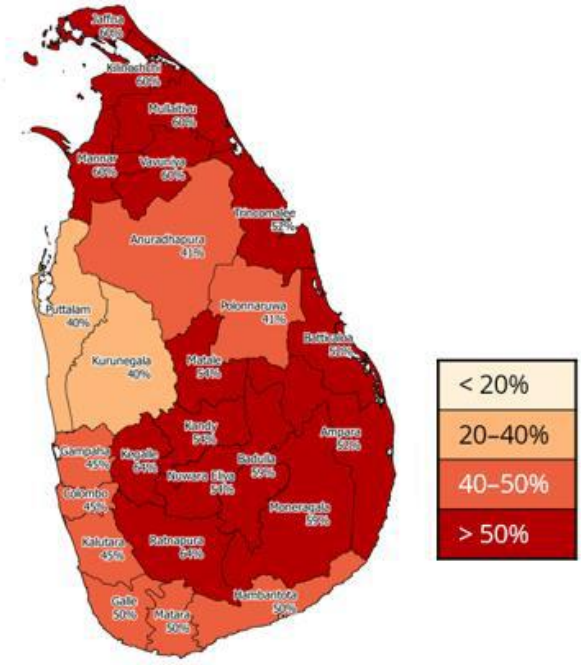


Figure 22: Non-affordability of a recommended diet, by district (Dizon & Herforth, 2018)

For both calculated diets (a minimum cost nutritious diet for the FNG, and the cost of a recommended diet for the World Bank), there is a similar geographic pattern of higher cost and higher non-affordability in Central districts. Some of these districts also show higher prevalence of stunting in children under 5 and lower proportions of child MAD. In these

[12] The national costs and non-affordability are averages of all districts, weighted according to district population.

[13] The Cost of a Recommended Diet (CoRD) is an estimate of the cost of a diet that meets national food-based dietary guidelines using government food price data.

areas, economic access to an adequately nutritious diet may be an important barrier to good nutrition among young children and interventions may need to improve household purchasing power or subsidize price of nutritious foods.

Non-affordability of a nutritious diet may also be higher than estimated or may be subject to fluctuations throughout the year. Sri Lanka's food expenditure curve is fairly flat, so a small change in the cost of a diet would cause a larger change in the proportion of households that would not be able to afford it. Variations in food production, food prices and incomes, including due to climate-related shocks, likely affect access to a nutritious diet for many households. Food preferences may play a role in choices for non-nutritious items or a greater variety of nutritious foods that are more expensive. Regional differences are also important as seasonal changes in non-affordability could be greater in areas with more vulnerable livelihoods, less physical access to markets and higher poverty levels. There is widespread recognition and understanding among stakeholders regarding the importance of affordability and purchasing power, and the variations within and across households, on food choices available.

Fresh foods are available and consumed but generally not in sufficient quantities to provide the necessary benefits.

Sri Lanka's FBDGs highlight the importance of a diverse diet with multiple daily servings of vegetables, protein-rich foods including fish, pulses and meat, and fruit. The recommended consumption of foods rich in fats and sugars is minimal, while the recommendation for fruits and vegetables is a combined five servings per day minimum.

Households currently spend only one-quarter of their food budget on grains, and almost half on fresh and nutritious foods across a wide array of groups including fruit and vegetables (13 percent); meat, fish and eggs (19 percent); and dairy products (eight percent) (Figure 23). However, one third of food expenditure goes toward condiments, prepared food and other uncategorised foods that may include processed commodities that are high in energy but low in essential nutrients (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016). Spending is also an inaccurate reflection of consumption, as nutrient-dense foods are typically more expensive and thus make up a smaller share of what households eat in terms of quantity compared to what they spend. Thus, relatively high expenditure on meat and fish does not necessarily mean a high consumption of animal-source foods, while fruits and vegetables almost certainly make up less than 13 percent of diets.

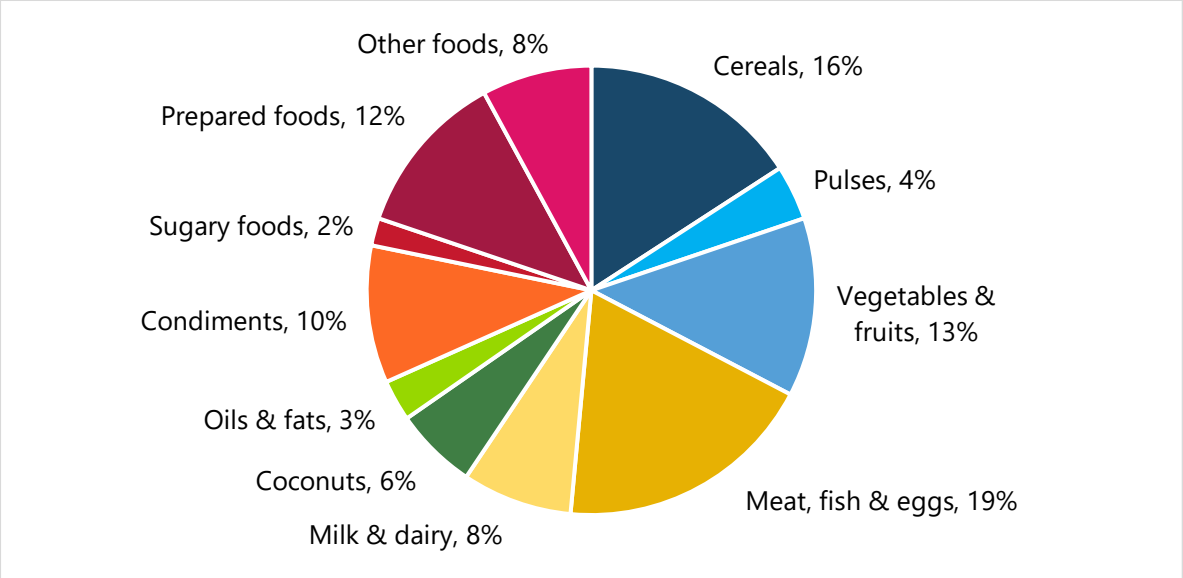


Figure 23: Average monthly household food expenditure by food group (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016)

Intake of fruit and vegetables plays an important protective role in preventing non-communicable diseases including cancers and heart disease, but both availability and consumption of these foods are too low. Data on the national availability of fruit and vegetables shows that domestic production, which yields an average of 230 grams of fruit

and vegetables per capita per day, is insufficient to provide for both the national FBDG and WHO/FAO recommendations of 400 grams of fruit and vegetables per day (Figure 24) (South Asia Policy and Research Institute, Institute of Policy Studies, Medical Research Institute, Hector Kobbekaduwa Agrarian Research and Training Institute, & Department of Census and Statistics, 2017b). These data on insufficient availability also correspond to consumption data in which less than 30 percent of adults reported having five or more servings of fruit and/or vegetables per day. On the contrary, two-thirds of adults did eat fruit or vegetables every day but only 1-2 or 3-4 servings, below the recommended five; the portions may also be relatively small (Figure 25) (Ministry of Health Nutrition and Indigenous Medicine & WHO, 2015). Interventions to increase consumption should improve awareness of the importance of fresh fruit and vegetables in the diet, and the recommended number and size of servings, to increase consumer demand and work towards greater national production and better economic access to fresh foods.

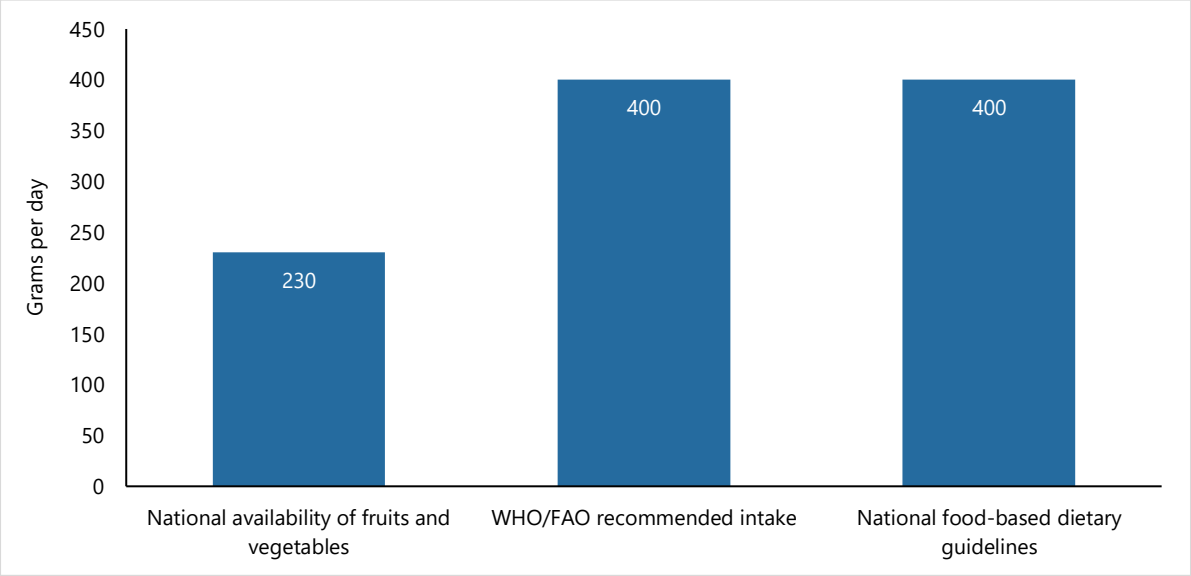


Figure 24: Grams per capita per day of fruits and vegetables as available at the national level, as recommended by the WHO and FAO, and as recommended by Sri Lanka's national FBDGs (South Asia Policy and Research Institute, Institute of Policy Studies, Medical Research Institute, Hector Kobbekaduwa Agrarian Research and Training Institute, & Department of Census and Statistics, 2017a)

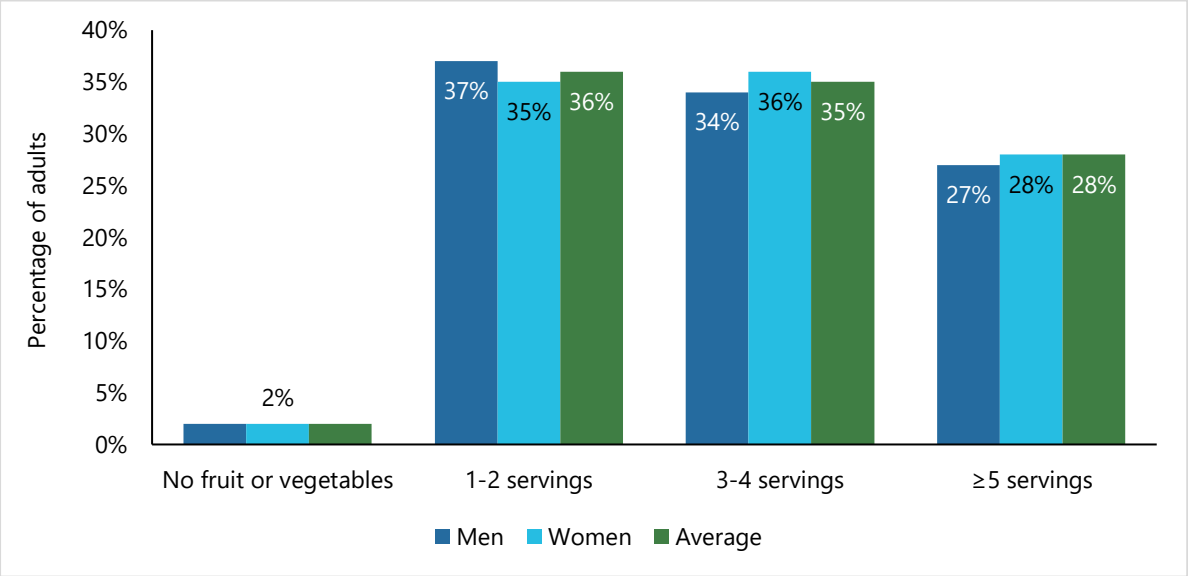


Figure 25: Percentage of adults who consumed fruit or vegetables on an average day, by number of servings (Ministry of Health Nutrition and Indigenous Medicine & WHO, 2015)

Home gardens represent an important source of fresh produce that could be leveraged to increase availability and household consumption of fruit and vegetables, and that may not be accurately reflected in existing national-level availability data. The plot size and prominence of gardens vary by household and province: some households cultivate as little as 0.05 hectares and others more than 2.5 hectares. While gardens cover only two percent of the land area in Mannar, they cover 36 percent in Matara (Pushpakumara, Marambe, Silva, Weerahewa, & Punyawardena, 2012). One study estimated that home gardens yield between 50–60 percent of all leafy vegetables produced nationally, and that 27 percent of fresh food produce (in terms of monetary value) consumed directly by suburban households is from their home garden production, with the remainder purchased on markets (Kumari & Kansuntisukmongkol, 2009). Home gardens have been estimated to be the most important source of fruit production in the country (Weerakkody, Kumara, & Ratnayake, 2004).

Additional assessments are needed to understand the current contribution of home garden production to overall availability of produce, and to determine the potential of increased yields from both home gardens and commercial farms. Along with an adequate supply, it is important to consider the demand for different foods, and whether people would increase their consumption of fresh vegetables and fruits if they were more readily available or affordable. Complementary behaviour change interventions may also be required to shift consumer preferences towards these foods.

Programmes or policies targeting dietary behaviours should aim to increase consumption of fresh nutritious foods and decrease the current high intake of sugar and processed foods, such as the tax recently imposed on sugary beverages. Per capita intake of plain sugar, not including sugary drinks and snacks, exceeds the limit of 5 percent per capita energy intake

recommended by the WHO. This does not differ very much across regions and sectors and changes only minimally with wealth: only the two bottom economic deciles have a plain sugar intake below the WHO recommended limit. When the sugar content of other foods and beverages is taken into account, total sugar intake across most groups likely exceeds the 10 percent upper limit set by the WHO (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016). Consumption of salty processed foods is also high, with one-quarter (27 percent) of adults ages 18–69 reporting that they eat these foods "always or often". This proportion is highest among young men (ages 18–29), of whom one-third eat processed foods, but otherwise varies little by age or sex (Ministry of Health Nutrition and Indigenous Medicine & WHO, 2015).

Sri Lanka has developed economically, increasing overall wealth and food expenditure. Despite this, income inequality leads to unequal access to nutritious foods.

Purchasing power in Sri Lanka increased from 2005 to 2016. During this period the consumer price index rose by 130 percent, indicating a higher cost of living, but the increase in the average monthly household income was even greater, roughly 200 percent (Figure 27). This overall increase in wealth is reflected in food expenditure, which increased by 23 percent in absolute amount (from LKR 15,651 per month to LKR 19,114) but decreased as a proportion of total household expenditure (from 38 percent to 35 percent) from 2012 to 2016 (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016).

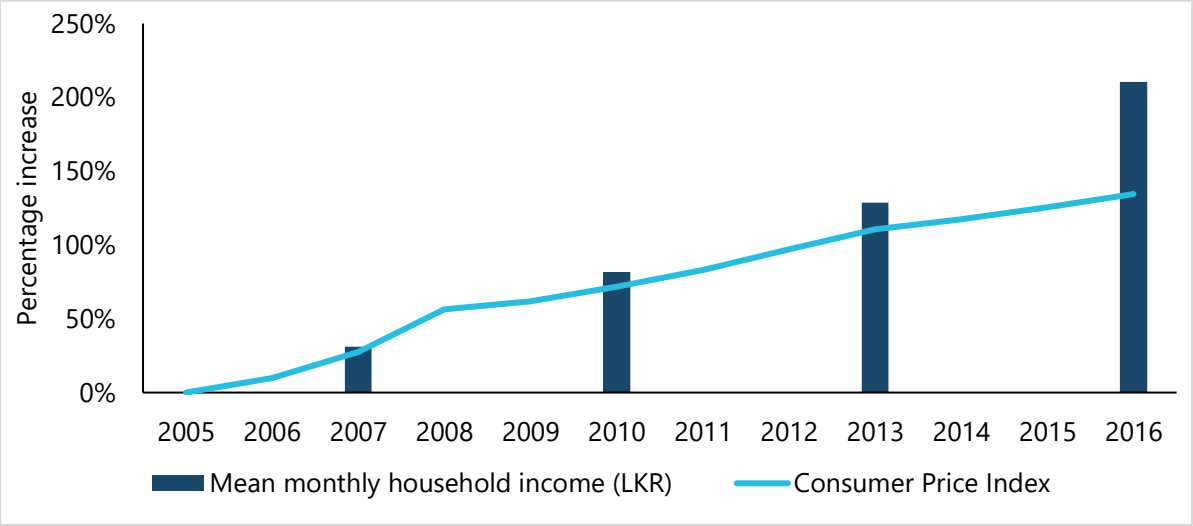


Figure 26: Annual percentage increase in mean monthly household income in LKR and CPI, by year (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016; Index Mundi, n.d.)

However, wealth is not equally distributed, especially when looking across Sri Lanka's sectors: the average total household expenditure of LKR 77,377 per month in urban areas is more than twice that in the estate sector, where households spend only LKR 34,851 per month on average (Figure 27). Urban households spend 30–40 percent more on food than rural or estate households, but while food accounts for 30–35 percent of urban and rural household expenditure, nearly half of household expenditure in the estate sector goes to food. Estate households also devote a greater proportion of their expenditure to cereals, accounting for a quarter of their overall food expenditure (Figure 28) (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016).

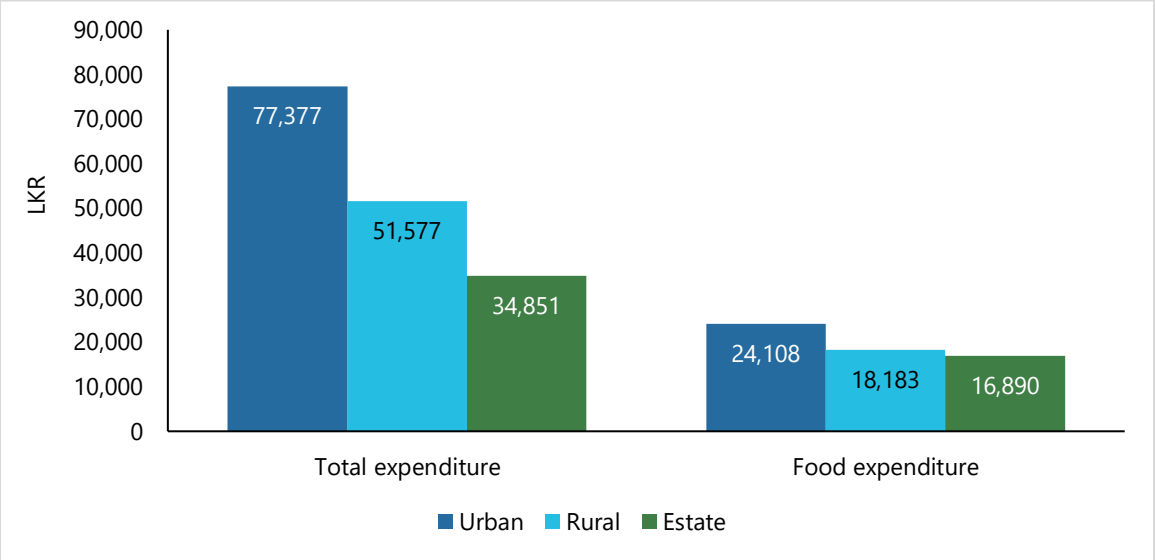


Figure 27: Average monthly total household expenditure and average monthly food expenditure per household, by sector (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016)

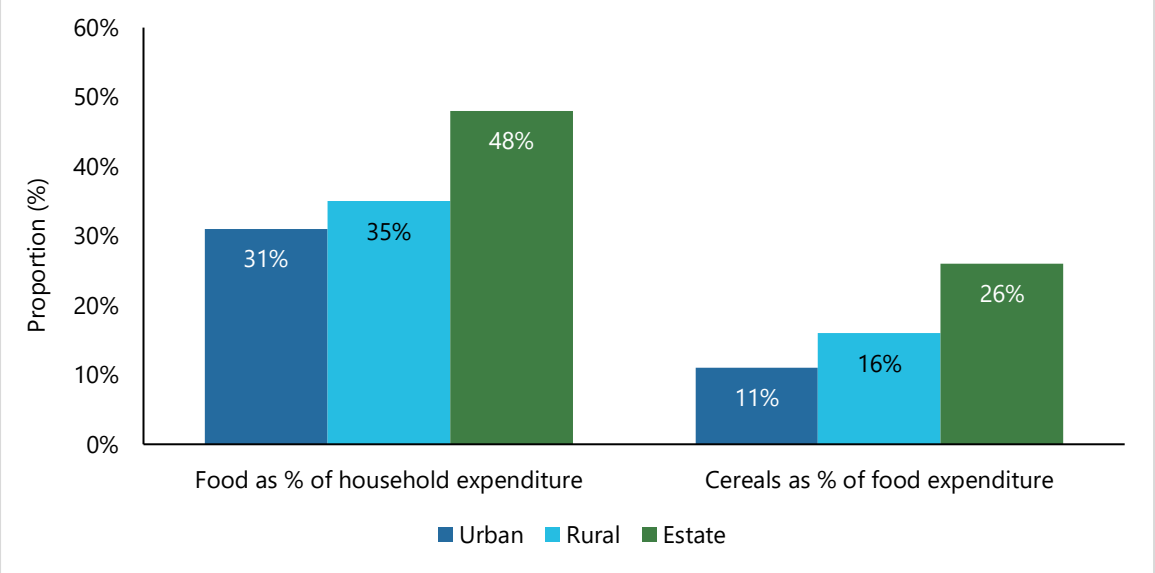


Figure 28: Food expenditure as a percentage of total household expenditure, and cereals as a percentage of household food expenditure, by sector (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016)

These disparities in wealth present an important barrier to adequate nutrition and food security. The proportion of households that cannot afford a nutritious diet is highest in the estate sector. In Rathnapura, for example, a nutritious diet is unaffordable for only 16 percent of urban households but rises to 22 percent among rural households and 35

percent in the estates (Figure 29).[14] This pattern was also found in other provinces with estates, including Kandy and Badulla.

