

Fill the Nutrient Gap Lao PDR

Full Report

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List of Acronyms

ANC	Antenatal Care
ASF	Animal source food
CFSA	Comprehensive Food Security Assessment
CFSVA	Comprehensive Food Security and Vulnerability Analysis
CotD	Cost of the Diet
DHS	Demographic and Health Survey
FAO	Food and Agriculture Organization
FNG	Fill the Nutrient Gap
FNSS	Food and Nutrition Security Survey
HQ	Head Quarters
IFPRI	International Food Policy Research Institute
IYCF	Infant and young child feeding
LAK	Lao kip
LANI	Lao American Nutrition Institute
LWU	Lao Women Union
LCAAS	Lao Child Anthropometry Assessment Survey
LECS	Lao Expenditure and Consumption Survey
LSIS	Lao Social Indicator Survey
MAD	Minimum acceptable diet
MAF	Ministry of Agriculture and Forestry
MDD	Minimum dietary diversity
MDD-W	Minimum Dietary Diversity for Women
MICS	Multiple Indicator Cluster Survey
MMF	Minimum meal frequency
MMG	Minerals and Metal Group
MMT	Multiple Micronutrient Tablets
MNP	Micronutrient Powder
MoES	Ministry of Education and Sports
MoH	Ministry of Health
MPI	Ministry of Planning and Investment
NGO	Non-governmental organisation
NNC	National Nutrition Committee
NNSPA	National Nutrition Strategy and Plan of Action
NTFP	Non-Timber Forest Product
ODX	Oudomxay Province
PLW	Pregnant and Lactating Women
PPP	Public-private partnership
PSI	Populations Services International
PSL	Phongsaly Province
RB	Regional Bureau
RNI	Recommended nutrient intake
RVS	Risk and Vulnerability Survey
SBCC	Social and behaviour change communication
SDGs	Sustainable Development Goals
SKG	Sekong Province
SNF	Specialised Nutritious Food
SNUT	Staple-adjusted nutritious diet
SQ-LNS	Small Quantity Lipid-based Nutrient Supplement
SUN	Scaling Up Nutrition
SVK	Savannakhet Province
UNICEF	United Nations' Children's Fund
USD	US dollar
VTE	Vientiane Capital
WASH	Water Sanitation and Hygiene
WFP	World Food Programme
WHO	World Health Organization
WRA	Women of Reproductive Age

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Background

The United Nations World Food Programme (WFP), with technical input from key research institutes (University of California Davis, the International Food Policy Research Institute [IFPRI], Epicentre, Harvard University and Mahidol University) and the United Nations Children's Fund (UNICEF), developed a framework for strengthened nutrition situation analysis and decision-making, now called "Fill the Nutrient Gap" (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. This tool focuses primarily on the dietary intake side of the malnutrition conceptual framework displayed below:

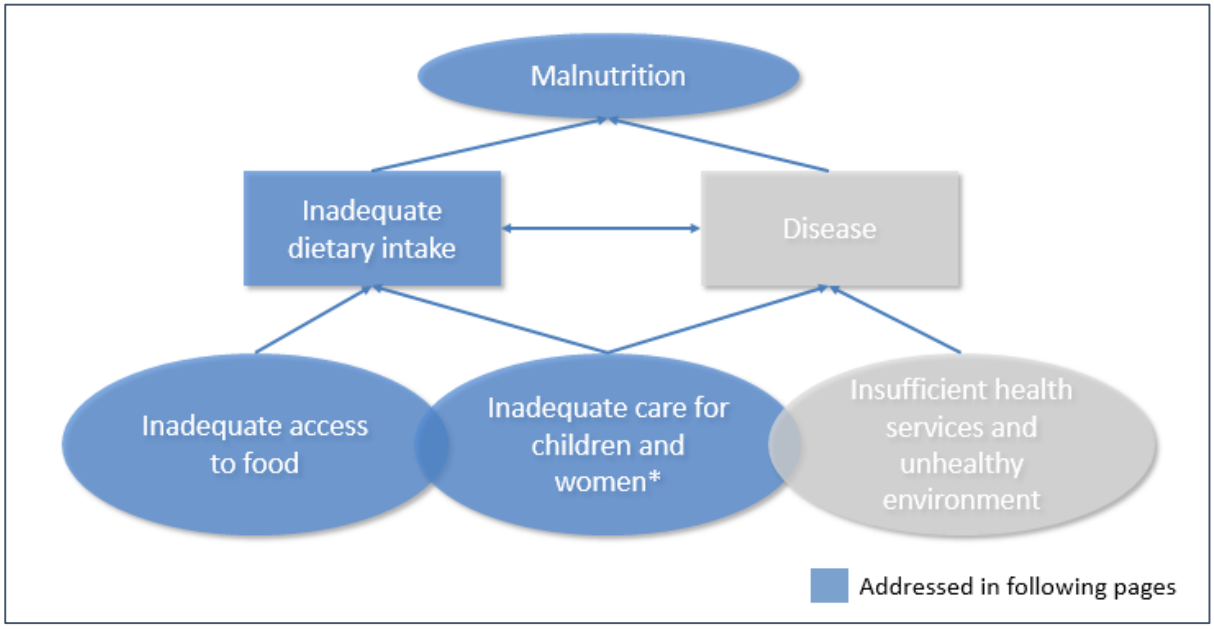


Figure 1: UNICEF Conceptual Framework for Causes of Malnutrition in Society. (Source: UNICEF)

The FNG tool primarily uses secondary data in combination with the results from linear programming tools such as Cost of the Diet (CotD) and Optifood; to better understand the barriers to adequate nutrient intake in the context and model potential interventions to improve access to nutrients, in particular from nutritious foods. The framework for analysis depicted in Figure 2 helps to consolidate and analyse existing secondary data at country level based on the following categories:

i) **Malnutrition Characteristics** - review prevalence data of malnutrition characteristics (stunting, wasting, anaemia, underweight, overweight) and if possible data on certain micronutrient deficiencies. If relevant, seasonal patterns of various nutritional problems within populations can be considered. Malnutrition characteristics are reviewed in the initial stage to define priority groups for the analysis.

ii) **Enabling Policy Environment** - analyse if the policy environment adequately facilitates access and availability of nutritious foods for the population and to identifying possible gaps in national policy, and legal or regulatory frameworksand their enforcement. Enforcement of these policies and regulations is a key part of the analysis; for example, while there may be a mandatory national fortification policy, compliance of this policy may be low in reality. This section is crucial in identifying current or potential entry points for nutrition interventions.

iii) **Availability of nutritious foods in the local market** – review information on local availability of nutritious foods (natural and fortified) as well as on local production and processing capacity to assess whether it would be possible to meet nutrient needs from locally available foods.

iv) **Access to Nutritious Foods** - determine if the target populations have access to nutritious foods in both lean and non-lean seasons, in urban vs rural areas etc. Also gain a better understanding of the adequacy of nutrient intake at the household level and the ability of households to cope with potential shocks.

v) **Nutrient Intake** - examine gaps in nutrient intake at the individual/target group level, in particular related to infant and young child feeding (IYCF) practices and the coverage of supplementation and/or fortification programmes. Each age group will have different nutrient requirements (e.g. a 6-11 month old child will require a diet with much greater nutrient density in iron and zinc per 100 kcal than an adult male).

vi) **Local Practices** - identify socioeconomic and cultural factors influencing food purchasing patterns and feeding practices that currently act as a barrier to adequate nutrient intake or could in the future limit the effectiveness of certain food-based interventions, particularly among target groups of interest. Information gathered with tools such as ProPAN can be very useful to gain insights into local preferences and behaviours, which can inform strategies such as social and behaviour change communication (SBCC) to improve feeding practices. Focus ethnographic studies or focus group discussions carried out by local academia or non-governmental organisations (NGOs) can provide key insights into this often overlooked area of analysis.

vii) **Cost Optimization** - utilising linear programming tools, such as Optifood and CotD, the minimum cost of a locally available nutritious diet can be estimated. An insight can also be gained into what proportion of the population can afford this diet in different geographic areas or among social safety net beneficiaries compared to non-beneficiaries. Tools such as CotD can also be used to model possible intervention options that might improve affordability, such as introduction of fortified foods and/or specialised nutritious foods (SNFs) through market channels or social protection programmes, and cash transfers.

Once this information has been consolidated and analysed, context-specific optimal packages of policy and programmatic interventions can be identified. These strategies and possible entry points can be collectively identified by the different stakeholders once the preliminary results of the analysis are available.

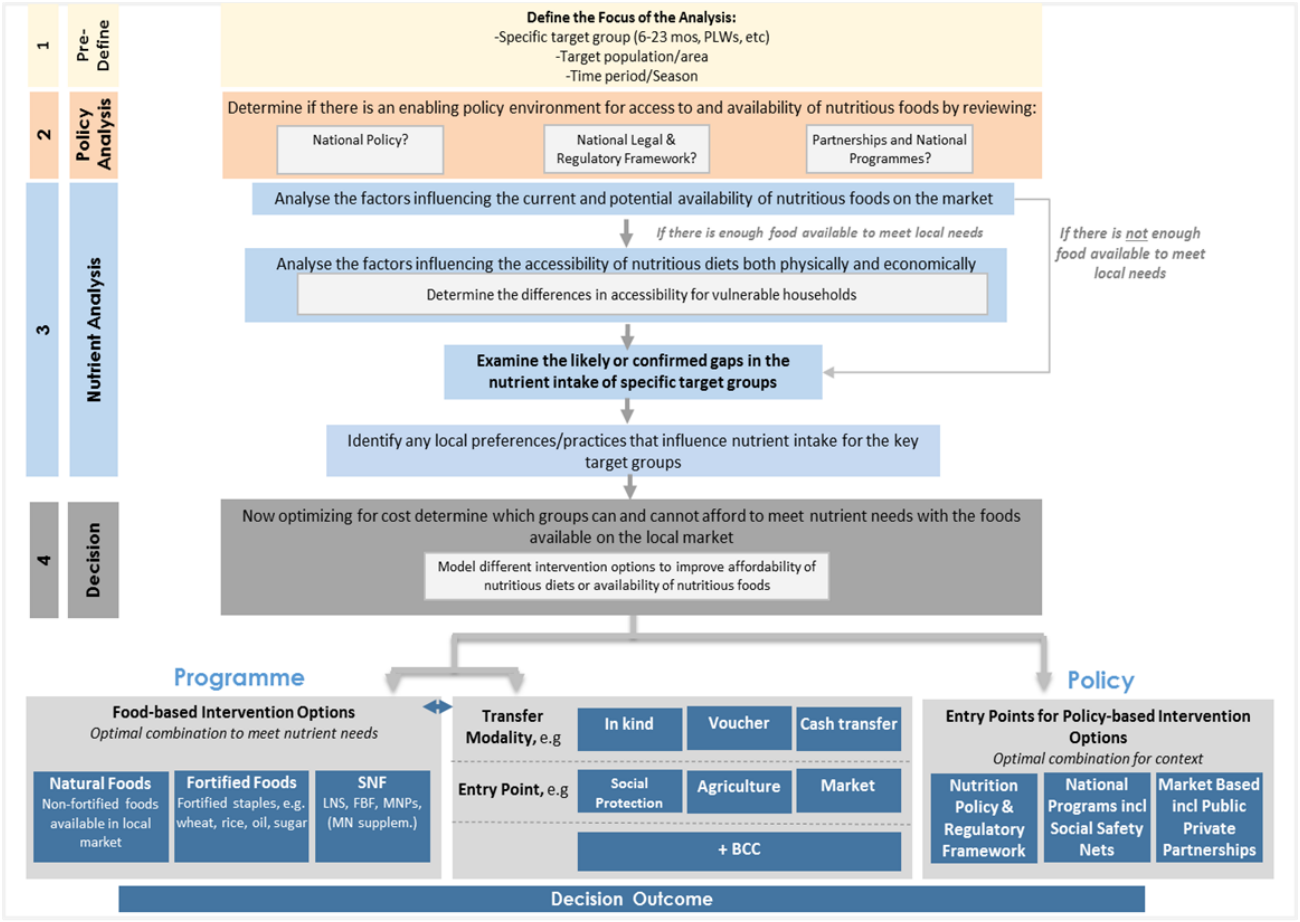


Figure 2: "Fill the Nutrient Gap" Framework for situation analysis and decision making.

Pilot testing of the FNG tool took place in El Salvador, Ghana and Madagascar in 2015-16. The application of this tool was validated in a consultation with the key technical partners in September 2016. Further roll out of the tool began with Guatemala, Tanzania and Pakistan in late 2016, and Lao People's Democratic Republic (Lao PDR) in early 2017.

The process in Lao PDR

The process started in February 2017 (described in Figure 3) with a multi-stakeholder inception meeting led by the Ministry of Health (MoH), Department of Hygiene and Health Promotion and National Nutrition Committee Secretariat in collaboration with WFP. Representatives from National Government, UN agencies and key NGOs[1] attended this meeting to launch the process, including representatives from WFP headquarters, regional bureau and country offices. A primary market price data collection[2] took place in 5 provinces[3] by enumerators from the MoH in collaboration with WFP staff. Following data collection, the FNG team met with multiple national stakeholders to consolidate secondary data and to gain their input on the analysis and possible interventions to model / illustrate.

[1] The full list is attached as Annex 1

[2] Using the methods described in the Cost of the Diet Practitioner's Guidelines (Save the Children, 2014)

[3] Vientiane Capital, Phonsaly, Sekong, Savannakhet, and Oudomxai. The selection of provinces was based on their differing rates of stunting and their differing livelihoods, in order to develop an understanding of the diversity of the national situation in respect to access to and availability of nutritious foods.

In March-April 2017 the process continued with further analysis of the compiled secondary data and of the Cost of Diet results by the Fill the Nutrient Gap team, in consultation with national stakeholdersto ensure continued input and insights into the analysis.

A multi-stakeholder workshop was held in the second half of May to share the key findings of the analysis and develop recommendations with key stakeholders who were engaged during the data consolidation and analysis phase. This report includes all the recommendations made by the stakeholders during the consultative process.

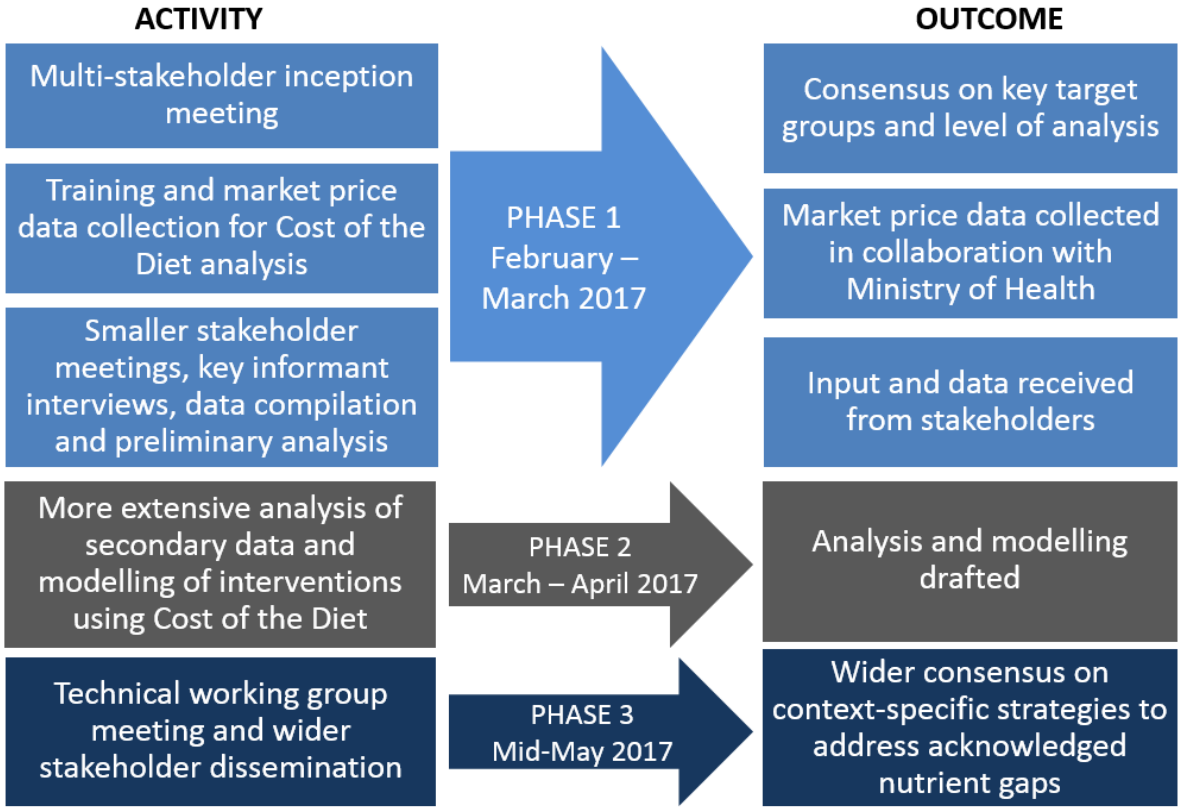


Figure 3: The "Fill the Nutrient Gap" process in Lao PDR

Introduction

This report seeks to understand the different drivers of the nutrition situation in the Lao PDR, particularly for the most vulnerable groups, in relation to nutrient access and intake during the first 1000 days of life. The analysis is aimed to provide a basis upon which different strategies and intervention packages can be identified that are well-tailored to the context and are targeted to improve nutrient intake in key target groups, with a focus on children 6-23 months as well as pregnant and lactating women (PLW) and adolescent girls.

Lao PDR is a landlocked, mountainous country in the lower Mekong River basin in Southeast Asia. It achieved lower-middle income (LMIC) status in 2011, but remains classified as a least developed country (LDC). Strong economic growth since the early 2000s, driven primarily by the agricultural and natural resource sectors, has brought reductions in poverty, but progress has been concentrated among the wealthy and the urban. Three quarters of the population still lives in rural areas and engages primarily in agriculture, and although national poverty prevalence fell from 45 percent in 1992 to 23 percent in 2012, this varies from 10 percent in urban areas to 40 percent in rural areas without roads. Similarly, human development improvements including increased life expectancy and

decreased under-five mortality rates have been uneven. Minority ethnolinguistic groups tend to live in more remote areas than the Lao-Tai majority, with less access to services, sanitation, and infrastructure and higher rates of poverty and malnutrition (World Bank Group 2016).

Malnutrition Characteristics

Key Highlights:

Child malnutrition varies according to geographic location (including road access), ethnolinguistic group, and socioeconomic factors.

The key target groups for analysis were identified in collaboration with stakeholders based on consideration of current malnutrition characteristics across Lao PDR.



Children 6-23 months

- ➔ Stunting: 35.6 percent of children under 5, particularly in northern and southern provinces
- ➔ Wasting: 9.6 percent of children under 5 (above14 percent in 3 provinces)
- ➔ Undernutrition: varies by geographic location and ethnic group, and remains high overall despite decreases over the past 20 years
- ➔ Anaemia: one in four children under 5 are anaemic, varying from 19-27 percent among the provinces



Pregnant and lactating women (PLW)

- ➔ Anaemia provincial data suggest 40 percent among pregnant women and 30 percent among lactating women are anaemic



Adolescent girls (10-19 years)

- ➔ Early marriage and early pregnancy are common: 18 percent of women give birth by the age of 18
- ➔ High nutrient needs make adolescents a key subgroup of women of reproductive age

Lao PDR is characterised by high levels of stunting, particularly in the North and South of the country, with some provinces also having very high levels of wasting. There is little data on micronutrient deficiencies in children and women but data on the prevalence of anaemia in five provinces suggests that this may be of concern. The data suggests that certain ethnic groups have a higher risk of malnutrition, particularly the Hmong-Mien and the Chinese-Tibetan. Malnutrition is also associated with road access, socio-economic status and maternal education. There are high rates of early marriage and adolescent pregnancy, which increases the risk of undernutrition in both mothers and children. Overweight and obesity are not yet a major concern for the country.

Nutritional status of children under the age of 5 years

The most recent child anthropometric data for Lao PDR comes from nationally representative surveys carried out in 2011/2012 and 2015, as well as a subnational survey carried out in five provinces in 2015. The Lao Social Indicator Survey (LSIS) 2011/2012 used technical frameworks from the Multiple Indicator Cluster Survey (MICS) and the Demographic and Health Survey (DHS) and had a sample size of approximately 11,000 children under the age of five; the data collected provided a baseline for the 7th National Social Economic Development Plan (Ministry of Health & Lao Statistics Bureau 2012). The Lao Child Anthropometry Assessment Survey (LCAAS) 2015 was conducted as an add-on to the National Immunization Survey with a nationally representative sample of 30,000 children under five, while a Food and Nutrition Security Survey (FNSS) was cluster household survey conducted the same year in five provinces[4] with a sample size of approximately 3,700 children. The FNSS provinces were chosen to evaluate the Maternal and Young Child Nutrition Security Initiative in Asia (MYCNSIA) in Attapeu, Saravane and Sekong, and to provide baseline data for implementation of the National Plan of Action on Nutrition 2016-2020 in Oudomxay, Saravane, and Luangnamtha. FNSS data was collected in August and September 2015, at the height of the lean season and accompanying annual food shortages, and may therefore reflect higher prevalence of undernutrition and food insecurity than other surveys conducted during different seasons (Ministry of Health & Ministry of Planning and Investment 2016).

Low Birthweight

Low weight at birth, defined as less than 2500 grams, is reflective of maternal health and nutrition, and results from inadequate nutrition before conception and/or during pregnancy, short maternal stature, and/or young / adolescent maternal age (Ministry of Health & Ministry of Planning and Investment 2016). In Lao PDR only 43 percent of children were weighed at birth, so data on low birthweight is estimated primarily through maternal recall. In 2012, 15 percent of babies were estimated to have low birthweight; this decreases with higher wealth and maternal educational attainment (Ministry of Health & Lao Statistics Bureau 2012). In the five provinces surveyed in the 2015 FNSS, between 32-60 percent of babies were weighed at birth, and between 15-21 percent were estimated to weigh less than 2500 grams (Ministry of Health & Ministry of Planning and Investment 2016).

