SAVING LIVES
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Fill the Nutrient Gap
Myanmar

Final Report

WFP
World Food Programme

FNG
FILL THE NUTRIENT GAP
SYSTEMS ANALYSIS FOR NUTRITION

June 2020

The summary report and the slide deck can be found here:

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List of Acronyms

BMI	Body Mass Index
CotD	Cost of the Diet
CRS	Catholic Relief Services
DHS	Demographic and Health Survey
FAO	Food and Agriculture Organization
FNG	Fill the Nutrient Gap
HKI	Helen Keller International
IFPRI	International Food Policy Research Institute
MAD	Minimum Acceptable Diet
MDD	Minimum Dietary Diversity
MMF	Minimum Meal Frequency
MMFCS	Myanmar Micronutrient and Food Consumption Survey
MMT	Multiple micronutrient tablet
MNP	Micronutrient powder

MoALI	Ministry of Agriculture, Livestock and Irrigation
MoE	Ministry of Education
MoSWRR	Ministry of Social Welfare, Relief and Resettlement
MPLCS	Myanmar Poverty and Living Conditions Survey
MS-NPAN	Multi-Sectoral National Plan of Action for Nutrition
NNC	National Nutrition Centre
RNI	Recommended Nutrient Intake
SD	Standard deviation
SNF	Specialized nutritious foods
UN	United Nations
UNICEF	United Nations Children's Fund
WFP	World Food Programme
WHH	Welt Hunger Hilfe (World Hunger Aid)
WHO	World Health Organization

Executive Summary

The Systems-focused Situation Analysis for Nutrition 'Fill the Nutrient Gap' identifies barriers to consumption of healthy diets and points out entry points that can improve nutrition across health, agriculture, social protection and education platforms. FNG analysis has been completed in 23 countries and is ongoing in 7 countries, as of 2020. FNG findings have been used by stakeholders to develop nutrition sensitive social safety nets, prioritize key interventions from national policies and identify opportunities to improve diets across the food system, via food supply, food environments and consumer behaviour.

FNG analysis was conducted in Myanmar in 2019 by WFP under the leadership of the National Nutrition Centre (NNC). Final results were disseminated during a workshop in October 2019 with stakeholders representing government ministries and development partners developing recommendations based on findings. This report outlines the FNG methodology and process in Myanmar, key findings and stakeholder recommendations.

The economic barrier to adequate nutrition in Myanmar is high. FNG analysis found that an estimated six out of ten households could not afford the lowest cost of a healthy, nutritious diet (4,358 Kyat/day[1]) and almost one in ten households could not afford to meet energy requirements at the lowest possible cost (1,963 Kyat/day[1]).

The ongoing prioritization by policy makers, as outlined in the multisectoral national plan of action for nutrition (MS-NPAN) has potential to improve access to nutritious diets. FNG analysis found that effectively delivering a combination of MS-NPAN interventions could more than halve the number of households unable to afford a nutritious diet in Myanmar. To deliver this impact, health, agriculture, social protection and education all have a role to play. Only by coordinating their efforts (e.g. aligning databases of beneficiaries) and making the most of existing platforms can these government ministries ensure nutrition will be a key contributor to Myanmar's development as a healthy, modern and productive nation.

Individual vulnerabilities require targeted interventions. It is more difficult and expensive to provide a healthy diet to those most vulnerable to malnutrition: children under two, adolescent girls and pregnant and breastfeeding women. This is because these individuals have elevated micronutrient needs due to their specific biological situation (brain and body development, menstruation, pregnancy, breastfeeding) and therefore require more nutrient-dense foods, such as vegetables, fruits and animal-source foods. Targeted interventions, such as vitamin and mineral supplementation, can decrease the cost of a nutritious diet for these individuals and hence reduce the risk of nutritional deficiencies.

[1] Minimum daily cost for a household of five, averaged across all states and regions.

Rice Fortification in social safety nets is a strategic entry point for a quick win. Rice is the main staple in Myanmar and consumed in large quantities. Fortified rice is a perfect vehicle to increase intake of essential micronutrients. In addition to making fortified rice available commercially, social safety nets and public channels (i.e. school meals, hospitals) can be valuable platforms to improve nutrient intake for the poorest households.

Promoting healthy diets requires increased supply and demand of nutritious foods. Myanmar has seen a remarkable increase in agricultural production and is a surplus producer of rice. Now is the time to diversify agricultural production, at the commercial and homestead levels, to increase the availability and accessibility of nutritious foods. Behaviour change communication is an essential tool to improve consumer knowledge and increase demand for nutritious foods.

Background to the FNG

WFP, with technical input from key research institutes (University of California Davis, IFPRI, Epicentre, Harvard University and Mahidol University), Save the Children and UNICEF, developed in 2015, a framework for strengthened nutrition situation analysis and decision-making, called "Fill the Nutrient Gap", or FNG, which aims to support identification of strategies for improving nutrition with an emphasis on increasing access to nutrients, especially during the critical period of the first 1,000 days.

The 2013 Lancet series on maternal and child undernutrition identified interventions with proven effectiveness to address undernutrition (Bhutta *et al.*, 2013). The FNG analytical process engages with stakeholders in-country to build commitment, develop programmes and move towards acting at scale to deliver proven interventions that are best suited to the national context. Based on this approach, intensified nutrition action can lead to the achievement of Sustainable Development Goal 2.

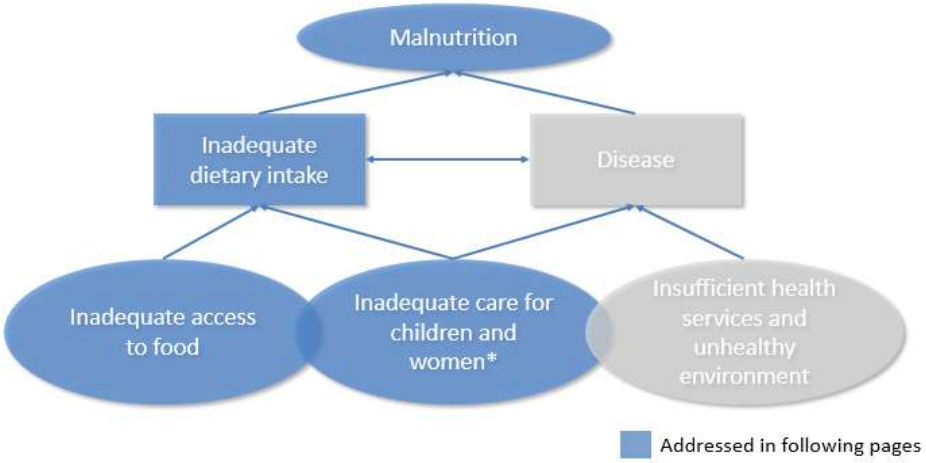
The improvement of nutrition in Myanmar can contribute to Myanmar becoming a modern and developed nation. Poor nutrition affects economic productivity since undernourished adults are less able to perform work and on average will have lower cognitive ability and lower completed education levels. A model of the annual loss in GDP associated with undernutrition in childhood and micronutrient deficiencies could be as high as 11 percent in Myanmar, costing the country more than US$7 billion each year in lost earning potential (Horton and Steckel, 2011, World Bank, 2018). Investments in evidence-based nutrition interventions could generate significant economic returns ranging from an estimated US$16 to as high as US$35 for every dollar spent (Shekar *et al.*, 2017).

The UNICEF framework for malnutrition identifies two primary drivers of malnutrition: inadequate dietary intake and disease (

Figure 1). The focus of FNG is on the left side of this framework. FNG addresses barriers to adequate nutrient intake, looking at access to food and specifically among key target groups, in particular children and women. Malnutrition is multi-sectoral in nature and addressing these

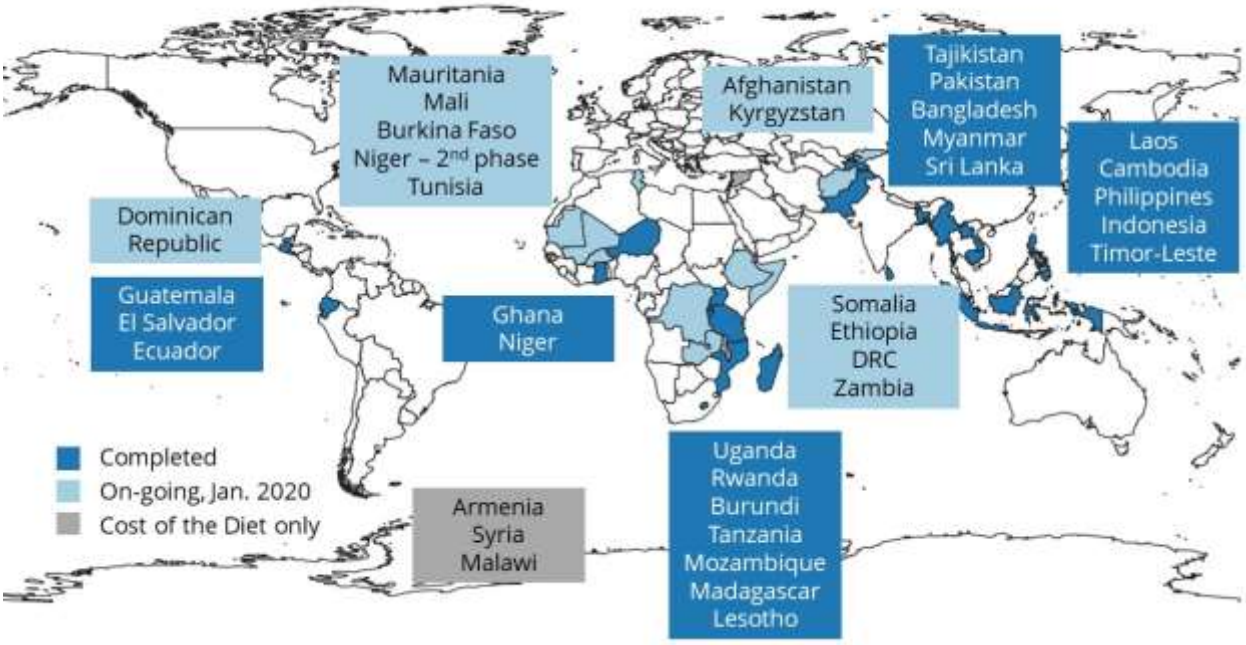
causes requires multi-stakeholder input and involvement to establish a shared understanding of issues, context and solutions.

Figure 1: UNICEF framework for causes of malnutrition (UNICEF 1991).



To date, the FNG analysis has been completed or is underway in close to 30 countries around the world (Figure 2).

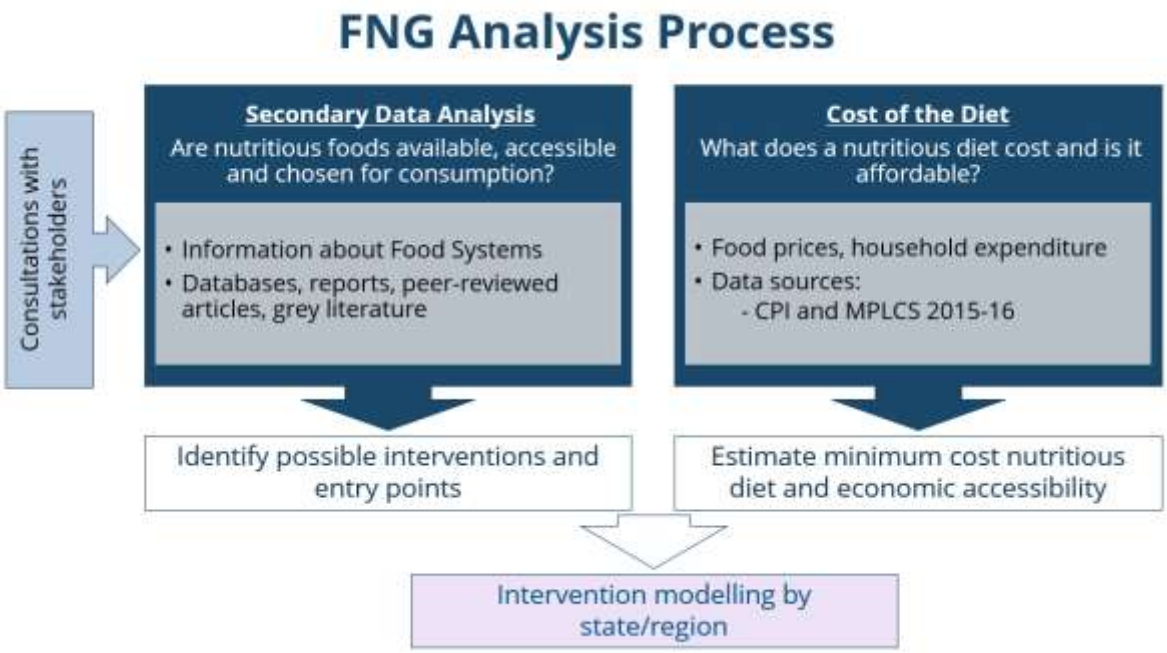
Figure 2: Countries that have completed Fill the Nutrient Gap or have the analysis on-going as of January 2020.



FNG Analysis Process

The FNG analysis process is built on two main components: secondary data review and linear programming using the Cost of the Diet software (Figure 3).

Figure 3: An overview of the FNG analysis process.



Secondary data analysis

Through consultations with stakeholders and desk-based research 70 sources were identified categorized and reviewed to gain an understanding of the nutrition situation in Myanmar. This review focused on factors contributing to sub-optimal nutrition outcomes, the current policy environment and opportunities for multi-sectoral actors to intervene across the food system and improve nutrition in Myanmar. Sources reviewed include databases, household surveys, reports, peer-reviewed articles and grey literature.

Collation and analysis of secondary data

Data sources were collected, reviewed and mapped over three main stages:

1) Consultation with national stakeholders: During initial missions to Myanmar information about data requirements were shared with the WFP country office and national stakeholders who shared relevant datasets, reports, articles and documents with the FNG team.
2) Literature search: In addition to obtaining data through national stakeholders a literature search was conducted online to identify further articles and reports relevant to the

nutrition situation in Myanmar and the ongoing and potential entry points for interventions to improve access to nutritious diets.

3) Follow up on identified data gaps: Once data provided by stakeholders and data obtained through literature search had been reviewed data gaps in terms of themes, areas of the country or population groups were identified. The FNG team shared this list with in-country stakeholders to inquire whether additional, targeted, resources could be obtained.

Cost of the Diet

Cost of the Diet (CotD) is a method and software developed by Save the Children UK to better understand the extent to which poverty affects nutritional status through economic access to nutritious food. The aim of the tool is to estimate, with linear programming optimization, the amount, combination and cost of local foods that would be needed to provide individuals or households with their average needs for energy and their recommended intakes of protein, fat and 13 micronutrients at the lowest possible cost. CotD analysis was conducted for 15 assessment areas in Myanmar – one assessment for each of the 15 states and regions. From these 15 assessments, weighted averages based on the 2014 Myanmar Population and Housing census were applied to produce national Cost of the Diet estimates (The Republic of the Union of Myanmar, 2018).

Food availability and price data

The 2017 Consumer Price Index provided data on food prices and availability for two distinct periods of the year, January and August (lean season). Analysis was conducted for 15 assessment areas representing all states and regions of Myanmar.

CPI information was disaggregated by states and regions, providing an estimate of availability and cost for that specific state or region. Information about the nutrient content of foods, included in the Cost of the Diet database was selected from food composition tables from the most appropriate geographic context – for example Indonesia or Bangladesh.

Household size and composition

The model household composition for CotD analysis was designed to incorporate the key target groups of interest for FNG Myanmar as identified by stakeholders (Figure 4). The modeled household was consistent with the national average household size of five people per household. The same modeled household was used in all assessments to allow for comparisons between different assessment areas across the country.

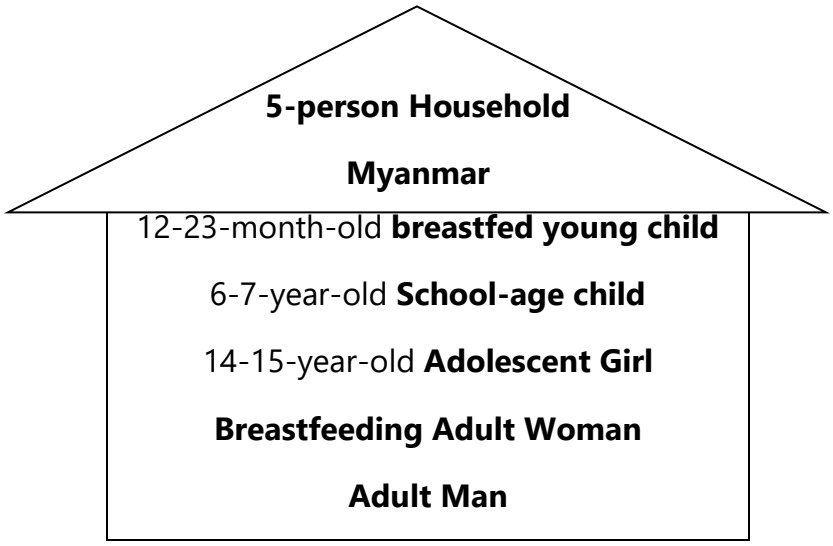
For each assessment area the modeled household included a breastfed child 12-23 months old, a breastfeeding adult woman 30-59 years old and an adolescent girl 14-15 years old, to represent the target groups suggested by stakeholders, along with a child 6-7 years old and an adult man 30-59 years old (

Figure 5). For this analysis the breastfed child 12-23 months old is to be used as a proxy for 6-23-month-old breastfed children, the child 6-7 years old is a proxy for a school aged child and the breastfeeding woman is a proxy for a pregnant and breastfeeding women (PLW). The diet of the 12-23-month-old child was modelled to account for age-appropriate continued breastfeeding. The sex of the 12-23-month-old child and the 6-7 years old child was not specified because nutrient intake recommendations are not different for boys and girls at those ages.