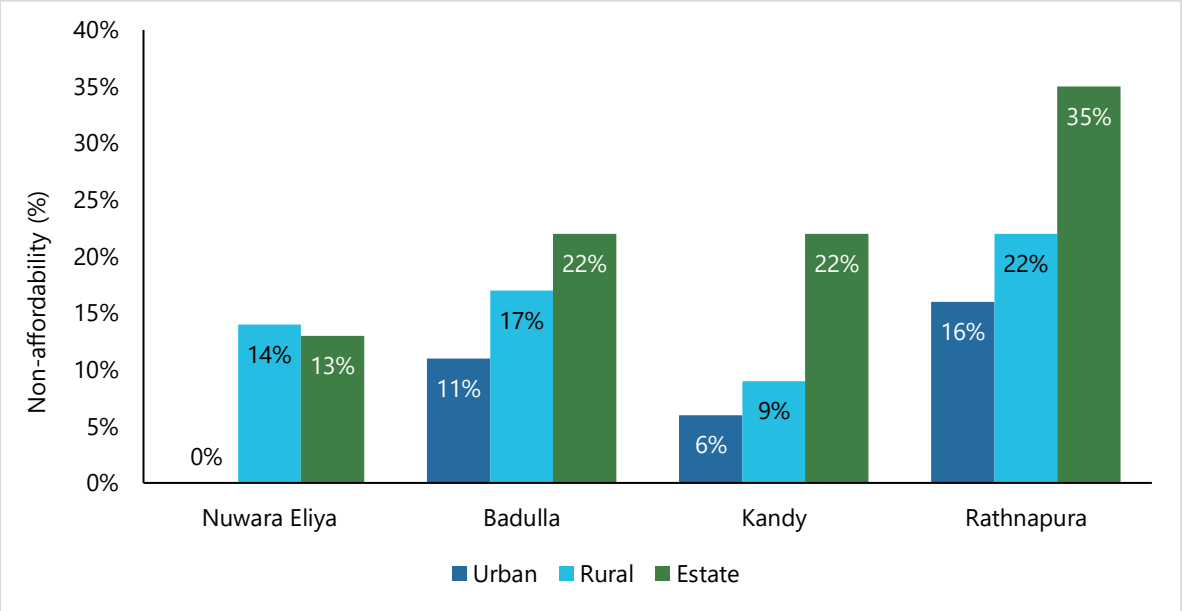


Figure 29: Non-affordability of a nutritious diet for the modelled 5-person household, by district and sector (Cost of the Diet analysis, 2018)

The greater wealth and purchasing power of urban households, particularly compared to estate households of the same size, is reflected in their purchasing choices and consumption patterns. While a larger share of food expenditure goes to maintaining staple food intake in the estate sector, urban households spend more on a wider variety of food groups. Expenditure on animal source foods, including meat, fish and milk, is higher in urban areas than in the rural or estate sectors, as is expenditure on prepared foods (Figure 30). On the other hand, spending on pulses was slightly higher among estate households than urban or rural ones, suggesting that this food group is an important source of protein in estates where animal-source foods are less affordable (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016). This trend is confirmed in data showing higher consumption of animal source foods among urban women than among women in the rural or estate sectors: three-quarters of women (ages 15-49) in urban areas had eaten animal products including meat, poultry, eggs, fish or seafood in the past day, but only 60 percent of rural women and less than half of women in estates had (Figure 31). Two food groups, however, are similarly accessible to women across sectors: 80–90 percent of all women reported consuming vitamin A-rich fruit and vegetables (although, as previously discussed, likely in insufficient quantities) and 26–36

[14] This calculation is based on differences in household expenditure by sector, while the cost estimate for the nutritious diet remains the same.

percent of women consumed sugary foods (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017).

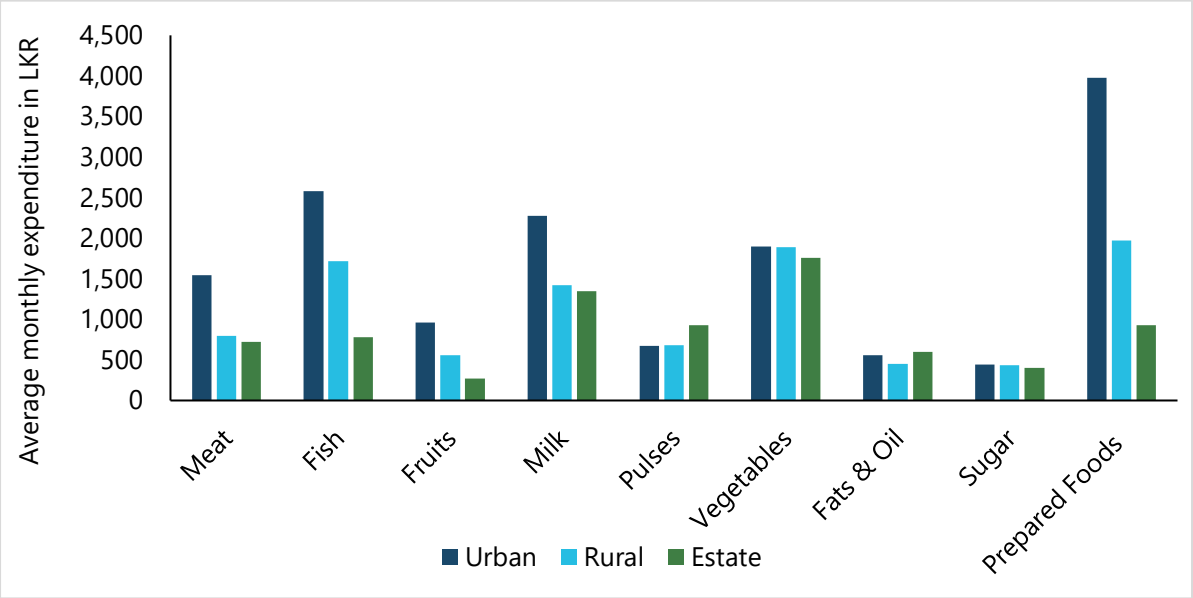


Figure 30: Averange monthly household expenditure in LKR, by food group and sector (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016)

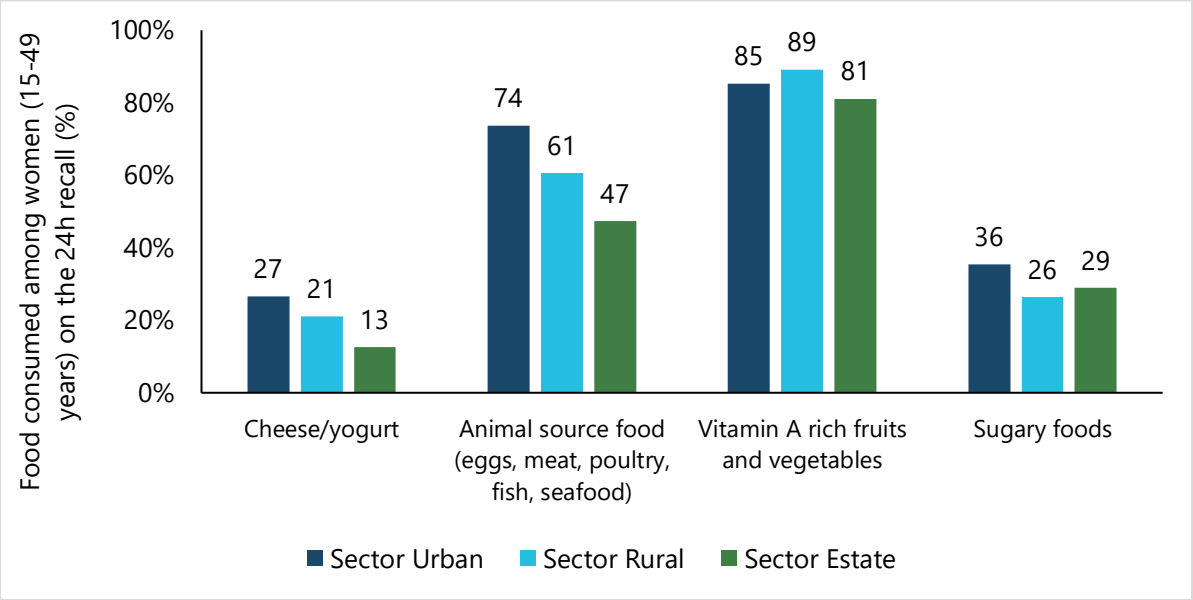


Figure 31: Foods consumed by women of reproductive age (15-49 years) in the past 24 hours, by selected food group and sector (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

Agriculture is a major employment sector but does not contribute greatly to GDP. Smallholder plot size is decreasing and labour is primarily informal.

Sri Lanka's population is overwhelmingly rural and dependent on agriculture, with four out of five people living in rural areas and farmers representing a quarter of the workforce. However, agriculture accounts for only 9 percent of Sri Lanka's Gross Domestic Product (GDP), of which 2 percent is tea production in the estates where only 4 percent of the population lives. This is disproportionately lower than the two other main sectors that contribute to GDP: services (62 percent of GDP and nearly half of the workforce) and industry (39 percent of GDP and 26 percent of the work force) (Figure 32) (Coslet, Goodbody, & Guccione, 2017). The low economic impact of agriculture indicates likely inefficiencies in the sector, where employment is predominantly informal.

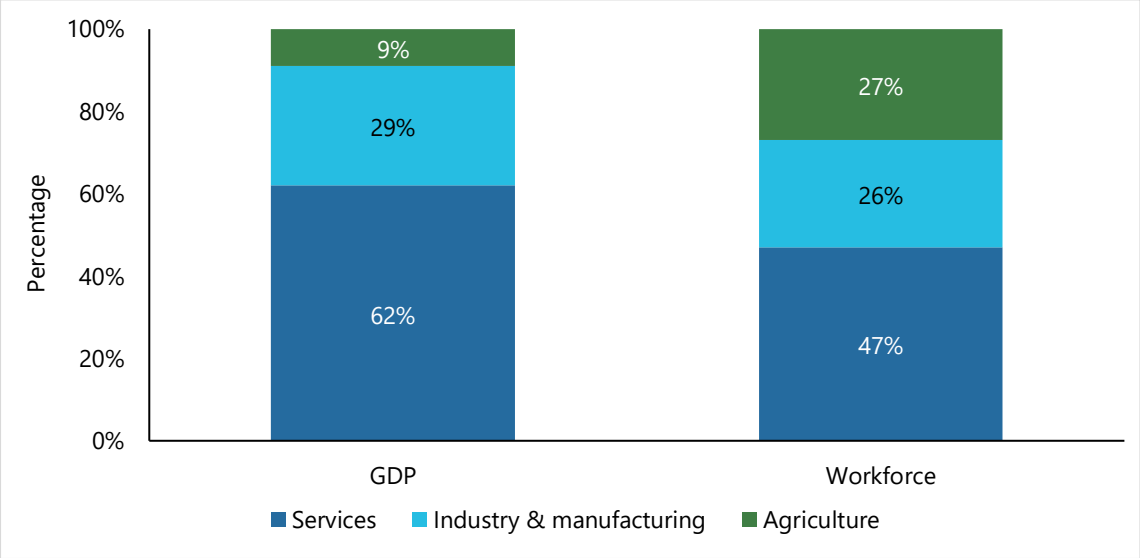


Figure 32: GDP and workforce, by sector (Department of Census and Statistics & Ministry of National Policies and Economic Affairs, 2016)

Livelihoods are also threatened by increasing pressure on land, with the size of smallholdings decreasing steadily over time. Among households cultivating fewer than eight hectares, the Agriculture Census found that the average holding size was 1.1 hectares in 1962, 0.8 hectares in 1982, and fewer than 0.5 hectares in 2002 (South Asia Policy and Research Institute et al., 2017b). Women are especially economically vulnerable as many work informally and/or in the household without remuneration. Moreover, although women account for three quarters of labour on farms, they rarely own the land they work; this can limit productivity and yields, as they are less able to invest in the land and may have less access to inputs or technology (Figure 33). In the estate sector, women provide 70 percent of total labour (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017; Kalansooriya & Chandrakumara, 2014).

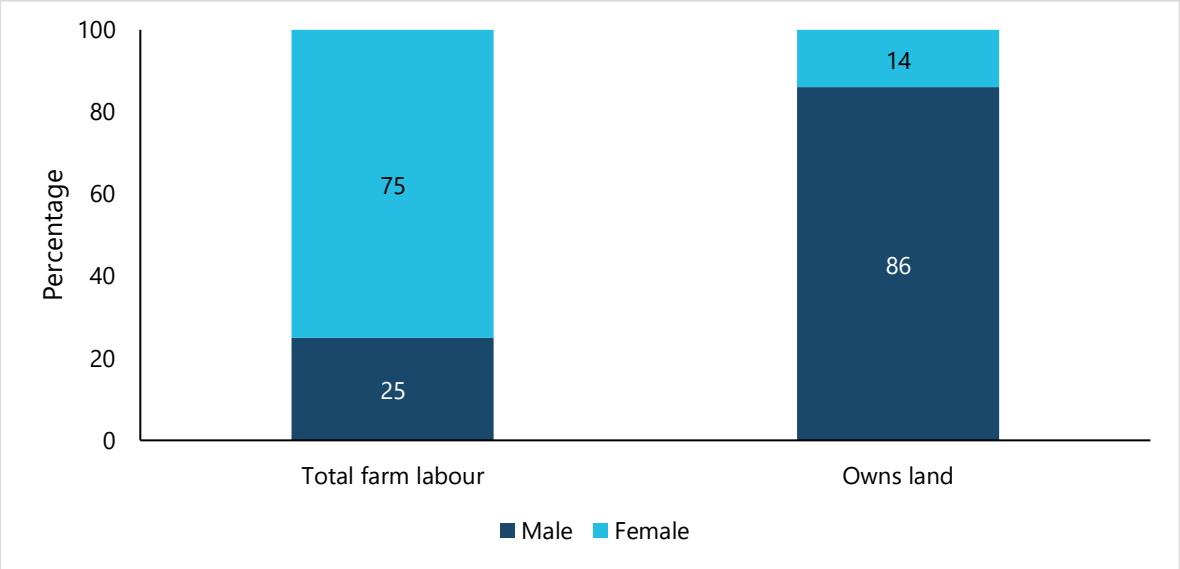


Figure 33: Pecentage of total farm labour contributed and land ownership, by gender (Kalansooriya & Chandrakumara, 2018)

Intra-household dynamics need to be understood to improve individual and household nutrition. Adolescents and pregnant and lactating women have particularly high nutritional needs, making them more vulnerable.

Women are principal decision-makers for household nutrition, but their agency and time are often limited. Although women prepare the meals in 80 percent of households, they often do not have power of decision on food purchases. Education and knowledge may restrict the choices available to them: women with no education were much less likely to consider the nutritional value of meals for their households than women with advanced degrees. Three-quarters of women with no education reported low interest in preparing nutritious food, while 70 percent of women with university degrees had high interest in nutritious meals (Kalansooriya & Chandrakumara, 2014). Formal sector employees are entitled to 84 working days of maternity leave and one hour per day to breastfeed thereafter, but many women are informally employed or engaged in other kinds of work. Given the amount of farm labour and other unremunerated family work that falls to women, they may not have enough time to prepare and feed nutritious meals to their young children and provide optimal care and stimulation.

Women and adolescent girls themselves are particularly vulnerable to poor nutrition, and their needs are compounded during pregnancy and lactation. The CotD analysis shows that the nutrient requirements of an adolescent girl and a lactating woman are the most expensive in the modelled five-person household. Each of them accounts for nearly 30 percent of the cost of a nutritious diet for the household, a larger share than the adult man and disproportionately higher than their shares in a household energy-only diet (Figures 34 and 35). This reflects the heightened and specific nutritional requirements of both adolescence, when a girl is undergoing rapid growth and beginning menstruation, and lactation, when a woman is producing breastmilk with the nutrients her baby needs for healthy growth and development.

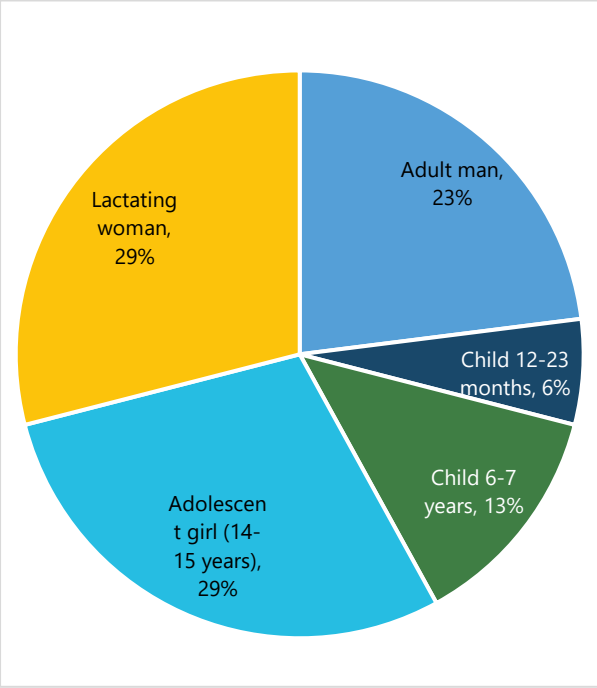


Figure 34: Percentage of the household cost of a nutritious diet, by individual (Cost of the Diet analysis, 2018)

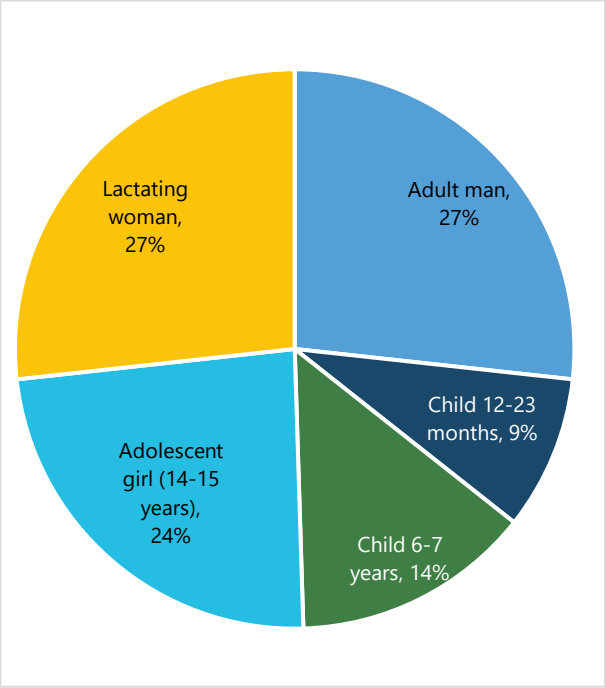


Figure 35: Percentage of the household cost of a diet that meets energy needs, by individual (Cost of the Diet analysis, 2018)

Stunting prevalence among younger adolescents (ages 10-14) has decreased in recent years, from 27–47 percent (depending on the exact age) in 2003 to 12–15 percent in 2017. However, adolescents as an age group remain susceptible to micronutrient deficiencies and, increasingly, overweight and obesity. Girls are especially vulnerable to deficiencies. One-third of adolescent girls (ages 10-18) are iron deficient, a prevalence three times higher than among boys of the same age (11 percent) (Figure 36), and prevalence of iron deficiency and iron deficiency anaemia nearly doubles in older adolescents (ages 15-18) of both genders as compared to younger boys and girls (ages 10-14). Forty-six percent of all adolescents (ages 10-18) are vitamin D deficient, and another 13 percent have vitamin D insufficiency. This is highest in girls: a total of nearly 70 percent have vitamin D deficiency (50 percent) or insufficiency (19 percent) (D. R. Jayatissa, 2018).