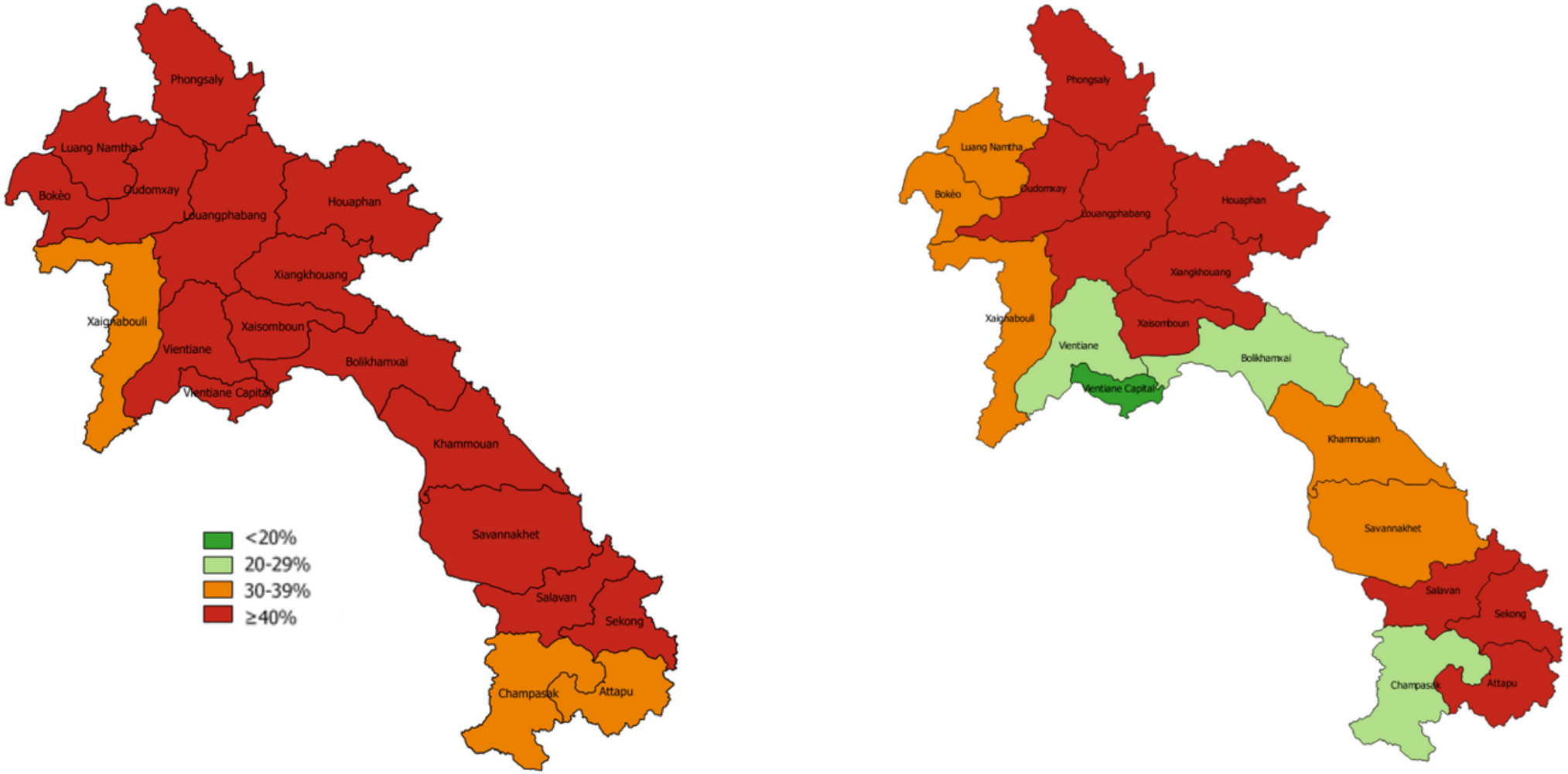
Stunting

Stunting, a measure of height-for-age, reflects chronic malnutrition over a long period of time; children are considered stunted if they fall more than two standard deviations below the reference population median (Ministry of Health & Lao Statistics Bureau 2012). Although stunting rates among children under the age of five have decreased in recent years, from 44 percent in the 2012 LSIS to 36 percent in the 2015 LCAAS, as shown in figures 4 and 5, current prevalence remains within the WHO classification of high public health significance. The LCAAS found that half of all children in rural areas without roads were still stunted (but only 23 percent in urban areas), and prevalence in eight provinces[5] exceeded 40 percent, denoting very high public health significance (Ministry of Health and National Institute of Public Health 2016). In 2012, 60 percent of children from Chinese-Tibetan and Hmong-Mien households were stunted, versus 33 percent of children from Lao-Tai households. Stunting rates were significantly higher among poorer households, ranging from 20 percent in the

[4] Luangnamtha, Oudomxay, Saravane, Sekong, and Attapeu

[5] Phongsaly (51.3 percent), Oudomxay (54.4 percent), Luangprabang (44.5 percent), Huaphanh (47.5 percent), Xiengkhuang (40.8 percent), Saravane (43.8 percent), Sekong (46.4 percent), and Attapeu (43 percent)

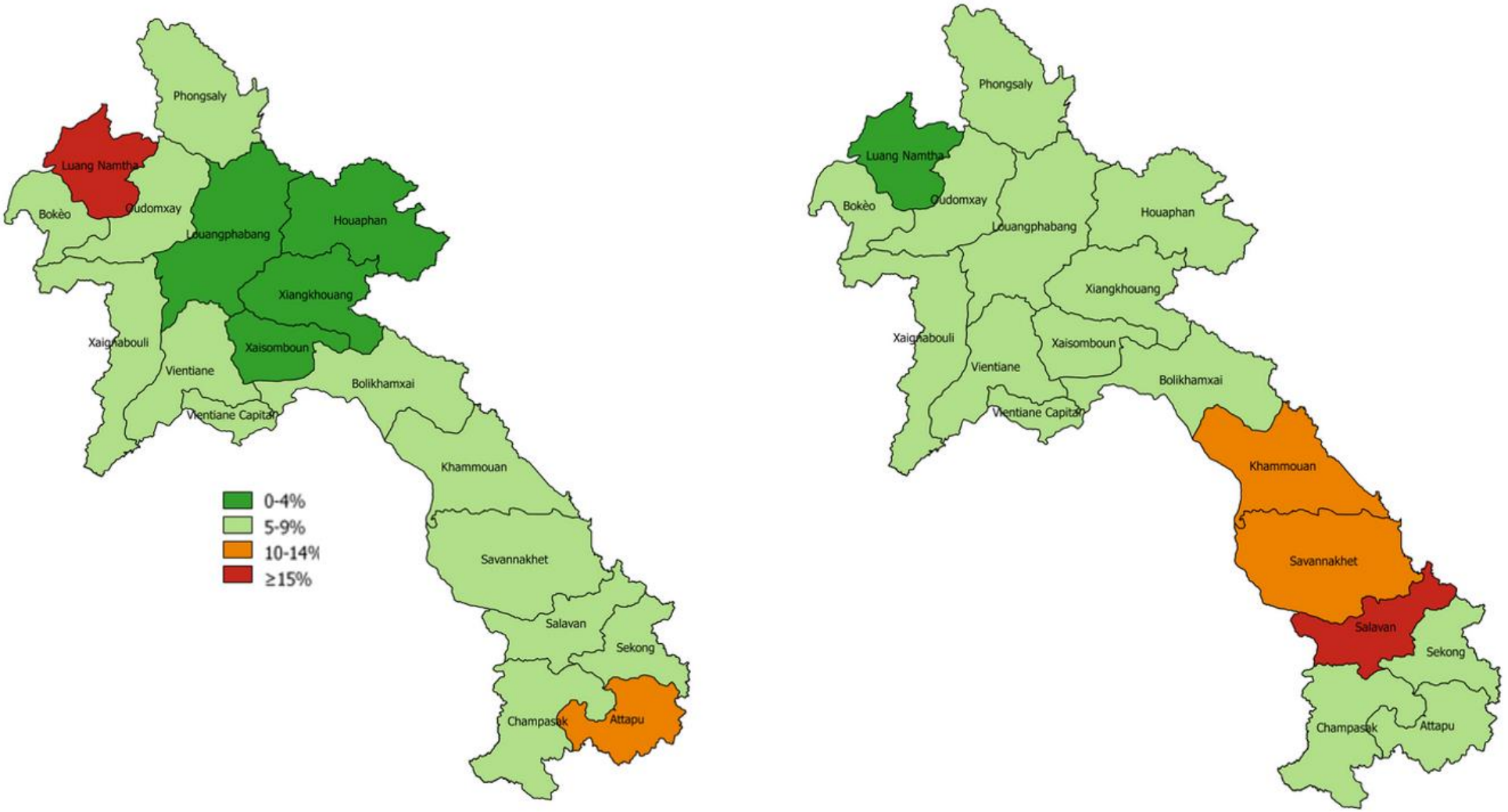
richest quintile to 61 percent in the poorest, and among children whose mothers had lower educational attainment (from 15 percent with higher education to 60 percent with no education) (Ministry of Health & Lao Statistics Bureau 2012). However, one in five of the richest children were still stunted; this may reflect to behavioral barriers to good nutrition, but likely also indicates that insufficient economic access to or availability of adequately nutritious food affects even the wealthiest segment of the population (Bouapao et al. 2016).



Figures 4 and 5: Stunting prevalence by province in 2012 (left) and 2015 (right) (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health and National Institute of Public Health 2016)

Wasting

Wasting, or weight-for-height that is two or more standard deviations below the median for the reference population, is a measure of acute malnutrition resulting from recent deficiencies. As such, it can reflect seasonal changes in food availability and prevalence may fluctuate throughout the year. Wasting rates showed a slight increase from the 2012 LSIS to the 2015 LCAAS, from 6 percent to almost 10 percent (figures 6 and 7); however, this may partly reflect the fact that the 2012 and 2015 data were collected in different seasons (Ministry of Health and National Institute of Public Health 2016). Prevalence exceeded 14 percent in three provinces (Khammuane, Savannakhet, and Saravane) and showed negative correlation with both wealth and mother's educational attainment. Unlike stunting rates, differences between urban and rural areas were insignificant for wasting (National Institute of Public Health 2016).



Figures 6 and 7: Wasting prevalence in 2012 (left) and 2015 (right) (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health and National Institute of Public Health 2016 2016)

Child Underweight

Underweight is a measure of weight-for-age that captures both acute and chronic malnutrition. One quarter of children under the age of five were underweight in 2015, a marginal decrease from 27 percent in 2012, with prevalence more than twice as high in rural areas without roads as in urban areas (35 percent and 17 percent respectively. Children were more likely to be underweight if they were from rural areas, the poorest economic quintile, or the Mon-Khmer ethno-linguistic group (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health and National Institute of Public Health 2016 2016). Indeed, Mon-Khmer children very high prevalence of poor nutrition for all three indices in the provinces surveyed by the FNSS (50 percent stunting, 11 percent wasting, and 35 percent underweight) (Ministry of Health & Ministry of Planning and Investment 2016).

Child Overweight

Overweight in young children is not currently of concern in Lao PDR, with 3 percent of boys and 1 percent of girls under the age of five weighing too much for their height (Ministry of Health & Ministry of Planning and Investment 2016).

Micronutrient deficiencies

National data on micronutrient deficiencies in children is lacking in Lao PDR. The main source of data on anaemia is from the FNSS in 2015, which surveyed approximately 3,700 children across five provinces during the lean season from August-September. Approximately one in four children under the age of five were anaemic, most mildly, with variation from 19-27 percent between the provinces, as shown in figure 8 (Ministry of Health & Ministry of Planning and Investment 2016). It is suggested that genetic conditions may be a contributing factor to anaemia levels, however, further research is required to verify this. It is likely that insufficient micronutrient intake, particularly for iron, and parasitic infection are exacerbating anaemia rates.

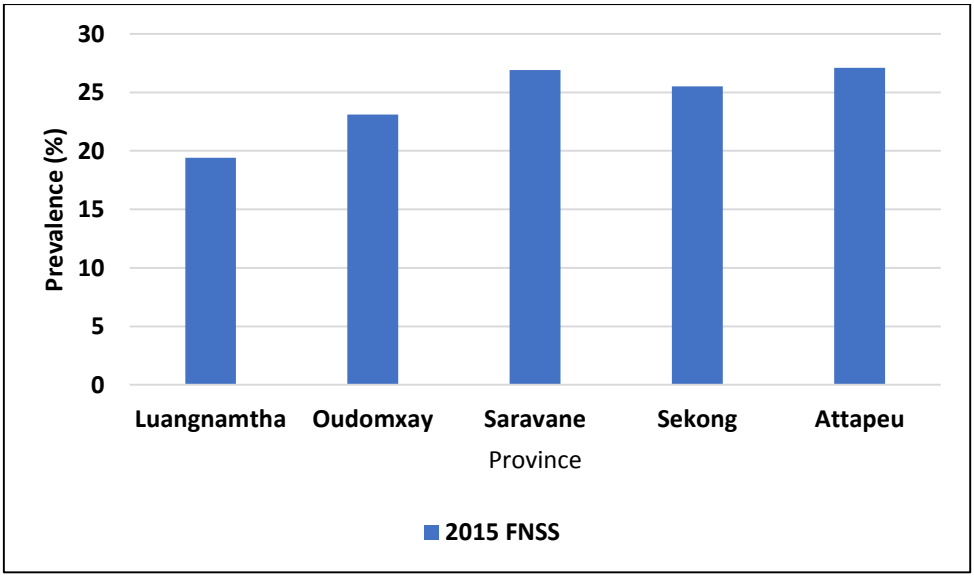


Figure 8: Anaemia prevalence in children 6-59 months in five provinces (Ministry of Health & Ministry of Planning and Investment 2016)

Child nutrition trends

Steady decreases in underweight and stunting prevalence were seen from 1993-2015, while variation in wasting rates may be partly due to seasonal differences between surveys, as mentioned

above (figure 9). At the provincial level, rates of stunting decreased at least marginally from 2012-2015 in all provinces except for Attapeu, which experienced a slight increase (figure 10). Over the same period wasting, on the other hand, increased in all provinces except for a remarkable drop in Luangnamtha and a small decline in Attapeu (figure 11). Changes in underweight varied across the provinces, with rates decreasing in seven and increasing in nine (figure 12) (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health and National Institute of Public Health 2016 2016).

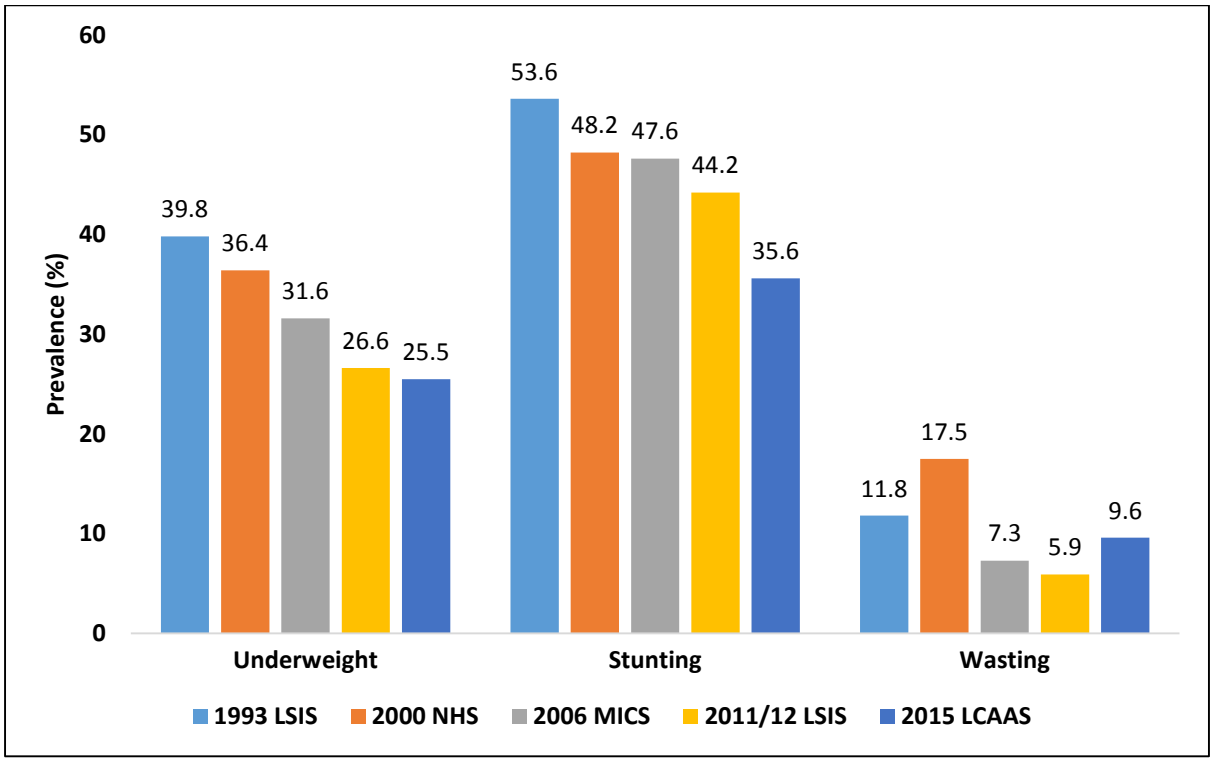
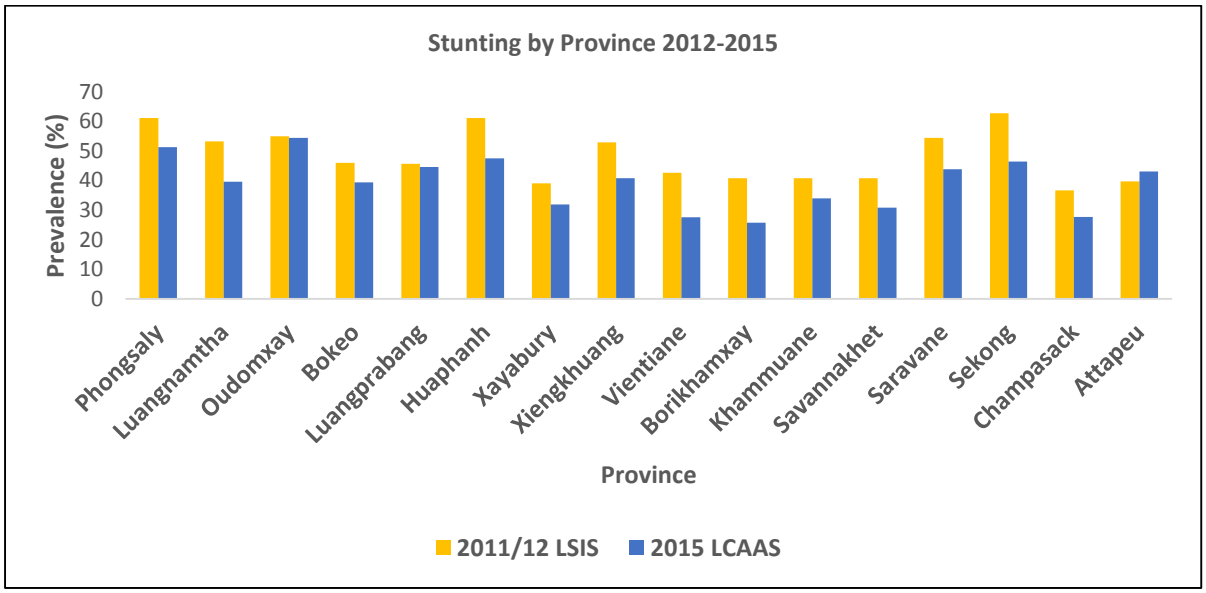
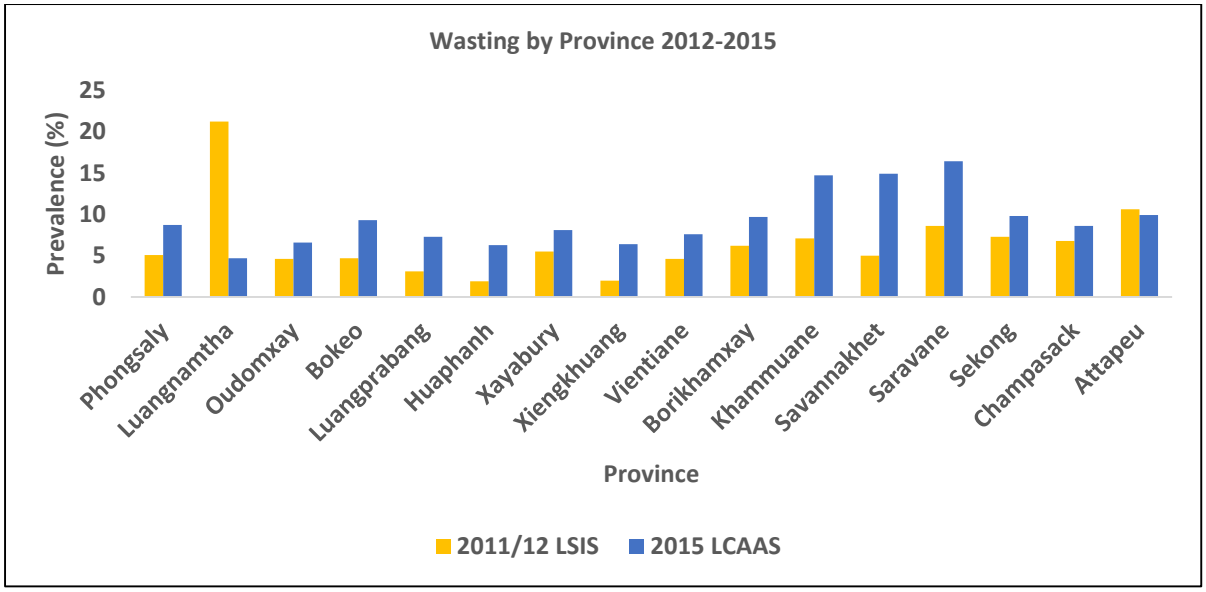
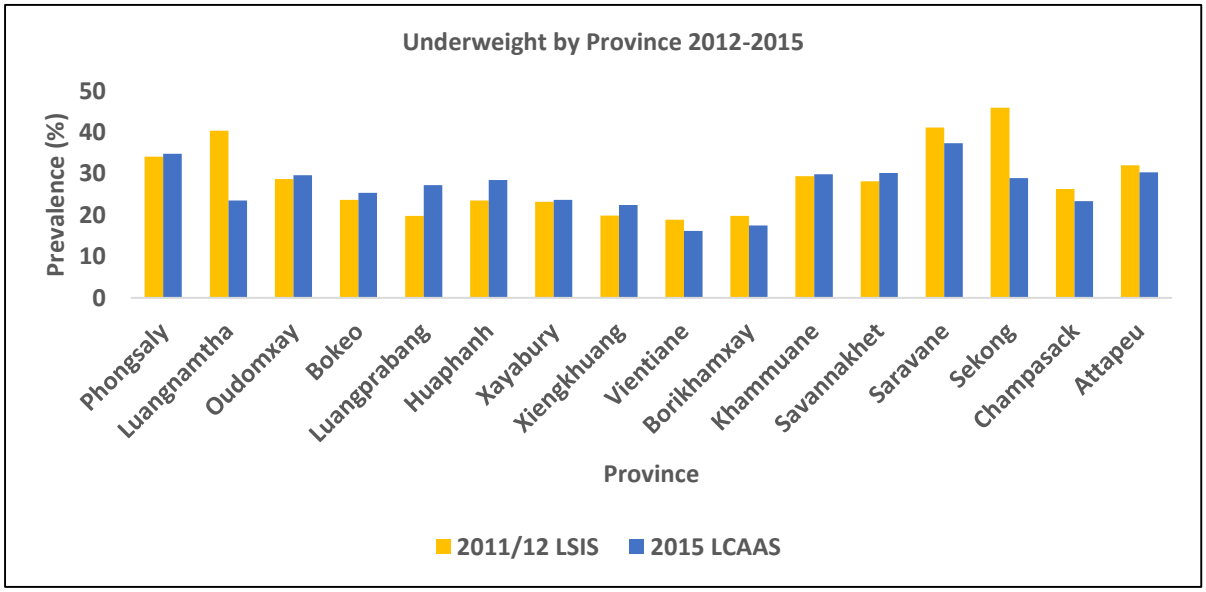


Figure 9: National trends prevalence of moderate or severe undernutrition in children under the age of 5 (0-59 months or 6-59 months) from 1993-2015 (Ministry of Health and National Institute of Public Health 2016 2016)







Figures 10-12: Stunting, wasting, and underweight prevalence by province in 2012 and 2015 (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health and National Institute of Public Health 2016 2016)

Trends in malnutrition characteristics by child's age show that most stunting, wasting, and underweight occurs between 6-18 months of age, as in figure 13. This is the period when most children are no longer exclusively breastfed and require nutrient rich complementary foods. This pattern of malnutrition indicates that complementary feeding practices are inadequate (discussed further in the Nutrient Intake and Local Practices section). Moreover, during this period where foods are introduced into the child's diet, they are exposed to a greater range of pathogens as they become more mobile and explorative and from water and food, which can result in diarrhea and nutrient loss (Ministry of Health and National Institute of Public Health 2016 2016). Anaemia rates are also highest in children 6-11 months of age, indicating that mothers have laid down insufficient iron stores during pregnancy and that the complementary foods provided to the child are low in iron

(refer to the Nutrient Intake and Local Practices section). As mentioned, the scope of the anaemia data is limited, so it is not possible to draw concrete conclusions at a national level.