Figure 4: Level of analysis and target groups for FNG Myanmar as agreed during stakeholder consultations.

Areas for analysis	Specific target group
State/regional level analysis with an assessment specific to each of the 15 states/regions of Myanmar	Life cycle approach focusing on the first 1000 days and school-age children: • Infants and young children aged 6-23 months • Pregnant and breastfeeding women • Adolescent girls (pre-pregnancy) • School children (school feeding)

Figure 5: Model household size and composition for all CotD assessments.



Energy only and nutritious diets

FNG analysis uses Cost of the Diet software to calculate the costs of two types of diet. The first diet calculated is an Energy Only diet that meets the kilocalorie requirements for individuals, based on WHO recommendations, at the lowest cost from locally available foods.

The second diet calculated is a staple-adjusted nutritious diet (herein referred to as the nutritious diet) that estimates the lowest cost diet that meets energy requirements and recommended intakes for protein, fat and 13 micronutrients (9 vitamins, 4 minerals) including two servings of the main staple food(s) (providing approx 50% of energy needs) for a given assessment area. Staple foods are defined as foods that are generally eaten every day by all household members.

For Myanmar rice was included as the staple in all assessment areas. Two servings per day were included for all household members except for the child 12-23 months old who had one serving per day included (Figure 6, numbers are uncooked weights).

Hence the nutritious diet is based on food available in local markets, represents the combination of foods that would meet nutrient needs at the lowest possible cost, includes portion sizes that are realistic and captures basic local staple food preferences. The CotD nutritious diet does not necessarily reflect what people are actually eating and is not designed to provide recommendations of what people should eat because foods are not selected with ingredients that would make a palatable recipe and only the most optimal foods are selected with little variation.

Figure 6: Daily staple consumption of rice included in CotD models for all assessment areas.

Household member	Portion size (uncooked)	Number of portions daily	Total rice per day included as staple
Child 12-23 months old	68 g	1	68 g
Child 6-7 years old	113 g	2	226 g
Adolescent girl 14-15 years old	184 g	2	368 g
Breastfeeding woman 30-59 years old	173 g	2	346 g
Adult man 30-59 years old	207 g	2	414 g

Affordability analysis

The cost of a nutritious diet becomes a more meaningful estimate when compared with the amount of money households can spend on food. This comparison allows for an estimate of the percentage of households within a population that would realistically be able to afford a minimum cost nutritious diet. To estimate the percentage of households within each region that could afford the nutritious diet, percentile rank analysis was conducted in STATA with food

expenditure data from the 2015 Ministry of Planning and Finance/World Bank Myanmar Poverty and Living Conditions Survey (MPLCS). Food that was produced by households for own consumption was monetized in that survey, based on how much the foods would have cost if they had been purchased.

Per capita food expenditure figures were multiplied by the number of individuals in the model household (5) and the number of days in an average month (30.4) to estimate monthly household food expenditure. Survey weights were used to account for unequal selection probabilities in the dataset; adjusting for non-responses and conforming to known population distributions.

National figures presented in this report are weighted averages based on relative distribution of population across states and regions (equation i).

Equation i: National figures are weighted averages based on the percentage of the population living in each state/region.

$$national\ average_i = \sum_{j=1}^{15} \frac{x_j}{total\ number\ of\ population} * y_j$$

With j denoting the state/region; x_j denoting number of people living in region j and y_j the estimated cost of the diet/non-affordability in state/region j.

Intervention modelling

Throughout this process, secondary data review identified ongoing and potential interventions to improve access to nutritious diets. These entry points were modelled in linear programming with the Cost of the Diet software.

In multi-stakeholder workshops and in bilateral consultations stakeholders identified interventions from Myanmar's Multi-Sectoral National Plan of Action for Nutrition (MS-NPAN) with the potential to improve nutrient intake for key target groups, through a lowering of cost of a nutritious diet and/or increase of food expenditure, and the corresponding entry points to reach the target groups across different sectors. Stakeholders subsequently provided details of government interventions currently implemented by Ministry of Health and Sports (MoHS), Ministry of Agriculture, Livestock and Irrigation (MoALI), Ministry of Education (MoE) and Ministry of Social Welfare Relief and Resettlement (MoSWRR) and non-government interventions implemented by World Fish and HKI.

Modelling included estimates of the potential impact from the following interventions:

- Complementary foods or specialized nutritious foods (SNF) made available through market channels and/or social safety nets;
- Micronutrient supplementation;
- Fortification of staple foods;
- Increased availability of local nutritious foods from home gardening and homestead fish production;
- Conditional cash transfers for vulnerable households.

The modelled interventions are theoretical, assuming optimal consumer choices, and would need to be accompanied by complementary behaviour change interventions to promote nutritious choices by consumers and actions on the supply side to ensure adequate availability (see Annex II for full list and description of modelled interventions).

Intervention modelling was conducted in the 7 states/regions selected as the priority regions for the roll-out of the MS-NPAN: Ayeyarwaddy, Chin, Shan, Kayah, Kachin, Kayin and Rakhine.

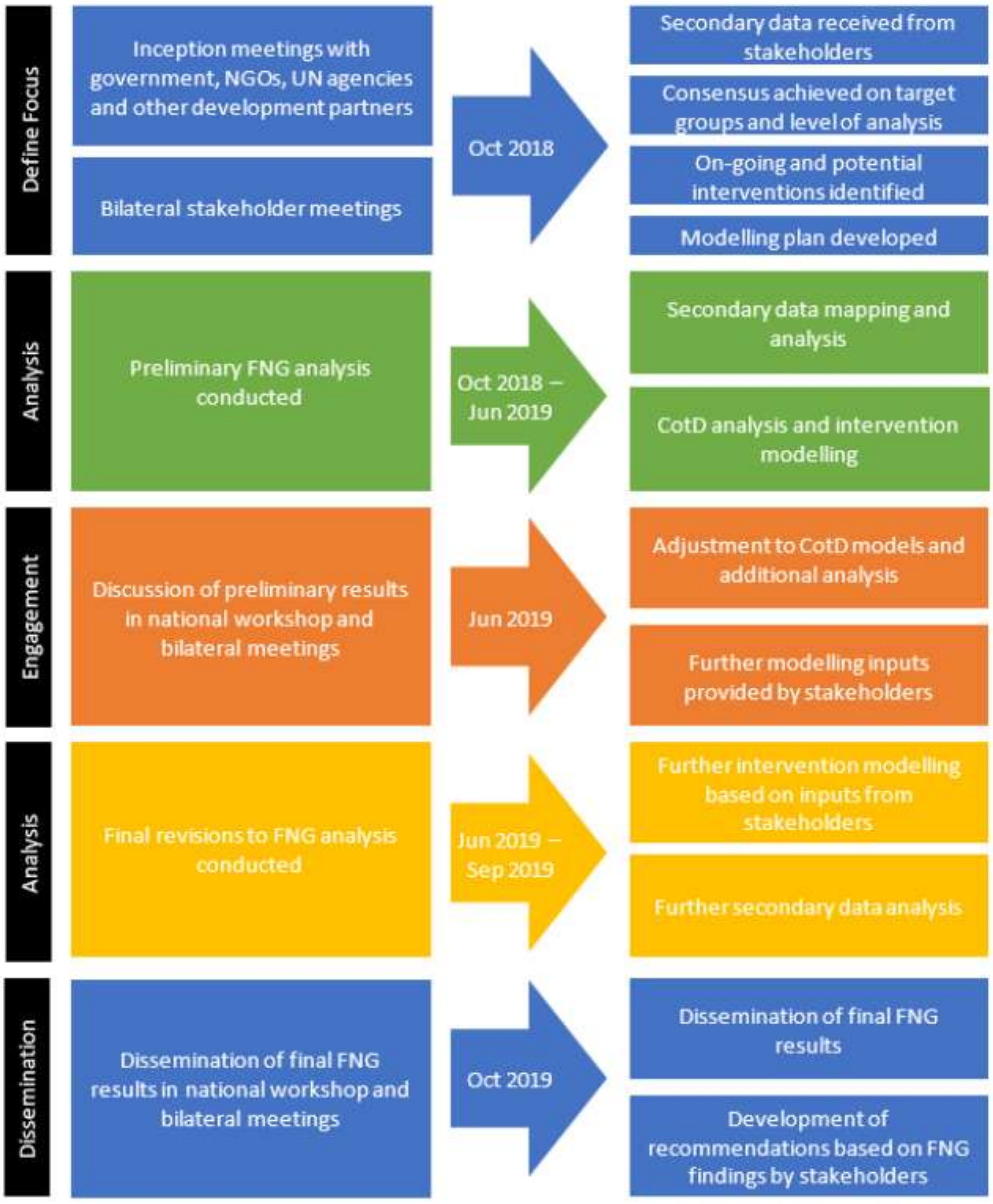
Figure 7: Regions included in the intervention modelling analysis.

The FNG process in Myanmar

The FNG process followed in Myanmar is outlined in Figure 8**Error! Reference source not found.**. The FNG process in Myanmar was led by the Ministry of Health and Sports (MoHS), with WFP providing technical assistance. FNG analysis was supported with guidance and input on secondary data sources, CotD modelling and the development of recommendations by Ministry of Agriculture, Livestock and Irrigation (MoALI), Ministry of Education (MoE), Ministry of Social Welfare, Relief and Resettlement (MoSWRR), United Nations Children's Fund (UNICEF), Food and Agricultural Organization (FAO), WorldFish, PATH, Catholic Relief Services (CRS), Welt Hunger Hilfe (WHH) and Helen Keller International (HKI).

The process started in October 2018 with meetings between WFP, government, NGOs, UN agencies and other development partners. To define the focus, stakeholders established consensus on the analysis and identified on-going and potential interventions for modelling. After this initial mission the FNG team conducted preliminary analysis and returned to Myanmar in June 2019 for a national workshop and bilateral meetings. At this time, stakeholders reviewed and commented on preliminary findings and informed the analysis by providing details for additional intervention modelling. The FNG team then completed final revisions to the analysis with complete intervention modelling. In October 2019 final results were presented and stakeholders developed recommendations based on FNG findings.

Figure 8: The FNG process in Myanmar.



Malnutrition overview

Myanmar suffers from a high prevalence of child and maternal undernutrition despite strong macroeconomic growth and poverty reduction. Overweight and obesity are on the rise.

Myanmar suffers a high burden of child undernutrition. The prevalence of stunting (low height-for-age) has decreased from 41 percent in 2003 to 27 percent for children under 5, classified as high by the World Health Organization (WHO) (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). This puts Myanmar roughly on track to achieve the national target of 21 percent by 2025. Despite commendable progress, as of 2017/18,

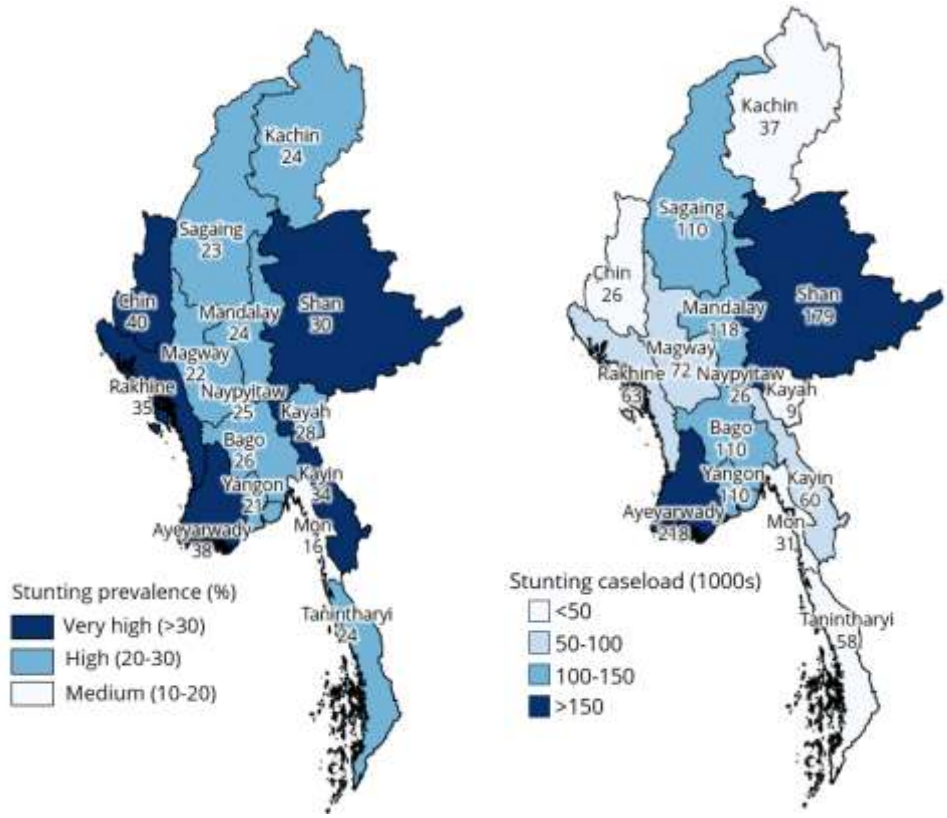
stunting prevalence is high or very high in 14 out of 15 states and regions (Figure 9), with 1.2 million children under five stunted in Myanmar. Sustained efforts are needed to continue reducing stunting. Stunting prevalence varies between 21 percent (Yangon) and 40 percent (Chin), but due to differing population densities, prevalence does not correspond to caseload: 110,000 in Yangon and 26,000 in Chin.

The prevalence of wasting (low weight-for-height) is 7 percent for children under 5, classified as medium by WHO (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). Wasting prevalence was 11 percent in 2003, and the current trend does not put Myanmar on track to achieve the national goal of less than 5 percent by 2025.

Among women of reproductive age (WRA) (15-49 years old) 14 percent are underweight (BMI<18.5), 30 percent are overweight or obese, an increase from 18 percent in 2003, and 30 percent have anaemia (among women non-pregnant and non-lactating) (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). Malnutrition is intergenerational, passed on from mothers to children. Improving maternal nutrition across these indicators is essential to break the cycle of poverty and enable sustainable development.

All forms of malnutrition – undernutrition, micronutrient deficiencies and overweight/obesity – are the result of poor diets, inadequate knowledge and resources and unhealthy food environments on the one hand and disease, hygiene, preventive health services on the other hand. In response to the current situation in Myanmar, this report aims to estimate gaps in adequate nutrient intake, share an understanding of the barriers to accessing nutritious foods and identify interventions that can improve access to nutritious diets, enabling better nutritional outcomes.

Figure 9: Stunting prevalence and caseloads for children under five by state/region (MMFCS 2017-18, Myanmar Census 2014).



Key Findings

Economic Barriers

Message 1: Cost and non-affordability

Nine out of ten households in Myanmar could afford a diet that meets energy needs but only four out of ten could afford a diet that meets nutritional needs.

Nationwide the average cost of an energy only diet for the modelled five-person household was 1963 kyat per day (Figure 10). On average, 10 percent of households would not be able to afford the energy only diet. Energy only non-affordability varied considerably throughout the country though, with a high of 35 percent in Chin state, followed by 30 percent in Rakhine state and 25 percent in Tanintharyi.

The energy only diet reflects the cheapest cost of meeting only caloric requirement. It consists predominantly of rice and oil and is a diet that will not provide sufficient vitamins and minerals essential for bodily functions and development. Not being able to afford an energy only diet

indicates severe food insecurity, i.e. not being able to access even the most basic of diets. A nutritious diet reflects the cost of meeting both the energy requirement as well as micronutrient requirements. It consists of staple foods as well as fresh, nutritious foods such as green leafy vegetables, other vegetables, fish, pulses and/or fruits.