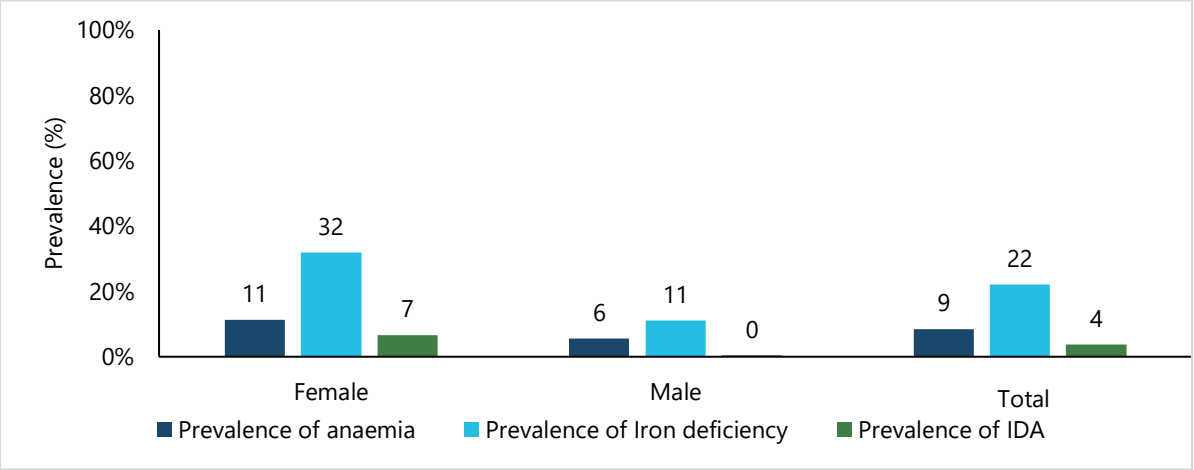


Figure 36: Prevalence of anaemia, iron deficiency and iron deficiency anaemia among adolescents ages 10-18, by gender (D. R. Jayatissa, 2018)

These micronutrient deficiencies are unsurprising given the poor dietary diversity of adolescents. On average only half of all adolescents across provinces were found to meet a minimum dietary diversity of five or more food groups every day (of 10 total food groups). While nearly all of them ate grains at least once a day, most had vegetables only 2-3 times per week or less often. Fruit and meat consumption was even less frequent, generally less than 2-3 times per week (except for chicken, which was eaten slightly more). Sources of iron are notably insufficient, with 92 percent eating meat less than 2-3 times per week and 87 percent eating dark green leafy vegetables 2-3 times per week or less; consumption of lentils and pulses was similarly low (Figure 37). However, consumption of sugary snacks may be increasing: one in five adolescents ate biscuits every day and one in two ate them 2-3 times per week, while one in three ate cakes or ice cream 2-3 times per week (D. R. Jayatissa, 2018).

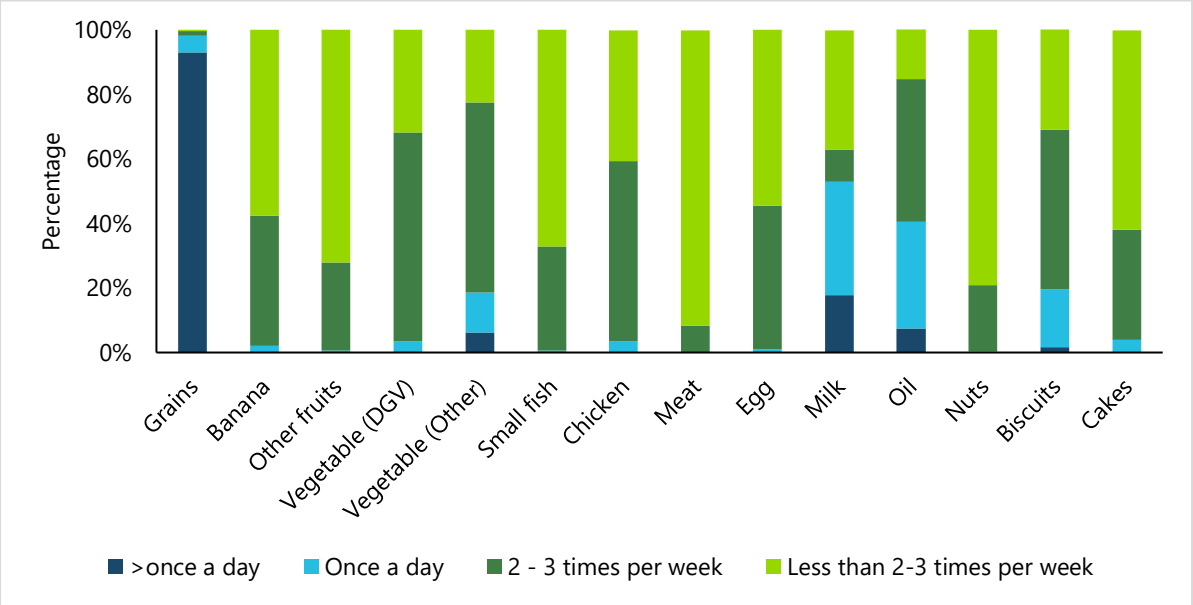


Figure 37: Average weekly consumption of different foods by adolescents ages 10-18 (D. R. Jayatissa, 2018)

Given this low consumption of nutrient-dense foods and prevalence of deficiencies in iron and potentially other micronutrients, supplementation could make an important contribution to meeting the needs of adolescents, particularly girls. The cost of a nutritious diet for an adolescent girl could decrease by up to one-third with iron-folic acid supplementation (given daily, according to international guidelines), reflecting the high cost of foods available on the market that would be required to meet her requirements for iron and folic acid. The reduced impact of this supplementation when provided according to Sri Lanka's current policy is due to the less frequent provision, once a week for six months per year rather than on a daily basis as per international standards. A multi-micronutrient tablet would have even greater impact than just iron-folic acid, reducing the cost of the girl's nutritious diet by more than 40 percent, from 139 LKR per day to 79 LKR (Figure 38).

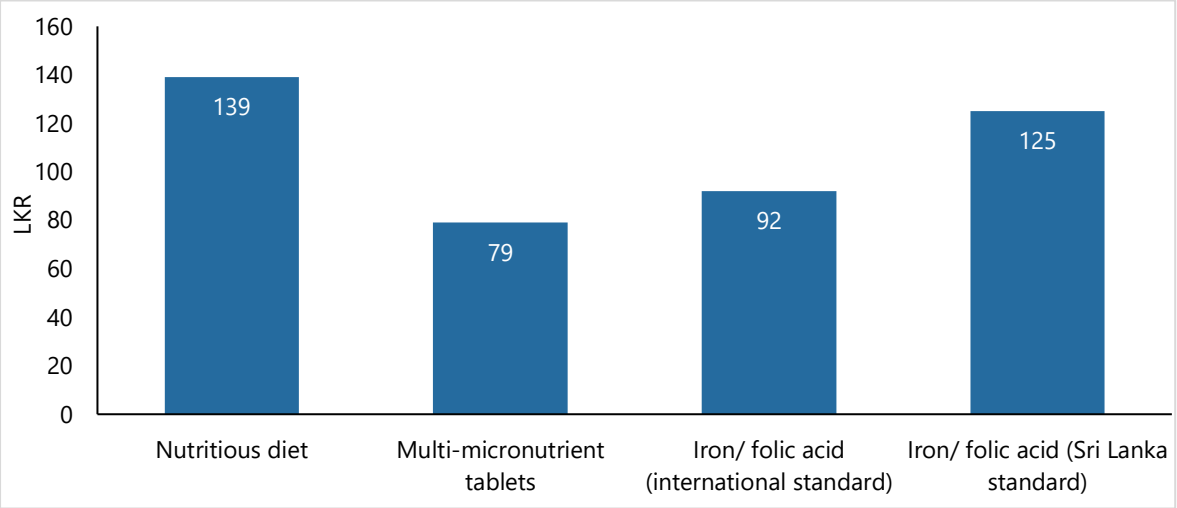


Figure 38: Average daily cost of a nutritious diet for an adolescent girl aged 14-15 years, with different micronutrient supplements (Cost of the Diet analysis, 2018)

Dietary diversity in adult women is quite good compared to adolescents. Consumption of vitamin A-rich fruit and vegetables is high, and over half of women reported consuming other fruit and vegetables, legumes and nuts, and animal-source foods (except dairy products) (Figure 39). However, consumption of oily and fatty foods is also common (nearly half of women) and nearly one-third of women consumed sugary foods. As noted earlier (message 4), these reported frequencies might be for small quantities of both nutritious and "empty calorie" foods, but increased sugar consumption is of concern for Sri Lanka's rising double burden (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017).

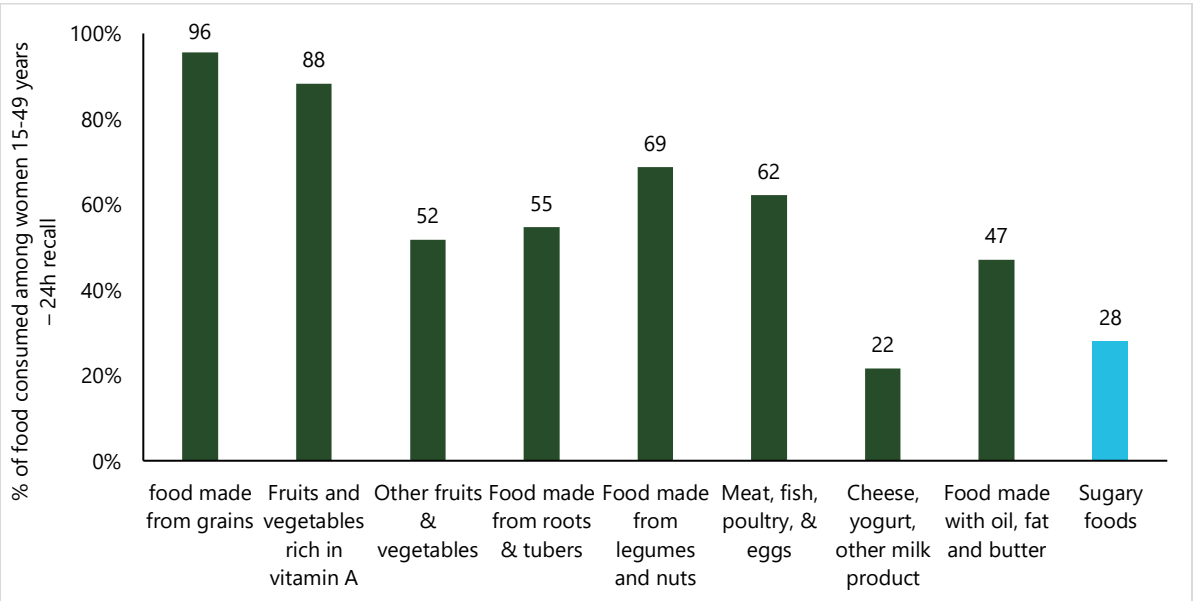


Figure 39: Consumption of different foods by women ages 15-49 over the past 24 hours, by food group (Department of Census and Statistics & Ministry of Health Nutrition and Indigenous Medicine, 2017)

The current government ration of 50 grams of Thriposha per day provided to pregnant and lactating women, decreases the daily cost of their nutritious diet by roughly 15 percent across the districts modelled (Figure 40). A ration of 100 grams would cover an even larger portion of a lactating woman's required intake for many micronutrients including vitamin C, many B vitamins and zinc; by comparison, 100 grams of Super Cereal Plus has greater vitamin A content but less folic acid, while a multi-micronutrient tablet notably provides more iron than 100 grams of either Thriposha or Super Cereal Plus (Figure 41). The increased Thriposha ration would decrease the cost of a lactating woman's nutritious diet by an average of 27 percent in the districts modelled. Supplementation with iron and folic can reduce the cost by approximately 14 percent, while a multi-micronutrient tablet would lead to a decrease of nearly 40 percent (Figure 40). These decreases reflect the high cost of nutrient-dense foods available on local markets to meet the nutritional needs of women, particularly foods rich in iron.

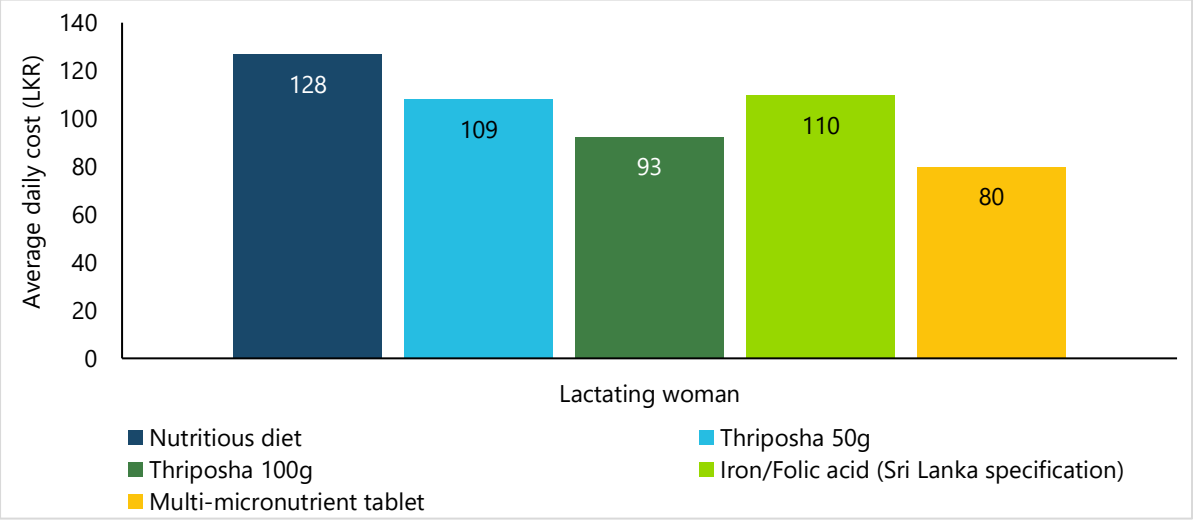


Figure 40: Average daily cost of a nutritious diet for a lactating women, with micronutrient supplementation and provision of specialised nutritious foods (Cost of the Diet analysis, 2018)

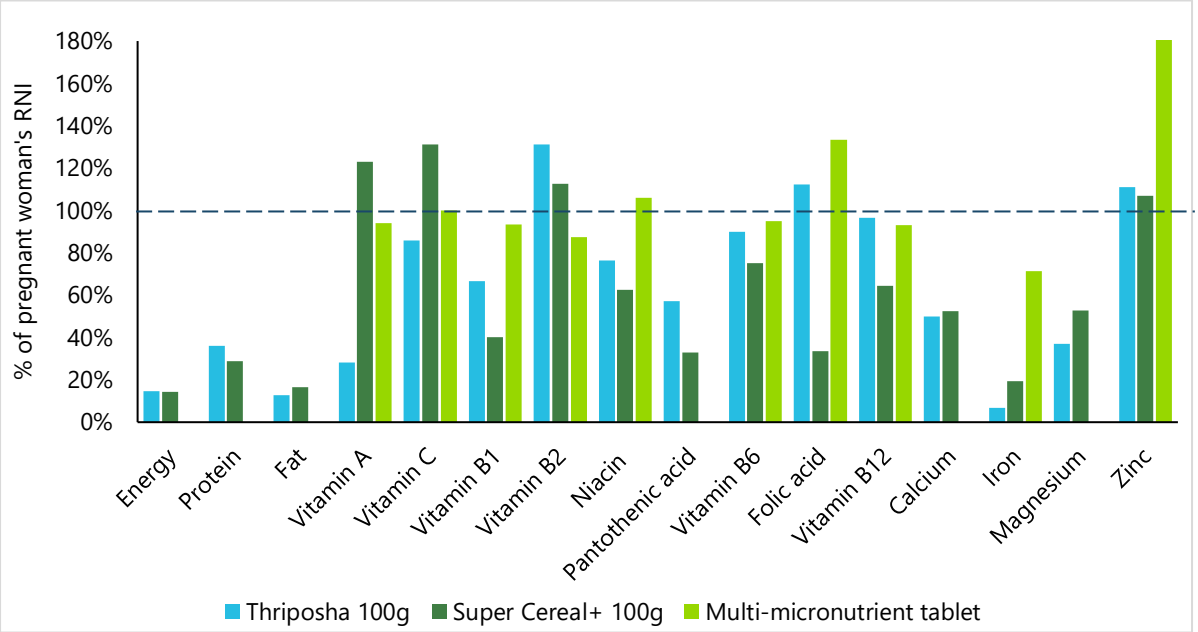


Figure 41: Percentage of the reference nutrient intake of a lactating woman covered by 100 grams of Thriposha or Super Cereal Plus, or by a multi-micronutrient tablet (Cost of the Diet analysis, 2018)

In addition to specialised nutritious foods and supplements, targeted vouchers can leverage social safety nets to contribute to improved nutrient intake in individuals and households. Sri Lanka's national PLW voucher programme currently provides 20,000 LKR worth of nutritious food[15] per woman during her last six months of pregnancy and first four months post-partum(Katuwawala & de Silva, 2016). Assuming the full amount of the voucher does go toward foods consumed by the woman, this could cover between 40-50 percent of the cost of her nutritious diet in the districts modelled (Figure 42). Even if distributed across the household, the value of the voucher would still make an important contribution that could account for more than 10 percent of the cost of a 5-person household's nutritious diet (Figure 43).

[15] The food is provided via coupons that are redeemable at Cooperative Wholesale Establishment, or SATHOSA, outlets. The food pack recommended by the Ministry of Health includes rice and undu flour; curd and fresh milk; dhal, cowpeas, green gram, chickpeas and soy beans; ground nuts, sesame seeds and coconut; meat, fish, dried fish, salmon, sprats and eggs; and local fruits and vegetables.