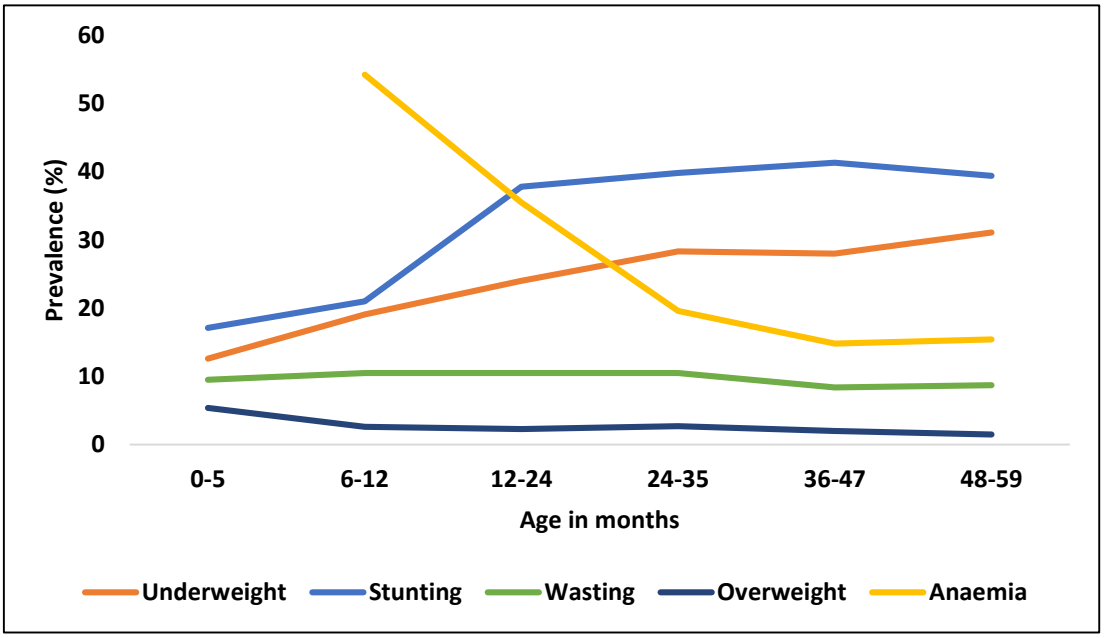


Figure 13: Prevalence of malnutrition characteristics in children by age in months (Ministry of Health and National Institute of Public Health 2016 2016)

As previously mentioned, prevalence of malnutrition varies widely by ethnolinguistic group, with children from Lao-Tai households generally having lower rates than children from minority ethnolinguistic groups (figure 14). It is, however, important to note the difference in geographical dispersion of the ethnolinguistic groups, with the Hmong-Mien (8 percent of the total population) and the Chinese-Tibetan populations (3 percent) concentrated in the northern uplands, the Mon-Khmer (21 percent) in the midland and plateau regions, and the Lao-Tai (66 percent) primarily in the lowlands of the Mekong Corridor (figures 15 and 16) (World Food Programme 2013). The disparities in malnutrition rates among these groups likely reflect the higher poverty rates and lower access to services and infrastructure in areas where minority groups predominantly live. Poverty rates among all minority groups except for the Chinese-Tibetan exceed the national rate of 23 percent (Pimhidzai et al. 2014), and minorities often have lower access to sanitation, services, and education. Qualitative data has suggested that where health services do exist, cultural and linguistic barriers may prevent access by minority women, who may not speak Lao language (while staff often only speak Lao language) or may be shy to do so (World Bank Group 2016). These factors may also interact with issues of availability of and access to nutritious foods for different ethnolinguistic groups.

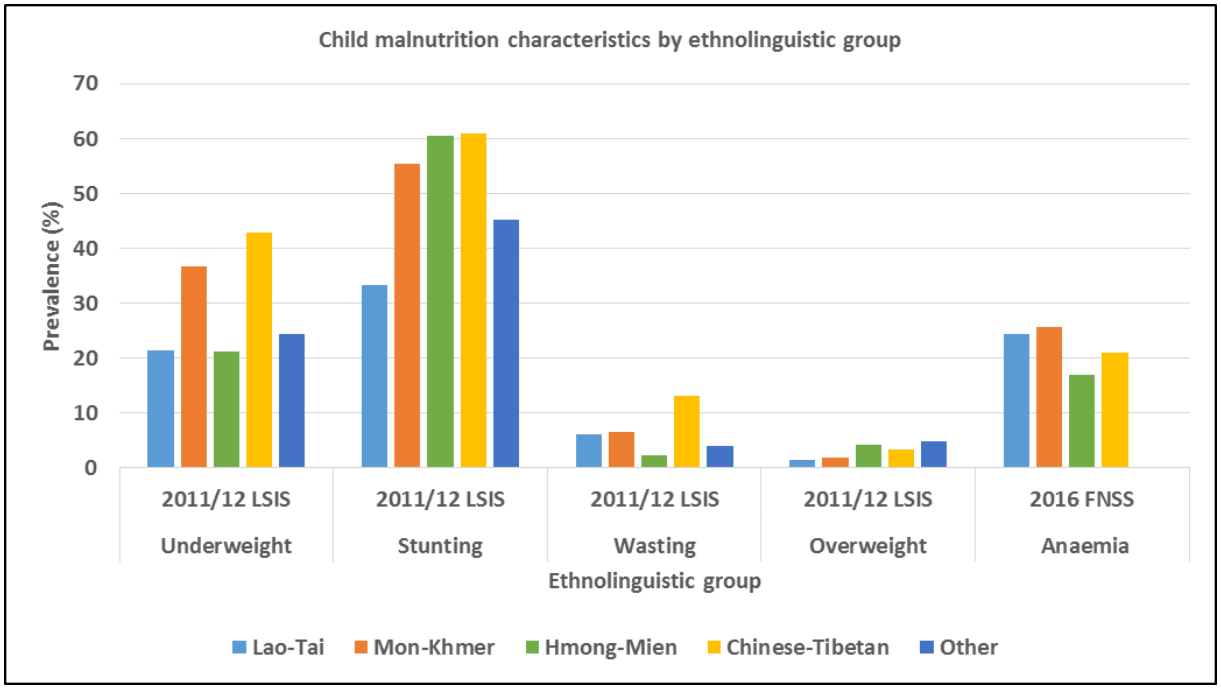


Figure 14: Prevalence of malnutrition characteristics in children under the age of 5 by ethnolinguistic group of the household head (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health & Ministry of Planning and Investment 2016)

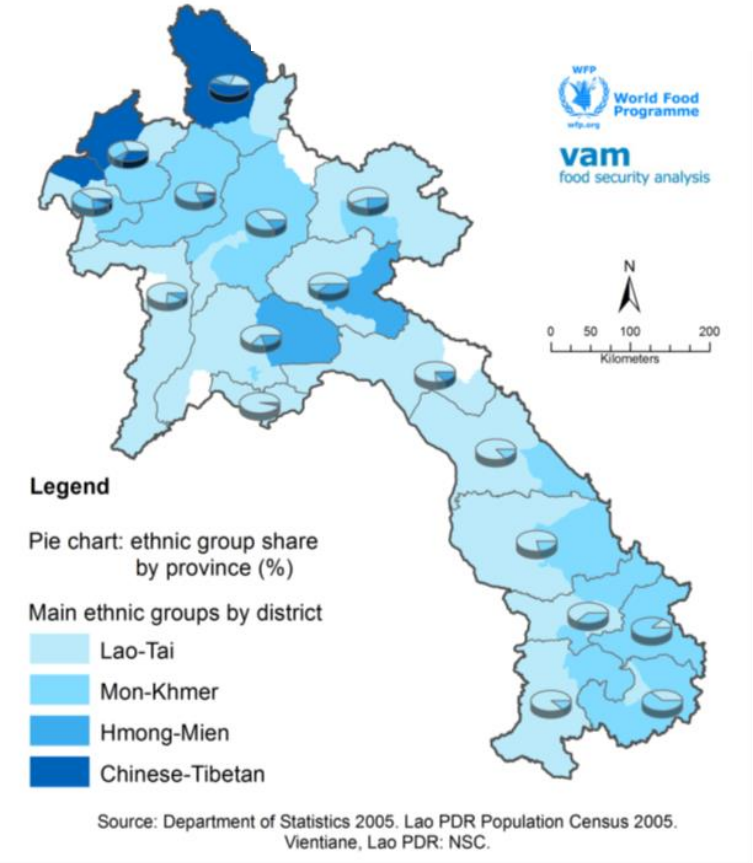


Figure 15: Distribution of ethnolinguistic groups by province (World Food Programme 2013)

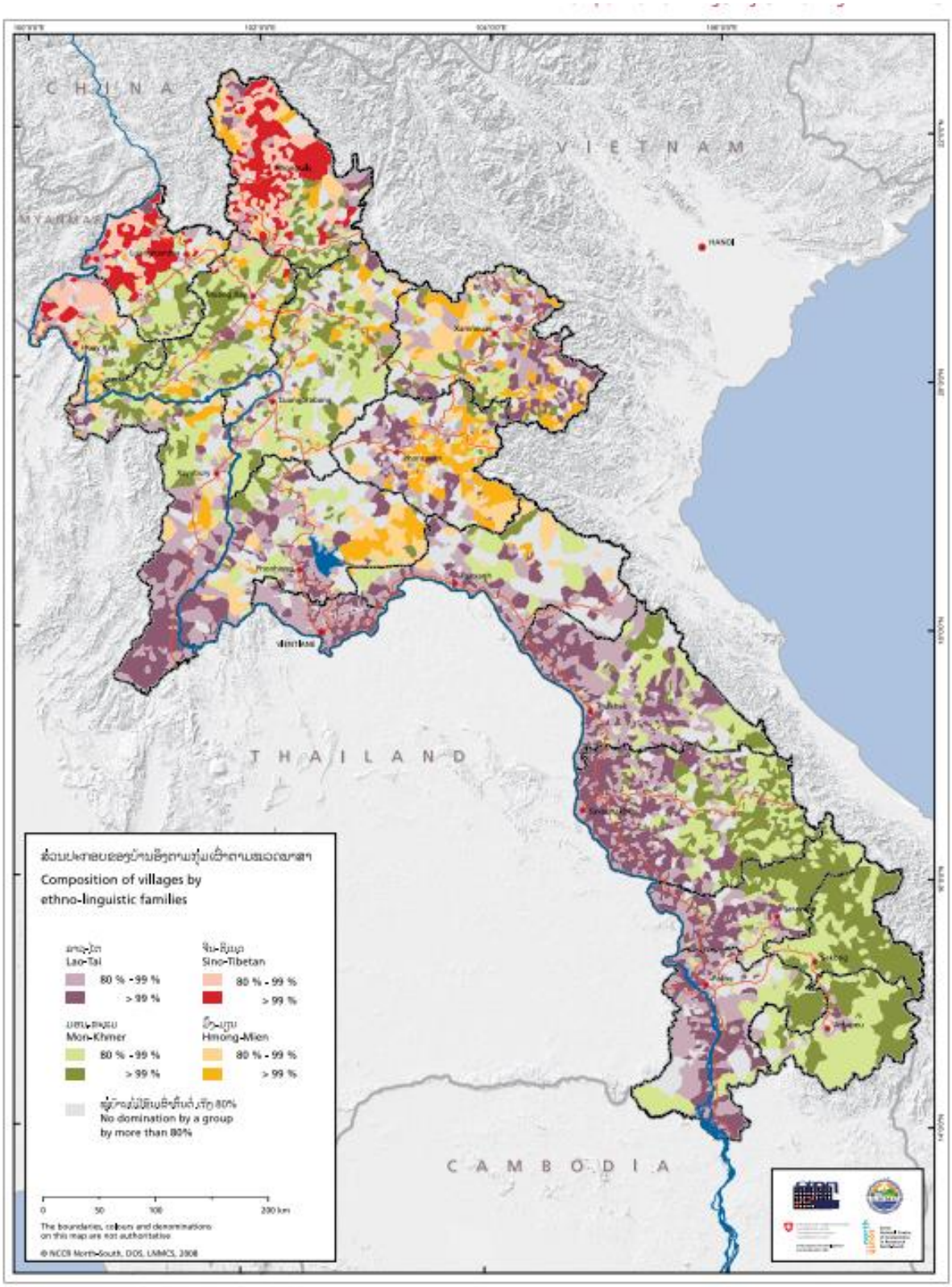


Figure 16: Composition of villages by ethnolinguistic families (Messerli et al. 2008)

Nutritional status of women

Women's anthropometry

The only recent data on women's anthropometry was collected in the 2015 FNSS. In all five provinces surveyed, two-thirds of women had a body mass index that fell within the normal range. In urban areas, 12 percent of women were classified as thin and 23 percent as overweight or obese, while in rural areas thinness prevalence was slightly higher (12 percent in areas with roads and 14 percent in areas without roads) and overweight was 11 percent and 8 percent in areas with and without roads, respectively. Overweight was highest among women in the richest quintile (23 percent) and the Lao-Tai ethno-linguistic group (20 percent) (Ministry of Health & Ministry of Planning and Investment 2016).

Micronutrient deficiencies

As with children, national data on micronutrient deficiencies in women of reproductive age (WRA) or during pregnancy and lactation is lacking in Lao PDR. The FNSS shows that the prevalence of anaemia was 40 percent among pregnant women and slightly lower among breastfeeding women, ranging from 30 percent in Luangnamtha to 46 percent in Attapeu (Ministry of Health & Ministry of Planning and Investment 2016).

Early marriage and childbearing

Lao PDR has high rates of early marriage, which is traditionally accepted in local cultures; this drives rates of adolescent pregnancy, which in turn contributes to children being born small for gestation age (or low birth weight) and children being at higher risk of stunting.

One in four women between the ages of 15-19 is married, with variation across provinces from 16 percent in Vientiane Capital to 35 percent in Phongsaly. Among women ages 20-49, 10 percent were married before age 15 and 37 percent before age 18. Early marriage is more common in rural areas (43 percent before age 18) than urban (23 percent) and correlates closely with educational levels (50 percent of women with no education versus 2 percent of women with higher education). It is also more prevalent among poorer women (48 percent in the bottom quintile versus 21 percent in the richest) and among Hmong-Mien households (57 percent of women) (Ministry of Health & Lao Statistics Bureau 2012).

Early marriage has a close relationship with early childbearing, and 18 percent of women age 15-19 were found to be pregnant or had already given birth; similarly, 18 percent of women ages 20-24 had given birth by the age of 18. Among women ages 25-49, 20 percent gave birth at age 18 and 40 percent gave birth at age 20. Early childbearing is more prevalent in rural areas and in provinces in the north. As with early marriage, there is a strong relationship with educational attainment and wealth quintiles: 36 percent of women age 15-19 with no education had begun childbearing and 28 percent in the lowest wealth quintile, versus less than 1 percent with higher education and 7 percent in the top wealth quintile (Ministry of Health & Lao Statistics Bureau 2012). An analysis of factors associated with stunting found that the probability was more than 10 percentage points higher among children whose mothers were younger than 17 years old at conception, as shown in figure 17 (World Bank Group 2016).

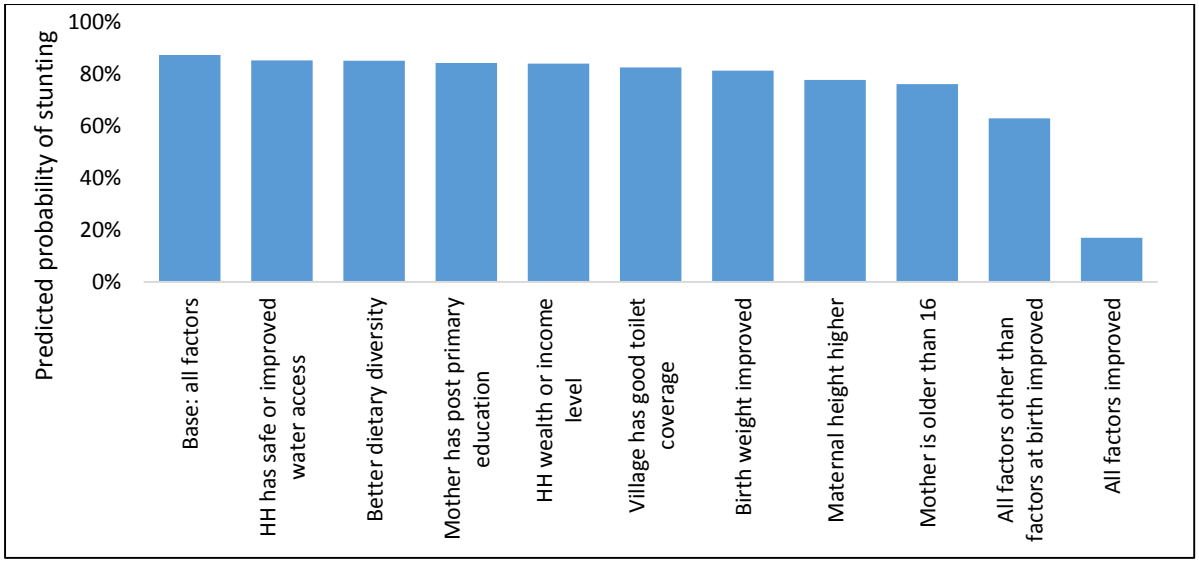


Figure 17: Predicted probability of stunting for children 6-23 months, by cause (World Bank Group 2 2016)

Nutrition-related policies, programmes and regulatory framework

Key Highlights:

It is important to maintain and expand high level political commitment for nutrition. Strong national policies need coordination and implementation at all administrative levels.

National policy, legal and regulatory framework

- ➔ National Nutrition Strategy to 2025 and Plan of Action for 2016-2020: multi-sectoral, aligned with SDGs, prioritize reduction in rates of stunting in children under 5
- ➔ Scaling Up Nutrition (SUN) member since 2011; Ministry of Health serves as focal point
- ➔ High level political commitment, but challenges in local implementation
- ➔ Mandatory fortification: only salt iodization
- ➔ Social protection schemes are being developed, but with limited coverage

Public-Private Partnerships

- ➔ The 1000 Day Project: Public-private partnership between the Government of Lao, UNICEF, and mining company Minerals and Metal Group that began in 2012 in selected provinces. It distributes SuperKid micronutrient powder (MNP)either free provision for children 6-23 months, or subsidized provision for children 2-5 years and provides malnutrition screenings and education sessions.

Historically, national responses to undernutrition have been limited and characterized by difficulties in coordination. Nutrition programmes have targeted school-age children rather than the first 1,000 days of life, while wasting prevention has been focused on emergency-response interventions with rice rations. Programmes are often implemented only in selected priority areas, and comprehensive packages of nutrition interventions are rare (World Food Programme 2010). Where health facilities are available, access to services often remains a challenge due to barriers related to cost, distance, or language and culture; moreover the poor quality of care can act as a disincentive, and capacity for nutrition services in particular remains low at health centres (Bouapao et al. 2016). High level political commitment, spearheaded by the Ministry of Health's Department of Hygiene and Health Promotion and the National Nutrition Center, has recently led to pushes for better coordination across sectors and administrative levels to provide improved responses.

National Policies

The first National Nutrition Policy was promulgated in 2008, forming the basis of the National Nutrition Strategy and Plan of Action (NNSPA) for 2010-2015. Implementation was challenged by insufficient coordination mechanisms and budgetary allocations, which led to the creation of the National Nutrition Committee (NNC) in 2013 with the mandate of providing leadership and guidance to coordinate the NNSPA across sectors and levels (Government of Lao PDR 2015). A multi-sectoral platform, the NNC is chaired by the Vice-Prime Minister, and supported by a Secretariat (Bouapao et al. 2016).

Lao PDR joined the Scaling Up Nutrition Movement (SUN) in 2011. The Ministry of Health is the SUN focal point, demonstrating its commitment to reducing malnutrition using a multi-sectoral approach. The current National Nutrition Strategy to 2025 is accompanied by a Plan of Action for 2016-2020; although the central goal is to decrease rates of stunting in children under the age of 5, additional goals align with the Sustainable Development Goals and other global targets and include reductions in prevalence of underweight, wasting, and anaemia, prevention of overweight and obesity, and promotion of breastfeeding (table 1 and figure 18). The strategy and plan of action emphasize a multi-sectoral approach and highlight the contribution of good nutrition to economic development (Government of Lao PDR 2015).