The national average cost of a nutritious diet was more than double the cost of the energy only diet: 4358 kyat per day (Figure 11). Nationwide, 60 percent of households would not be able to afford a nutritious diet. In nearly all regions and states the majority of households could not afford a nutritious diet. The highest non-affordability estimates were in the hilly, mountainous and coastal areas. In Chin state 82 percent of households could not afford the nutritious diet, followed by 76 percent in Tainintharyi and 70 percent in Rakhine, Kachin and Shan states. Not being able to afford the nutritious diet indicates food insecurity, i.e. not being able to access foods necessary for optimal growth and development. Consuming a nutritious diet on a regular basis is a prerequisite for a healthy, economically active population. Cost of a nutritious diet, based on food prices and availability, is a primary driver of non-affordability and the five states and regions with the highest non-affordability had the highest cost of a nutritious diet, outside from Yangon, where residents have more purchasing power. The daily cost of a nutritious diet for the model household was as high as 6477 Kyat in Chin state.

Figure 10: Daily cost and non-affordability of an energy only diet for the FNG modelled household by state/region (CotD 2019).

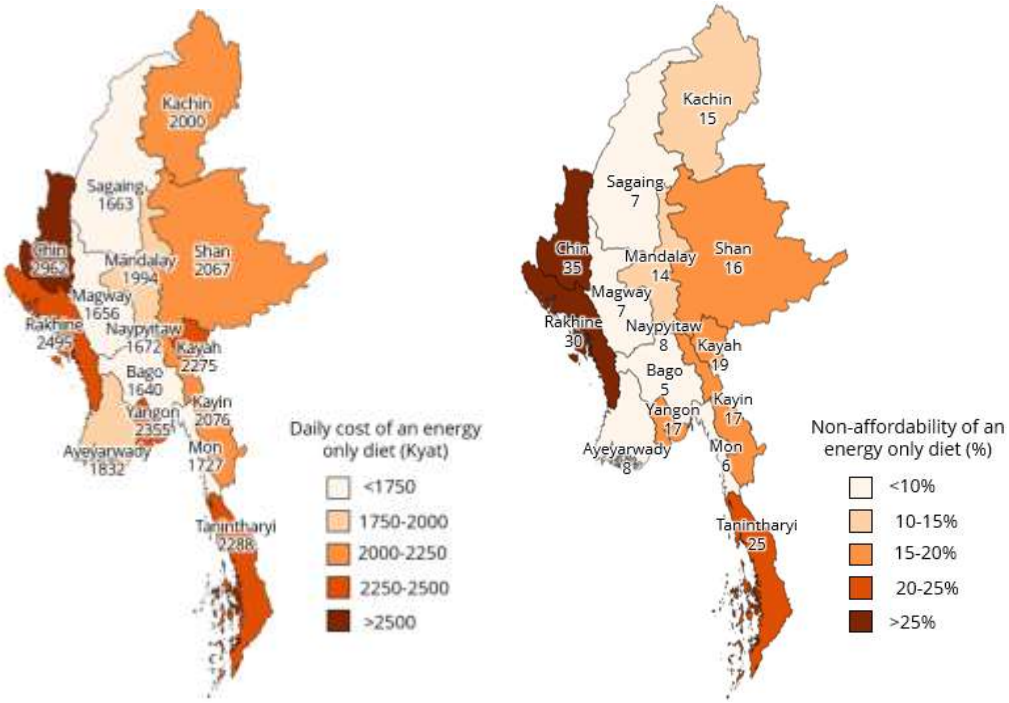
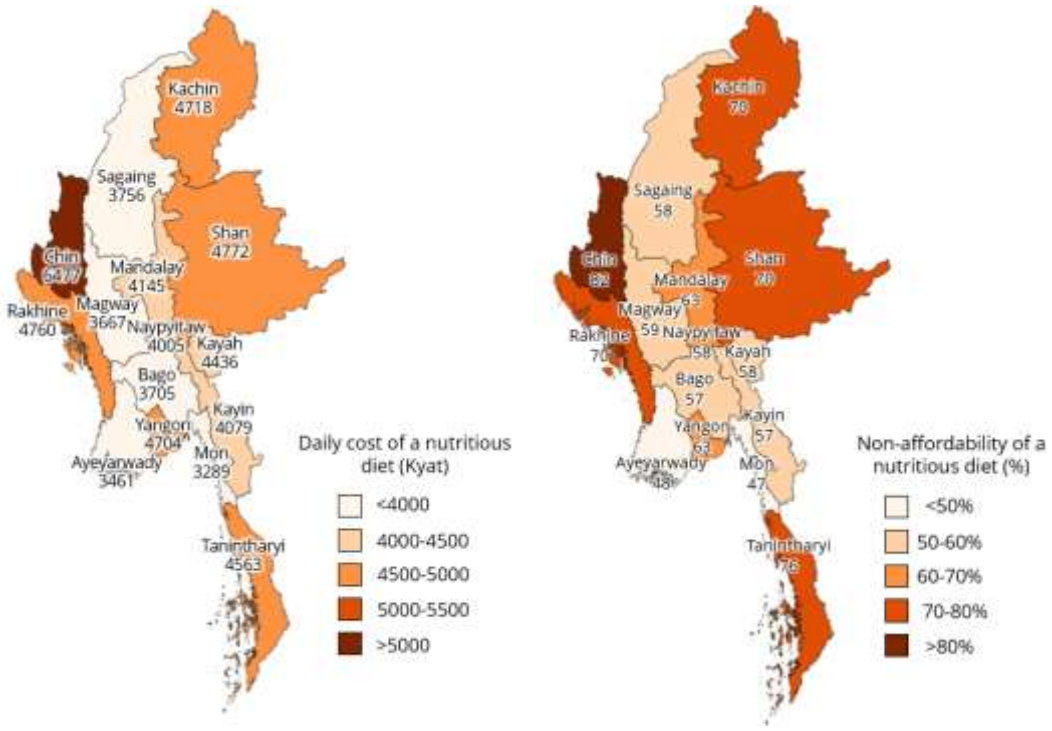


Figure 11: Daily cost and non-affordability of a nutritious diet for the FNG modelled household by state/region (CotD 2019).



Vulnerable Populations

Message 2: Infants and Young Children

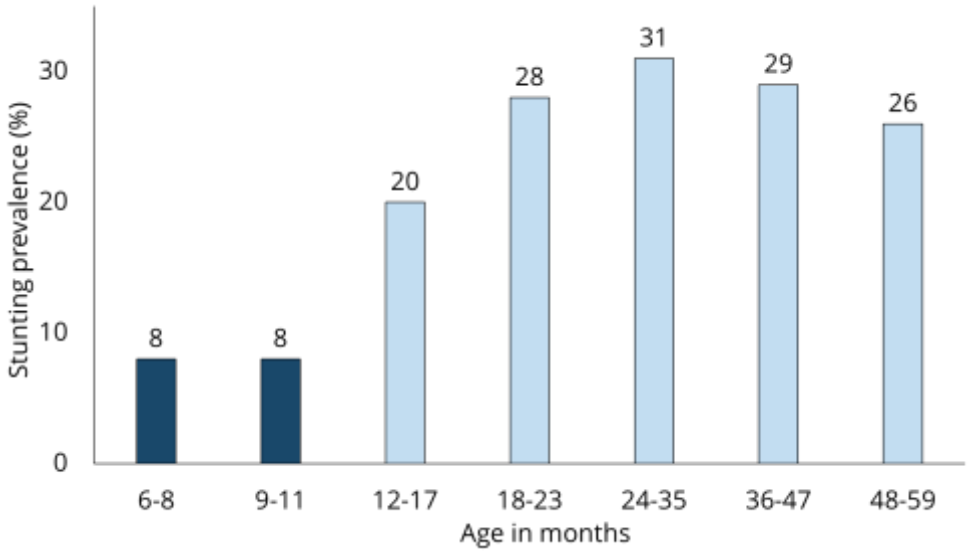
Dietary diversity and feeding practices of young children in Myanmar are suboptimal. Specialised nutritious foods, micronutrient supplementation and improved breastfeeding practices can support caregivers in providing nutritious diets to young children.

Stunting is a concern throughout Myanmar, with prevalence classified as high (>30 percent) or very high (>40 percent) in all regions or states (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). A strong determinant of stunting is inadequate diets among infants and young children. In Myanmar only 16 percent of children 6-23 months consume a minimum acceptable diet (MAD) (Ministry of Health and Sport (MoHS), 2017). With MAD being defined as meeting both frequency and diversity requirements, let's also look at the scores for those two components: 58 percent of children 6-23 months meet the standard for minimum meal frequency (MMF) and 25 percent of children 6-23 months meet the standard for minimum dietary diversity (MDD), highlighting the need to diversify diets of young children (Ministry of Health and Sport (MoHS), 2017).

The following contributing factors have been identified as barriers to adequate diets for young children: a burdensome workload for women, inadequate access and availability of food, especially nutritious food, and cultural beliefs about what foods young children can eat and when these foods can be introduced.

By age, stunting peaks during and after the period of complementary feeding with a prevalence of 31 percent for children 18-23 months old and 41 percent for children 24—35 months old (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). These figures reflect a sharp increase from a prevalence of 7 percent for children under 6 months of age (Figure 12). This finding indicates that inadequate diets during the period of complementary feeding is likely a primary driver of stunting among infants and young children. Exclusive breastfeeding, recommended to take place until the age of 6 months, is only at 51 percent for that age group, with continued breastfeeding at 12 months at 88 percent and 24 months at 64 percent.

Figure 12: Stunting prevalence by age of child in months (MMFCS 2017-18).



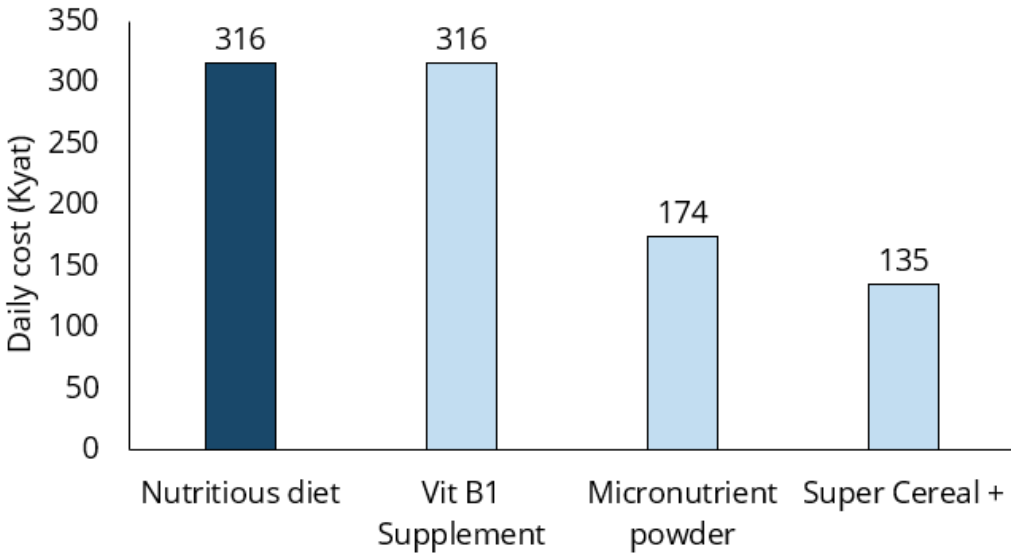
The Myanmar Micronutrient and Food Consumption Survey (MMFCS 2017-18) found that children in food insecure households and children in households with lower dietary diversity scores are more likely to be stunted (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). 36 percent of children in severely food insecure households are stunted compared to 24 percent of children in food secure households. Stunting is strongly associated with wealth and residence: poorer children and children in rural areas are more likely to be stunted than children in wealthier or urban families. Stunting prevalence varies geographically and of the five regions/states with a very high prevalence (>30 percent) three are hilly and mountainous, one is coastal and the other is delta.

The socio-economic pattern for wasting and anaemia in children under five differs from stunting -- children in wealthier households, urban areas and with well-educated mothers are as likely or in some cases more likely to have wasting and anaemia (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). This finding highlights the need to improve nutrition for all segments of the population of Myanmar.

To estimate the potential impact of improving diets of young children, the following products were modelled for a child 12-23 months old using Cost of the Diet software: vitamin B1 supplement, micronutrient powder and Super Cereal+.[2]

Of the three modelled interventions Super Cereal+ had the biggest potential impact, with an estimated reduction in cost for the child under two from an average of 316 Kyat per day across the modelling states and regions to 135 Kyat, a decrease of almost 60 percent. The estimated cost decrease represents an eased financial burden for caretakers to ensure infants and young children are consuming a nutritious diet (Figure 13), indicating that it would reduce the likelihood of nutritional deficiencies in the child's diet.

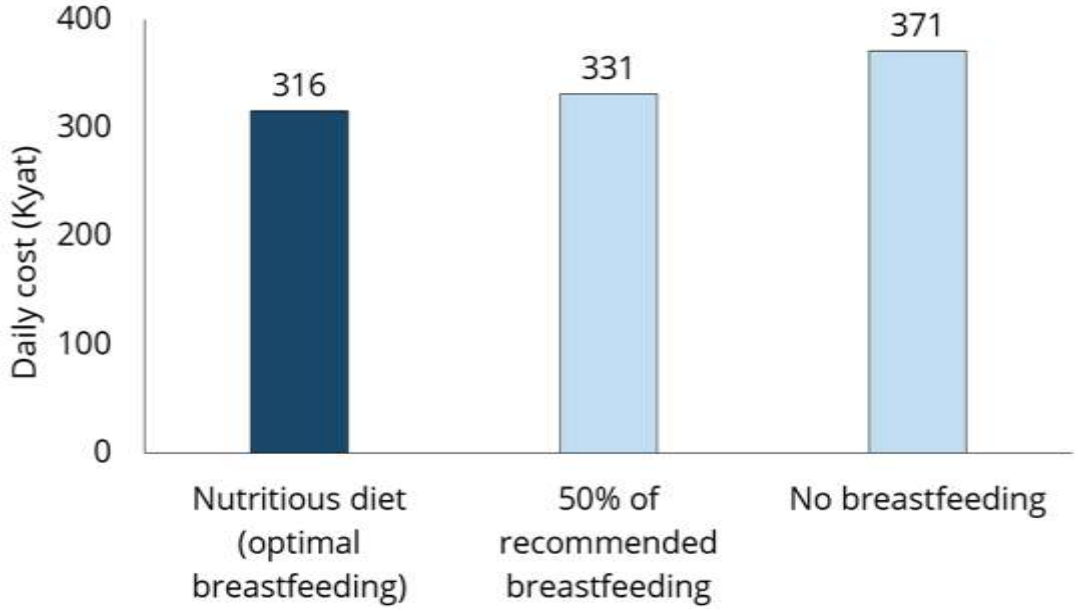
Figure 13: Daily cost of nutritious diet for a child under two with targeted interventions (average of modelling areas) (CotD 2019).



For a child 12-23 months old, CotD modelling looked at a comparison of optimal breastfeeding to 50 percent breastfeeding (instead of recommended quantities) and no breastfeeding. CotD analysis found that with no breastfeeding the cost of a nutritious diet for the child increased by almost 20 percent (Figure 14). This finding illustrates the importance of breastfeeding and the value in promoting good breastfeeding habits and enabling opportunities for mothers to continue breastfeeding, provided mothers' nutrition needs are taken care of as well to ensure breastmilk will be of assumed and desired quality. Myanmar has seen comparably high continued breastfeeding rates in recent years, with 88 percent of children continued to be breastfed at 12 months, but exclusive breastfeeding is still low. The improvement of exclusive breastfeeding is a key opportunity to improve nutrient access for young children, especially if continued breastfeeding remains high.

[2] See Annex for specification and details on composition

Figure 14: Daily cost of a nutritious complementary feeding diet of a 6-23 mo old child combined with optimal breastfeeding, 50 percent of recommended breastfeeding and no breastfeeding (average of modelling areas) (CotD 2019).

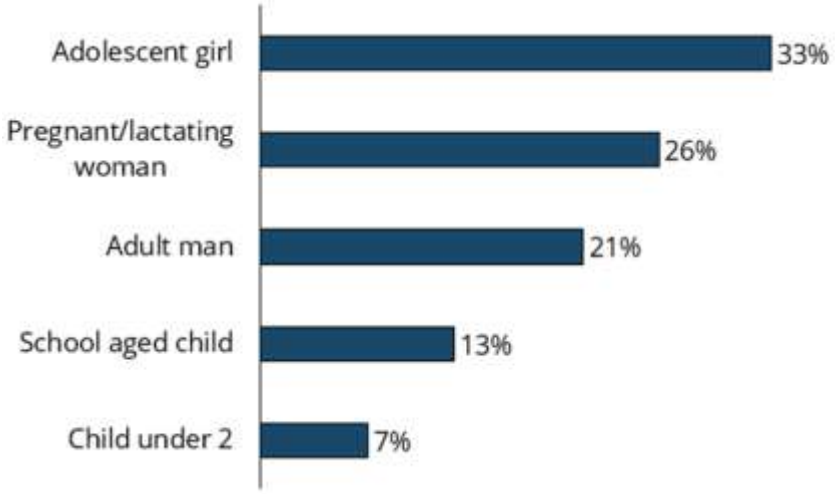


Message 3: Adolescent Girls and Pregnant and Breastfeeding Women

Meeting the nutritional needs of adolescent girls and pregnant and breastfeeding women would cost the household the most. Their micronutrient needs are higher, which means they require the largest share of the more expensive nutritious foods. This is generally not considered in household food allocation, putting them and their (future or unborn) children at greater risk of micronutrient deficiencies. Dietary supplementation can reduce the cost of accessing a nutritious diet.