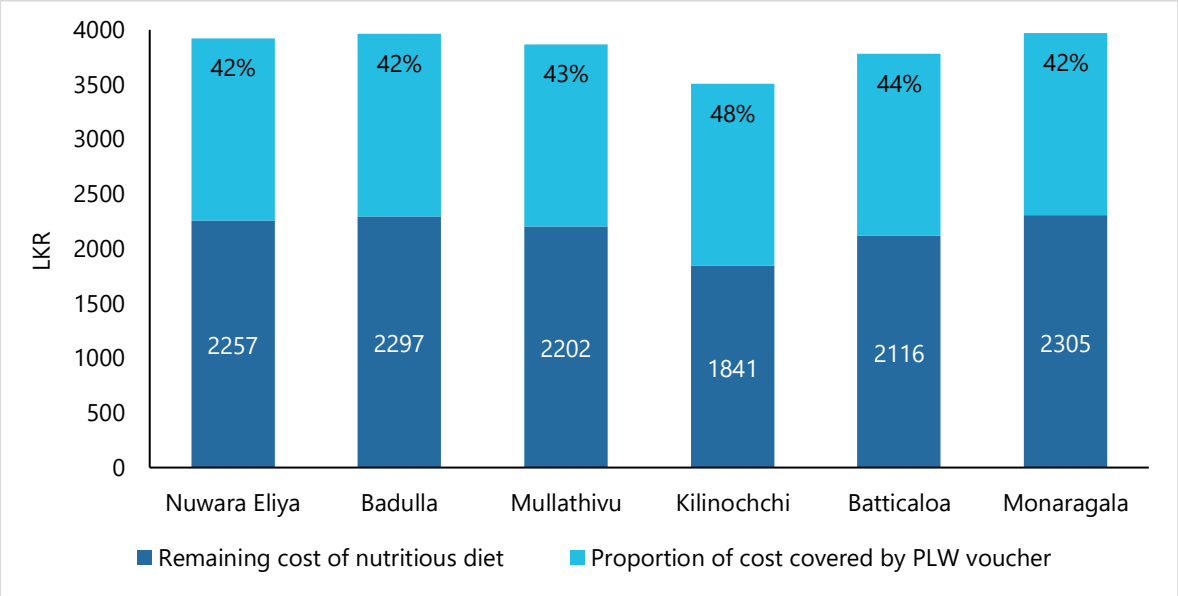


Figure 42: Percentage of the average daily cost of a nutritious diet for a lactating woman covered by the PLW voucher, and remaining cost to the household (Cost of the Diet analysis, 2018)

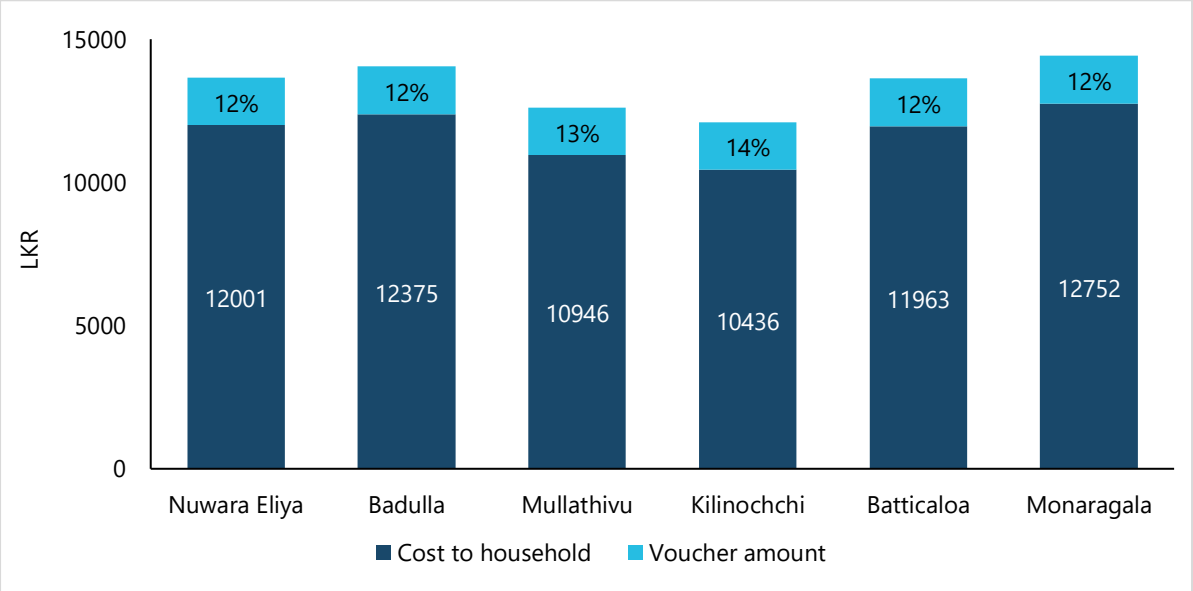


Figure 43: Percentage of the average daily cost of a nutritious diet for the modelled 5-person household covered by the PLW voucher, and remaining cost to the household (Cost of the Diet analysis, 2018)

Another voucher programme, Samurdhi, provides a higher amount (roughly LKR 2,590 per month, redeemable at SATHOSA outlets) intended to improve family-level nutrition and food consumption. The Samurdhi voucher reduces the cost of a nutritious diet for the household by 20 percent across the modelled districts (Figure 44).

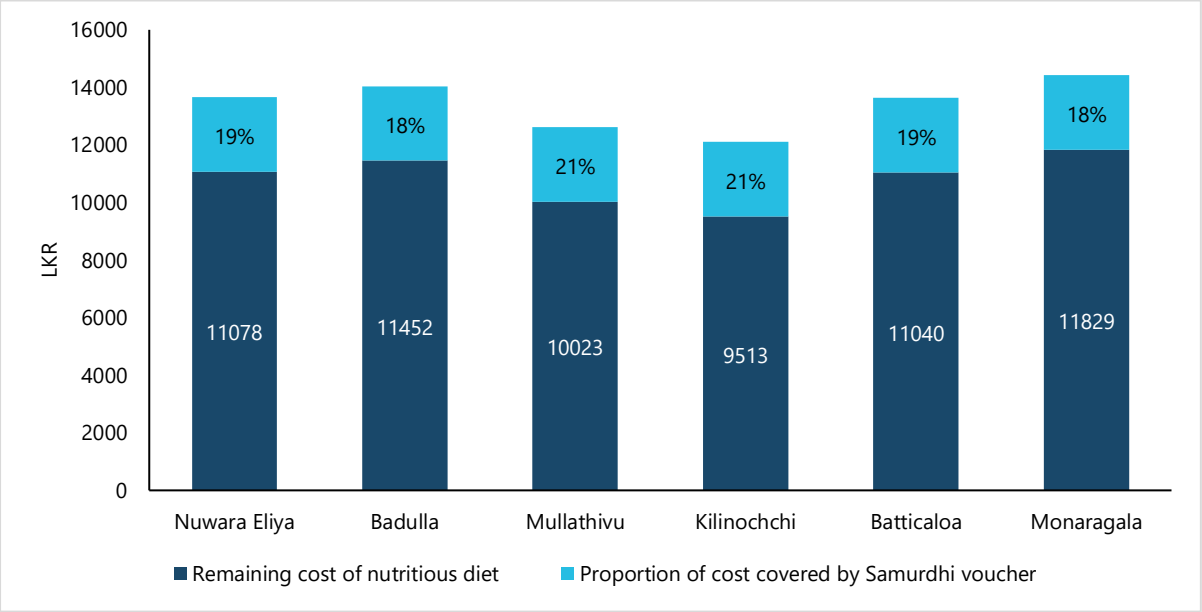


Figure 44: Percentage of the average daily cost of a nutritious diet for the modelled 5-person household covered by the Samurdhi voucher, and remaining cost to the household (Cost of the Diet analysis, 2018)

Climate-related shocks put food security and nutrition gains at risk and may also lead to seasonal differences in availability and access.

The timing of the Maha and Yala seasons, their harvesting periods and related climate patterns and hazards do not vary much throughout the country. Maha rice and maize are planted between September and November and harvested in February and March, while Yala cereals and vegetables are planted in April and May and harvested in August and September (Figure 45). This island-wide uniformity is reflected in prices of foods that are not regulated, which do not vary much across seasons and only slightly across districts (Figures 46-47). Because prices are fairly constant, the cost of a nutritious diet was found to be stable across seasons, increasing in some districts during the Maha season, especially the Maha harvest (Figure 48).

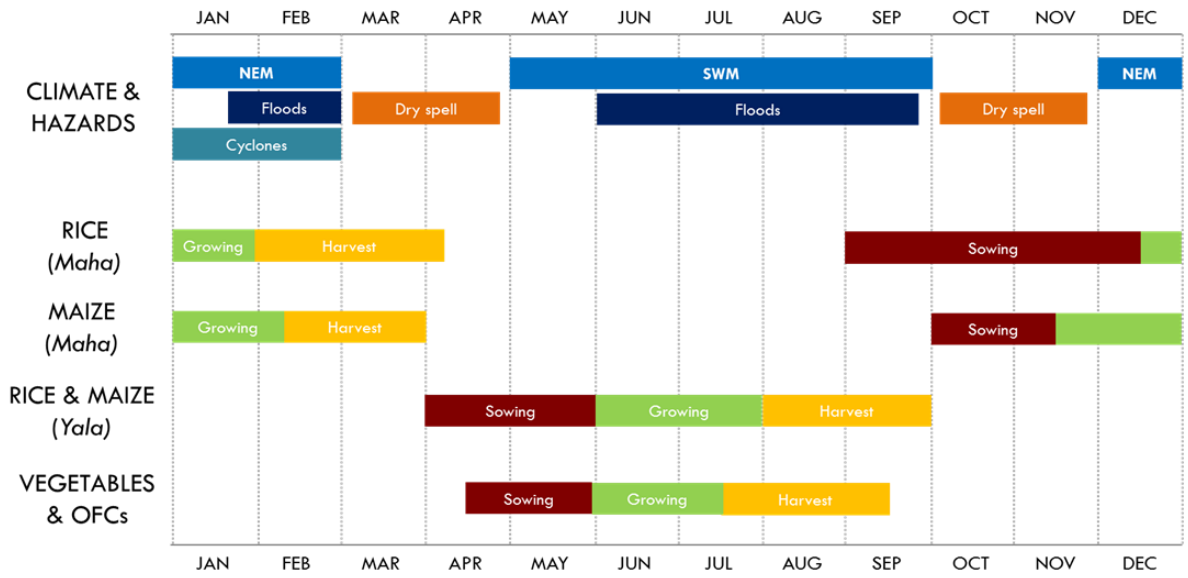


Figure 45: Seasonal calendar of Sri Lanka (World Food Programme & Hector Kobbekaduwa Agrarian Research and Training Institute, 2015)

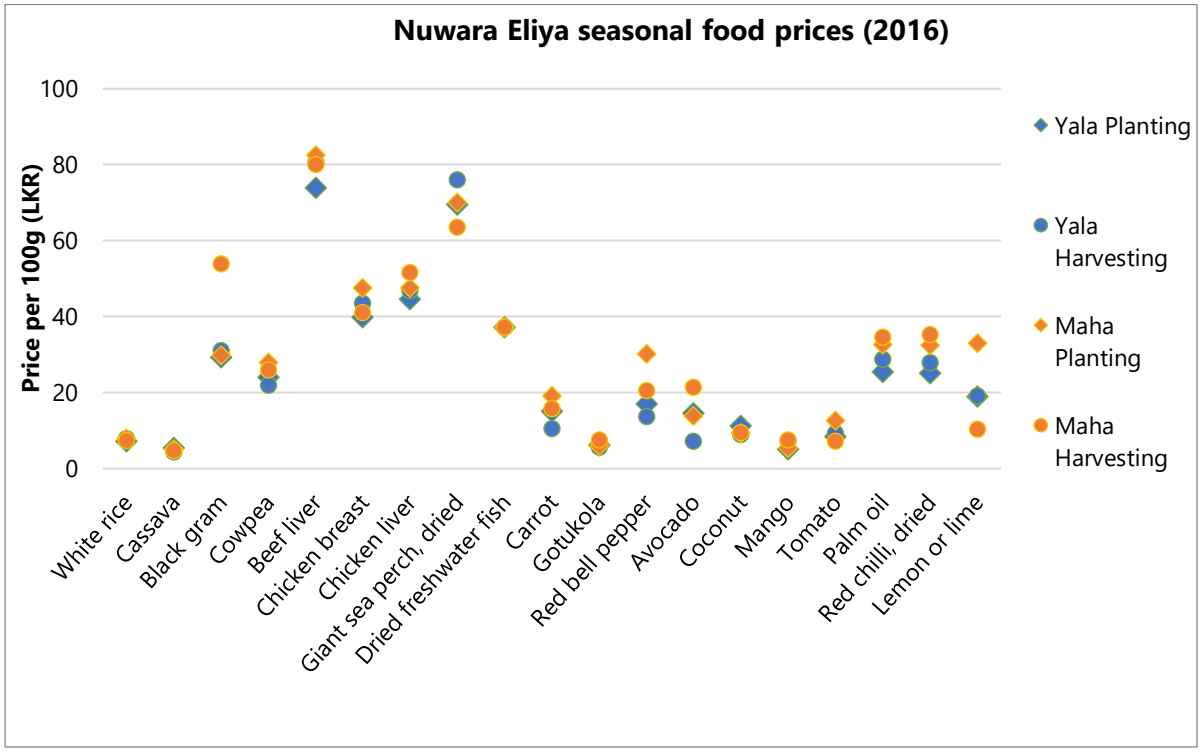


Figure 46: Average price per 100 grams of different food commodities in Nuwara Eliya, by season in 2016 (Cost of the Diet analysis, 2018)

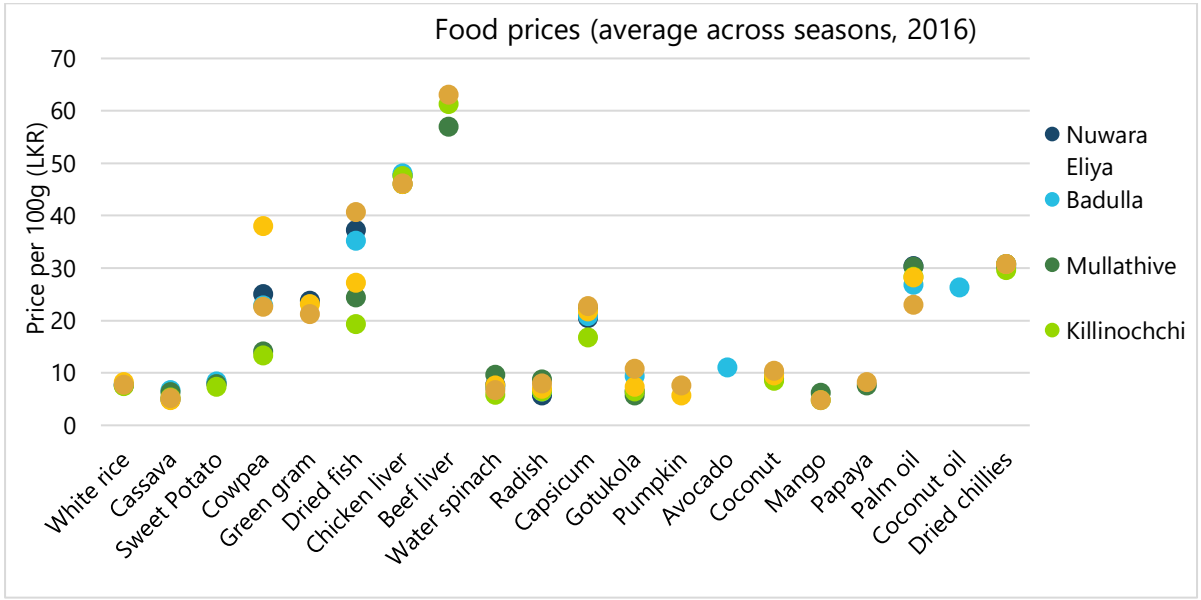


Figure 47: Average price across seasons per 100 grams of different food commodities in selected districts (Cost of the Diet analysis, 2018)

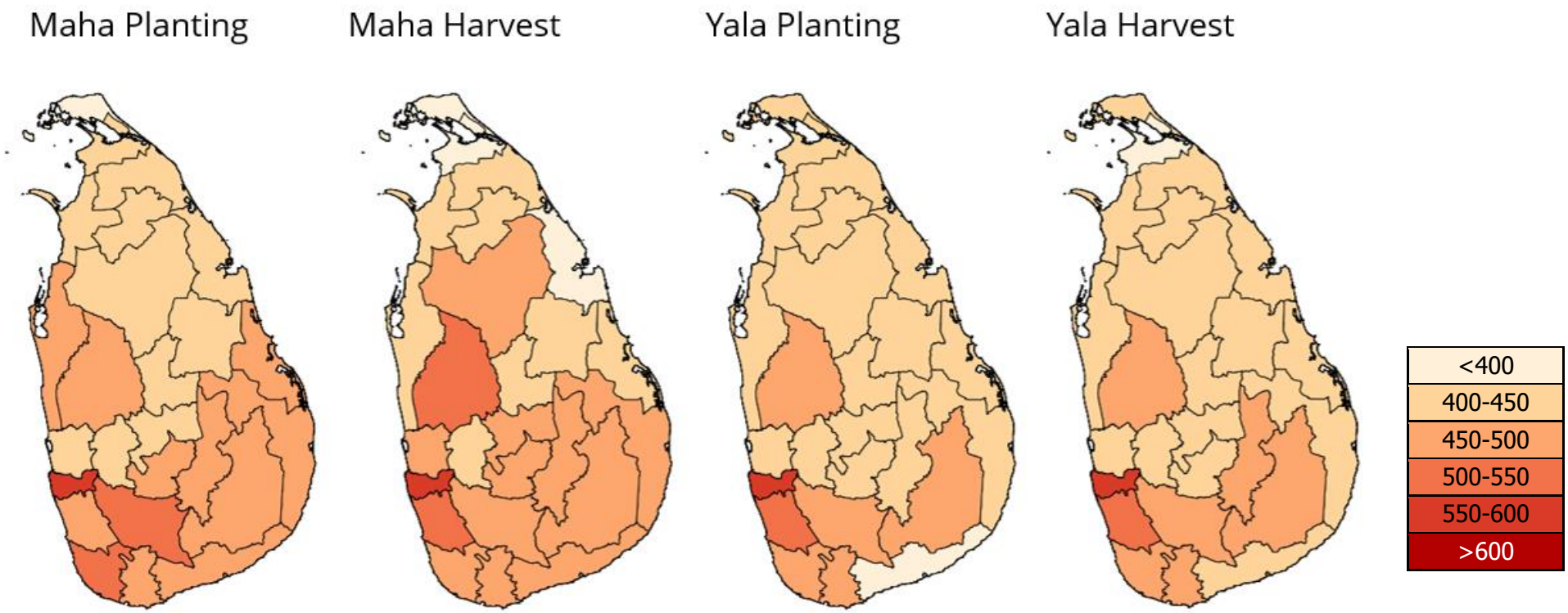


Figure 48: Average daily cost in LKR of a nutritious diet for the modelled 5-person household, by season and district (Cost of the Diet analysis, 2018)

However, Sri Lanka is susceptible to climate-related shocks, and is likely to experience an increasing number of events like bad harvests and droughts as the effects of climate change intensify. These shocks and resulting poor harvests correlated with increased rice prices in 2016 and 2017 (Figure 49), are linked to livelihoods and household food and nutrition security. During droughts in recent years, 15-30 percent of households reported poor or borderline food consumption, indicating decreased quantity and quality of diets among these households (Coslet et al., 2017).