Indicator	2012 baseline (percent)	2015 baseline (percent)	2020 target (percent)	2025 target (percent)
Malnutrition rates from data gathered				
Chronic malnutrition rate in children under 5	44	42	34	25
Sudden malnutrition (wasting) rate in children under 5	6	6	5	5
Underweight rate in children under 5	27	22	17	12
Anaemia rate in children under 5	41	40	30	20
Anaemia rate in women of reproductive age	36	30	23	15
Low birth weight	15		11	8
Overweight rate in children under 5	2	2	2	2
Breastfeeding rate	40	40	50	60
Iodine deficiency rate among school-age children	27		17	10

Table 1: Indicators for the National Nutrition Strategy to 2025 (Government of Lao PDR 2015)

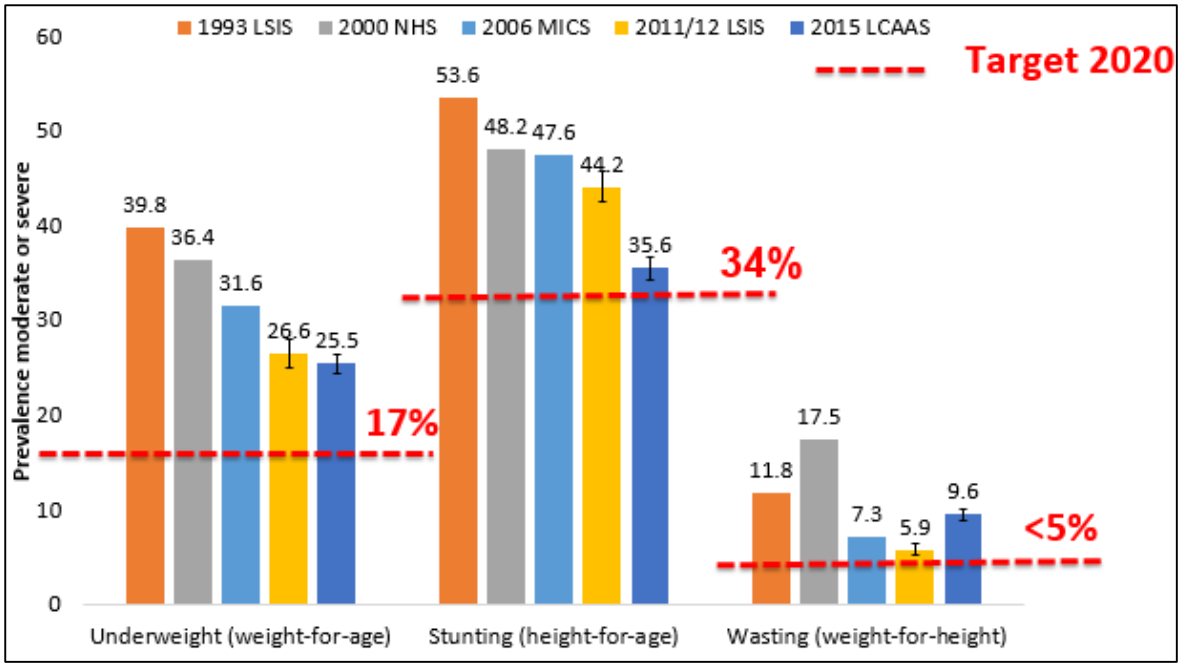


Figure 18: 2020 targets for prevalence of underweight, stunting, and wasting (Government of Lao PDR 2015)

Despite the high-level support for nutrition and the range of policies, strategies, and action plans that the national government has recently developed, implementation is challenging, especially at lower administrative levels. Insufficient financial and human resources, as well as unclear linkages between the national and subnational levels, have been the primary obstacles to effective implementation of the policies formulated (Bouapao et al. 2016).

In addition to the creation of the NNC and its Secretariat, attempts to improve coordination have included the establishment of a Technical Working Group on Food and Nutrition Security (TWG-FNS) and a Food and Nutrition Security Government Core Group. The TWG-FNS is a multi-sectoral body composed of members from 10 existing sectoral working groups, while the Core Group comprises representatives from the Ministry of Health, the Ministry of Food and Agriculture, the Ministry of Education and Sports, the Ministry of Planning and Investment, and the National Poverty Reduction Committee. Further recommendations have included clarifying and strengthening the roles and functioning of both of these bodies, as well as the NNC Secretariat. Further support to governance and coordination at local levels – province, district, and village – is also crucial (Wilkinson & Chanlivong 2015).

Social Protection

Four national social protection schemes exist for pension and health coverage purposes, but coverage is limited, especially for the most vulnerable groups (Leebouapao 2010). The government is working to expand social protection coverage, although challenges arise from the large percentage of the population with low incomes or working in the informal sector. A new scheme is being developed that will merge all social protection under the National Social Security System with the aims of strengthening capacity and efficiency (Leebouapao 2010). In 2014, the Prime Minister issued a decree providing free maternal, neonatal, and child health services, but no data is available on outcomes of this decree (Thompson 2015).

Fortification

Salt iodisation has been mandatory since 1995, and is the only national fortification scheme. In 2012, iodised salt was found in 80 percent of households nationally; this varied widely by province (Ministry of Health & Lao Statistics Bureau 2012). As of 2015, the lowest coverage was in Sekong where 67 percent of households used iodised salt; coverage was nearly universal in Luangnamtha at 97 percent of households. No important disparities were found between urban and rural areas (Ministry of Health & Ministry of Planning and Investment 2016). However, while both the 2012 LSIS and the 2016 FNSS tested for the presence of iodine in salt, neither determined whether levels of iodisation were adequate (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health & Ministry of Planning and Investment 2016). This data gap would need to be addressed in order to assess the impact of the iodisation policy.

Industrial food fortification is reportedly being considered, and a number of possibilities have been listed, including soybeans or peanut oil plants, fortified noodles or fortified rice, or production of a lipid-based ready-to-use food (World Food Programme 2010).

Public-Private Partnerships

The 1000 Day Project, a public-private partnership (PPP) between the government of Lao, UNICEF, PSI, and mining company MMG, began in 2012. The project has been distributing "SuperKid" micronutrient powder (MNP) in the provinces of Savannakhet, Saravane, and Attapeu, with free provision for families with children under the age of two and subsidized provision for families with children under the age of five. In addition to MNP, the project provides malnutrition screenings and education and information sessions. An estimated 180,000 children and their families have been reached thus far, with plans to expand to a fourth province (Huaphanh) and reach 270,000 children during the second phase of the project (began 2016) (MMG Limited 2016; MMG Limited 2017).

Availability of Nutritious Foods

Key Highlights:

Households' sourcing of foods is changing due to decreasing access to land and forests, and shifts in agricultural production

Availability

- ➔ Rice is the dominant staple: households consume their own production, and compensate with purchases during the lean season
- ➔ Subsistence slash-and-burn farming is gradually being replaced by monoculture production of cash crops
- ➔ Annual shortages are common before the rice harvest
- ➔ Own production and non-timber forest products are important sources of food, although an increasing amount of food is purchased at markets

Specialised nutritious foods

- ➔ Specialised nutritious foods, including fortified infant cereals, are not widely available in local markets; those that are found are imported (Cerelac™, Lactogen™)
- ➔ SuperKid MNPs available through PPP (UNICEF- PSI, 1000 Day Project)
- ➔ WFP distributes a small quantity lipid-based nutrient supplement (SQ-LNS) (Nutributter™, imported) to children 6- 23 months and to pregnant and lactating women
- ➔ Energy bars are being developed and produced locally for distribution to school-aged children

The population of Lao PDR is overwhelmingly rural, with most (77 percent) households employed in agriculture. As of 2006 Comprehensive Food Security and Vulnerability Analysis (CFSVA), 81 percent of rural households were predominantly engaged in agriculture; of those, 36 percent were farmers, 21 percent farmers and gatherers[6], 14 percent engaged in a combination of farming, fishing and hunting; and 10 percent were agro-pastoralists (Ministry of Agriculture and Forestry 2013). The average plot size was 0.77 hectares (Ministry of Natural Resources and Environment & World Food Programme 2016). The 2012 Risk and Vulnerability Survey proposed three general village categories based on the predominant livelihood strategies, comprising market-oriented farming villages, part-time farming villages, and subsistence rice-based upland farming villages (Ministry of Agriculture and

[6] While households whose livelihoods were classified as "farmer" sourced nearly half of their food from own production, 38 percent from purchasing and 10 percent from gathering, "farmer/gatherer" households sourced 38 percent of food from gathering, 38 percent from purchasing, and only 19 percent from own production (CFSVA 2006).

Forestry 2013). Agro-ecological zones and livelihood zones are diverse, and have been divided into as few as six zones (figure 19) and as many as 41 (figure 20).

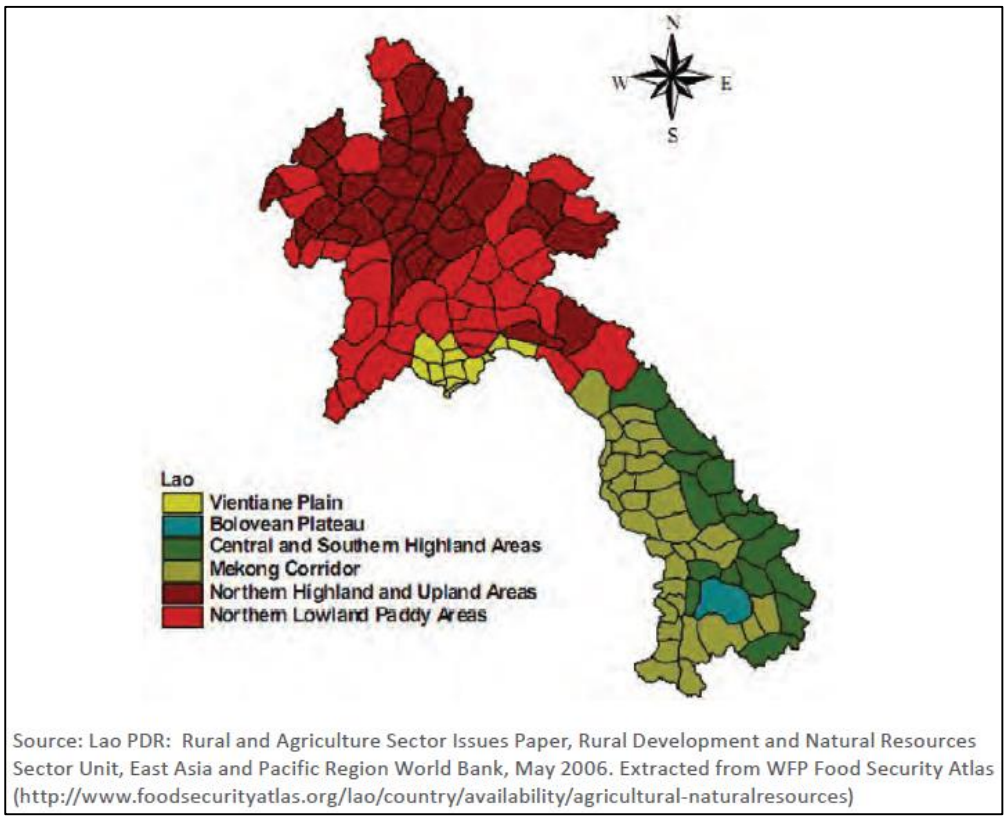


Figure 19: Agro-ecological zones of Lao PDR (Ministry of Agriculture and Forestry 2013)

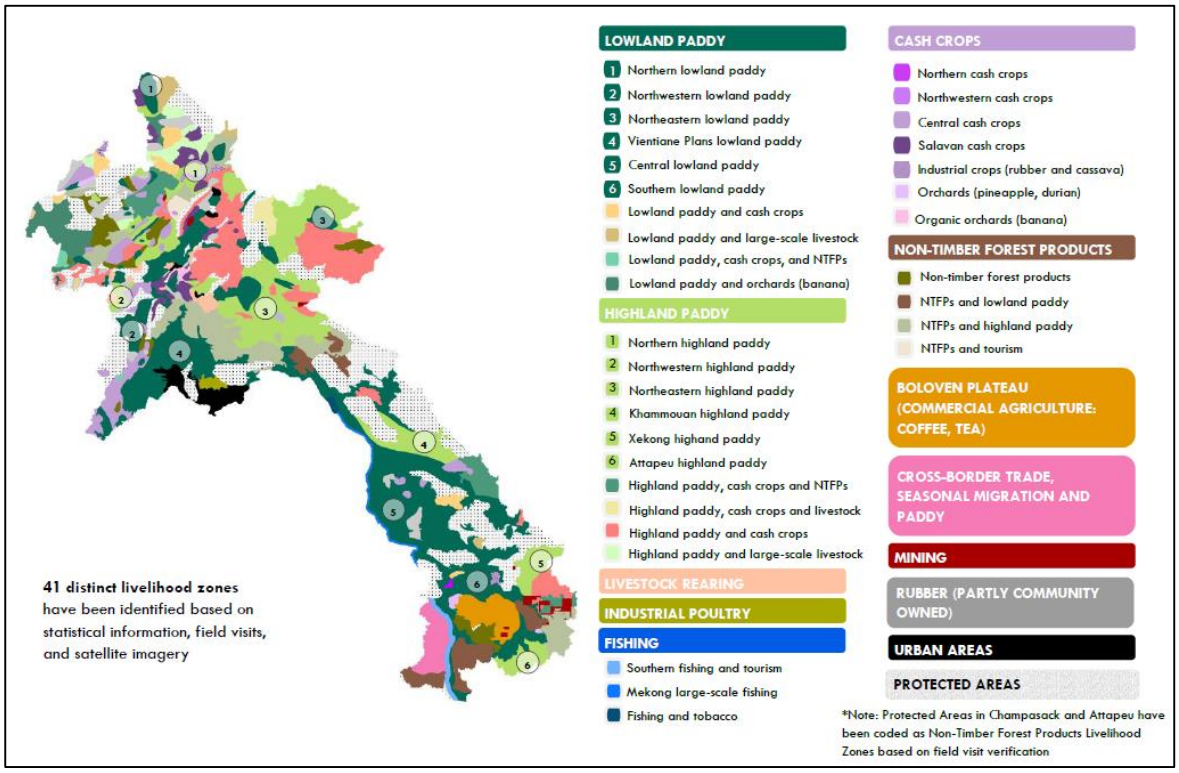


Figure 20: Livelihood zones of Lao PDR (Ministry of Natural Resources and Environment & World Food Programme 2016)

Production

Rice is the predominant staple both in terms of production and consumption (World Bank Group 2016). Production relies on a combination of lowland rain fed, irrigated, and upland cultivation systems, with 70 percent of total rice produced coming from five provinces in the central region (Bolikamxai, Khammouan, Savannakhet, Vientiane, and Xiengkhouang, as in figure 21) (Ministry of Agriculture and Forestry 2013). Lao PDR has been self-sufficient in rice production since 2000, with average annual yields of approximately three million metric tons nationally (Bouapao et al. 2016; Ministry of Agriculture and Forestry 2013). Although nearly all (90 percent) households report meeting their rice consumption requirements throughout the year, during the lean season (rains before the rice harvest, May-October) up to 15 percent are unable to meet these requirements through their own production (Ministry of Agriculture and Forestry 2013).

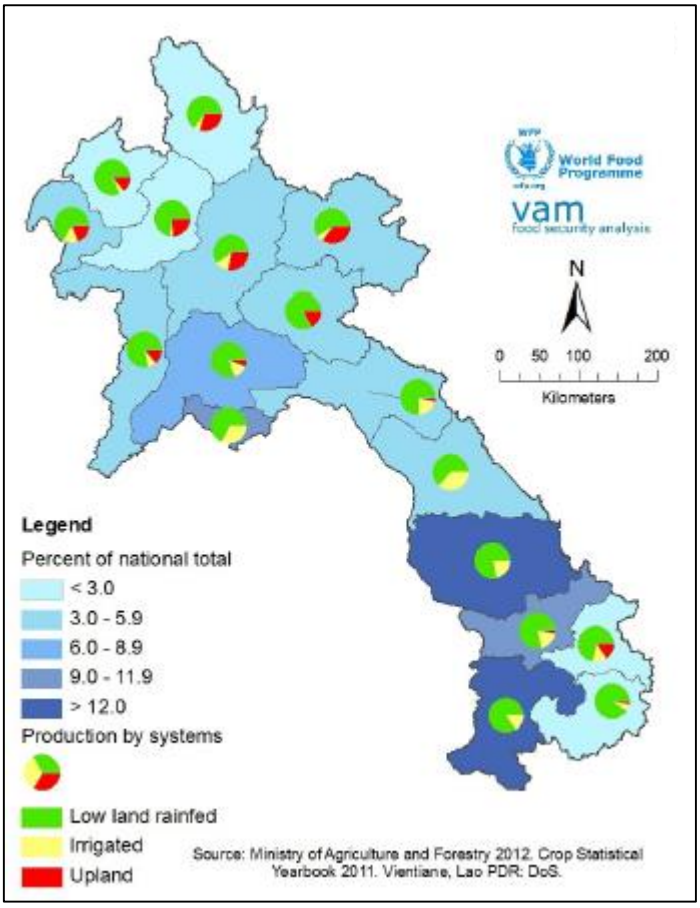


Figure 21: Rice production as percentage of national production by province and production system (World Food Programme 2013)

Agricultural methods have historically centered on slash and burn production with shifting cultivation, but have been moving increasingly to lowland paddy fields, upland fields, and highland fields with mixed shifting cultivation (Douangsavanh & Phouyyavong 2009). Rice and vegetables are mostly produced by households for their own consumption, starches (including maize, cassava and tubers) are either grown at home or purchased on the market, and animal-source foods are either purchased (fish, eggs, and meat) or foraged (primarily small aquatic animals and small rodents) (Ministry of Agriculture and Forestry & World Food Programme 2016). Because rice production remains highly decentralized, it would be difficult to introduce fortification into the current system.

Production and yields are limited by both natural and man-made hazards. Floods, droughts, epidemics, and infestations occur regularly and, nationally, increasingly frequent climate-related hazards are anticipated as a result of climate change. Man-made hazards include deforestation, dams, land concessions, and unexploded ordinances (UXOs), all of which limit access to land (Ministry of Agriculture and Forestry 2013; Ministry of Natural Resources and Environment & World Food Programme 2016). UXOs are estimated to cover some 170,000 hectares of agricultural land nationally, affecting one in every six villages (figure 22) (Ministry of Agriculture and Forestry 2013).

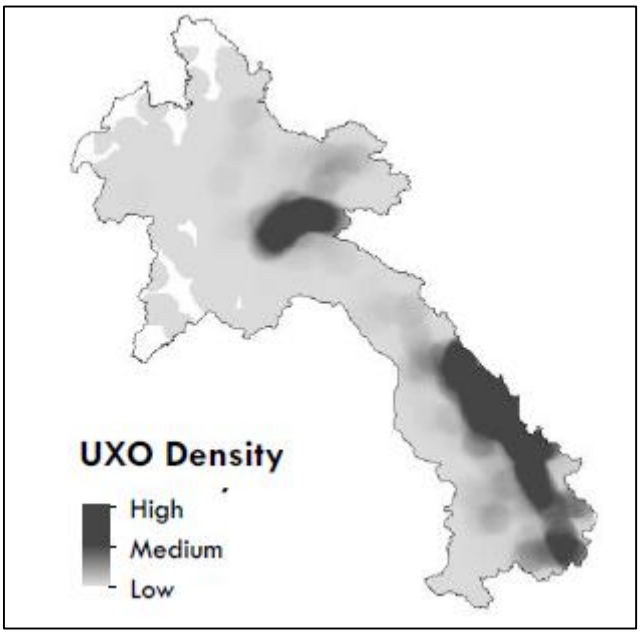


Figure 22: Unexploded ordinance density in Lao PDR (Ministry of Agriculture and Forestry 2013)

Although overall agricultural production has increased in recent years, a shift from subsistence toward commercial agriculture has led to increasing monoculture of cash crops such as cassava, coffee, rubber, and others (figure 23). As of 2011, some 30 percent of agricultural households reported producing crops mainly for sale (Ministry of Agriculture and Forestry 2013). Moreover, much of the yield is exported, as food processing capacity is very limited within Lao PDR (Bouapao et al. 2016; World Food Programme 2013). Given the historic reliance on own production for food, this decreasing agricultural diversity and increasing sale of crops is reflected in greater reliance on markets to source food (World Food Programme 2013). Nationally, more than half of food consumption (55 percent) is still sourced from households' own production, with 42 percent from market purchases. This varies, but there are only three provinces in which more than half of food is sourced from markets (86 percent in Vientiane Capital, 58 percent in Champasack, and 52 percent in Vientiane). Conversely, own production accounts for 83 percent of food consumption in Huaphanh and 75 percent in Phongsaly (Lao Statistics Bureau 2013).

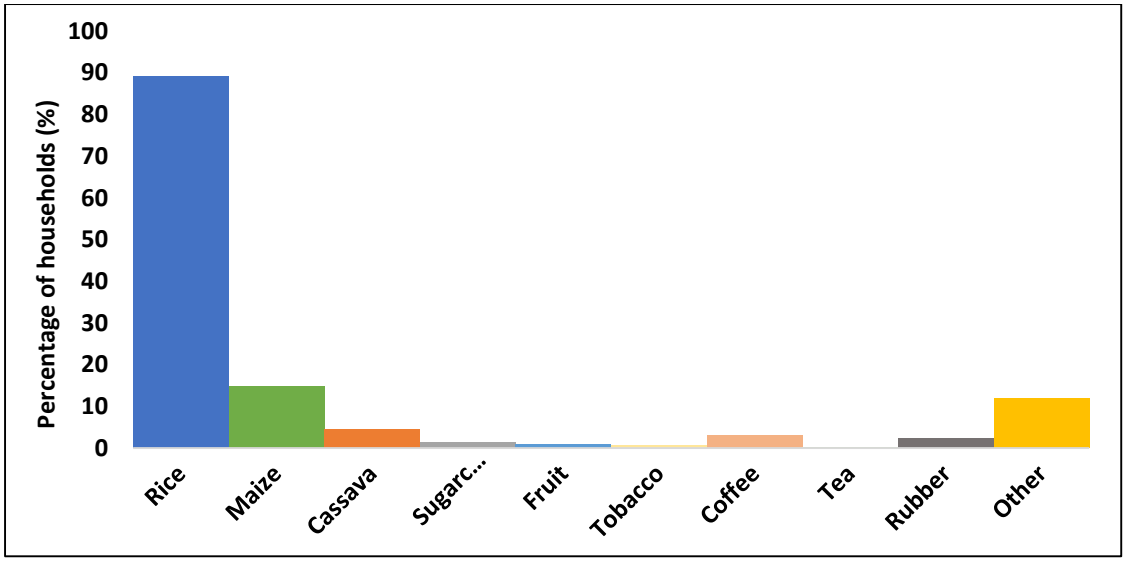


Figure 23: Percent of households producing different crops in 2012 (Ministry of Agriculture and Forestry 2013)

Livestock is common, with 80 percent of households nationwide owning poultry and 50 percent pigs; smaller animals are commonly raised for household consumption, while larger animals are traded or kept as household savings (Ministry of Agriculture and Forestry 2013; Silke STOEBER, Engsone SISOMPHONE 2013). Home vegetable plots are also widespread at 70 percent of households nationally; slightly fewer households (62 percent) in the bottom economic quintile cultivate these gardens, and there is regional variation that may reflect disparities in available land or production priorities (figure 24) (Ministry of Agriculture and Forestry 2013). Crops grown in home gardens (as detailed in table 2) include fruits, vegetables, and others such as medicinal plants.