CotD analysis identified adolescent girls and breastfeeding women as having the most expensive nutritious diets in the modelled household due to high nutrient requirements compared to energy intake. These two household members comprised almost 60 percent of the total household nutritious diet cost (Figure 15).

Figure 15: Average distribution of household cost of a nutritious diet by family member (CotD 2019).



In many cases food allocation, in terms of quantity and sharing of food preferred by households, is not based on nutrient-density needs but on perceived energy requirements and intra-household dynamics. This finding suggests an insufficient proportion – and total amount – might currently be allocated to household members, particularly those in need of the more nutrient-dense foods. It is in line with other surveys that show 60 percent of women do not achieve adequate dietary diversity (Ministry of Health and Sports, 2015). Likewise, the Myanmar Micronutrient and Food Consumption Survey found that one third of all women aged 15-49 years suffer from anaemia. This trend persists across the poorest (33 percent) and wealthiest (28 percent) wealth quintiles and rural (31 percent) and urban (29 percent) strata. It is particularly high in pregnant women, at 40 percent (National Nutrition Centre, 2019).

Anaemia prevalence in young children starts high (at 61 percent for 6-8 months old children), peaks at 67 percent around one year of age and slowly begins to decrease from two years of age, reaching 22 percent for children 48-59 months. Anaemia prevalence above 60 percent in young children indicates that mothers – and therefore the unborn child – is not acquiring enough iron during pregnancy.

Prioritisation and improving purchasing power for the household to buy nutritious food for the most vulnerable members are crucial for improving access to nutritious diets. To estimate the potential impact of improving nutrient intake for adolescent girls and breastfeeding women, the following products were modelled using Cost of the Diet software: vitamin B1 supplement (daily for both), iron and folic acid (IFA, once per week for adolescent girl), multi-micronutrient tablet (MMT, daily for both) and a portion of school milk for adolescent girls (but not breastfeeding women).[3]

Of the modelled interventions MMT, administered daily, had the biggest potential impact, with an estimated reduction in cost for breastfeeding women, from an average of 1154 Kyat per day

[3] See Annex for details on commodity specification and food composition used for the modelling

across the modelling areas to 512 per day, a decrease of 56 percent (Figure 16). For adolescent girls, MMT reduced the cost of a nutritious diet from 1471 Kyat per day across the modelling areas to 854 Kyat, a decrease of 42 percent (Figure 17). Note that difference in frequency, e.g. IFA being modelled as one dose per week and MMT as one dose per day, may explain difference in price reduction.

Figure 16: Daily cost of a nutritious diet for breastfeeding women with targeted interventions (average of modelling areas).

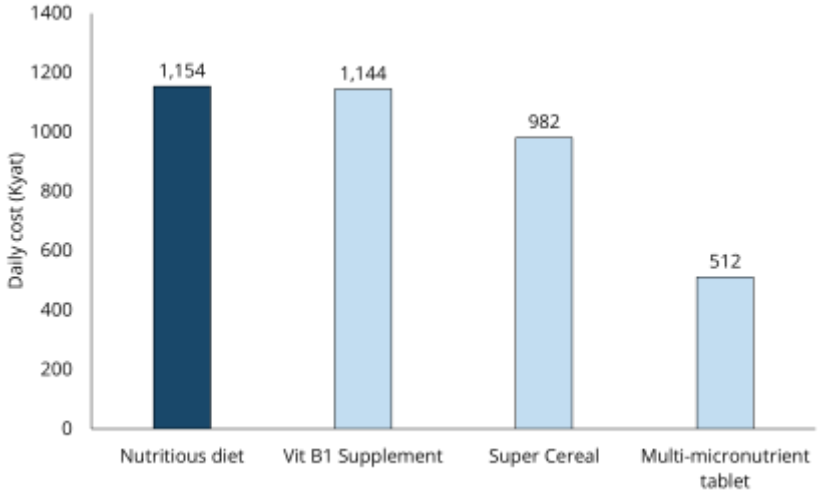
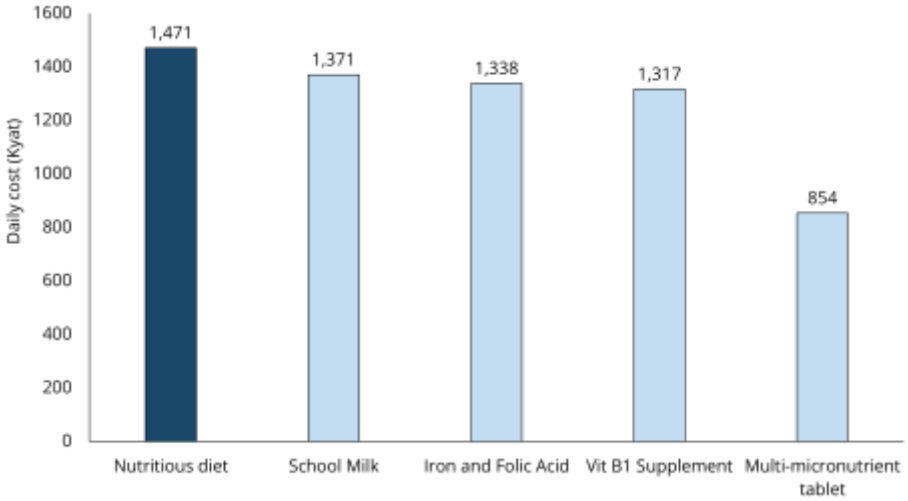


Figure 17: Daily cost of a nutritious diet for adolescent girls with targeted interventions (average across modelling areas).



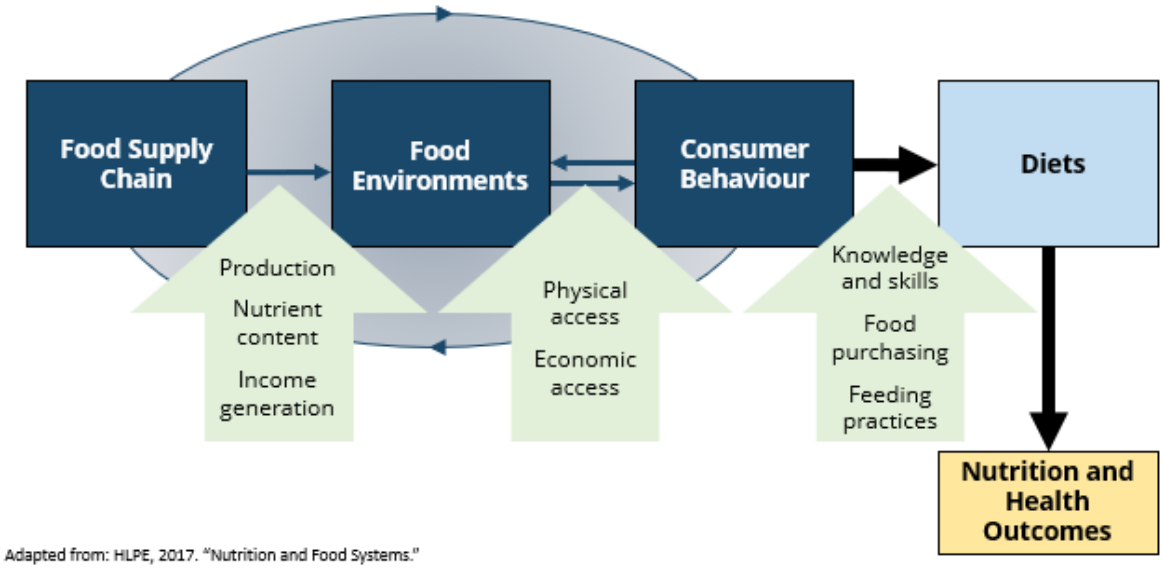
Food Systems for Diets and Nutrition

Message 4: Food Supply Chain

Agriculture is central to building a modern industrialized Myanmar. After a remarkable increase in per capita food production in recent decades, now it's time for Myanmar to diversify the food supply chain toward nutritious foods. Fruit and vegetable production from household gardens can increase access to nutritious foods for rural households.

Long-term solutions to malnutrition require transformation of the food system along food supply chains, in food environments and across consumer behaviour patterns to facilitate healthier diet choices (Figure 18) (HLPE, 2017). Healthy foods must be available and affordable, consumer demand for these foods must be strengthened and an enabling environment must support stakeholders who want to improve food systems.

Figure 18: Food systems for diets and nutrition and health outcomes framework (adapted from HLPE, 2017).



The food system is built on the food supply and agriculture is central to building a modern industrialized Myanmar. Agriculture represents one-third of national economic output, 3 out of 5 people in the workforce are involved in agriculture and agricultural exports have tripled since 2010 (World Bank, 2016). However, labour productivity from agriculture is 1/10th that of neighbouring Thailand, showing room for improvement from increased investment and adoption to support the use of modern techniques and mechanization (World Bank, 2016).

Myanmar has seen a remarkable improvement in per capita food production in recent decades. The percentage of the population whose caloric needs would not be met by the domestic food supply (1,800 kcal per capita per day) has decreased by almost 400 percent from 63 percent of the population in 1990 to 11 percent in 2017 (FAO *et al.*, 2017). The expansion in food production has surpassed population growth and these figures represent a reduction from 27 million people whose caloric needs would not have been met by domestic food supply in 1990 to 5.6 million people in 2017.

After experiencing significant growth in domestic food production, there is new potential for Myanmar to expand from producing enough food to diversifying production and increasing productivity. Currently, production is dominated by rice, with 1.2 kilograms of paddy rice per capita produced daily, followed by sugarcane with close to 500 grams per capita produced daily

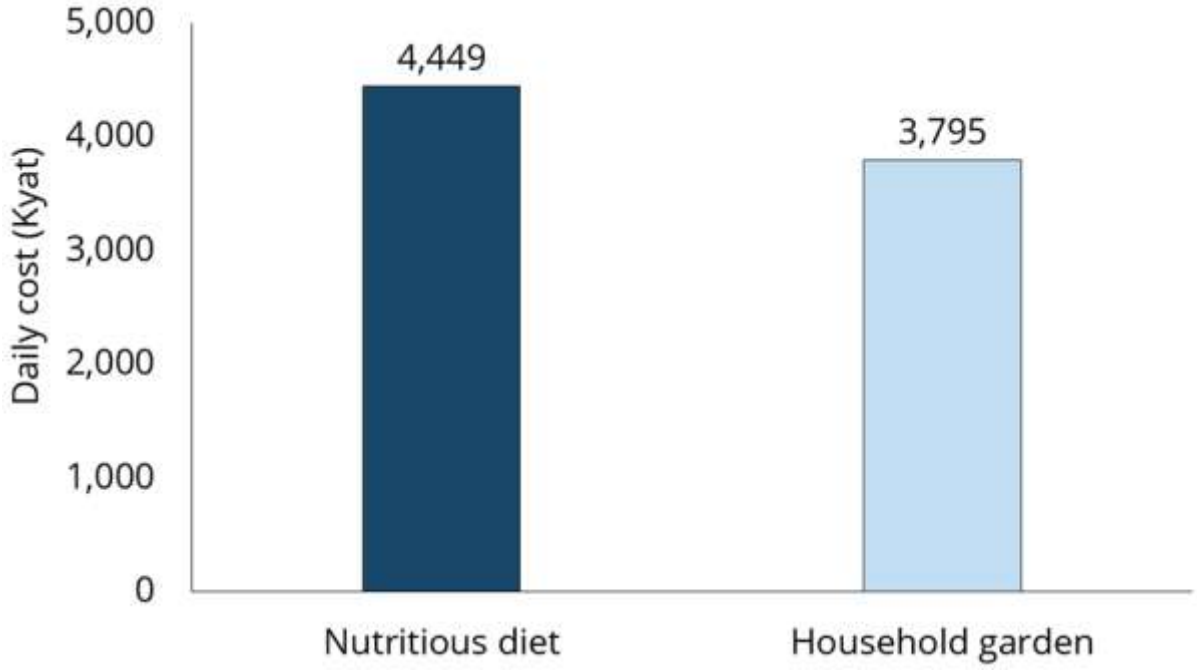
(FAOSTAT, 2020). In comparison, 270 grams per capita of vegetables are produced daily and less than 70 grams per capita of fruit are produced daily. Around 250 grams per capita of beans are produced daily, contributing to $1.4 billion annual earnings from beans and pulses exported predominantly to India (World Bank, 2016).

Diversifying production away from rice has potential nutritional benefits and economic benefits for those dependent on agriculture as a livelihood. At present, smallholder farmers are trapped in a cycle of low productivity. Farmers have limited land rights and insufficient credit opportunities resulting in low investment in quality inputs. Farmers have limited land use options resulting in low revenue from not being able to optimize the crops they produce. With limited movement, potential agriculture workers cannot get to work opportunities and farms face seasonal labour shortages. These factors all contribute to low productivity agriculture (World Food Programme, 2019).

An average of 10 percent of food by value comes from own production. The figure is slightly higher in rural areas (13 percent), among the poorest households (13 percent) and in hilly and mountainous areas (18 percent) (Ministry of Planning and Finance; World Bank Group, 2015, *own calculation*). On a state and region level, however, there is one outlier: Chin state, where almost 60 percent by value of consumed food comes from own production. Although their numbers are low on average, several states such as Sagaing, Kachin, Shan and Kayah are made up of geographic pockets where more than 30 percent of households largely rely on own production.

One strategy to improve access to nutritious diets is to promote household gardening, for households with access to land and water and the ability to perform the labour involved. A recent evaluation of vulnerable households in rural Myanmar found that promoting home gardens could improve food security and dietary diversity. CotD analysis modelled household gardening and found that for households producing in a weekly harvest on average: tomato (1.2 kg), roselle leaf (500 g), okra (700 g), lettuce (500 g), carrot (360 g), pepper (500 g), sweet potato (1.2 kg) and cabbage (700 g) the intervention could reduce the cost of a nutritious diet for the household by 15 percent (Figure 19), for those times of the year where harvest can be expected.

Figure 19: Daily cost of a nutritious diet with household garden intervention (average of modelling areas, during periods of harvest of household gardens) (CotD, 2019).



Message 5: Rural Food Environment

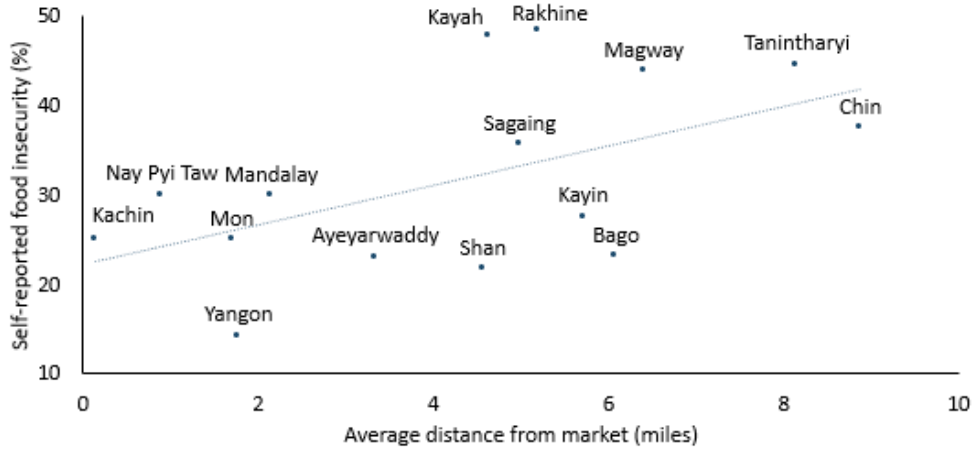
Myanmar's rural food environment is determined by diverse factors, such as ethnicity, livelihood, seasonality, conflict and economic status. Depending on livelihood system and acceptability, home production such as fishponds can provide a reliable complementary source of nutrients.

The food environment refers to the physical, economic, political and socio-cultural surroundings that shape people's dietary preferences, choices and nutritional status. For many households the food environment is based on foods they produce and purchase from local markets. Food environments vary across Myanmar's diverse geography. A high percentage of rural households in the delta, inland and coastal plains are landless and rely on cash from casual labour and/or credit to purchase food (Figure 20), For landless workers, on average 70 percent of household borrowing is for purchasing food, often leading to cycles of poverty and debt.

Figure 20: Landlessness in Myanmar (WFP Food Security and Poverty Estimation Surveys, 2013-2015) (WFP, 2019).

CotD analysis found the highest cost of a nutritious diet in Chin state, followed by Tanintharyi, Shan state and Kachin state. Poor market access due to challenging terrain increases the cost of a nutritious diet when suppliers travel greater distances to reach markets, passing costs on to consumers, and providing fewer nutritious foods for consumers to choose from. This is particularly the case where there is low demand from consumers due to low incomes. Using data from Myanmar's Poverty and Living Conditions Survey, we see a relationship between average distance from market and self-reported food insecurity.