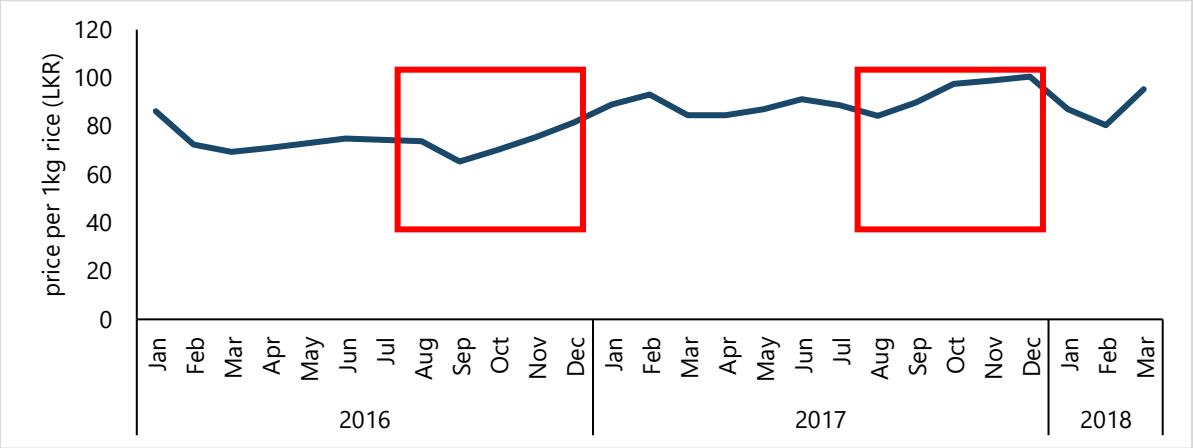
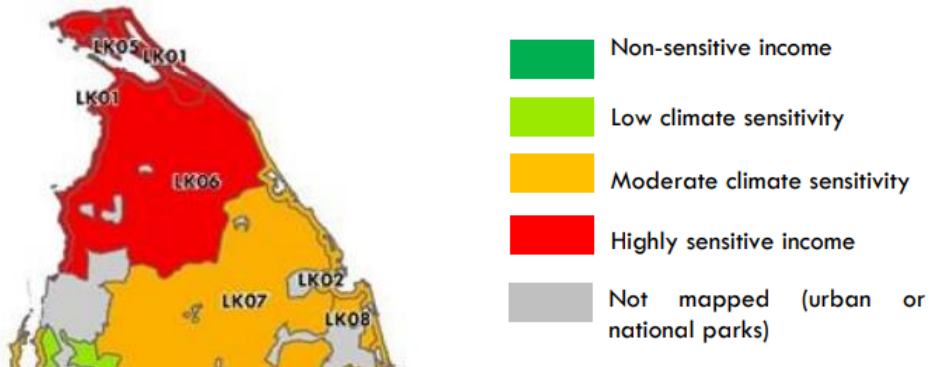


Figure 49: Average price in LKR per kilogram of rice, by month, with bad harvests and resulting higher prices market in red boxes (World Food Programme, n.d.-a, n.d.-b)

There is significant overlap between areas with more climate-sensitive livelihoods and incomes, greater risk of food insecurity, higher poverty rates, and lower road density. The greatest climate impacts on income are expected for rain-dependant livelihoods, including rainfed paddy and other agriculture, which are also areas that have been more affected by recent droughts (LK 06 and 09 in Figure 50) (World Food Programme & Hector Kobbekaduwa Agrarian Research and Training Institute, 2015). Moreover, these zones already have higher percentages of households living in poverty as well as lower road density, which may inhibit market access and limit the supply of foods available in markets. In these zones access to nutritious diets could decrease, potentially leading to higher rates of malnutrition (Coslet et al., 2017; Krishnamurthy, Turano, Nanayakkara, & Kumarasiri, 2014).



Rice consumption is high, therefore fortification of rice and other staples has high potential to improve micronutrient intake.

Domestic production in Sri Lanka is focused on staples and has not diversified much over the past 10 years (South Asia Policy and Research Institute et al., 2017b). After paddy rice, the greatest number of hectares are devoted to coconut production, followed by tea; all other crops represent a small share of total cultivated land (Figure 51). While rice dominates staple consumption, Sri Lanka is nearly self-sufficient in rice thanks to these high levels of domestic production, while other less-consumed staples such as wheat and maize are primarily imported (South Asia Policy and Research Institute et al., 2017b).

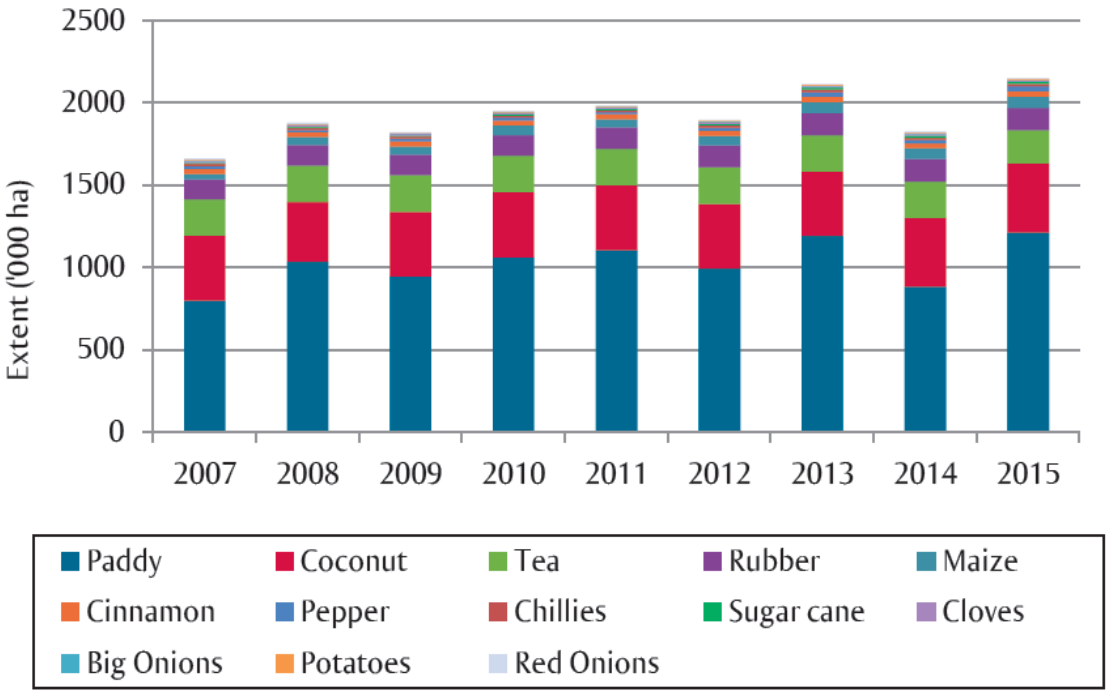


Figure 51: Hectares cultivated by crop (South Asia Policy and Research Institute et al., 2017a)

Consumption of staples, primarily rice, exceeds national and international recommendations for the percentage of energy intake from carbohydrate foods. Across the country and across sectors Sri Lankans get an estimated 75 percent of their energy intake from these foods, yet the national FBDGs recommend 65 percent and the WHO 50 percent (Figure 52) (Jayawardena et al., 2014).

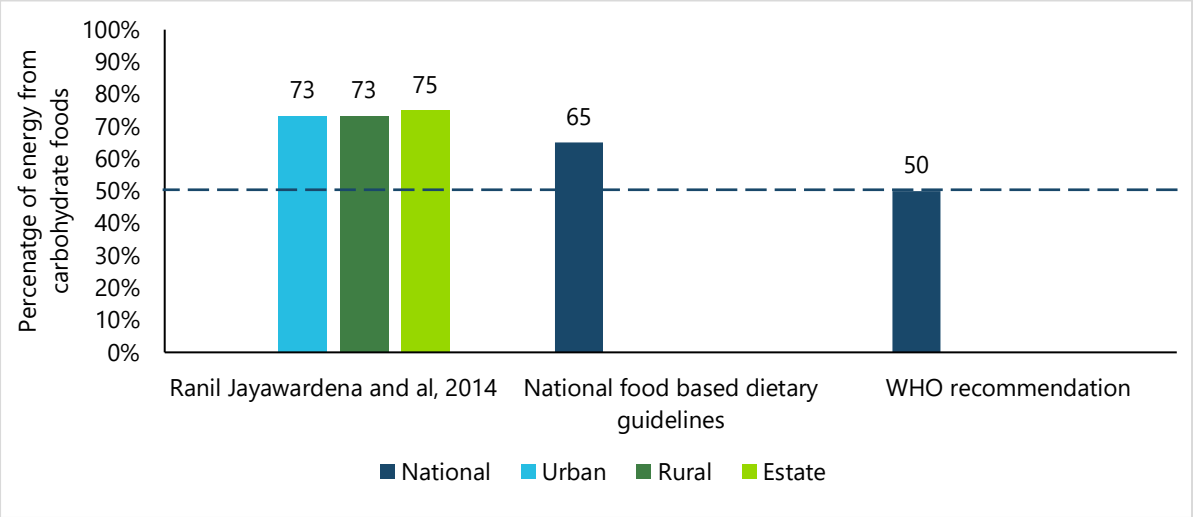


Figure 52: Average per capita percentage of energy intake from carbohydrate foods compared to national and international recommendations, by sector (Jayawardena et al., 2014)

In addition to the importance of increased dietary diversity as highlighted in previous sections, fortification of staple foods could contribute to better nutrient intake, particularly given the large share of rice in current diets. A national fortification policy that is currently pending cabinet approval would include: mandatory wheat flour fortification with iron and folic acid to combat anaemia; rice fortified with iron and folic acid distributed through social safety nets, including to schools; and a recommendation to assess the feasibility of local production of fortified rice kernels. Although this proposed national specification for fortified rice includes iron and folic acid, including additional micronutrients (such as B vitamins, vitamin A and zinc) should be considered as it could make an important contribution to improved micronutrient intake.

Wider market availability of fortified staples, beyond social safety nets, could also make an important contribution to nutrient intake among the wider population. Rice fortified with iron and folic acid could reduce the cost of a nutritious diet for households by more than 10 percent, if available for purchase on the market at a price 2 percent higher than that of unfortified rice (Figure 53). Multi-micronutrient fortified rice, in particular, would cover all of the household's requirements for many B vitamins and zinc, as well as folic acid, and contribute substantially to vitamin A requirements (Figure 54). For the household, this represents a straightforward way to improve nutrient intake with minimal time and effort. Fortified wheat flour provides additional nutrients but would decrease the household's cost only slightly (2 percent) because wheat flour is consumed less than rice in the Sri Lankan context.

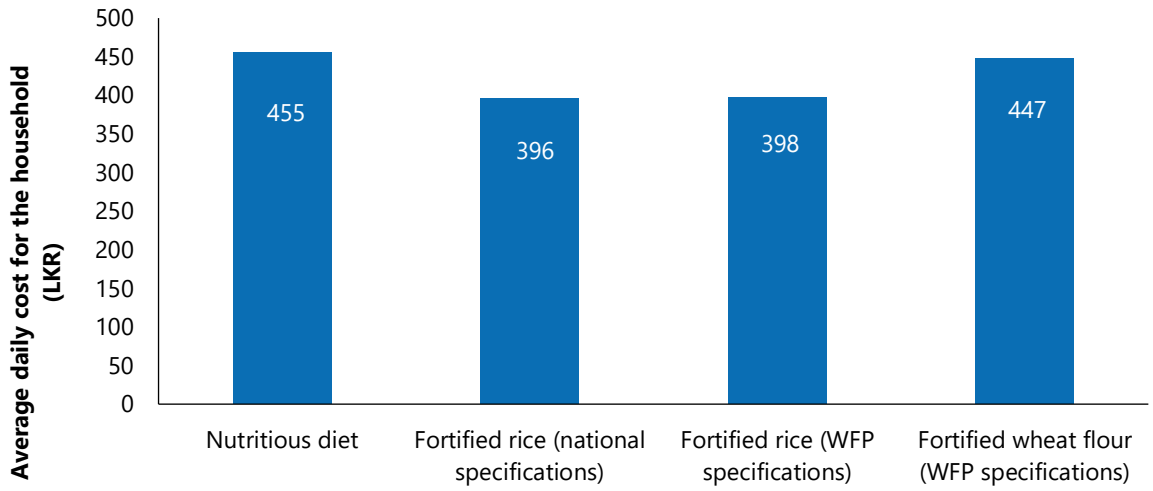


Figure 53: Average daily cost of a nutritious diet for the modelled 5-person household, with different fortified staples available on the market (Cost of the Diet analysis, 2018)

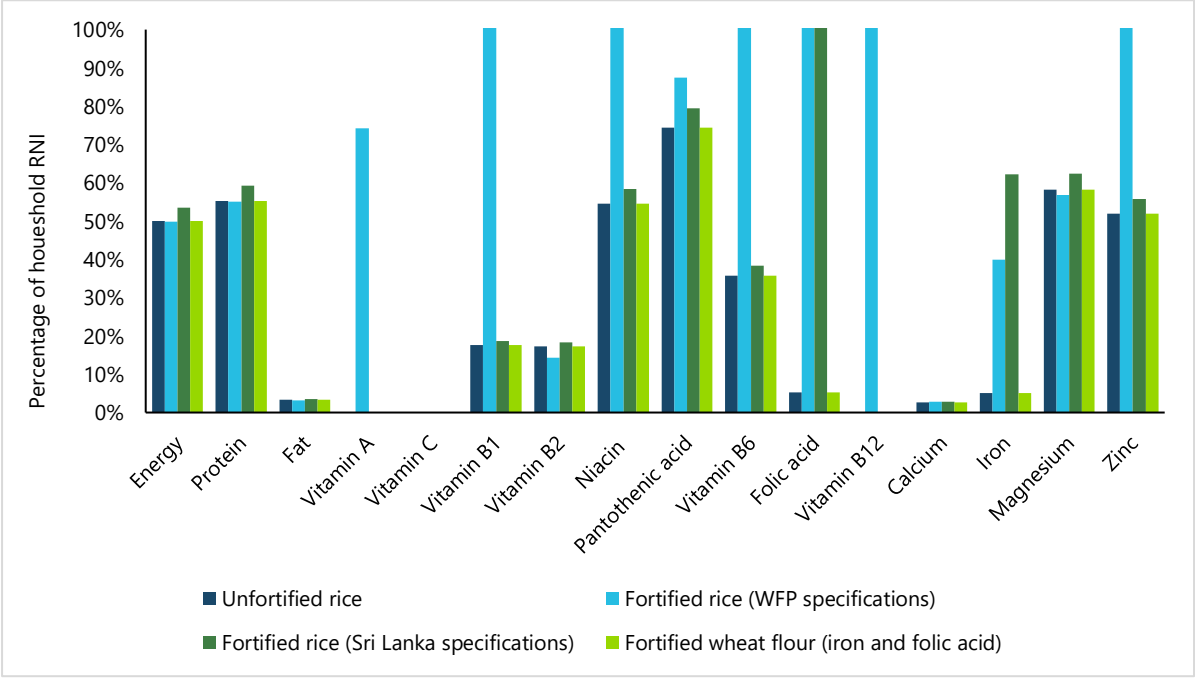


Figure 54: Percentage of RNI for the modelled 5-person household met by unfortified rice and different fortified staples, by nutrient (Cost of the Diet analysis, 2018)

School meals are an important platform for reaching schoolchildren with diverse and nutritious meals and establishing healthy dietary patterns.

Nearly all boys and girls in Sri Lanka attend school between ages 6 and 15, making the educational system a crucial entry point for nutritional interventions to prevent both undernutrition and overweight/obesity. Primary school-aged children (6-12 years) are still more likely to be thin (40 percent, including 10 percent severely thin) than overweight (9 percent including obese) (Figure 55), and stunting prevalence is higher in 12-year-olds than in younger children, but anaemia prevalence is relatively low (less than 15 percent) (D. R. Jayatissa et al., 2017).

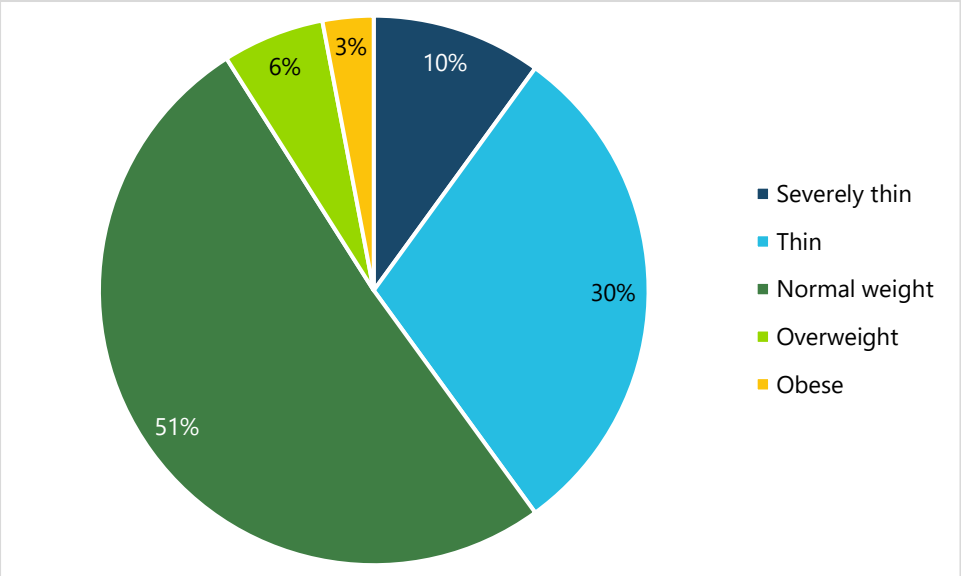


Figure 55: BMI of schoolchildren ages 6-12 (D. R. Jayatissa et al., 2017)

Educational interventions, including school meals, should aim to improve nutrient intake and dietary diversity while also limiting unhealthy behaviours. The most frequently consumed food groups among children aged 6-12 years were cereals, vegetables other than green or yellow, and oily foods, eaten by at least 70 percent of children (Figure 56). More than half of children reported eating bread, fish and milk products, green vegetables, and fruit the previous day. Iron-rich foods are a particular area where increased consumption should be targeted, as one-third of children reported eating meat and only 10 percent ate pulses. Increasing or maintaining consumption of nutritious and fresh foods must be complemented by limiting snacking, especially intake of processed sugary foods. More than 60 percent of 6-12 year-olds ate sugar products or biscuits and cakes, nearly half ate candy and chocolates, and one-quarter had soft drinks or other snacks (Figure 57). Among students aged 10-18, 90 percent reported having a snack every day. Finally, micronutrient supplementation through schools could also be expanded to increase the

number of children aged 10-18 who receive iron (currently 67 percent), especially given the potentially low consumption of iron-rich foods, vitamin A (33 percent) and deworming treatment (65 percent) (Figure 58) (D. R. Jayatissa et al., 2017).