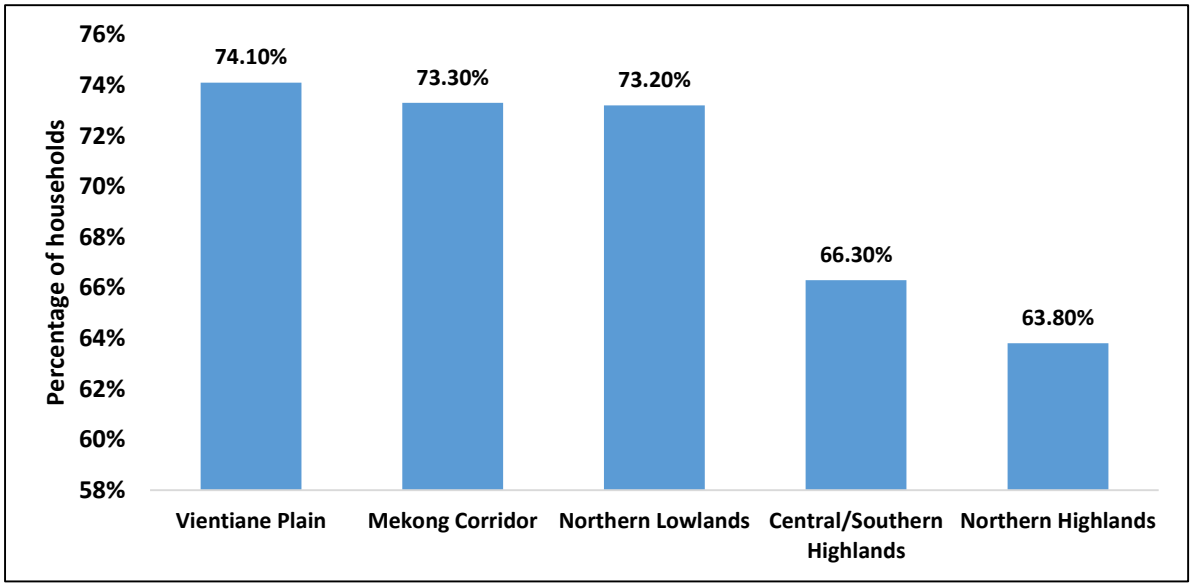


Figure 24: Percent of households with a vegetable plot by agro-ecological zone (Ministry of Agriculture and Forestry 2013)

Home Garden Crops	
Fruits	Papaya, banana, citrus, pineapple, mango, jackfruit
Vegetables	Aubergine, chilli, cabbage, beans, tomato, okra, lettuce, celery, cabbage
Other plants	Ginger, spring onions, galangal, taro, bitter bamboo, peanuts, medicinal plants

Table 2: Common crops grown in home gardens (Dyg & Phithayaphone 2005; Silke STOEBER, Engsone SISOMPHONE 2013)

Diversity of Foods available

The Cost of the Diet market survey conducted in February 2017 as part of the FNG process indicated wide availability of a variety of food items on the market from all different food groups. See the Cost Optimisation section for further information.

Seasonality

Lao PDR is located in the Lower Mekong Basin, with rains from June-October and a dry season from September-May (table 3). Annually, rice shortages are most common right before the harvest (varying by geographic area and type of production, as in table 3), but other shortages may also occur at the end of the dry season when foraging is difficult and droughts or infestations can compromise both crop yields and availability of foraged foods (Silke STOEBER, Engsone SISOMPHONE 2013). Shortages at the beginning of the rainy season may be due to limited foraging time because of intensive working in the fields, or to rains and flooding. Increasingly, chronic shortages are also occurring as a result of limited land and decreasing soil quality (Arnst & Laos Extension for Agriculture Project (LEAP) 2010).

	Cooler		**Hot/Dry**			**Wet**					**Cooler**	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
	NE monsoon			**Transition**		**SW monsoon**					**NE monsoon**	
Upland rice, rainfed	Land selection, preparation, slashing and burning				Planting	Weeding				Harvesting		
Lowland rice, rainfed			Land prep (first year only)		Nursery	Weeding				Harvesting		
Lowland rice, irrigated	Plant-ing		Weeding		Har-vest							

Table 3: Seasonal calendar of the Lower Mekong Basin and r*ice cropping calendar of Lao PDR, by production system* (adapted from Mekong River Commission 2010 and World Food Programme 2013)

Climate change is also having an impact on seasonality, particularly the timing and magnitude of rainfall. This varies by region, with northern parts of the country eventually expected to have more even rainfall throughout the year, while southern areas are experiencing more concentrated rains during the middle of the rainy season (figures 25-26); these trends have implications for crop production and may exacerbate risk of both flooding and drought in different regions (Ministry of Natural Resources and Environment & World Food Programme 2016).

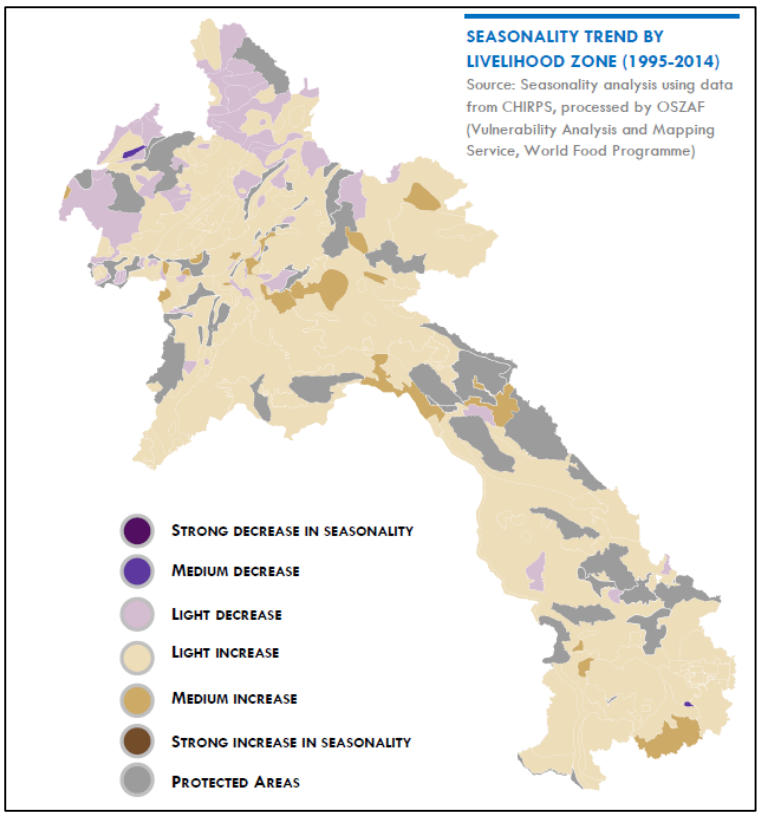


Figure 25: Seasonality trends by livelihood zone, 1995-2014 (Ministry of Natural Resources and Environment & World Food Programme 2016)

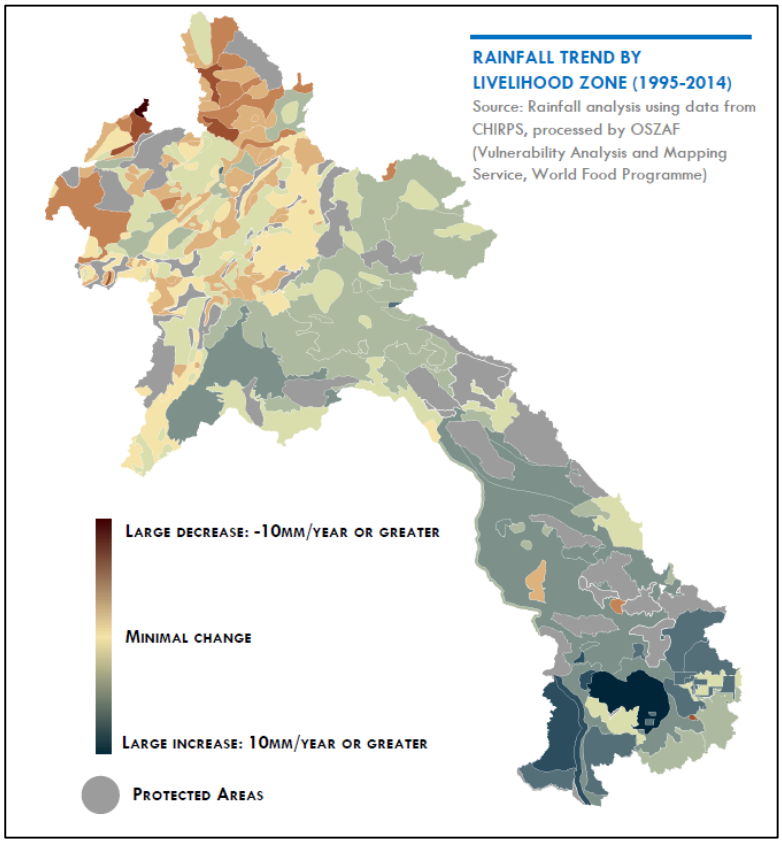


Figure 26: Rainfall trends by livelihood zone, 1995-2014 (Ministry of Natural Resources and Environment & World Food Programme 2016)

Non-Timber Forest Products (NTFPs)

Wild foraged products known as non-timber forest products (NTFPs) comprise a crucial component of both livelihoods and diets for a large percentage of the population. These include mushrooms and gathered vegetables, as well as fish and other wild animals and amphibians, as detailed in table 4. Both availability of NTFPs and reliance upon them as sources of food are highly seasonal, and they are particularly important during the lean months before the rice harvest (May-October); for example, mushrooms and bamboo are gathered primarily during the rainy months, mammals are hunted from October-December, while fishing is possible throughout the year. NTFPs constitute an important source of nutrients for much of the population, with rural households getting one third (32 percent) of animal protein from wild animals (World Food Programme 2013). On average, wild foods comprise 10 percent of total weekly dietary intake and an estimated 11-55 percent of household cash income, based on proximity to forests (Ministry of Agriculture and Forestry 2013). Decreasing access to land and to NTFPs, due to factors including loss of forest area and biodiversity, has important implications for food security and dietary diversity that are further explored in the following section (Access to Nutritious Foods).

Common Foraged Foods (Non-Timber Forest Products)	
Small aquatic animals	Crabs, shrimp, snails, small fish bones, insects
Wild animals	Wild pig, bamboo rats, monkeys, birds, deer
Vegetables	Ferns, bamboo shoots, Job's tears, lasia (phak nam), young banana leaves
Fruit	Bananas, longans, mangoes, coconuts, starfruit, guavas, papayas, pomegranates, jackfruit, lemons

Table 4: Common foraged foods (non-timber forest products) (Ministry of Agriculture and Forestry 2013)

Availability of Specialised Nutritious Foods and Complementary Foods

Specialised nutritious foods (SNFs) for young children are not widely available in Lao PDR, and those that are found are imported (such as Cerelac and Lactogen).

The SuperKid MNP distributed by UNICEF and PSI's 1000 Day Project was found to be available in nearly half (48 percent) of pharmacies and clinics surveyed in the project areas in Savannakhet and Saravane. There was also high availability of other micronutrient products, particularly syrups, with the most common brands being "9 Vitamins", "Manoprovid", and "Orlida" (UNICEF n.d.).

WFP distributes the small-quantity lipid-based nutrient supplement (SQ-LNS) Nutributter™ to children between the ages of 6-23 months as well as to pregnant and lactating women. There are also energy bars being developed locally by a social enterprise called Mai Savanh Lao for distribution to school-aged children, with each child receiving three bars per day. The bars contain peanuts, banana, coconut, puffed rice, and a seed called sancha inchi.

Access to Nutritious Foods

Key Highlights:

Economic access is a key barrier to households consuming a nutritious diet. This is likely to worsen as market reliance increases and land access and foraging capacity decrease, unless income from other sources increases.

Threats to food access across the country include regular natural shocks such as seasonal floods and droughts; decreasing access to land due to land degradation, deforestation, and relocation and migration; and regular economic constraints including insufficient wage labour opportunities during the dry season.

At household level quality of dietary intake (diversity) is of greater concern than overall quantity (energy intake).

Access

- ➔ Own production and NTFPs are important sources of food, particularly for cereals and vegetables (own production) and animal protein (foraged).
- ➔ Food consumption scores and other indicators of dietary diversity are lowest in upland areas and among rural households.
- ➔ Access to land and forests is increasingly limited, leading even rural agricultural households to employ a variety of methods to source food.
- ➔ Market access is poor: 1/3 of villages nationally have temporary produce markets, and markets are especially difficult to reach during the rainy season.
- ➔ Shocks are primarily natural, related to weather or failed crops. In 2015, late and unpredictable rains impacted 65 percent of all households nationally, while rodent infestation and floods also contributed to loss of both rice and cash crops. Such shocks and natural disasters can cause shortages that lead to increased prices and particularly impact poorer households.

Key threats to food access across the country include regular natural shocks such as seasonal floods and droughts; decreasing access to land due to land degradation, deforestation, and relocation and migration; and regular economic constraints including insufficient wage labour opportunities during the dry season.

Expenditure

The 2015 Comprehensive Food Security Assessment (CFSA) found that 66 percent of all households nationally spent less than half of their budget on food[7], and another 20 percent spent between 50-64 percent of their budget. These households that devote less than 65 percent of their expenditure

[7] This includes the value of non-purchased foods (obtained through own production) for consumption.

to food are considered to have more flexibility and greater resilience to shocks than those who spend a greater proportion of their budget and are less likely to have savings or emergency funds (Ministry of Agriculture and Forestry & World Food Programme 2016). The 2013 Lao Expenditure and Consumption Survey (LECS 5) found, similarly, that food accounted for an average of 63 percent of total consumption nationally (figure 27[8]) (Lao Statistics Bureau 2013).

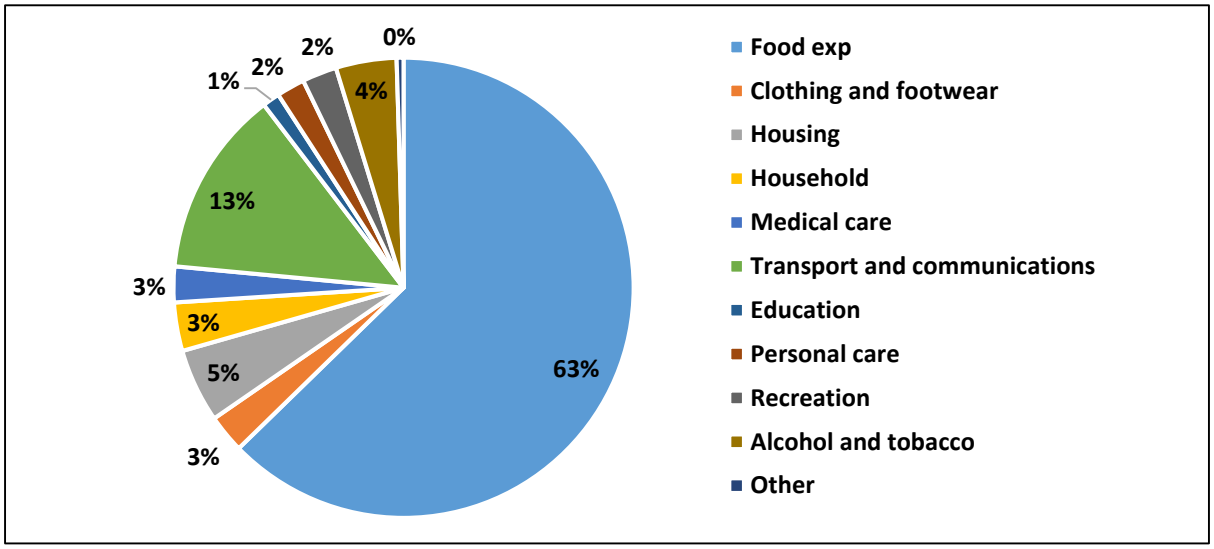


Figure 27: National monthly household consumption by category of goods and services (Lao Statistics Bureau 2013)

As discussed above in the Availability section, own production and NTFPs continue to be important sources of food across the country (figures 28 and 29), particularly for cereals and vegetables (own production) and animal protein (foraged) (figure 30).

[8] This also included the value of non-purchased foods

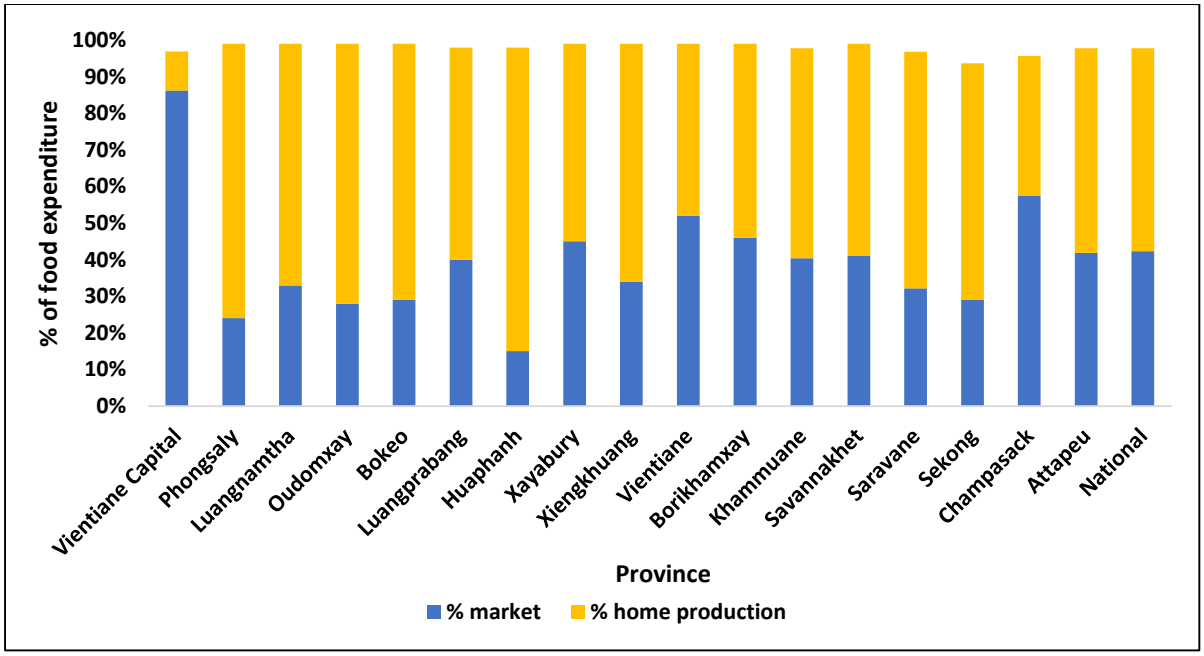


Figure 28: Share of food expenditure from market and home production by province[9] (Lao Statistics Bureau 2013)

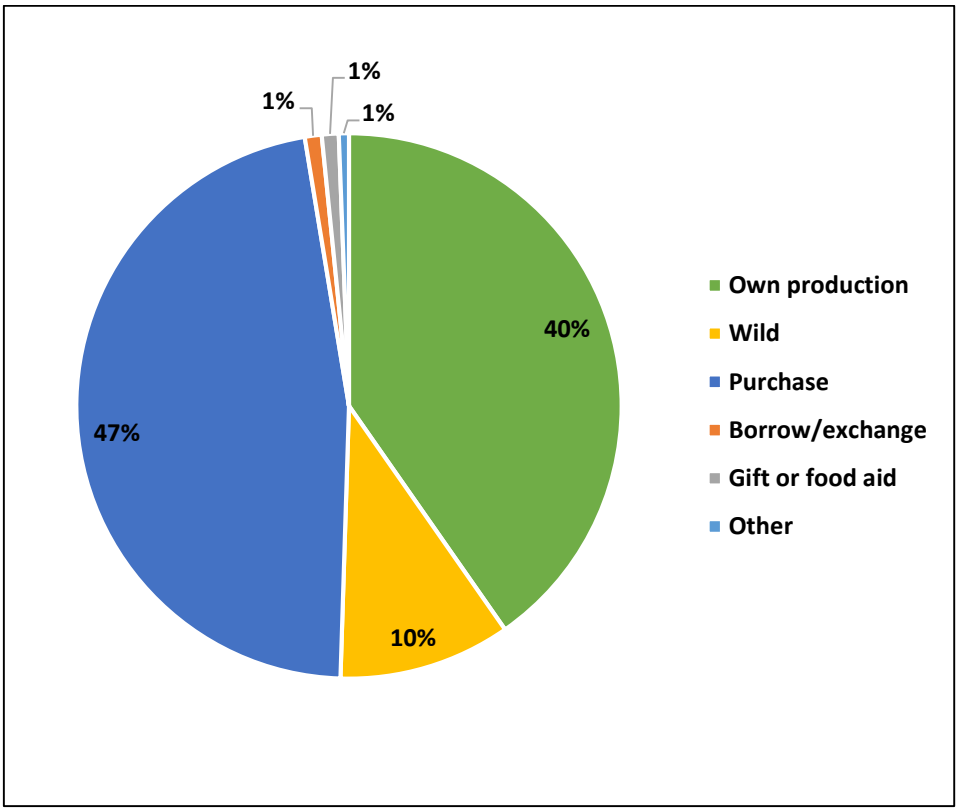


Figure 29: Sources of food by 7 day recall[10] (Ministry of Agriculture and Forestry 2013)

[9] Does not include foraged foods

[10] Data collected between December-February, nationally representative across the 6 agro-ecological zones

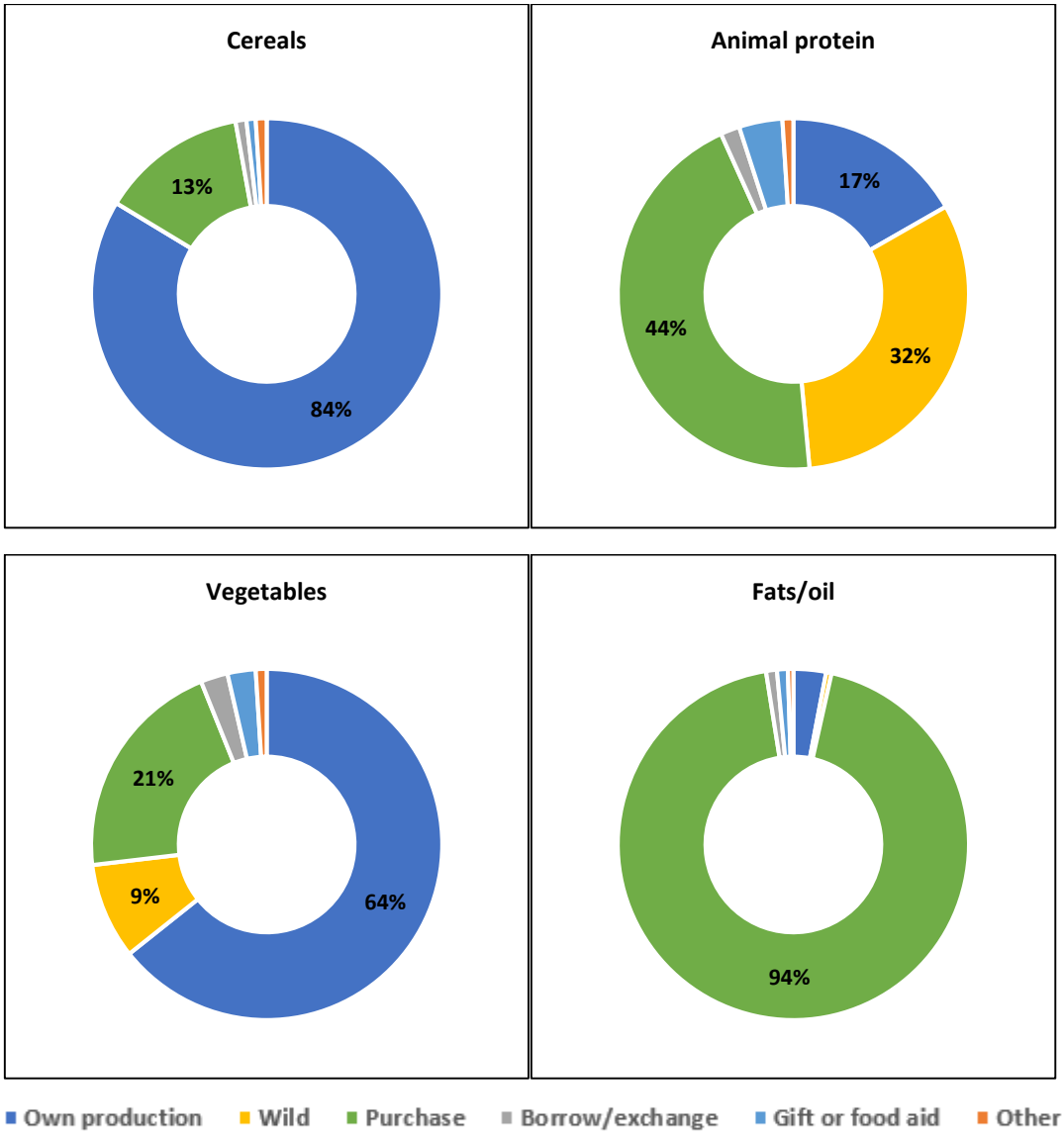


Figure 30: Sources of main food groups by 7 day recall[11] (Ministry of Agriculture and Forestry 2013)

Differences in expenditure and affordability of nutritious foods by province can be explained partly by variation in poverty prevalence and poor populations across the country (Pimhidzai et al. 2014). In figure 31, Sekong is shown to have a poverty rate of over 40 percent but only 4 percent of the total poor population, while Savannakhet has a lower poverty rate but also a much larger population and therefore a larger share of the poor in Lao PDR.