Figure 21. Households far from markets are more likely to report food insecurity. Adapted from World Bank 2015.



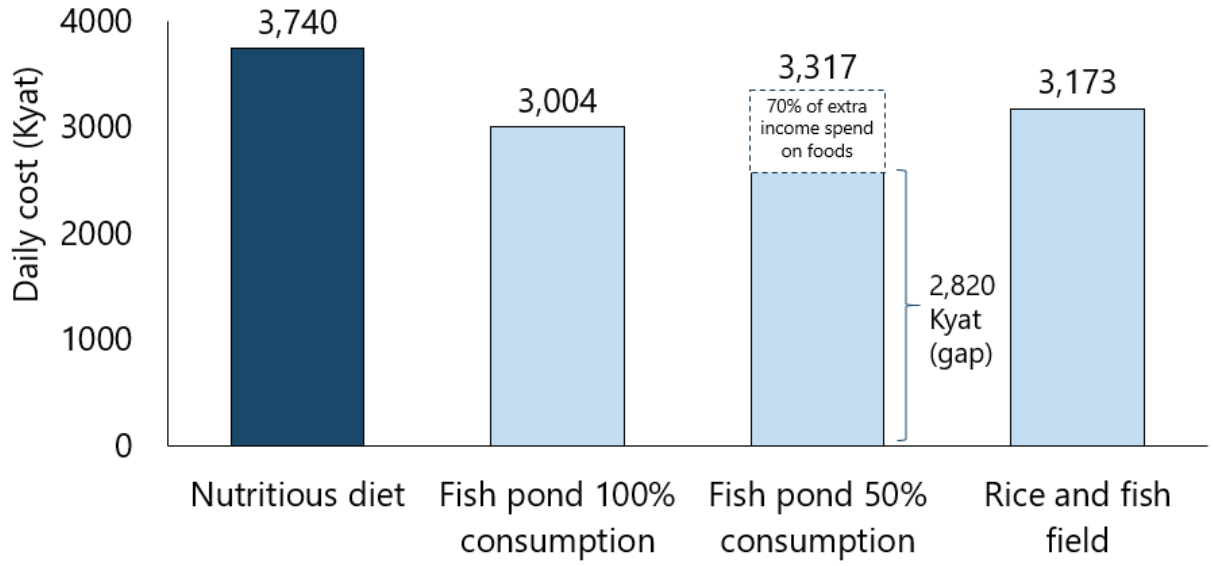
Given the compounding nature of challenges in the rural areas, including low market access, elevation and difficult terrain to traverse, own production can be a strategy for improved access to nutritious foods. Crop-based interventions can prove successful at higher elevations, as detailed in the previous key message. Household fishponds can be a feasible alternative for the rural inland and coastal plains, where fewer exacerbating factors exist and impact can be particularly high due to denser populations. Trials of such interventions have been carried out across the dry zone and the delta areas of Sagaing, Magway, Mandalay, Ayeyarwaddy, Mon and Kayin.

Small-scale fish production can support household nutrition and local economies. Average fish consumption is high at around 30kg/person/year (edible weight), although this varies between wealth quintiles. Additionally, it has been estimated that beyond improved nutrient intake,

small-scale commercial fish ponds would contribute three times more wealth to the local economy, compared to crop-based agriculture on the same land size (Belton, Filipski and Hu, 2017).

To estimate impact on household consumption, FNG assessment particularly focussed on three types of fish pond interventions: 1) a small pond, with local fish (silver barb, tilapia, pangasius, rohu) exclusively for own consumption; 2) a small pond with fish for consumption and income generation, where 70 percent of extra income is considered to go toward food (50/50); and 3) a rice paddy, with small fish species (rohu and silver barb) produced in the cultivation area for consumption.[4] Results show that all three models reduce the cost by around 20 percent, with intervention two being most efficient in Ayeyarwady (Figure 22). Similar interventions, such as using irrigation ditches for fish production, could target vulnerable population groups that do not have access to land. Fish from those sources, gathered at no cost beyond transportation, could provide the poorest landless households with nutrients they might otherwise not be able to access.

Figure 22: Cost reduction through fishpond interventions (CotD 2019).



Message 6: Urban Food Environment

In urban food environments in Myanmar, lack of time and purchasing power combined with an abundance of inexpensive processed foods has led to a rapidly increasing prevalence of overweight and obesity, alongside a persistently high caseload of child undernutrition. CotD modelling shows that unhealthy snacking increases the cost of a nutritious diet by providing calories but not other essential nutrients.

[4] See Annex for model specifications

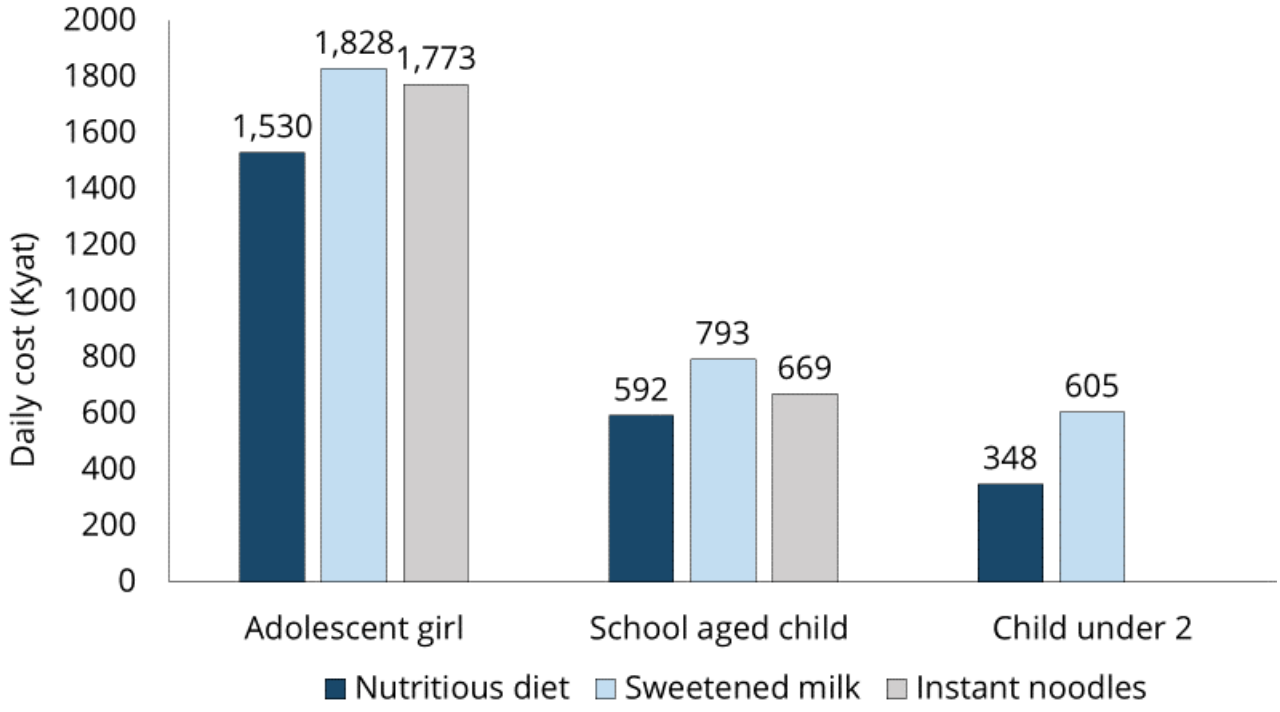
Households in urban areas, which have nearby markets, face a different set of challenges accessing nutritious foods. Proximity to nutritious food does not guarantee access, especially for low-income households unable to afford these foods. Myanmar's most significant urban area Yangon had the 5th highest cost of a nutritious diet, ranking below Chin, Tanintharyi, Kachin and Shan, four states and regions with significant constraints related to physical access to markets. In Yangon 63 percent of households would not be able to afford the nutritious diet, 17 percent would not be able to afford an energy only diet. While the stunting rate is at 21 percent and below the national average of 27 percent, due to its density, the stunting caseload is among the highest per area with an estimated 110,000 children stunted in Yangon alone (National Nutrition Centre, 2019).

Yangon is expanding rapidly, and further research is needed to better understand how urbanization impacts nutrition. The primary trigger of migration to Yangon is landlessness in Delta regions (WFP, 2019). For the urban poor and recently arrived, time is a major constraint, often leading to the consumption of street food (WFP, 2019). The urban poor also often lack safe water and sanitation and are highly vulnerable to flooding.

Overweight and obesity prevalence is higher in urban areas, including Yangon, where over 40 percent of women of reproductive age are overweight or obese (National Nutrition Centre, Department of Public Health and Ministry of Health and Sports, 2019). This may be partially explained by easy access to foods and drinks high in fat and sugar, but low in essential nutrients. The CotD assessment estimates that twice-weekly consumption of sweetened milk or instant noodles at market prices (225 kyat and 263 kyat per portion, respectively) increases the daily cost of a nutritious diet by around 300 kyat per day for adolescent girls and 200 kyat per day for school-aged children in Yangon (Figure 23). Anecdotal information exists that sweetened milk (mostly sugar with little milk content) is sometimes given to children under two and this was also modelled. Results showed that this unhealthy practice almost doubled the daily cost for an infant.

The increase in overweight and obesity is particularly concerning. If policies and programmes focus exclusively on undernutrition, overweight and obesity could become a rising problem as Myanmar continues to experience economic growth and urbanization.

Figure 23: Cost of a nutritious diet without and with consumption of unhealthy snacks[5] by household member (CotD 2019).



Message 7: Consumer Behaviour

The lowest wealth quintile in Myanmar prioritizes grains in food consumption, with low expenditure on other food groups. Limited economic access and poor knowledge of what constitutes a healthy diet are barriers to accessing nutritious foods. A cash-based transfer combined with social and behaviour change communication could improve access to nutritious diets.

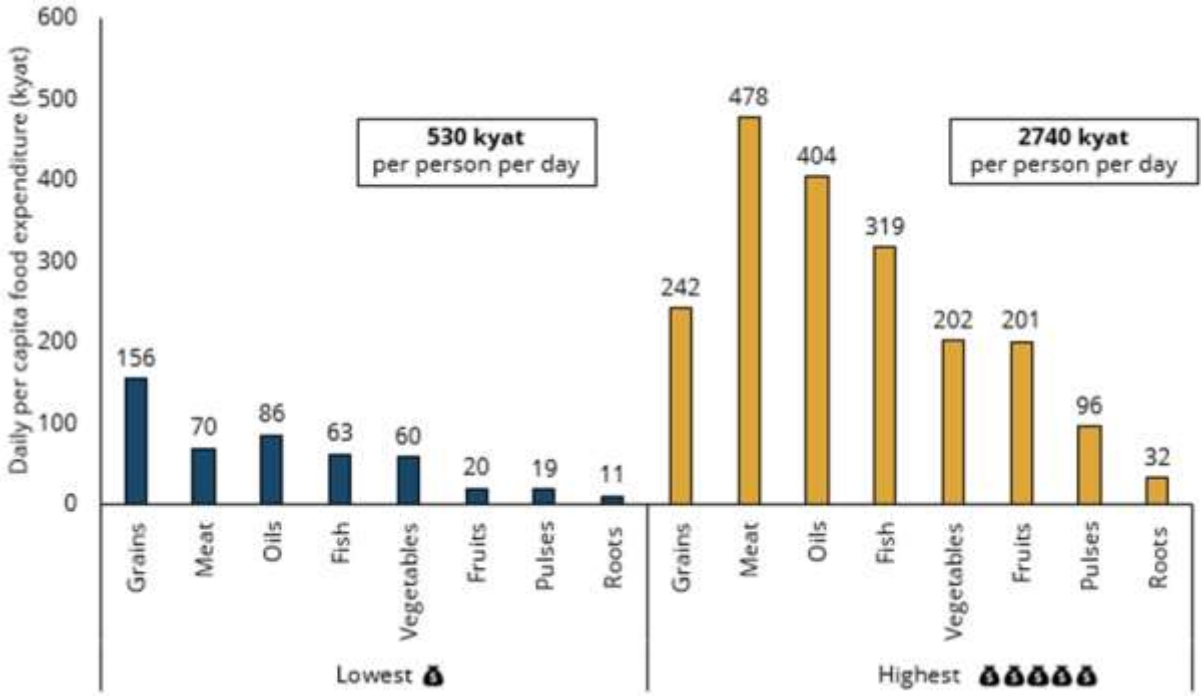
Consumer behaviour refers to the choices made by households and individuals determining which foods to buy, prepare and eat and how foods should be allocated among household members. Consumer behaviour in the food system is influenced by the food environment, which is influenced by the food supply, with feedback and interaction across the three constituent elements.

In Myanmar, an analysis of food purchasing patterns by wealth quintile finds that households in the richest wealth quintile spend on average 2,740 kyat per person per day, with the most money spent on meat, followed by oils, fish, grains, vegetables and fruit (Ministry of Planning and Finance; World Bank Group, 2015). In contrast, households in the poorest wealth quintile spend on average 530 kyat per person per day (less than 20 percent of what the richest spend), with the most money spent on grains, followed by oils, meat, fish, vegetables and fruits (Figure

[5] The model assumes two servings per snack, per week. Cost increase also accounts for cost of purchasing the unhealthy snack.

24). This indicates that choices are constrained and influenced by what money is available to spend on foods.

Figure 24: Daily per capita food expenditure for lowest and highest wealth quintile (MPLCS 2015, own calculation).



This finding also suggests that the poorest households prioritize energy needs by consuming grains, with few resources available for a diverse diet. One potential strategy to improve access to a nutritious diet – with more consumption from nutritious food groups – would be to provide the poorest households with cash transfers, accompanied by SBCC to increase the likelihood that cash transfers would be spent on nutritious foods.

Currently two large cash-based social safety nets are implemented in Myanmar: Maternal and Child Cash Transfer (MCCT) programme, providing 15,000 kyat per month to pregnant and breastfeeding women through the child's second year. Additionally, Food for Assets (FFA), a WFP programme targeting vulnerable households and providing 4,000 kyat per day worked for a maximum of 20 days per month. Both programmes have the potential to improve nutrition for vulnerable groups, if the money is dedicated to fresh, nutritious foods.

For cash transfers to improve nutrition, several conditions must be met at a minimum: 1) nutritious foods are available for beneficiary households; 2) households know which foods are nutritious, 3) households must have no competing demand for the resources (i.e. health care, school fees, transportation cost) and; 4) households intend to purchase and consume nutritious foods. At scale, a cash transfer intervention must consider the amount needed to deliver impact, the proportion of the population in need of cash transfer, and the ability of implementers to mobilize required resources. It is also critical to assess how cash transfers can improve gender relations, aiming for a balanced empowerment that is associated with better nutrition.

A recent study on the interface between consumers and food environments in Yangon (one upper-income township and one lower-income township), Tanintharyi (one middle-income township) and Magway (one lower-income township) found that economic affordability, not availability, was considered a barrier to accessing preferred foods (Downs *et al.*, 2019). However, focus group participants had limited knowledge of what constitutes a healthy diet. These two findings together suggest cash transfers combined with SBCC could be an effective strategy for improving consumption of nutritious foods and reducing inadequate nutrient intake.

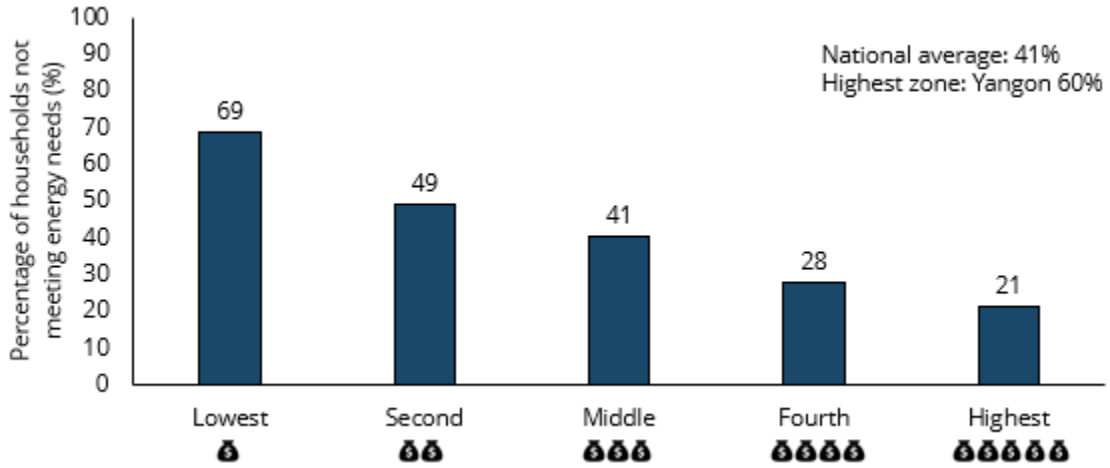
Message 8: Diets

Based on an analysis of current diets, the majority of the poorest households in Myanmar are not meeting energy needs. The average diet for Myanmar is based on grains and oils, with some consumption of vegetables, fruit, meat and fish. If households were to consume fortified rice it would reduce the cost of a nutritious diet.