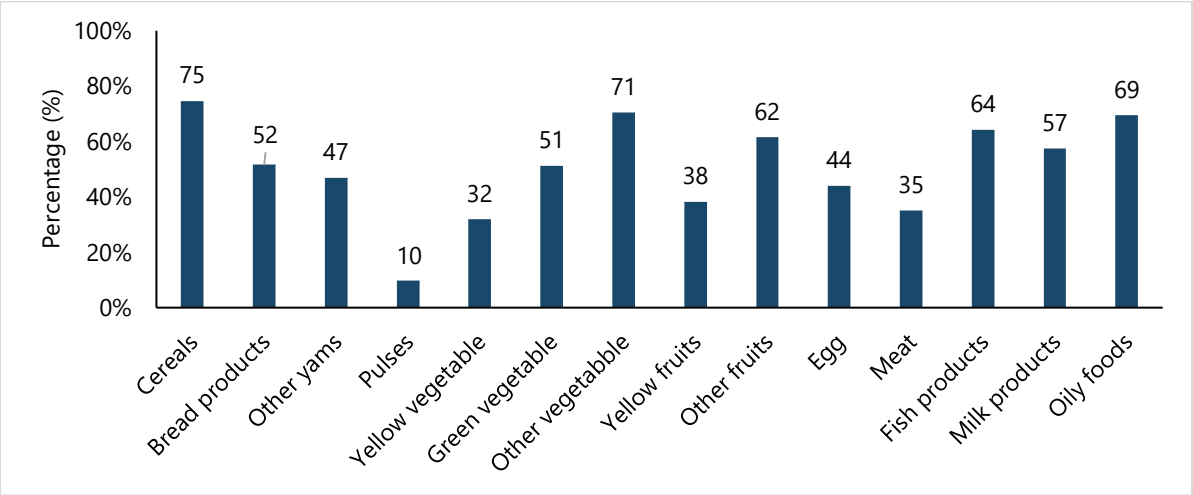


Figure 56: Percentage of children ages 6-12 consuming different food groups in the previous day (D. R. Jayatissa et al., 2017)

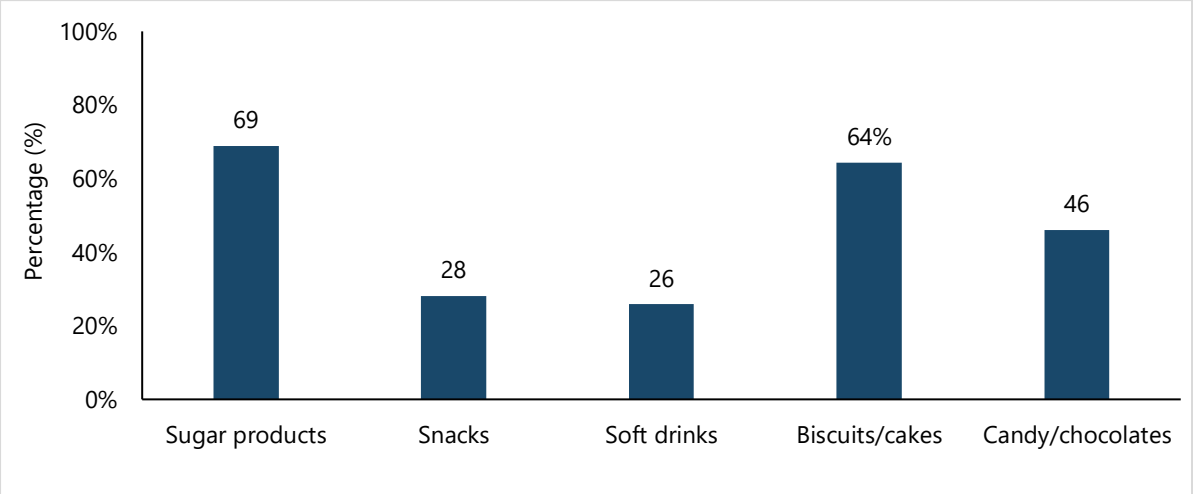


Figure 57: Percentage of children ages 6-12 consuming different sugary snack foods in the previous day (D. R. Jayatissa et al., 2017)

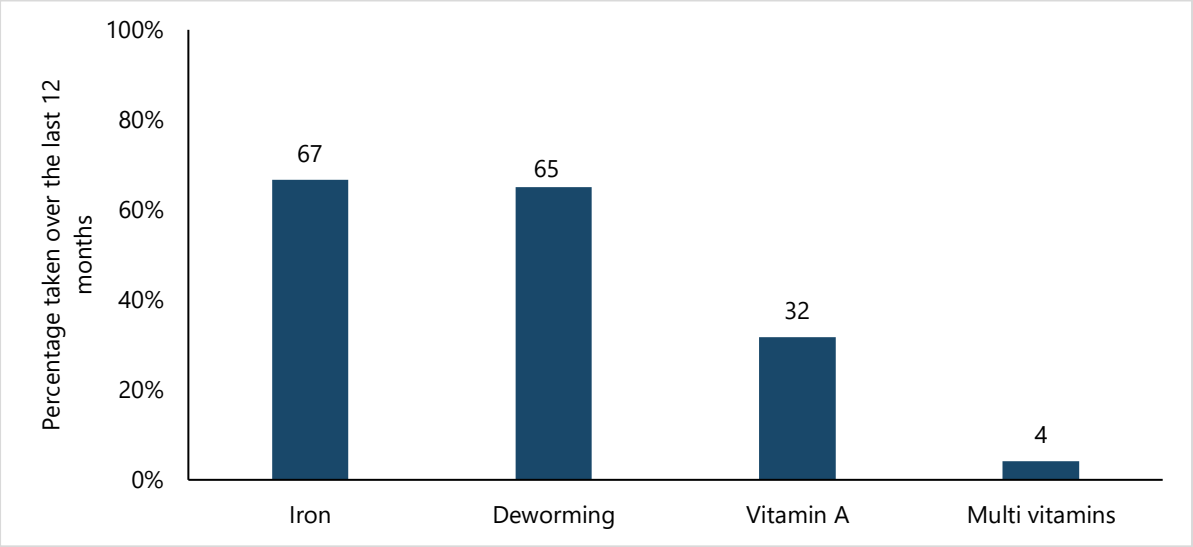


Figure 58: Percentage of adolescentes ages 10-18 who received micronutrient supplementation or deworming treatment over the past 12 months (D. R. Jayatissa, 2018)

Sri Lanka's midday school meal programme currently prioritises primary school children, with 40–50 percent of children aged 6-9 receiving meals and less than one-quarter of those aged 11-18 (D. R. Jayatissa et al., 2017). Rations consist of five food groups – cereals, pulses, vegetables, animal-source foods, and oil, providing 540 kcal at an approximate average local purchase cost of LKR 25 (Figure 59). A separate programme provides a daily ration (150 ml) of milk, at an average cost of LKR 13 if purchased locally. Both programmes contribute to meeting the nutrient needs of children and reducing the amount of money their families must spend to ensure an adequately nutritious diet for the child. If combined, the school meals and milk would cover one-fifth of the cost of a nutritious diet for a school-aged child or LKR 18 per day (Figure 60). This combined ration would cover a reasonable proportion of the child's energy and nutrient needs, with the assumption that meals provided at home are similarly nutritious. The current ration plus milk would help meet the child's recommended nutrient intake (RNI) for vitamin B2, niacin, pantothenic acid, vitamin B6, vitamin B12, magnesium and zinc (as well as vitamins A and C, which are already met by either the meal ration or the milk alone) (Figure 61).

Food group	Foods	Quantity
Cereals	Rice, aata flour, string hopper	71 grams
Pulses	Chickpea, green gram, daal	17 grams

Vegetables	Moringa leaves, tomato, carrot, cucumber, red onion, cabbage	32 grams
Animal source foods	Dried fish Sprats or egg	15 grams 15 grams or 50 grams
Oils and fats	Vegetable oil Coconut	7 grams 33 grams

Figure 59: Average composition of school meals rations based on 10-day menu cycle

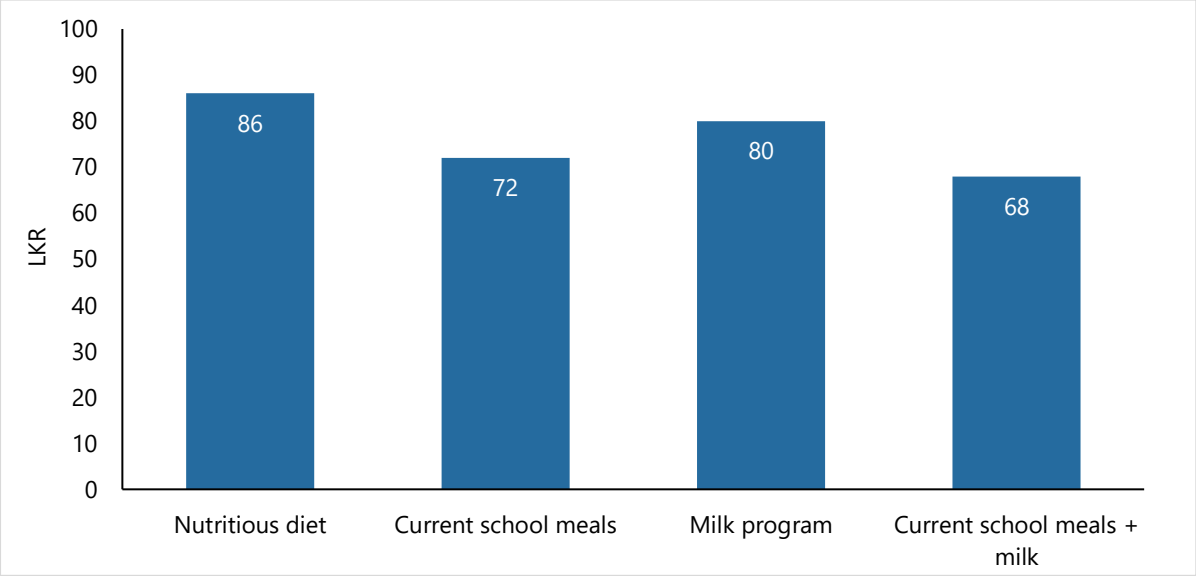


Figure 60: Average daily cost in LKR of a nutritious diet for a child aged 6-7 years with different school meals rations (Cost of the Diet analysis, 2018)

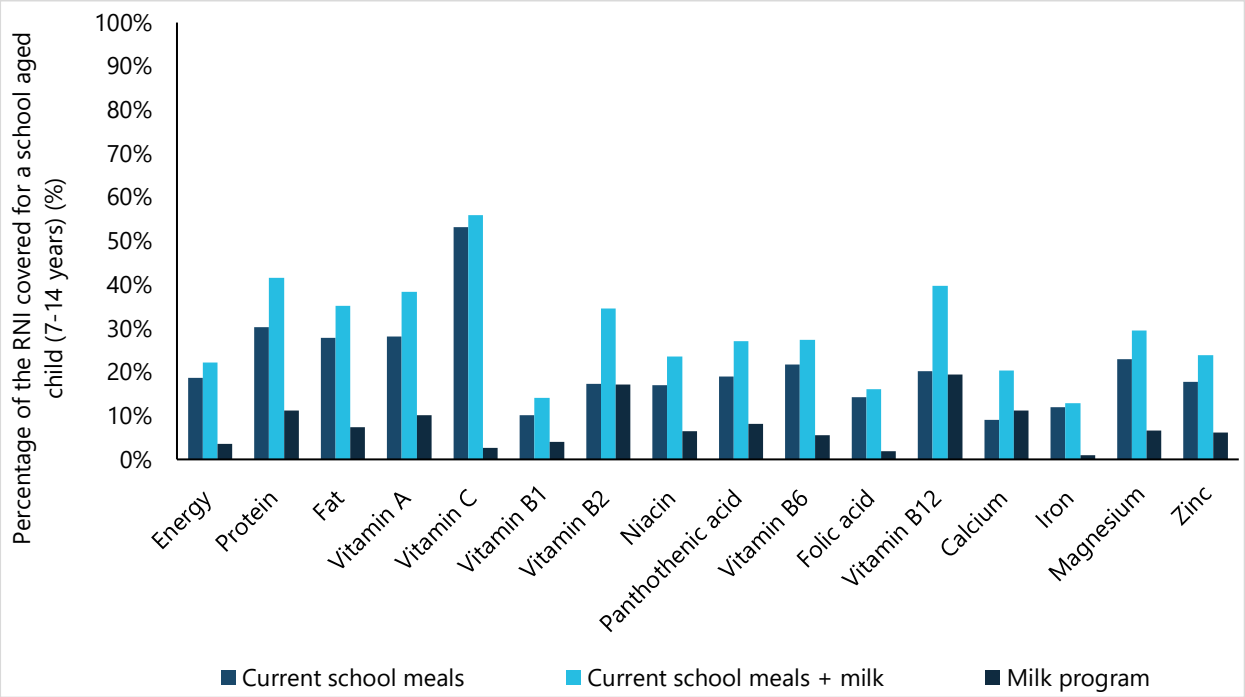


Figure 61: Percentage of RNI of a child aged 6-7 years covered by different school meals rations, by nutrient (Cost of the Diet analysis, 2018)

Giving fortified rice in school meals, as per the proposed fortification measure that is currently awaiting approval, would further improve the nutrient intake of school children. If fortified with multi-micronutrients, it would provide greater quantities of certain B vitamins, folic acid, and zinc (Figure 62). Fortified school meals would decrease the cost to the household of a nutritious diet for the school-aged child by one fifth, and by one quarter if combined with the milk programme. An iron supplement added to the current unfortified school meal ration would decrease the cost slightly more than the current ration alone (Figure 63). However, if the school meal programme were to expand coverage to secondary schools and target adolescents, particularly girls, iron supplementation could be an effective addition given the higher needs of this older age group.

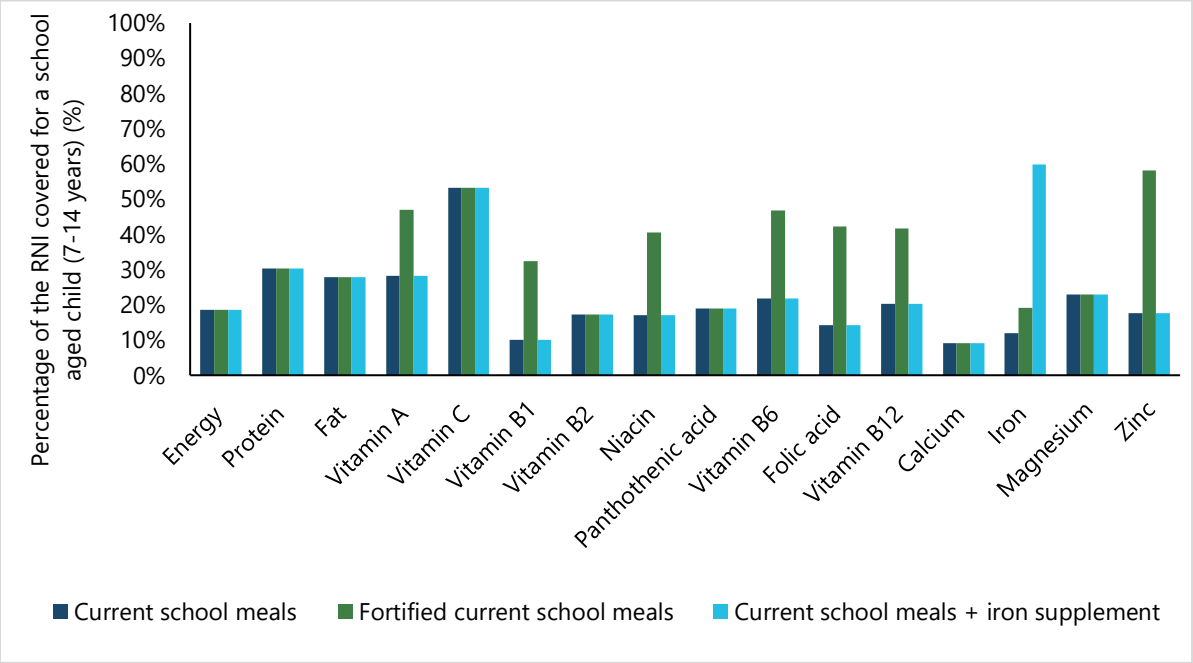


Figure 62: Percentage of RNI of a child aged 6-7 years covered by different school meals rations,wherein fortified rations iclude fortified rice, by nutrient (Cost of the Diet analysis, 2018)

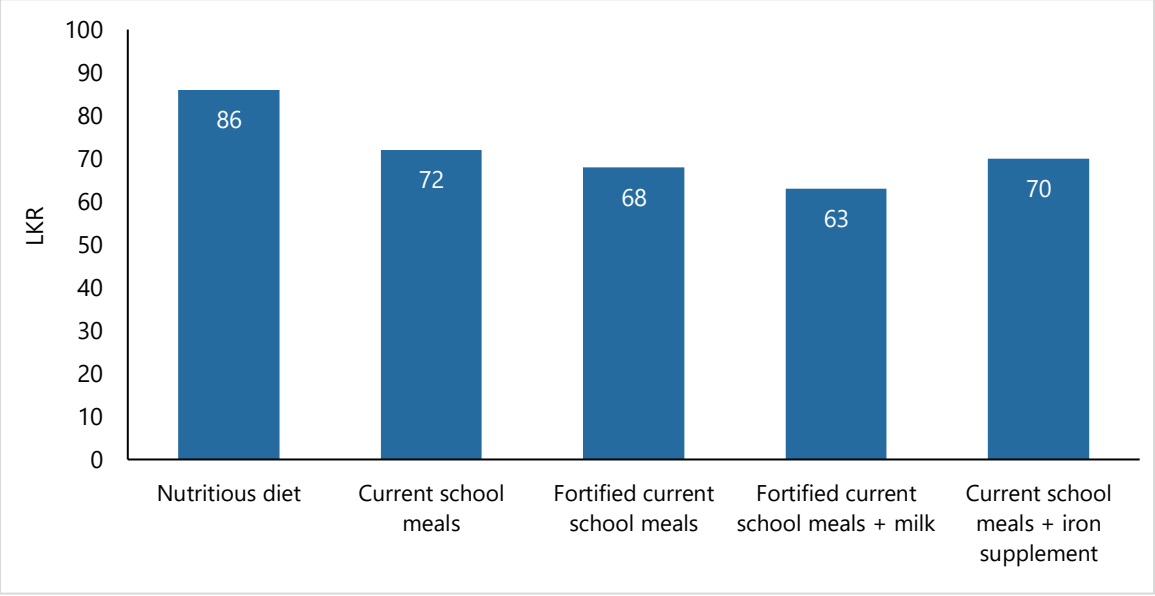


Figure 63: Average daily cost in LKR of a nutritious diet for a child aged 6-7 years with different school meals rations (Cost of the Diet analysis, 2018)

Stakeholder recommended priorities based on FNG findings and developed through group work, by sector

During the dissemination workshop, the main findings from the FNG analysis were shared and discussed with a broad group of stakeholders, who then worked together to formulate and prioritise recommendations. Participants formed six groups around a given theme: IYCF, agriculture, dietary diversity, climate-related shocks, food industry and social protection. Each group was asked to brainstorm interventions that could contribute to improved dietary diversity based on the challenges and opportunities identified by the FNG findings. The groups then selected one priority intervention, presented below, for which they identified target groups, objectives, specific opportunities and gaps, sectors to engage, and short- (1-2 years) and medium-term (3-5 years) activities.

1. IYCF: Develop and implement a communication for behavioural impact (COMBI) strategy to improve dietary diversity among children under 5 years.

Minimum dietary diversity among young children in Sri Lanka is constrained by unavailability or unaffordability of a diverse diet, health (such as frequent illnesses), inadequate IYCF practices, and other factors that influence caregivers including food taboos and myths. The FNG results highlight many good practices, particularly around breastfeeding, but show that minimum dietary diversity in particular is low and has not improved over recent years.

The COMBI plan should target caregivers with messages about the importance of animal source foods, fruit and vegetables, leveraging the increased literacy rate and the current strong focus on children in national policies. The plan should also include a component focused on limiting or reducing sugar intake. Health centres, mother support groups and other existing community-based organisations are good potential entry points for COMBI, but efforts must be made to address any language barriers or capacity constraints at the level of the health centres. Male caregivers should be included alongside women with the aim of improving gender equality and intra-household dynamics. The strategy and the specific messages should be developed in consultation with a broad range of sectors and stakeholders, including not only the ministries of health and women and child affairs, but also religious leaders, media, and social services.

In the short term a multi-sectoral working group should be established to develop the plan, with the aim of beginning implementation within 3-5 years. In the medium term, a team should be assembled (possibly volunteers) and trained on COMBI so they can train caregivers.

2. Agriculture: Identify and select nutrient-rich crops for school, home and community gardens for improved nutrition.

Sri Lanka has a number of existing programmes and initiatives to promote good agricultural practices, nutrition and resilience, including home garden promotion, school and preschool meals and gardens, edible landscapes, and Samurdhi[16]. The working group brainstormed several areas where there is room for improvement, including:

- crop selection and breeding based on nutritional value;
- nutrient analysis of crops;
- better post-harvest loss management;
- greater education and awareness raising on affordable nutritious foods and production;
- promotion and establishment of community gardens;
- management of off-season crop production;
- promotion of under-utilised crops; and
- initiatives for better sustainability and resilience in agriculture.

The priority identified for agriculture entails leveraging Sri Lanka's high crop diversity, existing gardening programmes and government extension services, and strong organisational structure for the development of technology. These aim to increase the knowledge base, improve coverage of agricultural initiatives, and strengthen coordination among institutions. The recommendation is two-fold: 1) improve data collection on local crops and their nutrient content, and 2) develop and promote garden models that are adapted to diverse geographic areas, incorporating locally grown nutrient-dense crops. This is particularly important for good nutrition outcomes, as the FNG found that a large share of domestic production of fruit and vegetables is from home gardens. The need for strong multisectoral collaboration was highlighted, including with the private sector (potential engagement with seed and fertilizer companies, food processing companies, and retailers).

Specific objectives highlighted by the group include:

- identifying crops with high nutrient content that could improve nutrition at low cost;
- developing innovative and attractive low-cost production techniques;
- enhancing sustainable production and marketing of these crops; and
- ensuring economic sustainability of nutritious food production.