[11] Data collected between December-February, nationally representative across the 6 agro-ecological zones

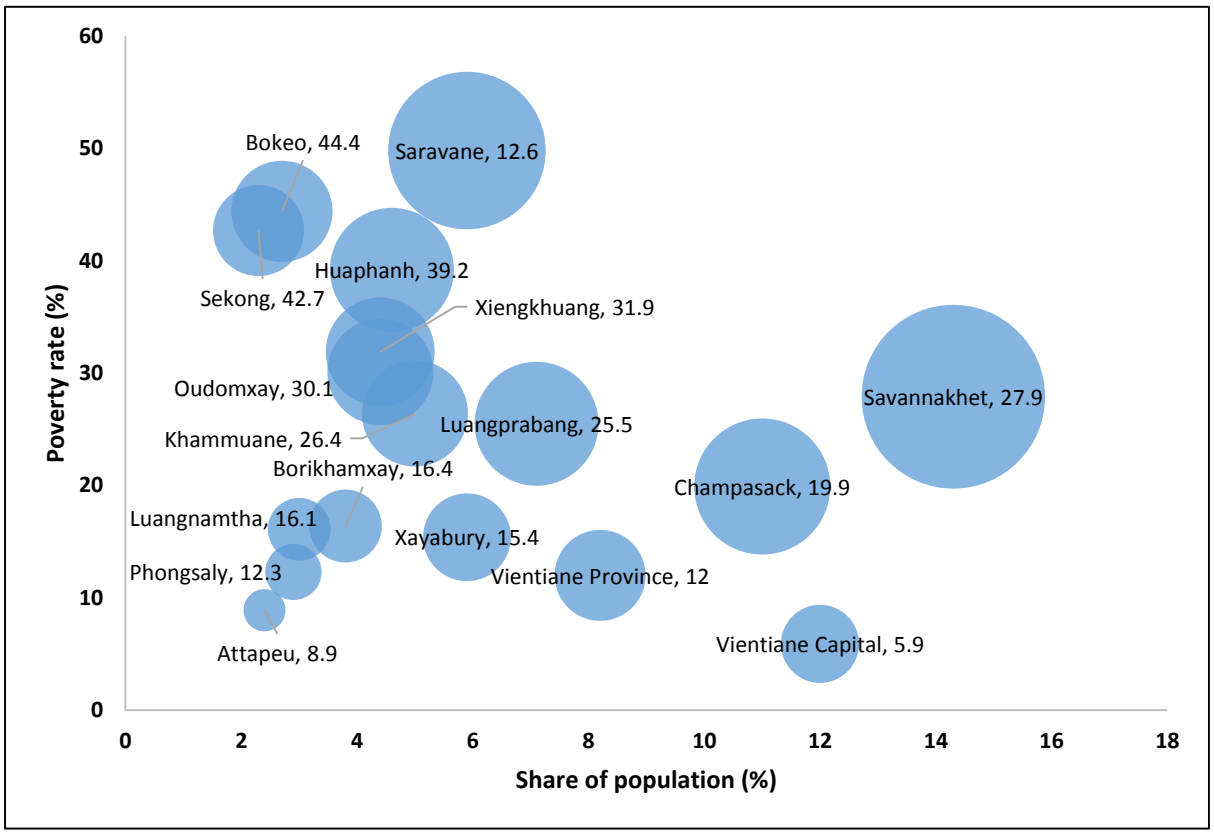


Figure 31: The distribution of the poor by geographic location (size of circle indicates number of poor) (Pimhidzai et al. 2014)

Food insecurity and dietary diversity

Food insecurity context: who and where

Nationally, it is estimated that 14 percent of the rural population is food insecure[12], of which nearly all are moderately food insecure, with only 1 percent are severely food insecure (Ministry of Agriculture and Forestry & World Food Programme 2016). These households can be characterized by livelihoods that rely on cash crop production, shifting upland cultivation, and unskilled labour. They are poorer and lack assets, with smaller plots of land and limited access to infrastructure, and are likely to be ethno-linguistic minorities (non-Lao-Tai) (World Food Programme 2013). Indeed, access to land, for both crop cultivation and for foraging wild products, has been identified by villagers as the key factor in food security (Foppes et al. 2011). Geographically, food consumption scores (an indicator of dietary diversity and hence better intake of required nutrients)[13] are poorest in upland areas, both in the northern and central/southern regions, and in areas dominated by land concessions for rubber and mining (figure 32). Other indicators of dietary diversity are also lowest in these regions. The best consumption scores are found in areas where livelihoods center on fishing

[12] Food security status is based on three indicators: food consumption score, share of food expenditure, and livelihood coping strategies.

[13] Food consumption score is based on dietary diversity and food frequency, and is calculated using types of foods consumed, frequency of consumption, and relative nutritional weight of different food groups over a seven day period. Scores are classified as poor, borderline, or acceptable.

and thus fish features prominently in diets (Ministry of Agriculture and Forestry & World Food Programme 2016).

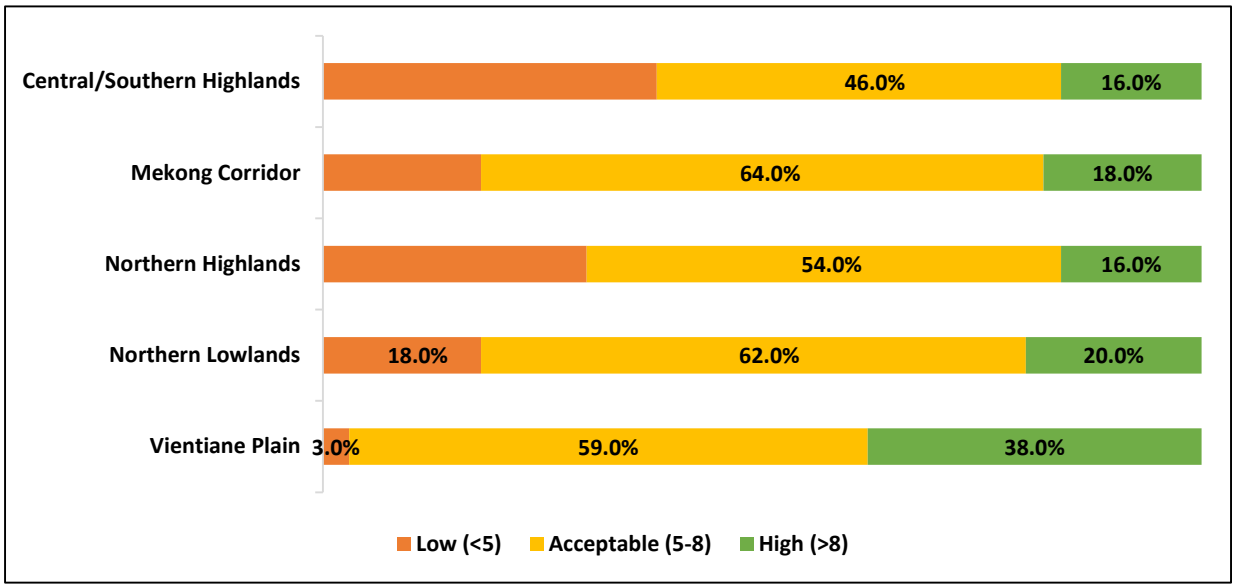


Figure 32: Household food consumption score by agro-ecological zone (Ministry of Agriculture and Forestry 2013)

Rice self-sufficiency

As discussed in the previous section on Availability of foods, rice is the standard by which food security is both measured and understood by local people. Rice self-sufficiency is highly seasonal, as on average households exceed their rice requirements through own production over the course of a year, but frequently sell some of the yield immediately postharvest and in turn must purchase rice later on in the lean season. Such practices can be part of a vicious cycle known as “khao kheo”, wherein farmers sell rice before it is even harvested to pay off debts and are then forced to take out additional loans at the end of the season (Foppes et al. 2011).

Dietary diversity

Insufficiently diverse diets are of greater concern than meeting caloric intake, which even the poorest groups exceed on average (World Bank Group 2016). The typical diet is centered on rice and condiments such as monosodium glutamate (MSG), which are consumed every day, and results in excess consumption of carbohydrates but inadequate fat, protein and micronutrient intake. Household dietary diversity based on 24-hour recall was classified as acceptable in 63 percent of households nationally and low in 19 percent of households[14]. Dietary diversity was worst among households in the central/southern and northern highlands, where 36 percent and 28 percent of households had low scores, respectively (figure 33) (Ministry of Agriculture and Forestry 2013).

[14] Households that had consumed 5-8 food groups out of 12 in the previous day (based on 24-hour recall) were classified as having acceptable dietary diversity, while households that consumed fewer than 5 food groups were classified as low dietary diversity.

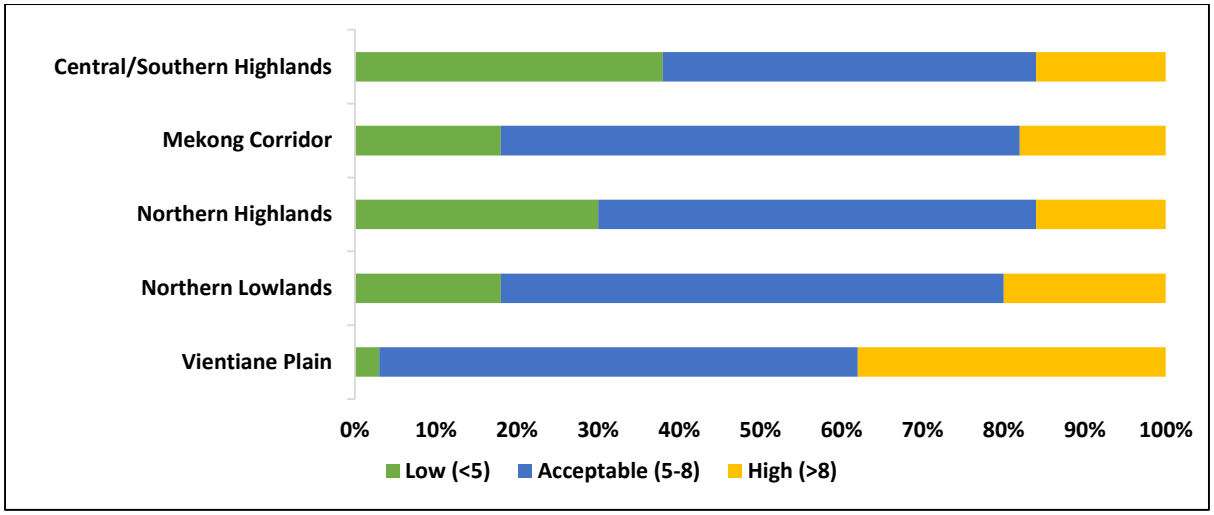
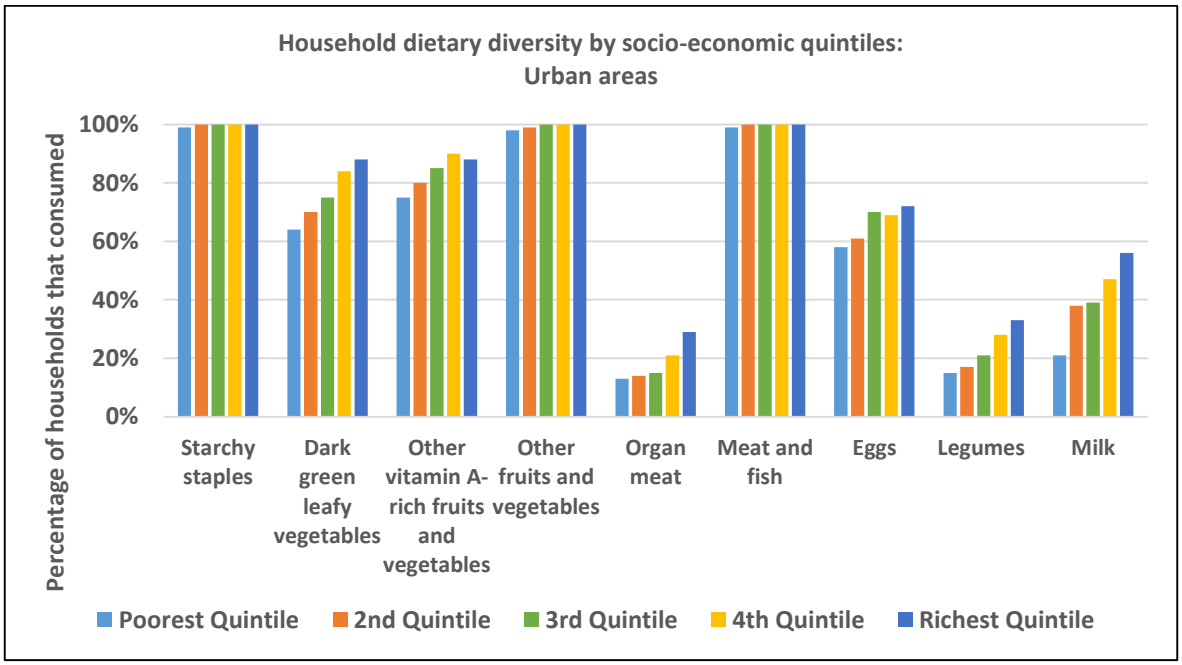
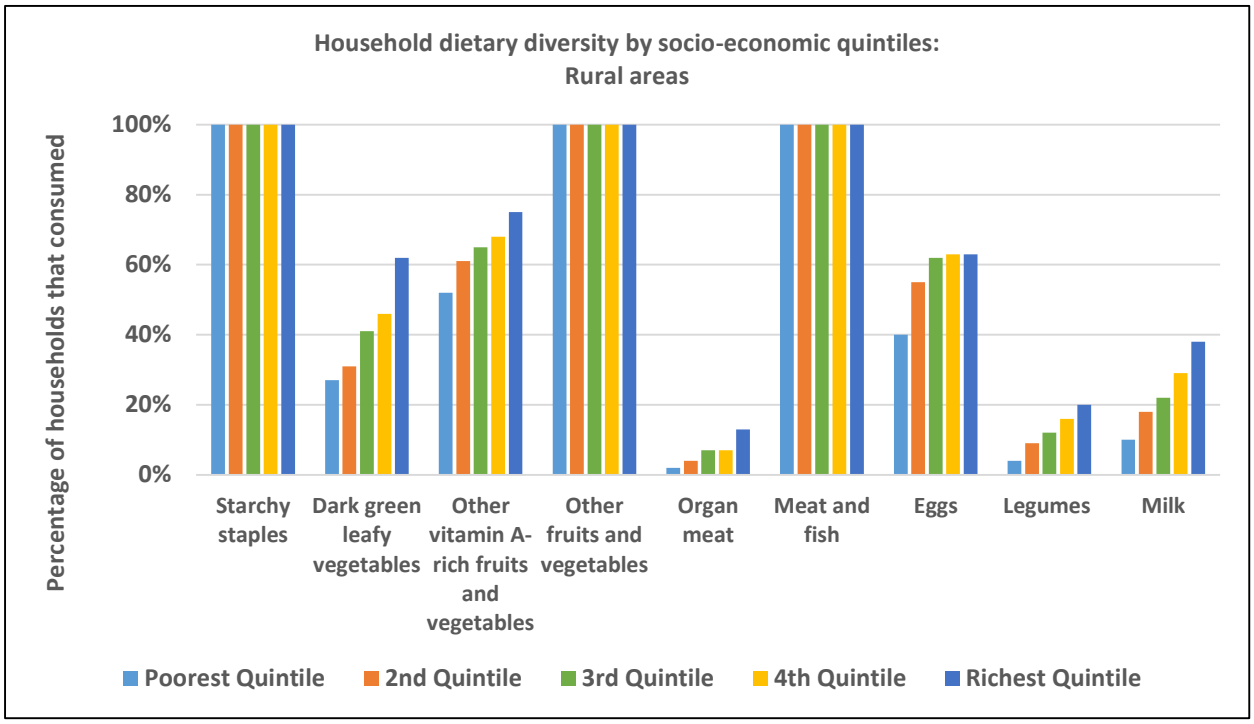


Figure 33: Household dietary diversity by agro-ecological zone (Ministry of Agriculture and Forestry 2013)

Dietary diversity was also lower in rural areas than in urban, and lowest among rural households in the poorest quintile (figures 34-35). Along with meat, legumes, dairy, and eggs were consumed by a smaller percentage of households across groups. Dark leafy vegetables were also less common in rural areas, with only 27 percent of the poorest rural households consuming them (World Bank Group 2016).





Figures 34 and 35: Household dietary diversity by socioeconomic quintiles in urban and rural areas (World Bank Group 2016)

Wild meat was the most common source of animal protein in 2006, but while trends show increased consumption of animal protein overall, they also indicate decreased wild meat consumption. In 2015, the most commonly consumed animal protein was fish, which households consumed on average every other day (3.4 days per week). Wild meat was only consumed an average of 0.8 days every week, less frequently than eggs (2.8 days) and domesticated meat including beef, pork, or chicken (2.5 days). Households in more remote areas with less access to markets continued to consume wild meat 2.2 days per week as their only source of animal protein, but overall community perceptions are of declining access to wild animals as a result of unsustainable hunting practices (Ministry of Agriculture and Forestry & World Food Programme 2016).

Shocks and coping mechanisms

Shocks are primarily natural, related to weather or failed crops. In 2015, late and unpredictable rains impacted 65 percent of all households nationally, while rodent infestation and floods also contributed to loss of both rice and cash crops (Ministry of Agriculture and Forestry & World Food Programme 2016). Such shocks and natural disasters can cause shortages that lead to increased prices and particularly affect poorer households; although insufficient rice availability presents a challenge even generally food secure households, those with sufficient access to assets and more diversified livelihoods are more resilient (Bouapao et al. 2016).

The most common coping mechanism, including during annual rice shortages, is selling NTFPs, cash crops, or livestock in order to buy rice (Douangsavanh & Phouyyavong 2009). Because the priority for most households is to maintain rice consumption, obtaining rice from sources other than own stocks is indicative of seasonal vulnerability to food prices (figure 36) (Ministry of Agriculture and Forestry 2013).

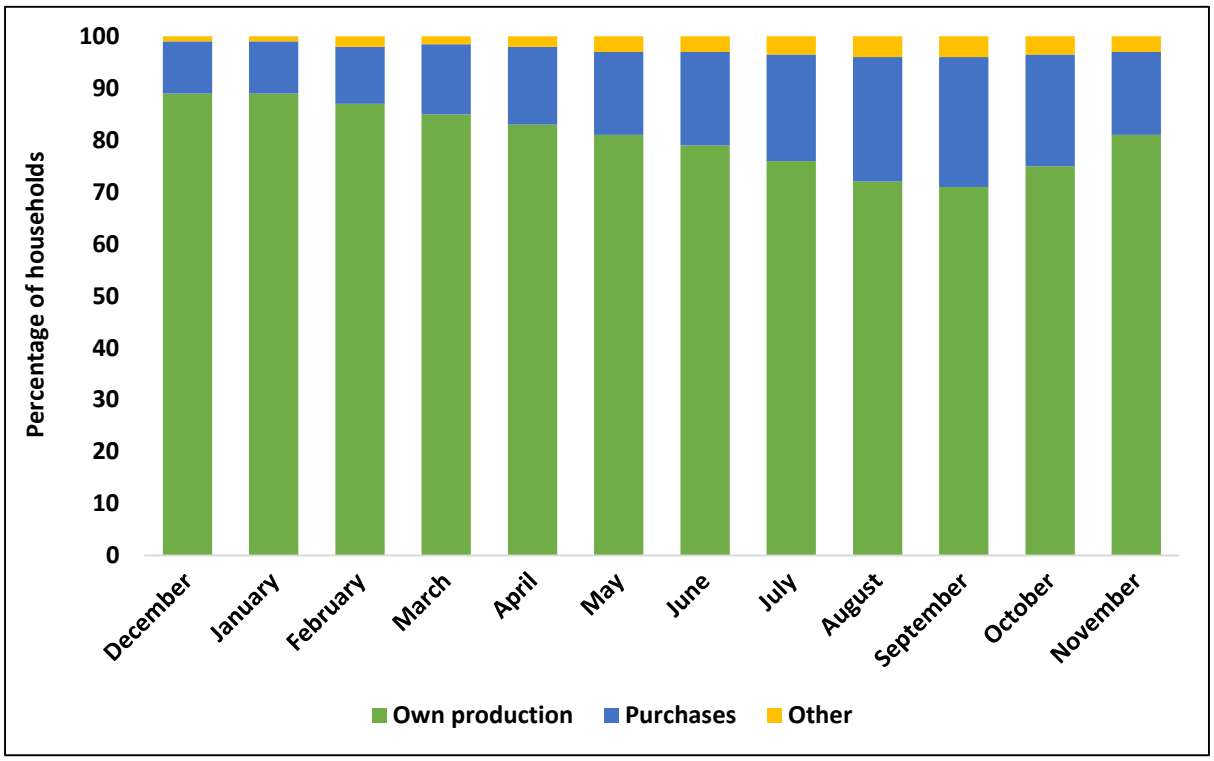


Figure 36: Primary sources of household cereals by month (Ministry of Agriculture and Forestry 2013)

Other coping strategies include consumption of NTFPs, reducing consumption, buying food with credit, and borrowing from family (Ministry of Agriculture and Forestry 2013). However, reliance on NTFPs is increasingly difficult as access to forested land becomes more limited due to deforestation, relocation or migration, and land concessions (Douangsavanh & Phouyyavong 2009). In data collected in December and January, nearly one-third of rural households nationally reported relying on at least one consumption-based coping strategy over the past seven days[15]. A similar proportion of households had employed a livelihood-based coping strategy, of which half were "stress" strategies and one third "crisis" strategies[16] (Ministry of Agriculture and Forestry & World Food Programme 2016).