Diets reflect what's made available by the food system. Through consumer demand and regulation, they drive future food systems. Interactions across food supply chains, food environments and consumer behaviour patterns determine the items, quantities, proportions and combinations of foods and beverages consumed by households and individuals. Healthy diets should meet energy needs, provide a diversity of foods of high nutritional quality and be safe.

An analysis of current diets across Myanmar, based on household consumption data, found that an estimated 41 percent of households were not meeting energy needs (Ministry of Planning and Finance; World Bank Group, 2015, *own calculation*). As Figure 25 shows, this varies across income groups, with 69 percent among the lowest wealth quintile. Across agro-ecological zones, the highest percentage of households not meeting energy needs with current diets was in Yangon at 60 percent. This indicates high heterogeneity of income and consumption in Yangon, having both above average food expenditure but also the highest proportion of households not meeting energy needs with current diets.

Figure 25. Estimated proportion of households not meeting their energy needs through consumption by wealth quintile (World Bank 2015)



To better understand the typical Myanmar diet, average consumption by weight by food group was calculated (Ministry of Planning and Finance; World Bank Group, 2015, own calculation). Grains were consumed in the highest quantity, on average 419 g consumed daily per capita, followed by vegetables (216 g), fruit (103 g), oils (97 g), meat (65 g), fish (60 g), roots (38 g) and pulses (34 g) (Figure 26). Comparing the lowest wealth quintile with the highest, grains make up a greater percentage of the diet by weight for the poorest households, with low consumption of vegetables, fruit and animal-source foods, contributing to a greater risk of micronutrient deficiencies for the poorest households (

Figure *27*). There are also very strong differences in total energy intake between the lowest and highest wealth quintile, which may be indicative of higher food waste in the upper wealth quintile. This would suggest that not all food purchased is actually consumed. At the same time, it is also in line with increasing overweight and obesity figures in higher wealth quintiles, showing overconsumption of kilocalories.

Figure 26: Daily per capita food consumption (weight) by food group (MPLCS 2015, own calculation).

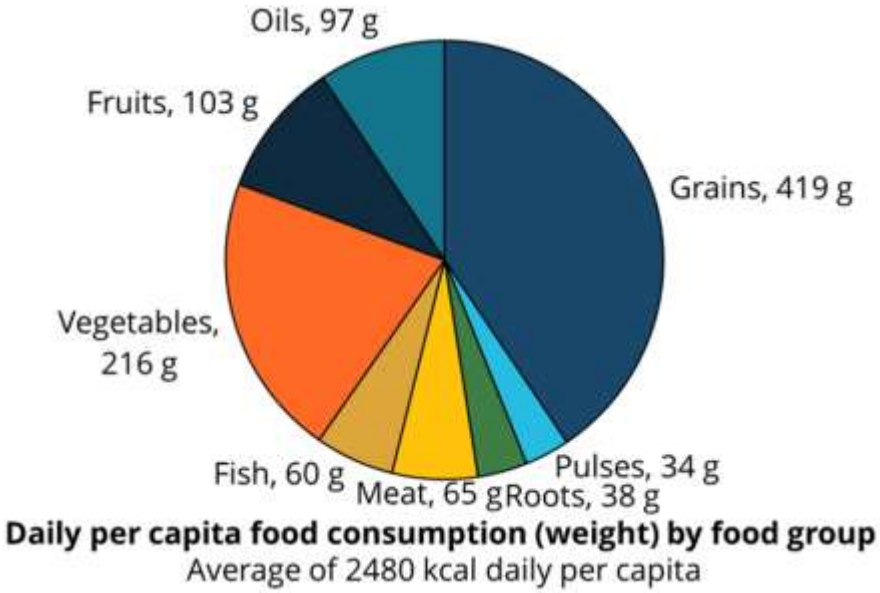
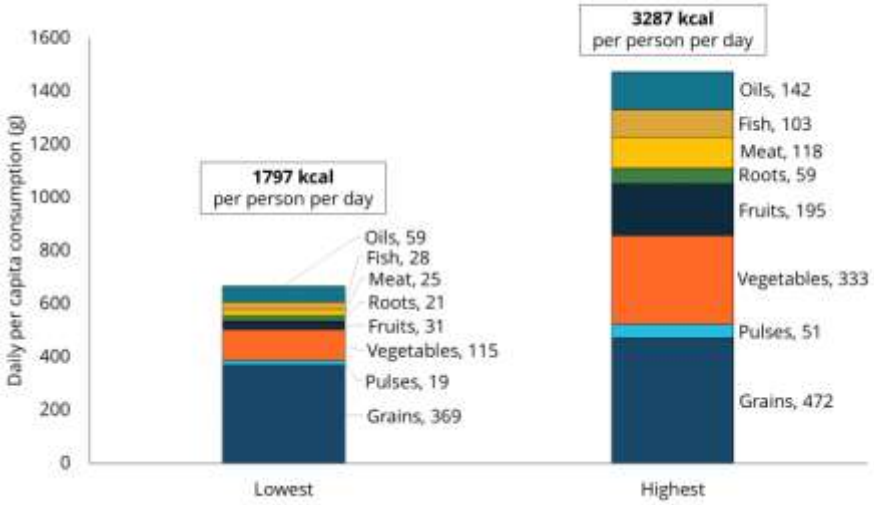


Figure 27: Average daily per capita consumption by food group for lowest and highest wealth quintile (MPLCS 2015, own calculation).

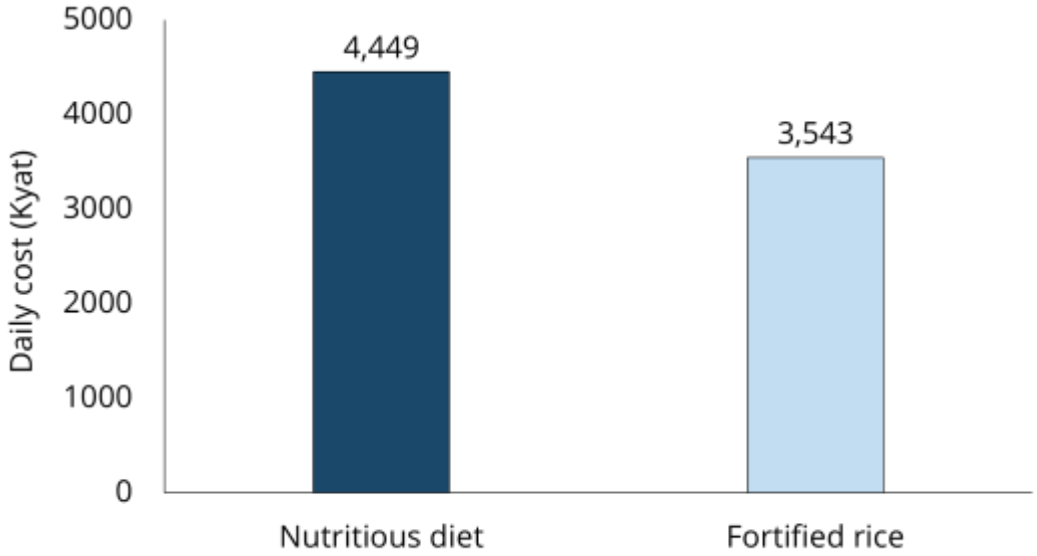


Because the typical diet is based on rice, one strategy to improve nutrient intake is to encourage the production and consumption of fortified rice. CotD analysis included a model in which households consumed rice fortified with iron, zinc, vitamins A, B1, B2, B6, B12 and folic acid. Although modelling fortified rice at 10 percent higher market prices[6] than unfortified rice, the average daily household cost of a nutritious diet for households in the modelling regions was reduced from 4,449 kyat to 3,543, a 20 percent cost reduction (Figure 28). This shows the

[6] Based on private sector stakeholder consultations, estimating cost of fortification through private channels.

potential that rice fortification, if rolled out comprehensively across the country, through both public and private channels, brings.

Figure 28: Average daily cost of a nutritious diet with fortified rice sold at a price that's 10% higher than current market price (average of modelling areas) (CotD 2019).



Multi-Sectoral Programming for Improved Nutrition

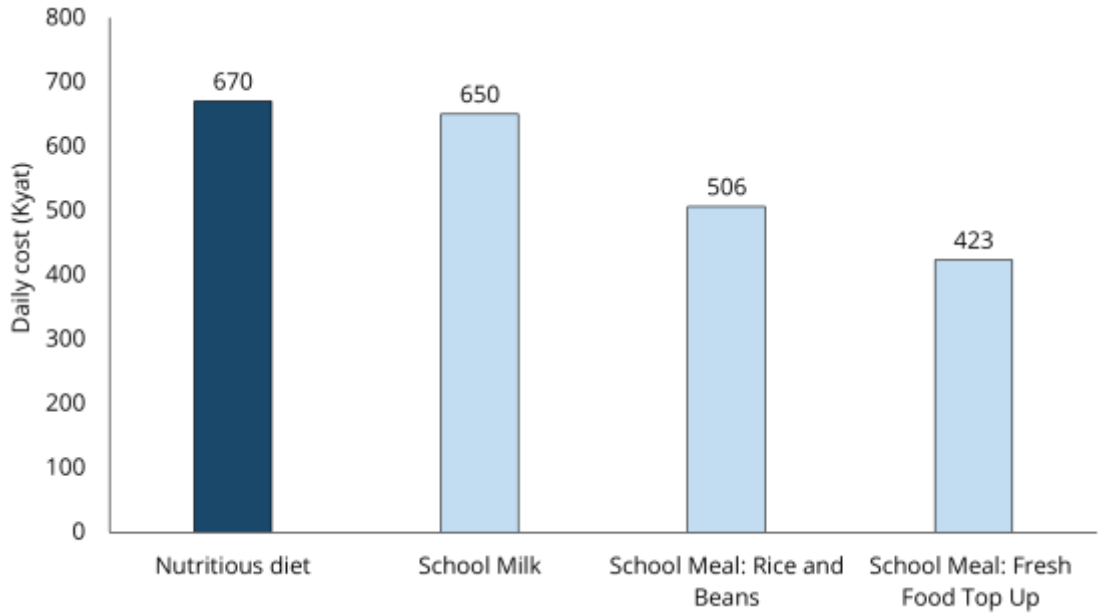
Message 9: School Meals and Emergency Rations

Improving nutrition requires multi-sectoral engagement and coordination, at the institutional and system-levels, especially for the marginalized and most vulnerable populations to meet their needs. The impact of school meals and emergency rations can be improved by providing additional fresh foods and fortified rice.

One opportunity to improve nutrition for a vulnerable population is through the education sector with school meals. The Department of Education will provide 350 ml of milk to students every 10 days, starting in 2021. WFP is currently delivering school meals to students in 11 states and regions. The current WFP ration consists of rice and beans. WFP has been in discussions to expand the school meal with a top up of additional fresh foods, for example dried fish and green leafy vegetables. CotD analysis found that in Shan state, where WFP is currently operating, by providing the planned quantity of milk, the cost to the household of providing a nutritious diet for a school-aged child averaged across the modelling areas would reduce from 670 to 650

kyat per day. This is compared to a reduction to 506 kyat with rice and beans, and a reduction to 423 kyat per day when further topped up with dried fish and green leafy vegetables (Figure 29).

Figure 29: Average daily cost of a nutritious diet for a school aged child with different school feeding interventions (Shan state) (CotD 2019).



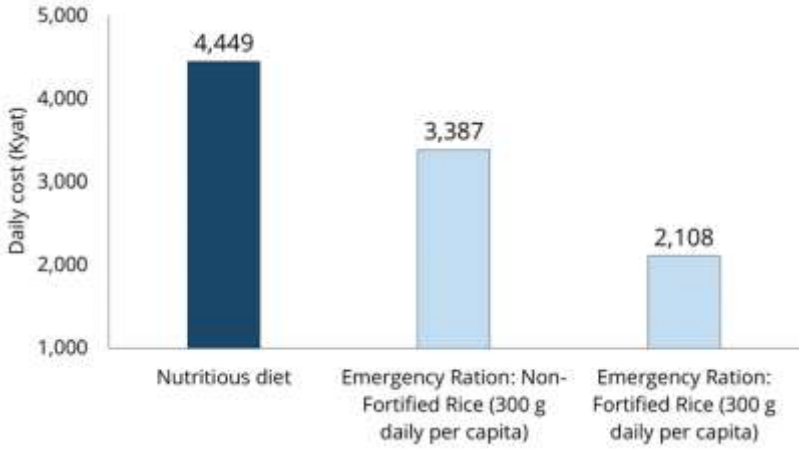
WFP currently provides an emergency ration of rice to beneficiaries in Northern Rakhine State, Central Rakhine, Shan State and in emergency response operations in any area where flooding has occurred. The ration of 13.5 kg of rice per person per month equates to 450 g per person per day and 1,620 kcal, exceeding the WHO recommendation that no more than 50 percent of energy come from cereal grains, provided the other 50 percent of energy can come from other foods. To deliver this amount, WFP could reduce the ration to 9.1 kg of rice per person, equating to 300 g per person per day and 1,080 kcal.

CotD analysis estimated the reduction in the cost of a nutritious diet if households were to receive the 9.1 kg of rice per person ration and the added benefit if rice were fortified. Non-fortified rice could reduce the cost of the nutritious diet for households in the modelling areas from 4,449 kyat per household per day to 3,387 kyat, representing a 24 percent reduction. Fortified rice could reduce the cost further to 2,108 kyat per household per day, representing a 53 percent reduction in the cost of a nutritious diet for beneficiary households (Figure 30).

In the context where emergency rations are being provided it is unlikely households would be able to afford the remaining costs to purchase a nutritious diet. To improve nutrient intake

additional assistance should be provided in the form of other foods, specifically fresh food vouchers or specialized nutritious foods for specific target groups.

Figure 30: Average daily cost of a nutritious diet for the modelled household with the emergency ration and with fortified rice as the emergency ration (average of modelling areas) (CotD 2019).



Message 10: MS-NPAN Interventions

Introducing MS-NPAN interventions from all sectors can drastically reduce the cost and non-affordability of nutritious diets.

Improving nutrition in Myanmar requires action from all sectors. To estimate the impact of combined interventions, different household packages were modelled with cash transfers, based on available social safety nets. The combination reflects different priorities from the MS-NPAN interventions, as outlined in the table below (Table 1).

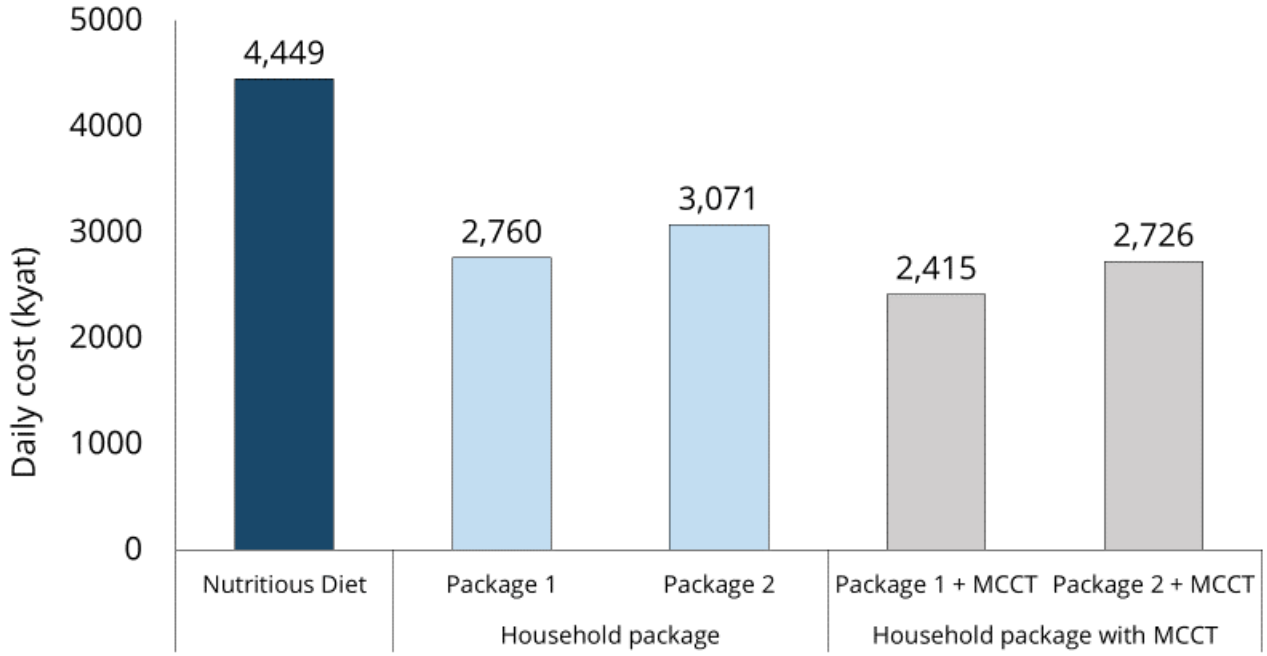
Table 1: Modelled interventions included in household packages.