Implementation of this approach would entail multiple phases. The first phase requires identification and collection of information on locally grown crops (either collation of available information or primary data if necessary), and subsequent selection of appropriate nutrient-dense crops to be promoted in different agro-ecological zones. The second phase

[16] One of the three key components of the Samurdhi programme is the rehabilitation and development of community infrastructure and resources; the other two components are a food stamp voucher and a savings and credit programme.

consists of developing home garden models in schools based on the crops identified, and then adapting these models to home and community gardens. In addition to school gardens, there could also be an initiative to improve the diversity of production among smallholder farmers (via government extension services) and link them with home-grown school feeding programmes to ensure the availability of diverse foods in school meals.

Complementary activities include measures that can engage the private sector by introducing competition for these crops and rewarding producers, and interest can be stimulated with food shows to increase knowledge about possible crops, how to grow them and manage post-harvest losses, and their nutritional benefits.

This intervention involves a wide range of partners across sectors. The ministry of agriculture will have a lead role in many of the activities, including selecting appropriate crops for the gardens (in collaboration with the ministries of education and health), developing and adapting school garden models for homes and communities (in collaboration with the presidential secretariat), organizing food shows (with research institutes and universities), providing and developing necessary technology, supplying materials for planting and infrastructure facilities, raising awareness and promoting education around these crops (with the private sector, the ministries of health and education, and universities), and helping to develop consumer-oriented value chains (with international non-governmental organisations and HARTI).

3. Dietary diversity: Improve dietary diversity through effective implementation of Sri Lanka's Food-Based Dietary Guidelines (FBDGs).

Though Sri Lanka's Food-Based Dietary Guidelines were recently revised, the FNG results showed that consumption of staple foods remains too high while fruit and vegetables appear to be consumed at about half the amount recommended. An implementation plan with a focus on results should be developed for the FBDGs, including design of indicators for monitoring and evaluation, and formulation and implementation of a nutrition behaviour change communication strategy.

Some of the short-term activities identified for this recommendation have already been accomplished, including revision of the guidelines and agreement with the government to formulate an implementation plan. Additional activities to be undertaken for the preparation of an implementation plan include designing indicators for monitoring and evaluation, and formulating and implementing a nutrition behaviour change communication strategy. Once implementation of the FBDGs begins, there should be regular review and revision of the programme.

Strong multisectoral engagement and coordination is crucial to translate the high political commitment into prioritisation and resource allocation for effective implementation. The plan should involve development and/or enforcement of healthy dietary guidelines based

on the FBDGs for school and preschool meal programmes and workplace canteens. This will require the participation of the ministries of health, education, agriculture, and estates, as well as social welfare and the children secretariat. Media channels should be sensitised to promote healthy food purchasing and cooking behaviours, while also engaging with the private sector for better regulation of advertising for unhealthy foods.

4. Climate change: Mitigate the effects of climate change on agricultural production and the cost of nutritious food through climate-smart agriculture approaches.

Sri Lanka is highly vulnerable to climate change and the resulting shocks, such as more frequent and severe droughts and floods, which pose a threat to agricultural production and food and nutrition security. These outcomes may be mitigated through the broad-scale development and implementation by smallholder farmers of climate-smart agriculture (CSA), which entails use of resistant crop varieties, smart water management, and weather-based decision management.

Effective use of CSA approaches will require public and private sector investment across the agricultural and meteorological sectors. Short-term activities identified include: training and capacity-building in meteorology, development of a mechanism to translate weather information into understandable agricultural guidance, strengthening of the agricultural extension system (both physical and digital), farmer training including on nutrition and the importance of crop diversity, and development of a coordination mechanism between the government and private sector. Mobile platforms present an excellent opportunity to disseminate messaging, and telecom companies will play a crucial role in ensuring dissemination of CSA messages and techniques.

Advocacy will be required to leverage the high government priority for agricultural modernisation into effective interdepartmental coordination, policy consensus, and resource allocation for necessary research and design. Sri Lanka has well-established research institutes which should be engaged to provide technical inputs and guidance. Other sectors can contribute complementary interventions including weather indexed insurance (through banking and insurance companies), weather forecasting and early warning systems (through the meteorological department), and data management on weather and crops (through the agriculture and agricultural exports departments and the meteorological department).

5. Food industry: Implement fortification of staple foods.

Fortification is an important approach for improving micronutrient intake of the population, alongside efforts to increase dietary diversity. Momentum towards fortification of staple foods in Sri Lanka must be maintained to ensure implementation. In addition to mandatory fortification of wheat flour, fortified rice has recently been approved for use in school meals and social protection, including the voucher programme targeting pregnant and lactating

women. Although rice remains the primary staple in Sri Lanka, fortified wheat flour has great potential in the estate sector, where it is consumed more. Entry points for consumption of fortified staples are plentiful, but concerted efforts will be needed to ensure adequate supply and demand, and monitoring and evaluation of coverage and outcomes, supported by public-private partnerships and input from technical partners.

Effective implementation of these measures will require, in the short term, standard setting, the development of a solid monitoring and evaluation framework, ongoing sensitisation of policymakers and food industry stakeholders, and increased awareness among beneficiaries about fortified foods. Surveys should be planned to assess both supply and demand for fortified commodities to ensure accurate targeting and to explore the possibility of introducing additional fortified products. In the medium to long term, continued impact assessment will be critical to identify gaps and strengthen the programme as needed, including additional research on micronutrient deficiencies beyond iron and folic acid to understand the potential of fortification with other micronutrients. The role of the private sector will be crucial to create demand for fortified foods and ensure adequate supply of these products. Collaboration between the private and public sectors, including media, can be leveraged to move forward on other initiatives such as introducing new value-added products (i.e. fortified with micronutrients) and to reframe the current programme by updating the commodity list for the cash voucher provided to PLW through the ministry of women and child affairs for instance.

Development and provision of fortified foods requires public-private partnerships with food producers, and the involvement of the ministries of agriculture, industry, health, and finance. The ministries of education, women and child affairs, and trade and commerce play a crucial role in provision of fortified foods through safety nets and marketplaces. As fortified products become available, mass media and civil societies, along with the ministry of health, must spearhead behaviour change and demand creation activities around these foods.

6. Social protection: Expand the current school meals programme for primary schools to universal coverage and to cover adolescents in secondary school, and expand the preschool meals programme to target the estate sector.

A range of social protection programmes already exist with nutritional targets for various vulnerable groups, including cash vouchers for PLW, the Samurdhi social transfer, the school morning meal programme, and the milk programme for schoolchildren. These are complemented by non-social protection programmes in nutrition, health and other sectors, such as the Thriposha supplementation programme (for undernourished children from 6 months to 5 years and all PLW), iron/folic acid supplementation for school children and pregnant women and multi-micronutrient supplementation (micronutrient powders) for infants and young children.

The priority intervention identified in the group work is to expand the current government school meal programme for primary schools to have island-wide coverage and to be more nutrition-sensitive, including promotion of healthy local foods and targeting the specific nutrition needs of adolescents as well. A complementary programme should be implemented in estate sector preschools. School meals should include rations of fortified rice, as per the recently approved cabinet measure, with the planned pilot in Anuradhapura district. All programmes should be accompanied by school canteen policies in line with the national FBDGs.

The ministries of education, health and finance should lead the activities for school meal interventions in partnership with the private sector, development agencies, academia and the media. Short-term activities identified include: budget briefs for increased financial allocations to school and preschool meals, development of programme evaluation, drafting of legislation regulating advertising of unhealthy foods, initiatives to promote healthy foods among schoolchildren and parents and empower them to make informed decisions, and piloting a preschool meals programme in the estate sector. In the medium term, the programme should be expanded to cover all preschool and schoolchildren and adolescents, island-wide. In addition to regular monitoring of implementation, an evaluation of the nutritional status and dietary behaviours of the children should be undertaken after 3-5 years.

The school and preschool meals programmes should be accompanied by media involvement and behaviour change interventions to raise awareness of good nutrition among children and parents, and by legislation regulating advertising of unhealthy foods especially targeting children.

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Acronyms

COMBI	Communication for Behavioural Impact
CotD	Cost of the Diet
CoRD	Cost of a Recommended Diet
CSA	Climate-smart agriculture
DHS	Demographic Health Survey
FAO	Food and Agriculture Organisation
FBDGs	Food-Based Dietary Guidelines
FNG	Fill the Nutrient Gap
GDP	Gross Domestic Product
HARTI	Hector Kobbekaduwa Agrarian Research and Training Institute
HIES	Household Income and Expenditure Survey
IYCF	Infant and young child feeding
LKR	Sri Lankan rupee
LP	Linear programming
MAD	Minimum acceptable diet
MDD	Minimum dietary diversity
MNP	Micronutrient powder
MMT	Multiple micronutrient tablet
MRI	Medical Research Institute
PLW	Pregnant and lactating women
RNI	Recommended Nutrient Intake
SNF	Specialized nutritious food
TSA	Targeted social assistance
UN	United Nations
UNICEF	United Nations Children's Fund
WHO	World Health Organisation
WFP	World Food Programme

Appendices

A) Complete cost and non-affordability results

Daily cost of a diet that meets household energy needs and a diet that meets household nutrient requirements, and non-affordability of a nutritious diet, by district and season

District	Season	Energy only diet daily cost (LKR)	Nutritious diet daily cost (LKR)	Nutritious diet non-affordability
Nuwara Eliya	Annual average	209.54	449.5	13%
	Yala planting	205.17	441.48	12%
	Yala harvesting	220.21	436.98	11%
	Maha planting	211.37	457.01	14%
	Maha harvesting	203.73	462.38	15%
Badulla	Annual average	212.69	461.66	18%
	Yala planting	206.19	434.57	12%
	Yala harvesting	205.15	455.97	15%
	Maha planting	220.76	474.60	19%
	Maha harvesting	217.06	496.58	24%
Mullathivu	Annual average	208.5	414.66	10%
	Yala planting	205.25	410.86	9%
	Yala harvesting	207.12	400.53	8%
	Maha planting	212.65	421.11	12%
	Maha harvesting	207.98	423.67	12%
Kilinochchi	Annual average	206.43	397.91	12%
	Yala planting	197.67	402.12	12%
	Yala harvesting	207.55	394.94	11%
	Maha planting	214.28	408.80	14%
	Maha harvesting	207.33	369.59	9%
Batticaloa	Annual average	216.55	448.10	8%

	Yala planting	227.39	444.06	8%
	Yala harvesting	224.38	439.28	7%
	Maha planting	209.81	460.05	9%
	Maha harvesting	200.06	440.65	7%
Monaragala	Annual average	213.73	474.05	22%
	Yala planting	218.75	461.43	20%
	Yala harvesting	221.07	464.26	20%
	Maha planting	207.75	479.08	23%
	Maha harvesting	208.21	499.76	26%
Anuradhapura	Annual average	213.49	427.3	10%
	Yala planting	213.13	418.44	8%
	Yala harvesting	221.95	421.60	8%
	Maha planting	205.03	421.50	8%
	Maha harvesting	223.12	463.63	14%
Mathale	Annual average	186.69	435.01	12%
	Yala planting	197.54	428.66	11%
	Yala harvesting	177.87	418.08	10%
	Maha planting	176.70	444.56	13%
	Maha harvesting	194.16	445.74	13%
Gampaha	Annual average	208.29	436.28	5%
	Yala planting	215.36	422.78	4%
	Yala harvesting	204.50	417.28	3%
	Maha planting	203.14	434.56	4%
	Maha harvesting	208.36	487.42	8%
Kaluthara	Annual average	220.44	519.39	17%
	Yala planting	223.98	522.56	18%
	Yala harvesting	224.59	515.67	18%

	Maha planting	214.31	520.16	13%
	Maha harvesting	221.59	515.03	18%
Hambantota	Annual average	213.41	434.29	7%
	Yala planting	199.31	399.39	4%
	Yala harvesting	211.48	434.47	6%
	Maha planting	223.36	458.49	8%
	Maha harvesting	223.80	455.82	8%
Matara	Annual average	226.91	467.20	19%
	Yala planting	211.12	456.67	17%
	Yala harvesting	222.42	458.02	17%
	Maha planting	237.08	474.11	19%
	Maha harvesting	243.00	484.04	21%
Galle	Annual average	214.29	477.43	12%
	Yala planting	212.28	461.02	11%
	Yala harvesting	220.65	471.86	12%
	Maha planting	216.56	505.14	15%
	Maha harvesting	207.14	459.36	11%
Rathnapura	Annual average	215.22	490.53	23%
	Yala planting	214.56	465.94	19%
	Yala harvesting	202.97	476.35	20%
	Maha planting	221.10	517.78	28%
	Maha harvesting	217.02	499.25	24%
Kegalle	Annual average	211.81	430.04	11%
	Yala planting	212.36	433.95	12%
	Yala harvesting	205.37	423.79	11%
	Maha planting	216.92	434.21	12%
	Maha harvesting	206.69	419.72	10%

Kurunegala	Annual average	210.30	489.74	15%
	Yala planting	208.78	490.28	15%
	Yala harvesting	211.05	490.07	15%
	Maha planting	206.77	482.71	14%
	Maha harvesting	220.05	502.98	15%
Puttalam	Annual average	199.18	446.40	4%
	Yala planting	189.37	407.64	2%
	Yala harvesting	222.15	445.16	4%
	Maha planting	205.64	485.05	6%
	Maha harvesting	182.27	447.28	4%
Jaffna	Annual average	206.29	394.62	4%
	Yala planting	203.06	401.46	5%
	Yala harvesting	212.57	409.98	5%
	Maha planting	202.75	390.78	4%
	Maha harvesting	213.83	372.60	3%
Vavuniya	Annual average	218.04	414.52	5%
	Yala planting	212.47	405.94	5%
	Yala harvesting	222.22	412.86	5%
	Maha planting	220.54	426.27	5%
	Maha harvesting	219.99	409.50	5%
Mannar	Annual average	211.70	424.38	2%
	Yala planting	204.72	417.69	1%
	Yala harvesting	211.48	428.10	2%
	Maha planting	217.17	437.87	2%
	Maha harvesting	214.94	406.24	1%
Polonnaruwa	Annual average	201.02	432.80	11%
	Yala planting	196.13	423.04	9%

	Yala harvesting	213.66	433.87	11%
	Maha planting	196.77	437.33	12%
	Maha harvesting	206.95	442.46	12%
Ampara	Annual average	207.97	433.74	5%
	Yala planting	205.32	409.78	3%
	Yala harvesting	180.49	403.86	3%
	Maha planting	222.59	464.49	7%
	Maha harvesting	211.41	450.10	5%
Trincomalee	Annual average	217.35	414.04	7%
	Yala planting	212.62	420.69	8%
	Yala harvesting	220.87	414.79	7%
	Maha planting	223.82	427.43	9%
	Maha harvesting	210.00	371.62	4%
Kandy	Annual average	215.56	424.98	10%
	Yala planting	214.50	403.83	7%
	Yala harvesting	222.49	415.49	8%
	Maha planting	220.05	438.30	11%
	Maha harvesting	202.17	450.76	12%
Colombo	Annual average	188.86	572.68	9%
	Yala planting	189.29	555.08	7%
	Yala harvesting	182.24	557.60	8%
	Maha planting	188.63	594.64	11%
	Maha harvesting	195.30	578.85	9%

Daily cost of a diet that meets household nutrient requirements, and non-affordability of a nutritious diet, for selected districts, by sector

District	**Sector**	**Nutritious diet daily cost (LKR) (average of seasons)**	**Nutritious diet non-affordability**

			(average of seasons)
Nuwara Eliya	Urban	449.5	0%
	Rural		14%
	Estate		13%
Badulla	Urban	461.66	11%
	Rural		17%
	Estate		22%
Kandy	Urban	424.98	6%
	Rural		9%
	Estate		22%
Rathnapura	Urban	490.53	16%
	Rural		22%
	Estate		35%

B) Modelling for the child under 2 years

Daily cost of a diet that meets nutrient needs of a child 12-23 months, by district and season, with different quantities of breastmilk

District	Season	Optimal breastfeeding (532g/day)	Breastmilk 50% (266g/day)	Breastmilk 0% (0g/day)
Nuwara Eliya	Annual average	28.72	33.13	41.50
	Yala planting	28.07	33.04	41.42
	Yala harvesting	28.46	32.52	40.24
	Maha planting	29.47	33.82	42.15
	Maha harvesting	28.86	33.12	42.17
Badulla	Annual average	28.12	32.61	40.58
	Yala planting	27.37	31.93	39.1
	Yala harvesting	28.21	32.54	39.67
	Maha planting	27.63	31.99	40.67
	Maha harvesting	29.27	33.96	42.86
Mullathivu	Annual average	24.65	28.94	36.77
	Yala planting	24.11	28.34	36.42
	Yala harvesting	23.87	28.03	35.3
	Maha planting	24.84	29.4	36.72
	Maha harvesting	25.77	30	38.63
Kilinochchi	Annual average	22.77	26.71	33.24
	Yala planting	24.50	28.2	34.66
	Yala harvesting	23.62	27.28	34.11
	Maha planting	22.94	27.04	34.14
	Maha harvesting	20.03	24.3	30.03
Batticaloa	Annual average	26.89	31.44	39.13
	Yala planting	26.08	30.71	38.01

	Yala harvesting	26.54	30.35	37.6
	Maha planting	28.58	33.63	42.01
	Maha harvesting	26.34	31.07	38.9
Monaragala	Annual average	28.88	33.44	41.10
	Yala planting	28.63	33.23	40.38
	Yala harvesting	27.59	32.35	39.88
	Maha planting	29.42	33.7	41.08
	Maha harvesting	29.89	34.49	43.07

Daily cost of a diet that meets nutrient needs of a child 12-23 months, by district and season, with fortified foods and micronutrient supplements

District	Season	Nutritious diet	Thriposha (50g/day)	Micronutrient powder
Nuwara Eliya	Annual average	28.72	12.19	24.59
	Yala planting	28.07	11.91	24.16
	Yala harvesting	28.46	12.11	24.4
	Maha planting	29.47	12.27	24.58
	Maha harvesting	28.86	12.48	25.21
Badulla	Annual average	28.12	12.36	24.62
	Yala planting	27.37	12.23	24.4
	Yala harvesting	28.21	11.99	23.87
	Maha planting	27.63	12.4	24.17
	Maha harvesting	29.27	12.81	26.02
Mullathivu	Annual average	24.65	11.55	22.01
	Yala planting	24.11	11.41	21.21
	Yala harvesting	23.87	11.26	21.52
	Maha planting	24.84	12.09	23.16
	Maha harvesting	25.77	11.42	22.16

Kilinochchi	Annual average	22.77	10.99	20.38
	Yala planting	24.50	11.35	21.65
	Yala harvesting	23.62	11.31	21.67
	Maha planting	22.94	11.5	21.71
	Maha harvesting	20.03	9.78	16.5
Batticaloa	Annual average	26.89	12.13	23.02
	Yala planting	26.08	12.47	22.99
	Yala harvesting	26.54	11.86	21.69
	Maha planting	28.58	12.31	24.57
	Maha harvesting	26.34	11.86	22.83
Monaragala	Annual average	28.88	12.51	25.34
	Yala planting	28.63	12.49	25.18
	Yala harvesting	27.59	12.21	24
	Maha planting	29.42	12.53	25.54
	Maha harvesting	29.89	12.81	26.64

C) Modelling for the adolescent girl

Daily cost of a diet that meets nutrient needs of an adolescent girl 14-15 years, by district and season, with different micronutrient supplements