Land and forest access

Physical access to land for crop cultivation or foraging is a crucial component of food security for most people in Lao PDR, and one that is increasingly limited. The rural poor rely on land for cultivation and foraging, which are their predominant means of both subsistence and the small amount of income that they may generate (Kenney-Lazar 2016). However, the number of landless rural households is growing (Bouapao et al. 2016), while communities attribute perceived

[15] Consumption-based coping strategies include eating less expensive foods, borrowing or getting help from family or friends, limiting portion sizes, reducing the number of meals per day, and limiting adult intake in favor of children.

[16] Livelihood-based coping strategies are classified as "stress", "crisis", or "high risk". "Stress" strategies include borrowing money, spending savings, and selling assets, goods, or non-breeding animals. "Crisis" strategies include selling productive assets, reducing expenditures in areas like health or education, or withdrawing children from school. "High risk" strategies are last-resort measures such as begging or selling land.

inaccessibility of forests and forest products to factors including deforestation and the spread of plantations (particularly rubber) (Ministry of Agriculture and Forestry 2013). Research suggests that other factors contributing to decreasing forest biodiversity include unsustainable hunting and illegal trade, shifting cultivation, and illegal logging. Nearly 80 percent of all households reported decreased access to forests in recent years (figure 37), which has serious implications for food security and dietary diversity (World Food Programme 2013). Women are particularly impacted by loss of forests and forest access, as they continue to be primarily responsible for foraging, and thus are forced to travel further and spend more time gathering NTFPS (Kenney-Lazar 2016). This also detracts from the time they have to engage in good child feeding practices, as discussed in the Local Practices section below.

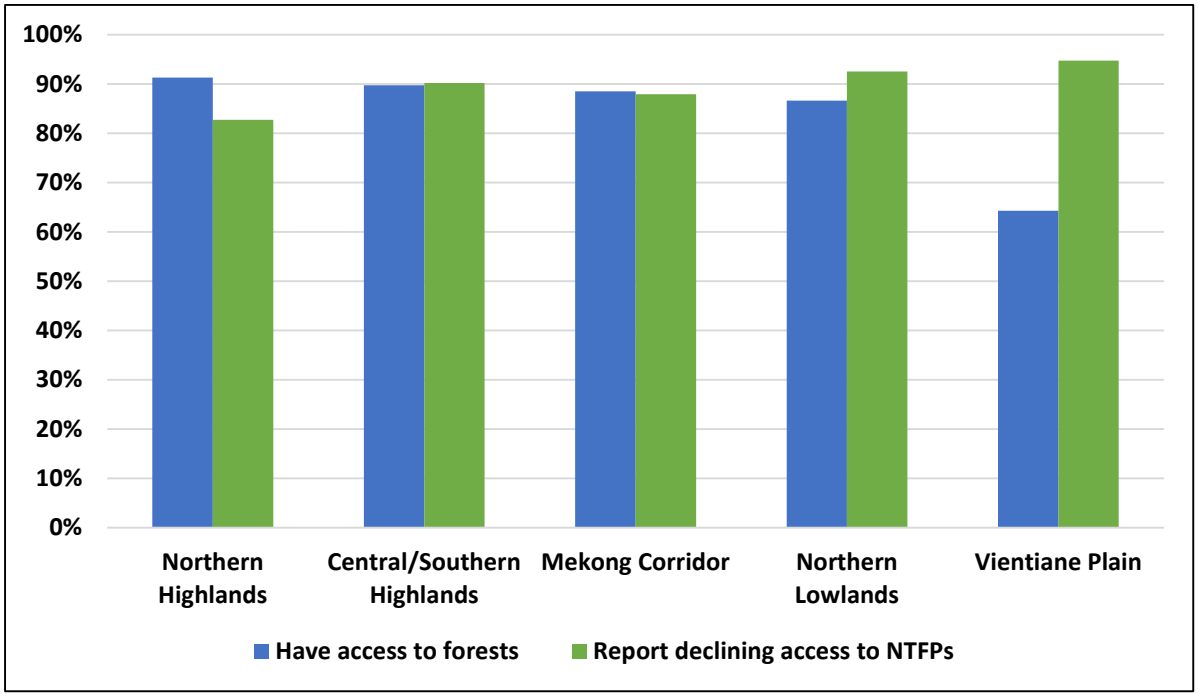


Figure 37: Access to forests and NTFPs by agro-ecological zone (Ministry of Agriculture and Forestry 2013)

Increasingly, even rural agricultural households must employ a variety of methods to source food beyond their own production and what they can forage (Ministry of Agriculture and Forestry 2013). Moreover, as wage labour becomes increasingly common, time for subsistence agriculture decreases, and markets become increasingly important sources of food; ultimately, households may become simultaneously better-off in terms of income and access to services and infrastructure, and less self-sufficient in terms of food production (Ministry of Agriculture and Forestry 2013).

Market access

Households mainly obtain animal-source foods and fats from markets: oil, sugar, meat, eggs, and milk are commonly purchased. Despite the trends outlined above indicating possible increasing reliance on incomes and purchased food, markets continue to be both geographically and economically inaccessible for much of the population in Lao PDR (figure 40). Only one-third of villages nationwide have temporary produce markets, although these are more common in the central and southern regions as well as in lowland villages. Virtually no rural villages (2 percent) have a permanent market and even where markets do exist, they may still be difficult to reach via road systems that are poor and often impassible during the rainy season (World Food Programme 2013).

Physical access to markets is less relevant for households that lack the income to make purchases. Although availability of wage labour, as well as the wages themselves, are improving, time spent working to earn money takes away from time spent growing crops for home consumption; this then increases both reliance on markets and the amount of money necessary to meet household food requirements. While selling foraged foods and NTFPs is a common source of income in many villages, just as the share of wild food consumed may decrease, foraging products to sell may become increasingly unfeasible. Moreover, foraging (and own-production) is time-consuming, and not all households can afford to do this regularly. Improved rural incomes may also be met by inflation and similar increases in costs of living. Ultimately, the pressure to earn money can result in livelihood strategies that compromise household food consumption (Bouapao et al. 2016). If access to land, and thus access to own production, NTFPs, and other resources, continues to decline, improved market access and increased purchasing power will be integral to food security and dietary diversity. Even in 2010, farmers interviewed were already reporting that they purchased larger shares of their food than previously and meet a smaller proportion of their needs through non-cash methods (figure 39) (Arnst & Laos Extension for Agriculture Project (LEAP) 2010).

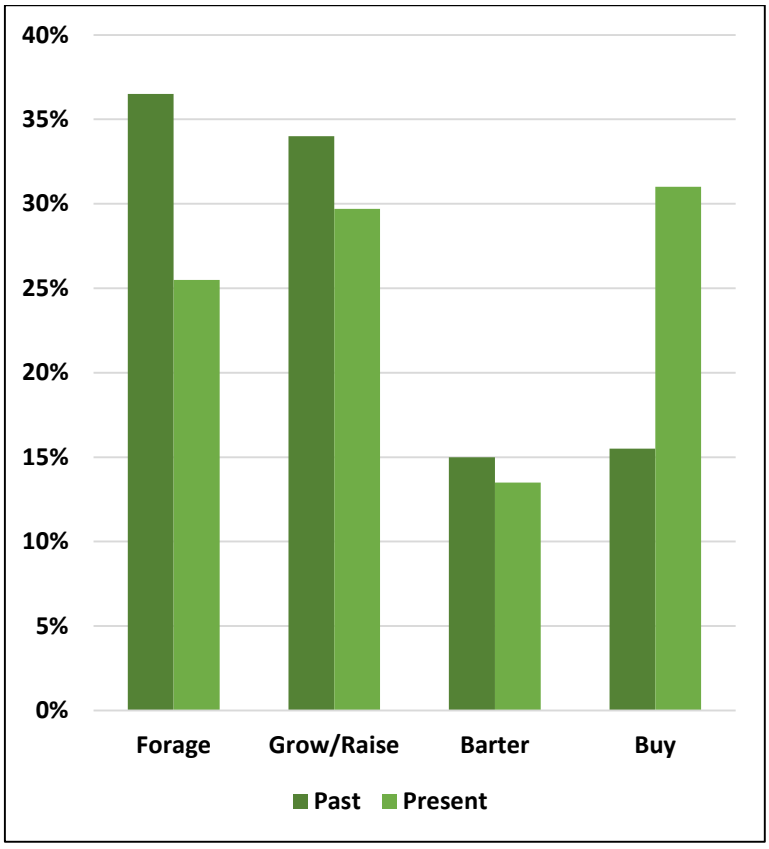


Figure 39: Farmer-reported changes in percentage of food from different sources over time (Arnst & Laos Extension for Agriculture Project (LEAP) 2010)

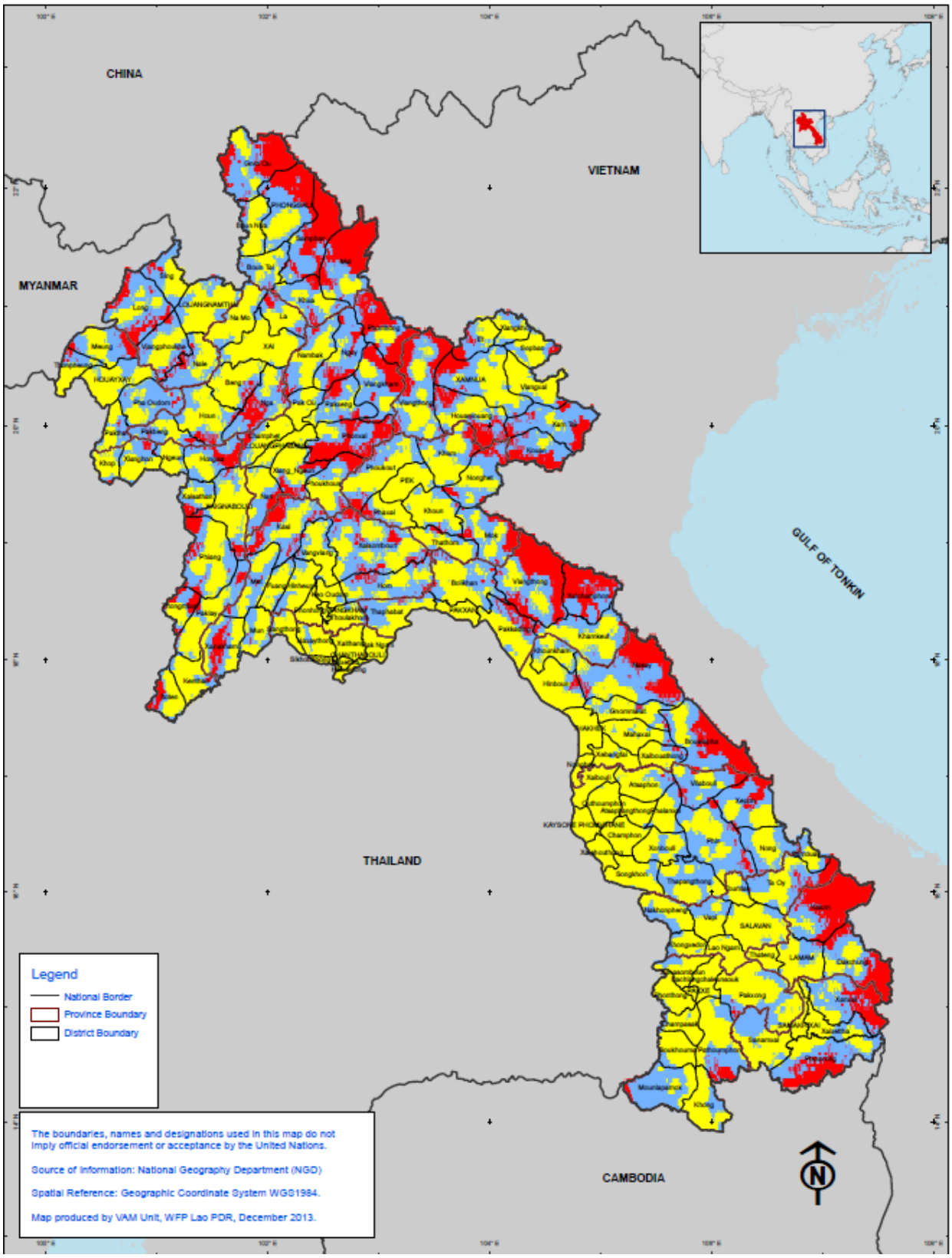


Figure 40: Market accessibility[17], (WFP VAM 2016) Yellow indicates good market access, Blue indicates challenging market access, and Red indicates poor market access

[17] This is calculated using 5 proxy indicators: market location, road network, healthcare centre location, provincial and district town, and the elevation

Nutrient Intake

Key Highlights:

Suboptimal breastfeeding and complementary feeding practices are important causes of undernutrition. Children are not fed adequately nutritious foods (local foods as part of complementary foods and family diet as well as special foods) nor fed frequently enough. This is likely driven by economic constraints as well as the lack of time and/or knowledge of mothers and caregivers.

Poor nutrition among women is related to unaffordability, but also results from adolescent pregnancies, gender inequalities and local dietary practices; and contributes to malnutrition in their children

- ➔ Nearly all children are breastfed, but practices are suboptimal: early initiation is 40 percent, 40 percent of children under 6 months are exclusively breastfed, and duration falls short of the recommended 24 months (median is 20 months).
- ➔ Minimum meal frequency is met by 43 percent of children 6-23 months, while minimum dietary diversity is met by only 16 percent.
- ➔ 36 percent of non-pregnant women and 44 percent of pregnant women reached minimum dietary diversity.
- ➔ Lao diets are generally dominated by a large share of rice and other staples.
- ➔ Micronutrient supplementation coverage may be constrained by limited supplies at health centers: 60 percent of children 6-59 months received vitamin A and 50 percent of women took iron folic acid during pregnancy (but only 25 percent took 90 doses or more).

Infant and young child feeding practices

Nearly all children in Lao PDR are breastfed at some point, but specific practices with timing, duration, and exclusiveness are low across the country. Only 40 percent of babies were breastfed within the first hour after birth, as recommended by the WHO and UNICEF, and 30 percent were not breastfed within the first day. Early initiation correlates with both wealth quintile and maternal educational attainment, and was lowest in Khammuane and Savannakhet provinces, where less than half of all children were breastfed within the first day after birth (Ministry of Health & Lao Statistics Bureau 2012). One third of children received pre-lacteal feeds before breastfeeding, sometimes as early as the first day, which commonly consist of water, pre-masticated sticky rice, or formula or diluted condensed milk (Ministry of Health & Lao Statistics Bureau 2012; USAID Nurture 2016; UNICEF 2017).

Less than half of all children under the age of six months are exclusively breastfed, as recommended, but the current rate of 40 percent is in fact an improvement over the exclusive breastfeeding prevalence of 26 percent found in 2006. Nationally, the median duration of exclusive breastfeeding is 2.7 months, although this is higher among the Hmong-Mien ethnolinguistic group, where the duration is 4.3 months (Ministry of Health & Lao Statistics Bureau 2012). In many instances, logistical

barriers are cited for pre-lacteal feeding, non-exclusive breastfeeding, and other suboptimal practices, as mothers must work and are unable to breastfeed regularly (USAID Nurture 2016; UNICEF 2017). In these circumstances, grandparents or other caregivers give children foods such as pre-masticated rice or water (USAID Nurture 2016). Geographical variation in breastfeeding practices is likely due in part to different practices among ethnolinguistic groups, with the Hmong-Mien and Chinese-Tibetan groups in the northern region practicing exclusive breastfeeding at a much higher rate than the Lao- Tai and Mon-Khmer populations in the south (Ministry of Agriculture and Forestry 2013).

Among children 6-23 months, minimum meal frequency is met by only 43 percent. This is higher for non-breastfed children (56 percent) than for breastfed children (37 percent), and much higher in urban areas (70 percent) than rural (48 percent). In Oudomxay, Huaphanh, and Sekong provinces, less than 15 percent of children meet minimum meal frequency (Ministry of Health & Lao Statistics Bureau 2012). Dietary diversity in young children is also extremely low (figure 41), as they are often fed primarily rice, and occasionally fish or broth (USAID Nurture 2016; UNICEF 2017). Both frequency and diversity are likely influenced by beliefs that children know when and how much they should eat, and it has been observed that dietary diversity at the household level or even among mothers does not correlate with dietary diversity among children (USAID Nurture 2016; UNICEF 2017; Ministry of Agriculture and Forestry 2013). These observations are explored further in the following section on Local Practices.

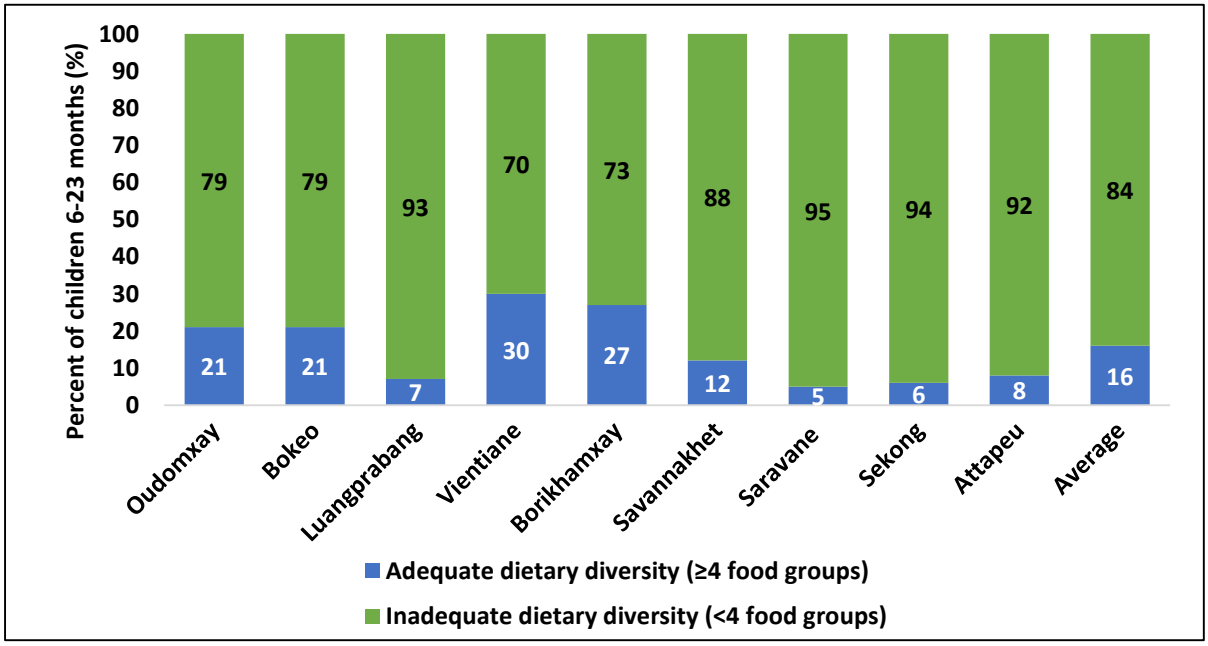


Figure 41: Child food diversity score for children 6-23 months of age, by province (Ministry of Agriculture and Forestry 2013)

The 2012 Risk and Vulnerability Survey collected information on consumption of packaged snack foods by children, as a way of understanding shifts in availability and affordability and possible impacts on nutrition. Over half of children under the age of 5 (53 percent) and nearly as many children under the age of 2 (45 percent) had eaten a packaged snack food in the preceding day (Ministry of Agriculture and Forestry 2013). Increasingly, these snack foods[18] are being imported

[18] Such as shrimp crackers, crisps and candy

from Thailand and Vietnam and are marketed toward school-age children, often only labelled in foreign languages (Bouapao et al. 2016).

Maternal dietary diversity

Minimum dietary diversity in women (MDD-W) assesses whether women consumed at least five out of ten food groups in the past 24 hours. In the five surveyed provinces, only 36 percent of non-pregnant women who had given birth in the past two years met MDD-W, and less than half (44 percent) of all currently pregnant women had minimally diverse diets. MDD-W was much higher in urban areas (76 percent) than rural areas with or without roads (33 percent and 20 percent, respectively), and correlated with both educational attainment and wealth status. It was achieved more frequently among Lao-Tai women (55 percent) than among minority ethnic groups, and was lowest among the Mon-Khmer (29 percent) (Ministry of Health & Ministry of Planning and Investment 2016).

The mean number of food groups consumed ranged from 4 to 4.5 in the provinces surveyed, and was again higher in urban areas (6.1 food groups) than in rural areas (3.9 groups in rural with roads, and 3.4 in rural areas without roads). Iron-rich flesh foods were consumed by 67-83 percent of women across the provinces surveyed, and consumption of vitamin A-rich dark green leafy vegetables ranged from 66-78 percent. Notably, consumption of legumes and dairy products was less than 7 percent among women in rural areas without roads (Ministry of Health & Ministry of Planning and Investment 2016).

Supplementation

Supplementation coverage is generally low, which may be in part the result of limited availability of supplements in health centers (World Bank Group 2016). Health cards are not widely used to record coverage, but the 2012 LSIS repoted that more than half (59 percent) of mothers and caretakers reported that their children (6-59 months) had received vitamin A in the six previous months (Ministry of Health & Lao Statistics Bureau 2012). The 2015 FNSS reported that three quarters of children had received vitamin A, but just over half had received it in the past six months (Ministry of Health & Ministry of Planning and Investment 2016). In both surveys, coverage was slightly higher in urban areas and improved with income quintile and maternal educational attainment, Lao-Tai children were much more likely to receive supplementation than Hmong-Mien children (63 percent and 31 percent, respectively, in 2015). Geographically, coverage by province varied from 32 percent in Sekong to 88 percent in Xayabury (2012), and from 40 percent in Attapeu to 65 percent in Saravane (2015) (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health & Ministry of Planning and Investment 2016).

In 2012, just over half of all women (52 percent) took any iron folic acid supplements during their pregnancy, and only one quarter took the recommended 90 doses or more. Coverage was highest among Lao-Tai women (69 percent), in urban areas (79 percent), and among wealthier women (87 percent in the richest quintile) and women with more education (88-93 percent of women with upper secondary education or more); it was lowest among Hmong-Mien women (24 percent), in rural areas without roads (22 percent), and among poorer women (24 percent in the poorest quintile) and women with no education (22 percent) (Ministry of Health & Lao Statistics Bureau 2012). Women who were between the ages of 20-34 when they gave birth were more likely to have taken iron folic acid supplements than older or younger mothers in 2012; this trend was also seen in 2015, when women ages 20-29 and 30-39 were the most likely to have bought or received iron folic

acid supplements (Ministry of Health & Lao Statistics Bureau 2012; Ministry of Health & Ministry of Planning and Investment 2016).