Target Group	Package 1	Modality	MSNPAN Activity
Household	Fortified Rice	Market Price	#6
	Home Garden/Fishponds	Own Production	#23 / #24
Adolescent girl	School Meals with Fortified Rice & School Milk	In-Kind	#17 / #4
Breastfeeding woman	Super Cereal	In-Kind	# 7
School-aged child	School Meal with Fortified Rice & School Milk	In-Kind	# 17
Child under 2 years	Super Cereal	In-Kind	#7

Target Group	Package 2	Modality	MSNPAN Activity
Household	Vitamin B1	In-Kind	
Adolescent girl	School Meals & School Milk & MMT	In-Kind	# 17 / #6
Breastfeeding woman	MMT	In-Kind	# 4
School-aged child	School Meals & School Milk	In-Kind	# 17 / # 6
Child under 2 years	MNP	In-Kind	# 1

Interventions were selected that reflect different livelihood dynamics. For example, the HKI home garden was modelled in the mountainous states and regions, whereas a fishpond was modelled as part of the package for the delta states and regions. Results of the appropriate models were then averaged to demonstrate impact on a national level. The results show that a combination of targeted interventions and the Maternal and Child Cash Transfer (MCCT) can reduce the cost of a nutritious diet. For the modelled household, receiving package 1 and the MCCT would reduce the nutritious diet cost from 4,449 kyat per day to 2,415 kyat per day (Figure 31).

Figure 31: Average daily cost of a nutritious diet for the modelled household compared to two packages of interventions with and without the MCCT (average of modelling areas) (CotD 2019).



Achieving this impact can only be achieved with support from multiple stakeholders across the following systems: food (agricultural interventions), health (supplementing diets with specialized nutritious foods or micronutrient supplements), education (healthy, nutritious school meals), and social protection (cash transfers for the most vulnerable).

Assuming all households would be eligible for the modelled interventions, non-affordability of a nutritious diet could be reduced from 61 percent to 25 percent, making a nutritious diet available for many more.

These results demonstrate the possible effects that could be gained from increasing household access to nutritious foods with a package of interventions delivered across multiple entry points and sectors. The underlying assumption is that adequate demand-creation strategies are in place to ensure that cash transfers or vouchers provided would be spent on nutritious food which would be consumed by the targeted individuals.

Stakeholder Recommendations

As part of the dissemination workshop stakeholders were asked to break out in groups to develop recommendations based on the analytical findings of the FNG. During that process stakeholders identified key steps for the different sectors, focussing on regional disparities to inform considerations for the roll-out of the MS-NPAN. Taking a dedicated multi-sectoral perspective, these points aim to support prioritization and action plans across projects and programmes.

Health	
Maintain Focus on the first 1,000 days	<u>Micronutrient supplementation for mothers and young children</u> <u>Interpersonal communication</u> ○ Mother-to-mother support groups ○ Identify change agents ○ Positive deviance models ○ Training of trainers in rural areas <u>Quality health center counseling and support services</u> ○ Baby Friendly Hospital Initiative and Basic Health Staff programming ○ Scale-up and increase coverage of ongoing campaigns to vaccinate, reduce parasite infections and child morbidity

	Policies and regulation ○ Adequate maternity leave policies that enable women to provide exclusive breastfeeding for the first six months ○ Issue breastmilk substitute code Support pregnant and breastfeeding women and adolescent girls ○ Provide iron and folic acid and multi-micronutrient tablets on a regular basis
Social Welfare	
Build on maternal and child cash transfer (MCCT)	Evaluate amount of targeted Cash Transfers ○ Food purchases are often made for the entire household and targeting individuals with 15,000 kyat per month may not be enough ○ Additional support with complementary programming Social behavior change communication along with cash transfer ○ Educate mothers on which foods are nutritious and promote positive food consumption behaviours
Provision of nutritious foods in safety nets	Provide nutritious food in social safety net and emergency rations ○ Fortified rice, using preferred varieties and distributed in affordable formats. Vouchers or mandatory supply of fortified rice in schools, hospitals and MCCT schemes would help. ○ Enabling fresh food purchases along with rice rations, either through cash or voucher
Education	
Leverage education platform to reach children and adolescents	Combine targeted with blanket interventions and awareness of nutrition ○ School meals for all age groups ○ Include micronutrient supplementation based on needs (targeted and/or blanket) ○ Use healthy recipes and meals to improve awareness on nutrition Expand on existing school meals with fresh foods ○ Investigate possibilities of homegrown school feeding models ○ Using the school as a nutritional hub where freshly-cooked meals are provided, fortified rice coming from local producers and local varieties is supplied, fresh vegetables from school gardens are used, SBCC is promoted with the students and their parents Connect with other platforms and sectors

	○ Agricultural interventions to connect smallholder farmers and school gardens to school meals ○ Evaluate possibility to target nutrition-specific (health) interventions through schools (e.g. IFA or MMT for adolescent girls) ○ Purchase fortified rice for blanket cereal component in school meals

Agriculture, Public and Private Sector	
Diversify agriculture production	<u>Promote diversification to different production channels of nutritious foods</u> ○ Commercial level (Small and medium enterprises), promote Farmer's Associations and Networks to leverage power on the production side ○ Small-scale household level ○ Household gardens to increase diversity of vegetables at household level for self-consumption and to sell small surplus ○ Small-scale livestock, especially poultry for egg productions, supporting government programs for laying hens. ○ Fish pond aquaculture <u>Invest in productivity of small-holder farmers</u> ○ Training farmers on improved techniques, through MoALI's increased extension services ○ Providing inputs: seeds, materials, water <u>Realize the benefits from addressing issues related to land rights, land use options and restrictions on limited movement</u> ○ Expanded access to credit and micro-credit in hard-to-reach areas ○ Increased investment in quality inputs, such as improved livestock breeds and seeds to be available at a subsidized price. Targeting small-scale farmers through private sector, e.g. conditionality on eligibility for subsidies. ○ Support fewer seasonal labour shortages through further knowledge and communication on seasonal labour flows
Improve availability and nutrient content of foods	<u>Large-scale rice fortification can be a quick win (if the mixing process is decentralized and adapted to preferred local varieties)</u> ○ Promote the benefits of rice fortification to consumers ○ Consider the public interest of fortified rice beyond just being a market commodity and support it with mandatory public policies to translate potential for wide

	health improvement ○ Provide technical support to small- and medium-scale millers in the priority areas to enrich local rice varieties to be able to reach local markets and schools <u>Strengthen regulatory environment for food safety and marketing</u> ○ Advocacy through Sun Business Network
Livelihood Focus	
Target interventions for specific livelihoods	<u>Hills and Mountains + Dry Zone</u> ○ Homestead gardens and small-scale livestock and poultry interventions <u>Coastal</u> ○ Vocational training for off-farm activities to landless people to improve their labor situation, making them less dependent on temporary, unskilled labor. Identify skills that are most in demand in those areas (machineries, hair dressing, tailoring). ○ Homestead gardens, off-shore fishing, on-shore aquaculture and livestock (poultry and pigs) <u>Delta</u> ○ Vocational training for off-farm activities to landless people to improve their labor situation, making them less dependent on temporary, unskilled labor. Identify skills that are most in demand in those areas (machineries, hair dressing, tailoring). ○ Homestead gardens and aquaculture (fish-ponds, fish production in rice fields) <u>Urban livelihood zone</u> ○ Introduce overweight and obesity prevention measures ○ Explore sugar tax and food labelling regulations ○ Only allow healthy foods at schools

References

Belton, B., Filipski, M. and Hu, C. (2017) 'AQUACULTURE IN MYANMAR : FISH FARM TECHNOLOGY , PRODUCTION Feed the Future Innovation Lab for Food Security Policy', (May).

Bhutta, Z. A. *et al.* (2013) 'Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost?', *The Lancet*, 382(9890), pp. 452–477. doi: 10.1016/S0140-6736(13)60996-4.

Downs, S. M. *et al.* (2019) 'The interface between consumers and their food environment in Myanmar: An exploratory mixed-methods study', *Public Health Nutrition*, 22(6), pp. 1075–1088. doi: 10.1017/S1368980018003427.

FAO *et al.* (2017) *The State of Food Security and Nutrition in the World*. Rome. doi: 10.1080/15226514.2012.751351.

FAOSTAT (2020) *New Food Balances*. Available at: http://www.fao.org/faostat/en/#data/FBS.

HLPE (2017) 'The High Level Panel of Experts on Food Security and Nutrition', (September). Available at: www.fao.org/cfs/cfs-hlpe.

Horton, S. and Steckel, R. H. (2011) 'Global economic losses attributable to malnutrition 1900-2000 and projections to 2050', *Cambridge University Press*, pp. 247–272.

Ministry of Health and Sport (MoHS) (2017) *Myanmar Demographic and Health Survey 2015-16*, *Final Report*. Nay Pyi Taw, Myanmar and Rockville, Maryland USA. Available at: http://www.measuredhs.com/what-we-do/survey/survey-display-345.cfm.

Ministry of Health and Sports (2015) 'Demographic and health survey 2015-16'.

Ministry of Planning and Finance; World Bank Group (2015) 'Myanmar Poverty and Living Conditions Survey', (December), p. 86.

National Nutrition Centre (2019) 'Myanmar Micronutrient and Food Consumption Survey'.

National Nutrition Centre, Department of Public Health and Ministry of Health and Sports (2019) *Myanmar Micronutrient and Food Consumption Survey MMFCS (2017-2018) Interim Report*.

Shekar, M. *et al.* (2017) *An Investment Framework for Nutrition*. World Bank Group.

The Republic of the Union of Myanmar (2018) *The 2014 Myanmar Population and Housing Census Multidimensional Welfare in Myanmar*.

WFP (2019) 'Myanmar Food Security Atlas', (April).

World Bank (2016) 'Myanmar: Analysis of farm production economics', (100066), pp. 1–258.

World Bank (2018) *World Bank Open Data*, *Myanmar GDP*. Available at: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=MM&view=chart.

World Food Programme (2019) 'Myanmar Food Security Atlas', (April).

Works Reviewed

1. Access to Health (2020) 'The Access to Health Fund (2019-2023) Guidelines for Applicants', (July 2018).
2. Akester, M. J. et al. (2017) 'Gender in Myanmar's small-scale aquaculture sector', CGIAR Research Program on Fish.
3. Barigou, S. (2018) 'Handover Myanmar Nutritionist Part 1 Myanmar situation and Coordination mechanisms', (July).
4. Belton, B. et al. (2015) 'Aquaculture in Transition: Value Chain Transformation, Fish and Food Security in Myanmar', Feed the Future Research Report #4, 6. doi: 10.1017/CBO9781107415324.004.
5. Bhutta, Z. A. et al. (2013) 'Evidence-based interventions for improvement of maternal and child nutrition: What can be done and at what cost?', The Lancet, 382(9890), pp. 452–477. doi: 10.1016/S0140-6736(13)60996-4.
6. Bryce, J. et al. (2008) 'Maternal and child undernutrition: effective action at national level', The Lancet, 371(9611), pp. 510–526. doi: 10.1016/S0140-6736(07)61694-8.
7. Central Statistical Organization, UNDP and World Bank Group (2018) 'Myanmar Living Conditions Survey 2017', (June).
8. Concern Myanmar et al. (no date) 'Improving the Incomes and Nutrition Outcomes of Rural Poor in Northern Kayin State: Nutritional Causal Analysis', (October 2016).
9. Denning, G. et al. (2013) 'A Strategic Agricultural Sector and Food Security Diagnostic for Myanmar'.
10. Department of Population Ministry of Labour Immigration and Population (2018) The 2014 Myanmar Population and Housing Census Multidimensional Welfare in Myanmar.
11. Department of Public Health Myanmar (2017) 'Five-Year Strategic Plan for Young People's Health (2016 to 2020)', p. 63. Available at: https://myanmar.unfpa.org/en/publications/five-year-strategic-plan-young-peoples-health-2016-2020.
12. Development Initiatives Poverty Research (2018) 'Nutrition Country Profile: Myanmar, Global Nutrition Report', pp. 1–4.
13. Downs, S. M. et al. (2019) 'The interface between consumers and their food environment in Myanmar: An exploratory mixed-methods study', Public Health Nutrition, 22(6), pp. 1075–1088. doi: 10.1017/S1368980018003427.
14. Eckstein, D., Hutfils, M.-L. and Winges, M. (2019) Global Climate Risk Index 2019, Germanwatch. Available at: https://germanwatch.org/sites/germanwatch.org/files/Global Climate Risk Index 2019_2.pdf%0Ahttps://germanwatch.org/en/7677.
15. EuroCham Myanmar (2018) 'Agriculture Guide 2018', p. 33. Available at: https://www.ccifrance-myanmar.org/sites/ccifrance-myanmar.org/files/resources-documents/agriculture_guide_2018.pdf.
16. Fallis, A. (2013) 'Integrated household living conditions survey in Myanmar: Poverty profile', Journal of Chemical Information and Modeling, 53(9), pp. 1689–1699. doi: 10.1017/CBO9781107415324.004.

17. FAO (2014) 'Myanmar-food and nutrition security profiles'. Available at: http://www.fao.org/3/a-at700e.pdf.
18. FAO (2020) 'Food balance sheet', p. http://faostat.fao.org/.FAO et al. (2017) The State of Food Security and Nutrition in the World. Rome. doi: 10.1080/15226514.2012.751351.
19. FAO, IFAD and WFP (2015) The State of Food Insecurity in the World: Meeting the 2015 international hunger targets: taking stock of uneven progress,
20. FAO, IFAD and WFP. doi: I4646E/1/05.15.FAO and WFP (2016) 'FAO/WFP crop and food security assessment mission to Myanmar', (March), p. 16. Available at: http://www.fao.org/docrep/012/ak346e/ak346e00.pdf.
21. FAOSTAT (2020) New Food Balances. Available at: http://www.fao.org/faostat/en/#data/FBS.
22. Filipski, M. and Belton, B. (2018) 'Give a Man a Fishpond: Modeling the Impacts of Aquaculture in the Rural Economy', World Development. The Authors, 110, pp. 205–223. doi: 10.1016/j.worlddev.2018.05.023.
23. GIZ (2018) 'Food and Nutrition Security in Eastern Shan State'.GIZ (2018) 'Nutrition Endline Survey - Food and Nutrition Security Project Shan State'.
24. Hlaing, L. M. (2018) 'Introduction of Fortified Rice in Myanmar', 2018(July).
25. HLPE (2017) 'The High Level Panel of Experts on Food Security and Nutrition', (September). Available at: www.fao.org/cfs/cfs-hlpe.
26. Horton, S. and Steckel, R. H. (2011) 'Global economic losses attributable to malnutrition 1900- 2000 and projections to 2050', Cambridge University Press, pp. 247–272.
27. Livelihoods and Food Security Trust Fund (2013) 'Household Survey 2013', p. 169.
28. Livelihoods and Food Security Trust Fund (2012) 'Livelihoods and Food Security Trust Fund Baseline Survey Results Livelihoods and Food Security Trust Fund Fund Manager Office', (July). Available at: http://www.lift-fund.net.
29. Mansour, M. (2018) 'Scaling up fortified rice in Myanmar A Tool for a Zero Anemia Strategy'.
30. Ministry of Agriculture Livestock and Irrigation (2018) 'Myanmar Agriculture Development Strategy and Investment Plan (2018-19 - 2022-23)'. doi: 10.1017/CBO9781107415324.004.
31. Ministry of Agriculture Livestock and Irrigation (2015) 'Myanmar Rice Sector Development Strategy'.
32. Ministry of Health and Sport (MoHS) (2017) Myanmar Demographic and Health Survey 2015-16, Final Report. Nay Pyi Taw, Myanmar and Rockville, Maryland USA. Available at: http://www.measuredhs.com/what-we-do/survey/survey-display-345.cfm.
33. Ministry of Health and Sports (2016) 'National Health Plan 2017-2021'.
34. Ministry of Health and Sports et al. (2018) Multi-sectoral National Plan of Action on Nutrition (MS-NPAN) 2018/19-2022/23.
35. Ministry of Health and Sports and REACH (2017) 'Myanmar Stakeholder and Nutrition Action Mapping Overview of Results (abridged version)', (June).
36. Ministry of Planning and Finance (2015) Myanmar Statistical Yearbook 2016.