District	Season	Nutritious diet	Multi-micronutrient tablet	Iron/folic acid supplement (international guidelines)	Iron/folic acid supplement (Sri Lanka guidelines)
Nuwara Eliya	Annual average	129.92	81.63	96.02	121.07
	Yala planting	127.10	80.72	93.83	119.21
	Yala harvesting	123.50	82.00	94.69	115.58
	Maha planting	130.73	82.52	98.51	122.79
	Maha harvesting	138.34	81.28	97.03	126.71
Badulla	Annual average	148.58	80.54	93.54	130.83
	Yala planting	126.27	81.47	89.76	118.11
	Yala harvesting	143.55	76.95	90.64	127.4
	Maha planting	157.56	79.60	93.37	134.65
	Maha harvesting	166.94	84.12	100.37	143.15
Mullathivu	Annual average	122.74	71.31	85.73	112.81
	Yala planting	123.01	71.09	84.6	112.46
	Yala harvesting	119.50	69.30	82.47	109.36
	Maha planting	124.94	74.98	87.5	115.44
	Maha harvesting	123.52	69.88	88.34	113.98
Kilinochchi	Annual average	122.29	66.09	78.85	108.37
	Yala planting	120.82	69.68	80.37	111.52
	Yala harvesting	118.69	66.61	79.9	108.41
	Maha planting	131.42	69.07	83	115.23
	Maha harvesting	118.21	59.00	72.13	98.3
Batticaloa	Annual average	135.81	75.95	90.47	121.82

	Yala planting	141.00	77.59	87.44	124.27
	Yala harvesting	133.30	71.48	90.17	118.67
	Maha planting	135.51	80.72	94.86	124.27
	Maha harvesting	133.42	74.01	89.42	120.07
Monaragala	Annual average	156.89	83.50	96.43	136.77
	Yala planting	144.76	83.01	93.26	130.23
	Yala harvesting	153.19	80.78	92.09	132.42
	Maha planting	159.15	83.23	98.03	138.68
	Maha harvesting	170.46	86.96	102.35	145.76

Daily cost of a diet that meets nutrient needs of an adolescent girl 14-15 years, by district and season, with pregnancy and lactation

District	Season	Nutritious diet	Pregnancy	Lactation
Nuwara Eliya	Annual average	129.92	158.31	161.08
	Yala planting	127.10	151.39	153.96
	Yala harvesting	123.50	153.81	157.43
	Maha planting	130.73	160.1	162.93
	Maha harvesting	138.34	167.94	169.98
Badulla	Annual average	148.58	152.51	156.16
	Yala planting	126.27	137.2	142.29
	Yala harvesting	143.55	149.64	153.33
	Maha planting	157.56	157.8	160.17
	Maha harvesting	166.94	165.41	168.85
Mullathivu	Annual average	122.74	128.63	133.76
	Yala planting	123.01	129.48	134.91
	Yala harvesting	119.50	124.52	130.46
	Maha planting	124.94	130.16	134.96
	Maha harvesting	123.52	130.37	134.71

Kilinochchi	Annual average	122.29	124.56	127.70
	Yala planting	120.82	127.86	132.77
	Yala harvesting	118.69	122.89	127.24
	Maha planting	131.42	130.27	130.31
	Maha harvesting	118.21	117.22	120.47
Batticaloa	Annual average	135.81	142.92	144.24
	Yala planting	141.00	144.4	147.92
	Yala harvesting	133.30	139.99	140.74
	Maha planting	135.51	145.54	146.7
	Maha harvesting	133.42	141.73	141.6
Monaragala	Annual average	156.89	158.31	161.08
	Yala planting	144.76	151.39	153.96
	Yala harvesting	153.19	153.81	157.43
	Maha planting	159.15	160.1	162.93
	Maha harvesting	170.46	167.94	169.98

D) Modelling for pregnant and lactating women

Daily cost of a diet that meets nutrient needs of a pregnant or lactating woman, by district and season, with different fortified foods and micronutrient supplements

	PREGNANT WOMAN - daily cost (LKR)					LACTATING WOMAN - daily cost (LKR)				
District / season	Nutritious diet	Thriposha - 50g/day	Thriposha -100g/day	Iron/ Folic acid	MMT	Nutritious diet	Thriposha - 50g/day	Thriposha -100g/day	Iron/Folic acid	MMT
Nuwara Eliya - Yala planting	123.25	104.57	88.29	105.43	76.72	127.31	108.78	91.99	112.51	81.23
Nuwara Eliya - Yala harvesting	123.63	103.89	89.97	103.15	78.57	126.46	107.62	92.55	109.45	83.21
Nuwara Eliya - Maha planting	128.56	107.22	91.24	107.19	78.55	131.77	110.75	93.76	114.22	83.41
Nuwara Eliya - Maha harvesting	127.77	109.46	94.07	109.06	76.28	130.74	112.44	96.1	117.15	80.92
Nuwara Eliya annual average	**125.80**	**106.29**	**90.89**	**106.21**	**77.53**	**129.07**	**109.90**	**93.60**	**113.33**	**82.19**
% reduction in cost		**-15.51%**	**-27.75%**	**-15.58%**	**-38.37%**		**-14.85%**	**-27.48%**	**-12.19%**	**-36.32%**
Badulla - Yala planting	123.26	105.02	90.40	99.65	77.83	126.79	108.03	93.12	105.73	82.76
Badulla - Yala harvesting	125.85	105.41	90.26	99.09	72.97	130.14	109.21	92.86	104.88	77.36
Badulla - Maha planting	124.74	106.64	91.90	105.94	76.09	128.57	110.51	94.67	114.21	81.01
Badulla - Maha harvesting	132.47	111.47	94.60	112.00	79.36	136.09	115.09	96.94	119.73	83.82
Badulla annual average	**126.58**	**107.14**	**91.79**	**104.17**	**76.56**	**130.40**	**110.71**	**94.40**	**111.14**	**81.24**
% reduction in cost		**-15.36%**	**-27.48%**	**-17.70%**	**-39.51%**		**-15.10%**	**-27.61%**	**-14.77%**	**-37.70%**
Mullathivu - Yala planting	114.79	98.25	85.16	95.88	69.15	119.22	102.31	88.57	104.57	74.52
Mullathivu - Yala harvesting	114.01	97.58	84.60	93.21	67.01	118.42	101.52	87.51	100.77	71.63
Mullathivu - Maha planting	119.85	103.90	90.35	96.99	71.99	124.23	107.34	92.84	105.14	76.91
Mullathivu - Maha harvesting	119.37	100.00	85.27	101.41	67.41	123.55	104.18	88.04	110.52	71.99
Mullathivu annual average	**117.01**	**99.93**	**86.35**	**96.87**	**68.89**	**121.36**	**103.84**	**89.24**	**105.25**	**73.76**
% reduction in cost		**-14.59%**	**-26.20%**	**-17.21%**	**-41.12%**		**-14.43%**	**-26.46%**	**-13.27%**	**-39.22%**
Kilinochchi - Yala planting	116.20	99.82	86.78	91.14	66.77	119.94	103.01	89.33	97.79	71.82
Kilinochchi - Yala harvesting	113.33	98.20	85.75	91.25	64.66	117.24	101.41	88.2	98.42	69.31

Kilinochchi - Maha planting	113.66	99.36	86.55	91.26	67.08	117.65	103.35	89.52	98.42	71.72
Kilinochchi - Maha harvesting	103.00	88.08	75.90	84.29	59.61	106.75	91.73	78.87	90.5	64.34
Kilinochchi annual average	**111.55**	**96.37**	**83.75**	**89.49**	**64.53**	**115.40**	**99.88**	**86.48**	**96.28**	**69.30**
% reduction in cost		**-13.61%**	**-24.92%**	**-19.78%**	**-42.15%**		**-13.45%**	**-25.06%**	**-16.56%**	**-39.95%**
Batticaloa - Yala planting	118.87	103.96	90.28	100.08	76.30	123.33	108.19	93.72	107.31	82.42
Batticaloa - Yala harvesting	119.13	99.77	87.35	101.87	70.27	122.68	103.41	90.2	110.57	75.92
Batticaloa - Maha planting	125.37	106.85	91.77	105.11	76.33	128.82	110.3	94.25	112.08	80.88
Batticaloa - Maha harvesting	119.67	102.49	88.68	102.00	70.86	122.94	105.76	90.97	110.25	76.08
Batticaloa annual average	**120.76**	**103.27**	**89.52**	**102.27**	**73.44**	**124.44**	**106.92**	**92.29**	**110.05**	**78.83**
% reduction in cost		**-14.49%**	**-25.87%**	**-15.32%**	**-39.19%**		**-14.08%**	**-25.84%**	**-11.56%**	**-36.66%**
Monaragala - Yala planting	125.49	106.55	90.77	100.86	79.04	128.57	109.62	93.37	106.67	83.67
Monaragala - Yala harvesting	121.93	103.26	88.43	99.57	77.51	125.62	106.72	91.29	105.32	82.22
Monaragala - Maha planting	130.16	108.73	92.76	105.41	78.51	133.12	111.51	94.99	112.66	83.1
Monaragala - Maha harvesting	132.46	111.17	94.20	110.06	81.16	135.31	114.01	96.02	116.6	85.3
Monaragala	**127.51**	**107.43**	**91.54**	**103.98**	**79.06**	**130.66**	**110.47**	**93.92**	**110.31**	**83.57**
% reduction in cost		**-15.75%**	**-28.21%**	**-18.46%**	**-38.00%**		**-15.45%**	**-28.12%**	**-15.57%**	**-36.04%**
Colombo - Yala planting	147.88	121.31	97.60	134.71	111.82	151.7	124.14	1000.01	139.44	117.38
Colombo - Yala harvesting	151.26	119.20	97.27	139.93	108.99	152.62	121.37	98.55	143.43	114.83
Colombo - Maha planting	160.38	126.83	102.23	147.10	114.45	163.28	129.49	104.42	150.71	118.34
Colombo - Maha harvesting	156.38	125.20	102.60	144.77	111.42	159.33	128.45	104.42	149.03	117.07
Colombo annual average	**153.98**	**123.14**	**99.93**	**141.63**	**111.67**	**156.73**	**125.86**	**326.85**	**145.65**	**116.91**
% reduction in cost		**-20.03%**	**-35.10%**	**-8.02%**	**-27.48%**		**-19.70%**	**108.54%**	**-7.07%**	**-25.41%**
Gampaha - Yala planting	114.37	93.14	74.28	111.02	72.78	121.09	97.37	80.27	118.63	84.43
Gampaha - Yala harvesting	113.45	91.17	72.89	109.66	71.12	119.71	95.22	77.89	116.83	82.63
Gampaha - Maha planting	120.10	97.61	78.87	112.18	73.67	126.28	102.27	84.6	119.18	83.03
Gampaha - Maha harvesting	133.92	110.15	93.80	122.18	88.94	138.95	114.2	96.66	129.86	94.16
Gampaha annual average	**120.46**	**98.02**	**79.96**	**113.76**	**76.63**	**126.51**	**102.27**	**84.86**	**121.13**	**86.06**
% reduction in cost		**-18.63%**	**-33.62%**	**-5.56%**	**-36.39%**		**-19.16%**	**-32.92%**	**-4.25%**	**-31.97%**

Percentage of the recommended nutrient intake of a pregnant or lactating woman met by different fortified foods and micronutrient supplements

	PREGNANT WOMAN					LACTATING WOMAN				
Weekly % RNI covered	**Thriposha (50g)**	**Thriposha (100g)**	**Super Cereal + (100g)**	**Iron/ folic acid**	**Multi-micronutrient tablet**	**Thriposha 50g**	**Thriposha 100g**	**Super Cereal + 100g**	**Iron/ folic acid**	**Multi-micronutrient tablet**
Energy	7.8%	15.6%	15.3%			7.3%	14.6%	14.3%		
Protein	20.1%	40.2%	32.1%			18.1%	36.1%	28.9%		
Fat	6.8%	13.6%	17.6%			6.4%	12.7%	16.5%		
Vitamin A	15.0%	30.0%	130.6%		100.0%	14.1%	28.3%	123.0%		94.1%
Vitamin C	54.5%	109.1%	166.9%		127.3%	42.9%	85.7%	131.1%		100.0%
Vitamin B1	35.7%	71.4%	42.9%		100.0%	33.3%	66.7%	40.0%		93.3%
Vitamin B2	75.0%	150.0%	128.6%		100.0%	65.6%	131.2%	112.5%		87.5%
Niacin	36.1%	72.2%	58.9%		100.0%	38.2%	76.5%	62.4%		105.9%
Pantothenic acid	33.3%	66.7%	38.3%			28.6%	57.1%	32.9%		
Vitamin B6	47.4%	94.7%	78.9%		100.0%	45.0%	90.0%	75.0%		95.0%
Folic acid	46.7%	93.5%	28.0%	111.1%	111.1%	56.1%	112.2%	33.6%	133.3%	133.3%
Vitamin B12	51.9%	103.8%	88.5%		100.0%	48.2%	96.4%	64.3%		92.9%
Calcium	23.6%	47.2%	49.6%			25.0%	50.0%	52.5%		
Iron	11.9%	23.8%	19.4%	142.9%	71.4%	11.9%	23.8%	19.4%	142.9%	71.4%
Magnesium	22.7%	45.5%	64.6%			18.5%	37.0%	52.7%		
Zinc	53.7%	107.4%	103.4%		201.3%	55.6%	111.1%	106.9%		208.3%

A) Modelling for the school-aged child

School meals models were based on an average of the 10-day menu cycle, and an average of female and male children aged 7-14 years.

Daily cost of a diet that meets nutrient needs of school-aged child, by district, with different school meals rations

District	Nutritious diet	Current school meals	Milk programme	Current school meals + milk	Current school meals + iron supplement	Fortified school meals	Fortified school meals + milk
Nuwara Eliya	90.94	76.93	85.75	71.97	75.85	71.90	66.72
Badulla	89.39	75.19	84.74	70.63	73.50	70.59	66.08
Mullathivu	81.30	66.97	74.97	62.71	65.66	63.61	59.47
Kilinochchi	75.39	62.97	70.15	59.74	60.75	59.22	55.75
Batticaloa	89.19	76.67	85.07	72.82	76.16	70.12	65.87

B) Modelling for the five-person household

Daily cost of a diet that meets nutrient needs of a five-person household, by district and season, with different fortified foods

District	Season	Nutritious diet	Fortified rice (national specifications)	Fortified rice (WFP specifications)	Fortified wheat flour (WFP specifications)
Nuwara Eliya	Annual average	449.46	404.04	398.66	449.47
	Yala planting	441.48	396.77	390.83	441.48
	Yala harvesting	436.98	395.97	392.27	436.97
	Maha planting	457.01	412.00	399.55	457.02
	Maha harvesting	462.38	411.40	411.99	462.39
Badulla	Annual average	465.43	397.23	404.85	456.70
	Yala planting	434.57	382.70	386.82	429.78
	Yala harvesting	455.97	383.25	382.39	444.80
	Maha planting	474.60	399.85	414.35	462.70
	Maha harvesting	496.58	423.13	435.83	489.53
Mullathivu	Annual average	414.04	371.22	371.78	407.46
	Yala planting	410.86	368.09	367.65	403.55
	Yala harvesting	400.53	355.89	356.44	396.85
	Maha planting	421.11	377.19	383.41	418.47

	Maha harvesting	423.67	383.70	379.61	410.98
Kilinochchi	Annual average	393.86	342.52	340.97	390.43
	Yala planting	402.12	351.11	347.76	399.50
	Yala harvesting	394.94	348.64	346.59	389.76
	Maha planting	408.80	352.91	360.55	407.73
	Maha harvesting	369.59	317.43	308.99	364.74
Batticaloa	Annual average	446.01	388.37	388.14	429.62
	Yala planting	444.06	380.95	392.75	436.9
	Yala harvesting	439.28	386.29	373.72	413.54
	Maha planting	460.05	400.83	397.31	442.26
	Maha harvesting	440.65	385.39	388.76	425.76
Monaragala	Annual average	476.13	403.73	410.75	466.59
	Yala planting	461.43	393.99	399.78	451.3
	Yala harvesting	464.26	389.58	398.52	452.12
	Maha planting	479.08	408.76	410.90	469.84
	Maha harvesting	499.76	422.57	433.81	493.08

Percentage of the recommended nutrient intakes of a five-person household met by different fortified foods

	Nutritious diet with fortified rice (WFP specifications)					Nutritious diet with fortified rice (Sri Lanka specifications)					Nutritious diet with fortified wheat flour (iron and folic acid)				
	Yala Planting	Yala Harvest	Maha Planting	Maha Harvest	Annual average	Yala Planting	Yala Harvest	Maha Planting	Maha Harvest	Annual average	Yala Planting	Yala Harvest	Maha Planting	Maha Harvest	Annual average
Energy	49.9%	49.9%	49.9%	49.9%	49.9%	50.1%	57.5%	53.4%	52.9%	53.5%	50.2%	50.2%	49.5%	50.2%	50.0%
Protein	55.5%	54.8%	54.8%	54.8%	55.0%	55.5%	63.7%	59.1%	58.5%	59.2%	55.5%	55.5%	54.8%	55.5%	55.3%
Fat	3.2%	3.2%	3.2%	3.2%	3.2%	3.3%	3.8%	3.5%	3.5%	3.5%	3.3%	3.3%	3.2%	3.3%	3.3%
Vitamin A	74.3%	74.3%	74.3%	74.3%	74.3%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Vitamin C	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Vitamin B1	167.2%	167.2%	167.2%	167.2%	167.2%	17.6%	20.0%	18.7%	18.6%	18.7%	17.6%	17.6%	17.4%	17.6%	17.6%
Vitamin B2	14.4%	14.4%	14.4%	14.4%	14.4%	17.2%	19.8%	18.4%	18.2%	18.4%	17.3%	17.3%	17.0%	17.3%	17.2%
Niacin	196.2%	196.2%	196.2%	196.2%	196.2%	54.7%	62.8%	58.3%	57.7%	58.4%	54.8%	54.8%	54.1%	54.8%	54.6%
Pantothenic acid	87.5%	87.5%	87.5%	87.5%	87.5%	74.5%	85.4%	79.3%	78.5%	79.4%	74.6%	74.6%	73.6%	74.6%	74.4%
Vitamin B6	189.9%	189.9%	189.9%	189.9%	189.9%	35.9%	41.2%	38.3%	37.9%	38.3%	35.9%	35.9%	35.5%	35.9%	35.8%
Folic acid	197.7%	197.7%	197.7%	197.7%	197.7%	192.5%	220.8%	205.0%	202.9%	205.3%	5.2%	5.2%	5.2%	5.2%	5.2%
Vitamin B12	148.1%	148.1%	148.1%	148.1%	148.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Calcium	2.9%	2.9%	2.9%	2.9%	2.9%	2.6%	3.0%	2.8%	2.8%	2.8%	2.6%	2.6%	2.6%	2.6%	2.6%
Iron	40.0%	40.0%	40.0%	40.0%	40.0%	58.3%	66.9%	62.1%	61.5%	62.2%	5.0%	5.0%	4.9%	5.0%	5.0%
Magnesium	56.8%	56.8%	56.8%	56.8%	56.8%	58.4%	67.0%	62.2%	61.6%	62.3%	58.4%	58.4%	57.7%	58.4%	58.2%
Zinc	339.6%	339.6%	339.6%	339.6%	339.6%	52.2%	59.8%	55.6%	55.0%	55.7%	52.2%	52.2%	51.5%	52.2%	52.0%

C) Specifications of products modelled

Nutrient composition of fortified foods modelled for individuals and for the household, per 100 grams

	Nutrient composition				
Product (100g)	**SC+ (WFP)**	**Thriposha**	**Fortified rice (national)**	**Fortified rice (WFP)**	**Fortified wheat flour (WFP)**
Energy (kcal)	394.5	401.8	361.63	360.0	364.0
Protein (g)	16	20	6.7	6.6	10.3
Fats (g)	10.1	7.8	0.6	0.58	0.98
RAE (ug retinol)	1045.2	240.2		150.0	100.0
Vit C (mg)	91.8	60			
B1 (mg)	0.6	1	0.06	0.57	0.56
B2 (mg)	1.8	2.1	0.06	0.05	0.3
Niacin (mg)	10.6	13	2.4	8.6	4.75
Pantothenic Acid (mg)	2.3	4	1.14	1.34	0.44
B6 (mg)	1.5	1.8	0.14	0.74	0.04
Folate (mcg)	168.1	561	221.0	227.0	193.0
B12 (mcg)	2.3	2.7		1.0	0.8
Calcium (mg)	525.3	500	8.0	9.0	15.0
Iron (mg)	11.4	10	7.0	4.8	2.67
Magnesium (mg)	142.2	100	36.0	35.0	22.0
Zinc (mg)	7.7	8	1.1	7.16	3.7