37. Ministry of Planning and Finance (2018) 'Myanmar Sustainable Development Plan 2018 - 2030', (August), pp. 1–66. Available at: http://themimu.info/sites/themimu.info/files/documents/Core_Doc_Myanmar_Sustainable_Development_Plan_2018_-_2030_Aug2018.pdf%0Ahttp://www.themimu.info/sites/themimu.info/files/documents/Core_Doc_Myanmar_Sustainable_Development_Plan_2018_-_2030_Aug2018.pdf.
38. Ministry of Planning and Finance; World Bank Group (2015) 'Myanmar Poverty and Living Conditions Survey', (December), p. 86.
39. Ministry of Planning and Finance; World Bank Group (2017) 'An Analysis of Poverty in Myanmar Poverty Profile', East, (December), p. 178.
40. Ministry of Planning and Finance; World Bank Group (2017) 'Selected Poverty Indicators', (December).
41. Myanmar Department of Population (2015) 'The 2014 Myanmar Population and Housing Census Kayah State', The 2014 Myanmar Population and Housing Census: Census Report Volume 3 - B, 3(May), pp. 915–919. doi: 10.1371/journal.pone.0049163.
42. Myanmar Department of Population (2017) 'The 2014 Myanmar Population and Housing Census: Thematic Report on Gender Dimensions', 4-J(August), pp. 1–30.
43. Myanmar Information Management Unit (2018) 'Vulnerability in Myanmar: A Secondary Data Review of Needs, Coverage and Gaps', (June).
44. National Nutrition Centre, Department of Public Health and Ministry of Health and Sports (2019) Myanmar Micronutrient and Food Consumption Survey MMFCS (2017-2018) Interim Report.
45. Oo, M. et al. (2017) 'Assessing Climate Risks in Myanmar: Summary for Policymakers and Planners'.
46. Oo, S. M. and Mackay, K. T. (2018) 'Small-scale aquaculture of wild fish in Myanmar: A preliminary report from the Bago Region', Aquaculture Asia, 22(2), pp. 19–26.Path and University of Washington Evans School of Public Policy and Governance (no date) 'Rice Fortification in Myanmar: Policy Choices for Impact and Sustainability'.
47. Raitzer, D. A., Wong, L. C. Y. and Samson, J. N. G. (2015) 'Myanmar's Agriculture Sector: Unlocking the Potential For Inclusive Growth', ADB Economics Working Paper Series, (470).
48. Rammohan, A. and Pritchard, B. (2014) 'The role of landholding as a determinant of food and nutrition insecurity in rural Myanmar', World Development. Elsevier Ltd, 64, pp. 597–608. doi: 10.1016/j.worlddev.2014.06.029.
49. Rammohan, A., Pritchard, B. and Dibley, M. (2019) 'Home gardens as a predictor of enhanced dietary diversity and food security in rural Myanmar', BMC Public Health. BMC Public Health, 19(1), pp. 1–13. doi: 10.1186/s12889-019-7440-7.
50. Save the Children (2017) 'A Cost of the Diet Analysis in the Dry Zone, Myanmar: Pakokku, Mahlaing & Yesagyo Townships'.
51. Save the Children (2014) 'A Cost of the Diet analysis in three livelihood zones in Rakhine State, Myanmar', (October 2013), pp. 1–52.

52. Schindecker, C. (2018) 'Nutrition Endline Survey 2018', (July).
53. Shekar, M. et al. (2017) An Investment Framework for Nutrition. World Bank Group.
54. Sibson, V. (2014) 'A Nutrition and Food Security Assessment of the Dry Zone of Myanmar in June and July 2013 Save the Children , WFP and the Ministry of Livestock , Fisheries and Rural Development February 10th 2014', (July 2013).
55. Social Protection Sub-Sector Coordination Group (2018) 'Costed Social Protection Sector Plan 2018-2022'.
56. Than, M. K. et al. (2019) 'Scaling up Breastfeeding in Myanmar through the Becoming Breastfeeding Friendly Initiative'.
57. Thwin, A. and Win, T. T. (2018) 'National Rice Fortification Policy "Way Forward"'.
58. United Nations World Food Programme (WFP) (2018) 'Strategic Review of Food and Nutrition Security in Myanmar: "In support of Sustainable Development Goal (SDG) 2 - Roadmap to 2030"', pp. 1–163.
59. University of Washington Evans School of Public Policy and Governance (2018) 'Rice Fortification in Myanmar'.
60. University of Washington Evans School of Public Policy and Governance (2014) 'Scaling Up Rice Fortification in Myanmar A Policy Implication Analysis', pp. 1–8.
61. UNOPS-LIFT Consultant Team (2015) 'LIFT Uplands Programme : Scoping Assessment Report', (July).
62. WFP (2019) 'Myanmar Food Security Atlas', (April).
63. WFP (2018) 'Strategic Review of Food and Nutrition Security in Myanmar: "In support of Sustainable Development Goal (SDG) 2 - Roadmap to 2030"', pp. 1–163.
64. World Bank (2016) 'Myanmar: Analysis of farm production Economics', (100066), pp. 1–258.
65. World Bank (2018) World Bank Open Data, World Bank open data. Available at: https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=MM&view=chart.
66. World Bank (2016) 'Myanmar: Analysis of farm production economics', (100066), pp. 1–258.
67. World Health Organization (2016) Global Health Observatory indicator views, Global Health Observatory (GHO) data. Available at: https://www.who.int/gho/en/.
68. World Health Organization (2012) 'Myanmar child malnutrition estimates', (October), pp. 1–4.
69. World Health Organization, Ministry of Health and Sports and UNICEF (2015) 'National Strategic Plan for Newborn and Child Health Development (2015-2018)'.
70. Youn, S.-J. et al. (2018) 'Determining the role of wild-caught and aquaculture-based inland fisheries in meeting Burma's human nutritional needs (final report)', Business, pp. 1–5. Available at: https://aquafishcrsp.oregonstate.edu/sites/aquafishcrsp.oregonstate.edu/files/16hhi05ms_fir_tr16-18.pdf%0Ahttps://aquafishcrsp.oregonstate.edu/asia-project-burma.

Appendix

Full CotD results by State/Region

Daily cost for a five-person household and non-affordability of energy only and nutritious diets.

	Energy only diet daily cost	Energy only diet non-affordability	Nutritious diet daily cost	Nutritious diet non-affordability
National Average	1963	13	4358	61
Ayeyarwady	1832	8	3740	48
Bago	1640	5	4494	57
Chin	2962	35	6664	82
Kachin	2000	15	4982	70
Kayah	2275	19	4812	58
Kayin	2076	17	4122	57
Magway	1656	7	3991	59
Mandalay	1994	14	4261	63
Mon	1727	6	3694	47
Naypyitaw	1672	8	3989	58
Rakhine	2495	30	4487	70
Sagaing	1663	7	3950	58
Shan	2067	16	4992	70
Tanintharyi	2288	25	5128	76
Yangon	2355	17	4714	63

Energy only and nutritious diet daily cost for a five-person household by region and by season.

		Energy Only daily cost	Nutritious Diet daily cost
Ayeyarwady	Season 1	1875	3816
	Season 2	1790	3664
Bago	Season 1	1586	4438
	Season 2	1694	4551
Chin	Season 1	2963	6651
	Season 2	2961	6678
Kachin	Season 1	1843	5199
	Season 2	2158	4764
Kayah	Season 1	2035	4366
	Season 2	2516	4059
Kayin	Season 1	1803	4070
	Season 2	2348	4174
Magway	Season 1	1660	4146
	Season 2	1651	3837
Mandalay	Season 1	2015	4269
	Season 2	1973	4253

Mon	Season 1	1701	3646
	Season 2	1753	3742
Naypyitaw	Season 1	1607	3956
	Season 2	1736	4022
Rakhine	Season 1	2399	4659
	Season 2	2591	4315
Sagaing	Season 1	1526	3900
	Season 2	1801	4001
Shan	Season 1	2044	4937
	Season 2	2091	5046
Tanintharyi	Season 1	2288	5144
	Season 2	2288	5112
Yangon	Season 1	2095	4620
	Season 2	2614	4808

Daily cost of a nutritious diet by family member.

	Child under two	School Aged Child	Adolescent Girl	Pregnant/Breastfeeding Woman	Adult Man
Ayeyarwady	266	456	1283	972	763
Bago	309	573	1611	1090	912
Chin	499	936	2094	1683	1453
Kachin	325	638	1630	1307	1083
Kayah	282	539	1331	1133	927
Kayin	277	507	1335	1133	870
Magway	262	491	1308	1022	908
Mandalay	283	544	1400	1127	908
Mon	286	438	1267	983	720
Naypyitaw	250	493	1310	1060	876
Rakhine	337	546	1479	1192	933
Sagaing	264	494	1305	1039	848
Shan	357	670	1624	1264	1076
Tanintharyi	394	632	1835	1261	1005
Yangon	348	592	1531	1265	978

Daily cost of a nutritious diet for individuals with interventions (information on frequency and quantity on tables below).

		Ayeyarwady	Chin	Kachin	Kayah	Kayin	Rakhine	Shan
Nutritious Diet	**U2**	**266**	**499**	**325**	**282**	**277**	**337**	**357**

Breastfeeding 0%	U2	239	640	402	356	320	410	427
Breastfeeding 50%	U2	271	536	348	311	294	362	375
Micronutrient Powder	U2	143	283	188	162	154	176	200
Snack Milk Juice (Dutchmil)	U2	506	719	381	493	525	588	586
Super Cereal +	U2	183	128	123	103	100	94	113
Nutritious Diet	**SAC**	**456**	**936**	**638**	**539**	**507**	**546**	**670**
School Milk	SAC	435	916	617	525	498	531	651
Snack High Energy Biscuit	SAC	460	852	598	501	431	522	612
Snack Sorghum and Sweet Potato	SAC	454	854	608	523	501	529	637
Snack - Steamed Banana	SAC	456	889	638	539	507	546	670
Snack Instant Noodles	SAC	664	1033	698	602	566	622	745
Snack Milk Juice	SAC	664	1107	643	714	699	752	841
School Meal Rice and Beans	SC	380	722	502	426	405	448	506
Nutritious Diet	**AG**	**1283**	**2094**	**1630**	**1331**	**1335**	**1479**	**1624**
IFA	AG	1175	2005	1472	1217	1206	1351	1493
MMT	AG	692	1418	944	793	805	818	990
School Meal Rice and Beans	AG	862	1801	1313	1250	1140	1428	1544
School Milk	AG	1270	2076	1619	1326	1328	1466	1616
Snack High Energy Biscuit	AG	1317	2078	1673	1306	1335	1475	1623
Snack Sorghum and Sweet Potato	AG	1283	2094	1630	1331	1335	1479	1624
Snack - Steamed Banana	AG	1283	2094	1630	1331	1335	1479	1624
Snack Instant Noodles	AG	1574	2375	1915	1498	1604	1731	1871
Snack Milk Juice	AG	1574	2392	1743	1564	1633	1783	1900
Super Cereal	AG	1283	2089	1630	1331	1335	1479	1624
Nutritious Diet	**PLW**	**972**	**1683**	**1307**	**1133**	**1133**	**1192**	**1264**

Multi-Micronutrient Tablet	PLW	617	1141	797	712	676	736	814
Super Cereal	PLW	972	1166	1081	922	942	897	997

Daily cost of a nutritious diet for five-person household with intervention packages.

	Ayeyarwady	Chin	Kachin	Kayah	Kayin	Rakhine	Shan
Nutritious Diet	**3,740**	**6,664**	**4,982**	**4,212**	**4,122**	**4,487**	**4,992**
Package 1	**2,272**	**3,744**	**3,259**	**2,725**	**2,673**	**2,691**	**3,138**
Package 2	**2,707**	**4,688**	**3,314**	**2,892**	**2,749**	**2,971**	**3,405**

Products included in CotD modelling

	MNP	IFA	MMT	Vit B1	Super Cereal	Super Cereal +	High Energy Biscuit	Fortified Rice
Target Group	U5	Adoles-cents	PLW	adults	PLW	U2	School Children	Household
Portion Size	1g	1g	1g	1g	100g	100g (provided) 66g (consumed)	50g	N/A
Frequency	3 times/ week	1/ week	daily	daily	daily	daily	per school day	daily
Iron Absorption Factor	7%	7%	7%	N/A	5%	5%	N/A	7%
Energy (kcal)	0	0	0	0	380	400	450	361.6
Protein (g)	0	0	0	0	14	16	9	6.7
Fats (g)	0	0	0	0	6	9	15	0.6
Saturated Fat (g)	0	0	0	0	0	0	0	0.3
Monounsaturated Fat (g)	0	0	0	0	0	0	0	0.3
Poluunsaturated Fat (g)	0	0	0	0	0	0	0	0.3
Carbohydrate (g)	0	0	0	0	0	0	0	79.61
Fiber (g)	0	0	0	0	4	1.4	2.3	0.8
Phytate (mg)	0	0	0	0	0	0	0	350.63
RAE (ug retinol)	40000	0	80000	0	1039.04	1039.04	250	150
Vit C (mg)	3000	0	7000	0	90	90	20	0
B1 (mg)	50	0	140	500	0.2	0.6	0.5	0.56
B2 (mg)	50	0	140	0	1.4	1.8	0.7	0.06
Niacin (mg)	600	0	1800	0	8	11	6	9.4
B6 (mg)	50	0	190	0	1	1.2	1	0.74
Folate (mcg)	15000	66666.67	66667	0	110	200	136	222.67
B12 (mcg)	90	0	260	0	2	2.3	2	1
Pantothenic Acid (mg)	0	0	0	0	1.6	2.2	3	1.14
Calcium (mg)	0	0	0	0	362	520	250	8
Copper (mg)	56	0	200	0	0	0	0	0.36
Iron (mg)	1000	6000	3000	0	6.5	11	11	4.6
Magnesium (mg)	0	0	0	0	127	130	150	36
Manganese (mcg)	0	0	0	0	0	0	0	0.98
Phosphorous (mg)	0	0	0	0	280	340	0	103.13
Potassium (mg)	0	0	0	0	140	230	0	81
Sodium (mg)	0	0	0	0	0	0	0	0
Zinc (mg)	410	0	1500	0	5	7	0	7.1

Asssumptions for Home Garden and Fish Pond models:

Home Garden Models
(based on HKI key informant interview):

Estimated yields of edible portion per garden/month
[HKI model garden]

HKI Key Informant: Garden edible yields/ month?	Month (g)	Week (g)
-- **Tomato** - 5-8 kg with 40% sold and 60% consumed	5000	1190.48
-- **Lady fingers** - 3 kg	3000	714.29
-- **Lettuce** - 2 kg	2000	476.19
-- **Cabbage** - 3 kg	3000	714.29
-- **Carrot** - 1.5 kg	1500	357.14
-- **Roselie** - 2 kg	2000	476.19
-- **Pepper** - 2 kg	2000	476.19
-- **Sweet potato** - 5 kg with 70% sold and 30% consumed	5000	1190.48
-- **Papaya** - less production		

Portion sizes per person per week from HKI model garden (in g)

	U2	**SAC**	**AG**	**PLW**	**AM**
Factor:	0.05	0.1	0.2	0.3	0.35
Tomato	60	119	238	357	417
Okra	36	71	143	214	250
Lettuce	24	48	95	143	167
Cabbage	36	71	143	214	250
Carrot	18	36	71	107	125
Roselie	24	48	95	143	167
Pepper	24	48	95	143	167
Sweet Potato	60	119	238	357	417

Fish Pond:

Baseline Characteristics

Overview:

MyCulture Programme

	% of HH that grow fish	Kg (edible)	% of total	Price per kg
Silver Barb	46%	24.1	17.44%	1849
Tilapia	16%	29.3	21.20%	1637
Pangasius	17%	51.6	37.34%	1335
Rohu	59.50%	33.2	24.02%	1679
Total		138.2		

Average pond size: 0.5 acre	0.5	acre
Average weight: 330kg (annual)	330000	g
Average income: 540k MMK (annual)	540,000	MMK

Model 1:

Consumption from small pond
0.5 acre - top 4 fish as distributed

			U2	SAC	AG	PLW	AM
	Factor:		0.05	0.1	0.2	0.3	0.35
	Total Weight (annual, g)	**Total Weight (weekly, g)**					
Silver Barb	57547	1107	55	111	221	332	387
Tilapia	69964	1345	67	135	269	404	471
Pangasius	123213	2369	118	237	474	711	829
Rohu	79276	1525	76	152	305	457	534

Model 2: 50% Consumption/ 50% Selling from small fish pond

0.5 acre - top 5 fish as distributed + income

			U2	SAC	AG	PLW	AM	Revenue in MMK
	Total edible Weight (annual, g)	Factor: Total edible Weight (weekly, g)	0.05	0.1	0.2	0.3	0.35	
Silver Barb	57547	553	28	55	111	166	194	1023.12
Tilapia	69964	673	34	67	135	202	235	1101.26
Pangasius	123213	1185	59	118	237	355	415	1581.63
Rohu	79276	762	38	76	152	229	267	1279.86
						Total (week)		4985.86
						Total (day)		712.2655691

Model 3:

Rice Fish: Show impact on consumption if fish from rice and fish fields is consumed
(rice is only here to provide a reference point in how much rice is grown, not reflected in the model)
0.5 acre and RCT results

Rice: 678 kg/ acre
Fish: 132 kg/acre

			U2	SAC	AG	PLW	AM
	Total edible Weight (annual, g)	Total edible Weight (weekly, g)	0.05	0.1	0.2	0.3	0.35
Rice	678000	13038	652	1304	2608	3912	4563
Fish	132000	2538	127	254	508	762	888
Rohu			63	127	254	381	444
Silver Barb			63	127	254	381	444

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