Consumption of other foods

Typically diets from Lao PDR are primarily cereal-based (rice) with little consumption of other food groups. Figure 42 displays the proportion of energy supplied by different food groups. As shown, cereal dominates the diet (69 percent) and the remainder is composed of much small percentage of the other food groups. When such a high percentage of calories is supplied by staple foods, it becomes very difficult to meet requirements of micronutrients. For example, if an adult man gets 70 percent of his energy intake from rice, that staple provides only 19 percent of his riboflavin requirements, 5 percent of his calcium requirements, and none of his vitamin A requirements; as a result, the remaining 30 percent of his dietary intake would need to be very nutrient dense (Solomons 2008). Nutrient requirements that were found to be difficult to meet in Lao PDR are discussed further in the Cost Optimization section.

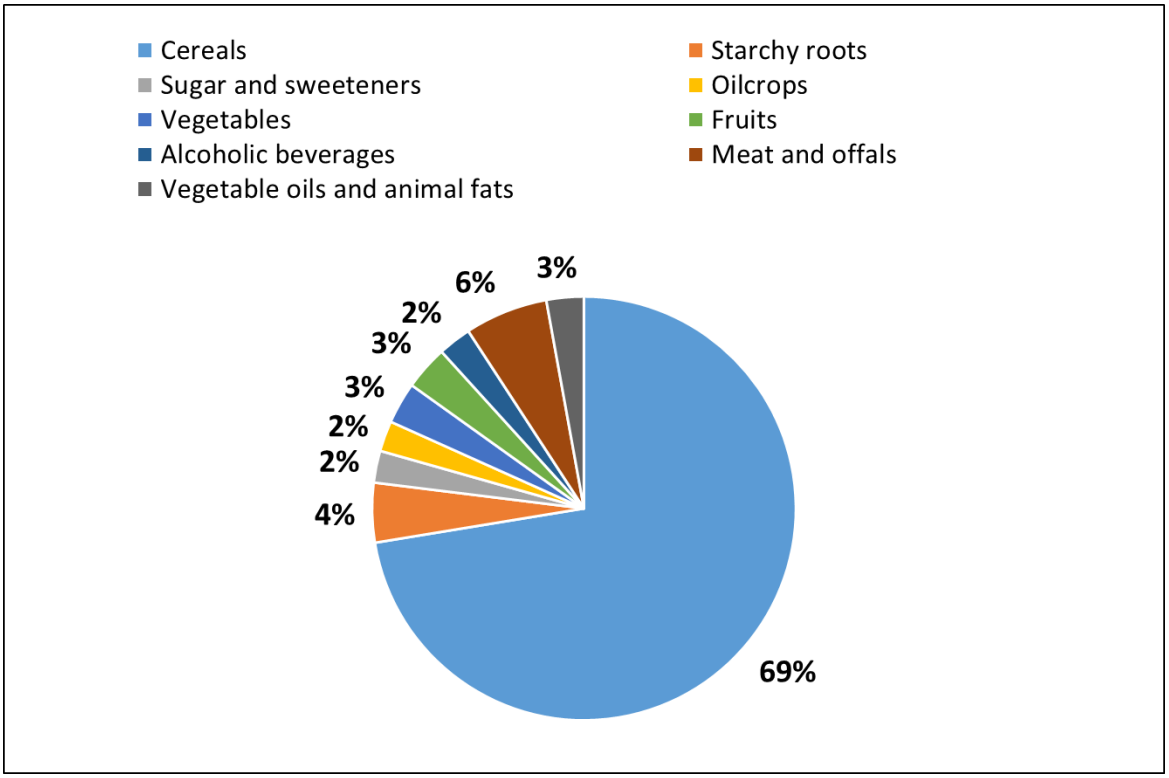


Figure 42: The proportion of energy supply made up by different food groups in a typical Lao diet (Food and Agriculture Organisaton of the United Nations 2014)

Local Practices

Key Highlights:

Current suboptimal IYCF practices and high rates of stunting are frequently attributed to lack of nutrition knowledge on the part of mothers and other caregivers, supported by evidence that dietary diversity is lower among children aged 6-23 months than among their mothers.

In addition to local beliefs and behavioral patterns affecting caregivers' choices, economic constraints are a major barrier, negatively affecting nutrient intake among vulnerable groups.

- ➔ Cost and time constraints related to women needing to return to work soon after giving birth may also negatively impact breastfeeding and complementary feeding.
- ➔ Food restrictions postpartum are widely practiced across Lao PDR, and commonly limit women to a diet of rice, salt, and ginger or galangal.
- ➔ Women are perceived to eat less than other household members.
- ➔ Key influencers of IYCF decisions: husbands and grandmothers, then health workers
- ➔ Key barriers to optimal IYCF practices: women's time working away from the home, cost of appropriate foods, insufficient knowledge

Two extensive literature reviews have been undertaken by Save the Children and UNICEF on infant and young child feeding practices. This section takes excerpts from this research, complemented by other sources. The table in Annex 2 displays how the information from these literature reviews relates to the survey data from the 2012 LSIS and the 2015 FNSS.

In Lao PDR, suboptimal child feeding practices, and high rates of stunting, are frequently attributed to lack of nutrition knowledge on the part of mothers and other caregivers. This is supported by evidence that food consumption and dietary diversity are generally classified as acceptable across the country, and yet children consume less diverse diets (Ministry of Agriculture and Forestry 2013). The role of culture and traditional practices is also cited regarding both complementary feeding for young children and maternal nutrition. Husbands and grandmothers are important influencers on mothers' dietary practices, more so than health center staff; this is observed among most women but may be especially pronounced in the presence of barriers to accessing health service such as cost, distance, and cultural or linguistic barriers (USAID Nurture 2016; UNICEF 2017). However, another important barrier to optimal feeding practices is constraints on women's time: while women have increasingly entered the workforce, they also continue to be responsible for their traditional roles of providing care and preparing food for the household (Bouapao et al. 2016). As a result, they are often away from home during the day, preventing continued breastfeeding or adequately frequent complementary feeding, as illustrated by table 5 (USAID Nurture 2016; UNICEF 2017).

Time	Women's activities: market days (2-3 /week)	Women's activities: non-market days	Men's activities
03:00-06:00	03:00: Travel on foot to market	04:00: Feed livestock, clean house, prepare breakfast	05:30: Get up, may help women feed chicken or pigs
06:00	Sell vegetables at market	Eat breakfast	Eat breakfast
07:00-12:00	Travel back home	07:00: Go to fields 11:00: Collect food and return home Prepare lunch	07:00: Go to fields 11:00: Collect food and return home
12:00-14:00	Lunch		
14:00	Go to fields		
17:00	Go home, feed livestock, fetch water, prepare dinner		Go home with wife, carry gun and children, cut firewood
19:00	Dinner		
20:00	Go to bed		Smoke, chat with other men, discuss village issues, go to bed before wife if tired

Table 5: Example of daily activity profiles of men and women in Thamdeng, Kaleum District, Sekong Province (Silke STOEBER, Engsone SISOMPHONE 2013)

Barriers/influencers to child feeding practices

Low rates of early initiation of breastfeeding (40 percent within the first hour and 70 percent within the first day, as discussed in the previous section) are partly explained by local beliefs about colostrum and pre-lacteal feeding. Many mothers believe that colostrum is dirty milk, hot, sour, or otherwise not good for babies, and therefore discard it, sometimes for up to six days after childbirth (Annim & Imai 2014; USAID Nurture 2016; UNICEF 2017). At the same time, there is a belief that breastmilk is insufficient, and that babies need other food such as rice (often pre-masticated), water, or other kinds of powdered or condensed milk; when babies cry, it is considered validation that they need to consume more than just breastmilk (USAID Nurture 2016; UNICEF 2017).

Mothers' return to work is a key barrier to both exclusive and continued breastfeeding and to adequate and appropriate complementary feeding practices. When mothers leave the home to work or collect wild foods, firewood, or water, or when they are busy with other household duties including cooking, grandparents or other caretakers will engage in early weaning with foods such as rice (UNICEF 2017). Thus suboptimal practices do not necessarily indicate a lack of education, but also reflect insufficient time or family support to breastfeed appropriately. Older female family members generally have a great deal of influence over mothers' choices, and local and ethnic traditions play an important role in decisions such as choice of weaning foods (Ministry of Agriculture and Forestry 2013).

Low rates of achieving minimum meal frequency among young children (43 percent, as discussed in the previous section on Nutrient Intake) are similarly due in part to mothers working away from the home and lacking time (USAID Nurture 2016; UNICEF 2017). There remains a widespread belief that young children know when to eat and how much, so parents will feed them if they cry or reach for food and will stop feeding if the child refuses to eat; this absence of engaged feeding behaviors may contribute to low dietary diversity in young children (USAID Nurture 2016; UNICEF 2017). At the same time, it has also been observed that children may not eat frequently enough because they are expected to eat only during mealtimes with the rest of the family (UNICEF 2017).

Knowledge about nutrition and optimal caring practices likely also affects the nutritional status of young children. When mothers in Oudomxay and Huaphanh provinces were asked at what age children should start to be fed solid food, the range of responses indicate an important role for education: many mothers correctly answered with six months, but responses in some villages ranged from less than one month to more than one year (figure 43) (Emerging Markets Consulting for SNV Netherlands Development Organisation 2017).

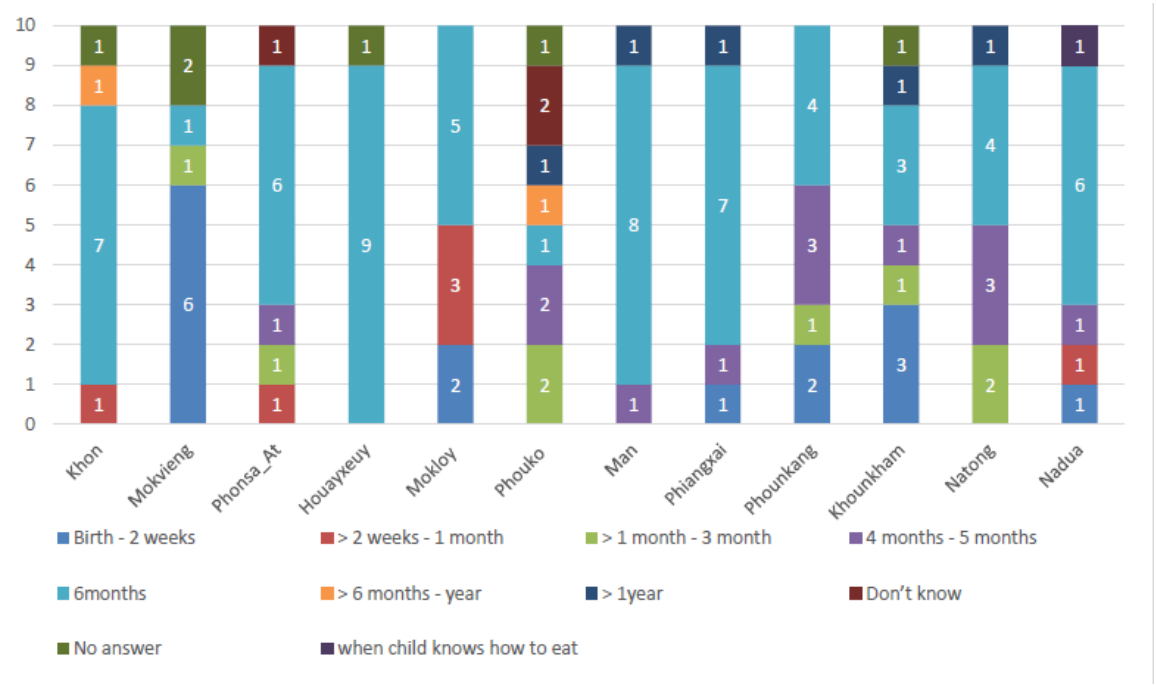


Figure 43: Mothers' knowledge about how old a child should be when she starts to feed solid food (Emerging Markets Consulting for SNV Netherlands Development Organisation 2017)

The disparity between household or maternal dietary diversity and child dietary diversity has also been cited as evidence of insufficient caregiver knowledge. Improved agricultural diversity has been associated with increased dietary diversity at the household level, but not in children, suggesting that even when diverse foods are available to the household they are not fed to young children. A bottleneck analysis by the World Bank looked into the percentage of children who consumed foods from certain groups if the mother consumed those foods. It found that children whose mothers consumed foods were more likely to consume those foods themselves than were all children, but a discrepancy remained between mother's consumption and child's consumption. While 74 percent of all mothers ate fruit and vegetables rich in vitamin A, only 45 percent of all children 6-23 months at these foods, and only 60 percent of children consumed these foods even when their mothers did. This was, however, better among older children: 92 percent of children 24-59 months whose mothers consumed vitamin A-rich fruits and vegetables also consumed these foods. Similar patterns were seen with flesh foods, other fruits and vegetables, eggs, and legumes and nuts: children were more likely to consume foods if their mothers did, and older children benefitted more from the effect of mother's consumption (table 6) (World Bank Group 2016).

The analysis also demonstrated greater consumption of diverse food groups by children whose mothers consumed them if the mothers also received education on growth monitoring and nutrition; the latter mothers were more likely to feed their children eggs, dairy, and legumes and nuts (table 7) (World Bank Group 2016).

Food group	Children 6-23 months			Children 24-59 months		
	Share of mothers consuming (percent)	**Share of children consuming (**percent)	**Share of children consuming if mother consumed (**percent)	**Share of mothers consuming (**percent)	**Share of children consuming (**percent)	**Share of children consuming if mother consumed (**percent)
Starchy staples	99.1	92.6	93.1	98.6	98.5	99.1
Vitamin A-rich fruit and vegetables	72.5	44.7	60.3	76.3	70.9	91.8
Other fruit and vegetables	82.3	49	58.2	82.3	76.8	90.9
Flesh foods	73.1	56.1	74.5	69.8	68.9	95.8
Eggs	15.1	56.1	74.5	12.3	13.8	81.6
Legumes and nuts	3	4.1	34.6	2.8	4.1	67.1
Dairy products	3	10.5	75.6	1.1	6.3	83.9

Food group	Mothers did not receive growth monitoring/nutrition education			Mothers received growth monitoring/nutrition education		
	Share of mothers consuming (percent)	**Share of children consuming (**percent)	**Share of children consuming if mother consumed (**percent)	**Share of mothers consuming** (percent)	**Share of children consuming (**percent)	**Share of children consuming if mother consumed (**percent)
Starchy staples	96.5	91.8	94.9	99.1	95.1	95.4
Vitamin A-rich fruit and vegetables	76	55.6	72.1	74.4	54.7	72.7
Other fruit and vegetables	65.5	50	71.2	83.9	60.6	70.7
Flesh foods	50.9	41.8	78.5	73.8	62.8	82.7
Eggs	7.3	4	37.6	14.7	14.2	73
Legumes and nuts	1.4	1	0	3.1	4.4	48.7
Dairy products	1.4	7.7	48.1	2.3	9	78.9

Tables 6 and 7: Food access, infant and child feeding practices by age group (top) and comparison of maternal, infant and child feeding practices by mothers' awareness of growth monitoring/nutrition education (bottom) (World Bank Group 2016)

Maternal nutrition: postpartum taboos

Food restrictions during pregnancy are practiced in Lao PDR, and vary by ethnic group. The practice of "eating down" to avoid a perceived difficult delivery of a large baby is fairly common and, while some women reported reducing vigorous physical activity and eating more meat or fruit during pregnancy, pregnancy and childbirth are not widely associated with extra care or attention (USAID Nurture 2016; UNICEF 2017).

However, the primary barrier to good maternal nutrition is postpartum food restrictions. These are prevalent across regions and among all ethno-linguistic groups and are believed to help women

recover from childbirth, promote good quality and quantity of breastmilk, and avoid digestive problems in breastfed babies (USAID Nurture 2016; UNICEF 2017). Specific taboos and practices vary by ethno-linguistic group, but one common restriction is for women to limit their diets to rice, salt, and ginger or galangal for up to one month after delivery (Ministry of Agriculture and Forestry 2013; USAID Nurture 2016). Other postpartum taboos include no meats that are white in colour, no fruit or vegetables, and no foods that are fermented, oily, sour, raw, or spicy (USAID Nurture 2016; UNICEF 2017).

These practices vary in ways that can be detrimental or beneficial to maternal health: an example of the latter is the practice among the Akha people in Phongsaly province of men preparing special soups from duck and chicken meat specifically for their breastfeeding wives (Ministry of Agriculture and Forestry 2013). Conversely, the Hmong-Mien ethnolinguistic group has been reported to have some of the most restrictive postpartum traditions which adversely affect both the health of the mother and the quality of her breastmilk (Silke STOEBER, Engsone SISOMPHONE 2013).

It has been noted that these maternal food restrictions may also constitute a barrier to continued breastfeeding of children, as in many cases women only restrict their diets as long as they are breastfeeding. Women may therefore choose to stop breastfeeding earlier than recommended in order to resume their usual eating patterns (USAID Nurture 2016; UNICEF 2017).

There is also an economic dimension to taboos, wherein poorer households are observed to practice restrictions for longer than wealthier ones (USAID Nurture 2016; UNICEF 2017). Moreover, women have reported that their primary obstacle to good nutrition during pregnancy is availability or affordability of diverse and nutritious foods. They recognized many adverse outcomes of insufficient dietary intake during pregnancy, the importance of nutritious foods during pregnancy and postpartum, and the negative impact that malnutrition can have on both the mother and the child. (figure 44) (Emerging Markets Consulting for SNV Netherlands Development Organisation 2017).

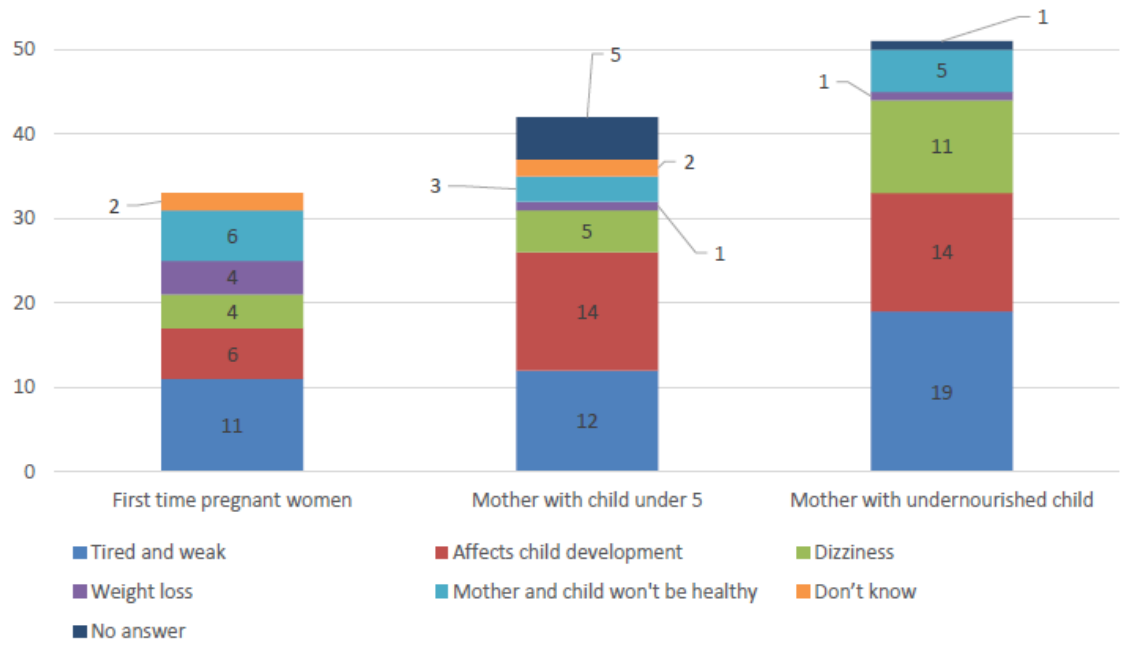


Figure 44: Mothers' responses about what happens to them and their babies if they do not eat enough during pregnancy (Emerging Markets Consulting for SNV Netherlands Development Organisation 2017)

Gender and intra-household sharing

While women are responsible for sourcing and preparing food for the household, they likely eat less than men or children in the household. Qualitative data on perceptions of both men and women found that, out of nine villages surveyed, all respondents thought that women ate less than men; the only exception was men surveyed in the northern uplands, who thought that men ate less than women (figure 45) (Silke STOEBER, Engsone SISOMPHONE 2013).

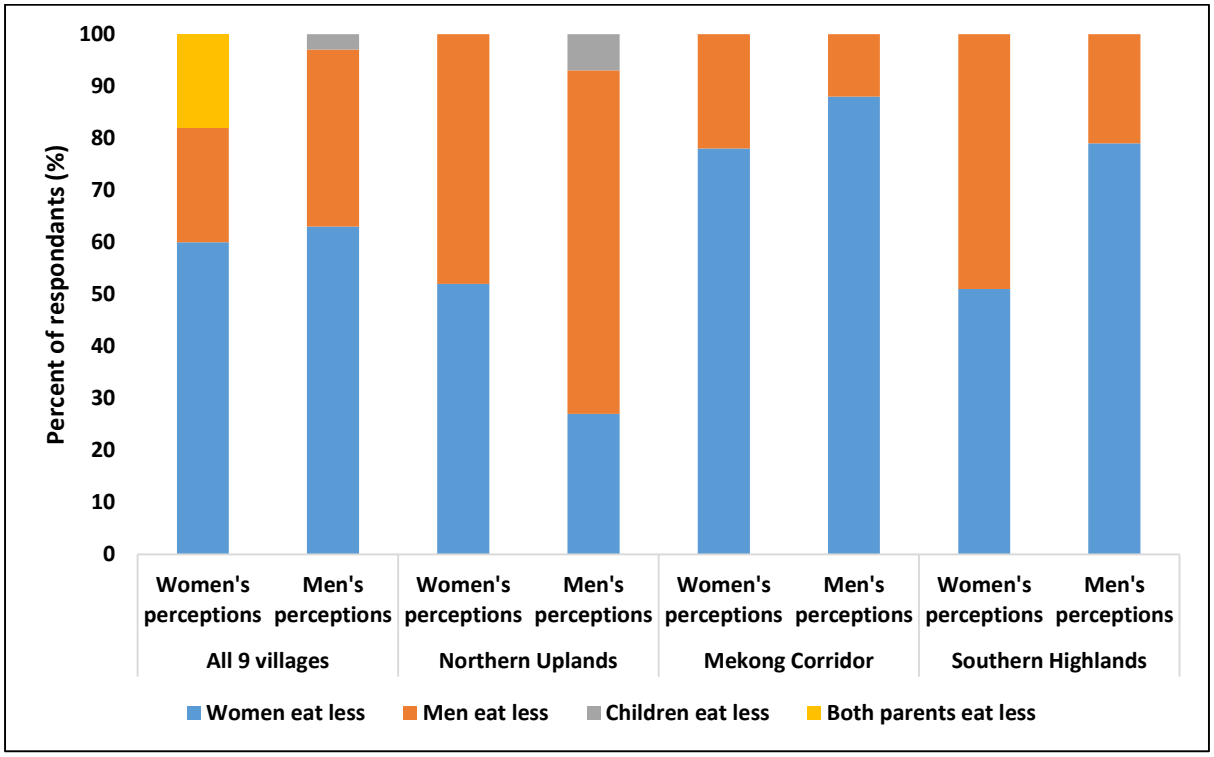


Figure 45: Perceptions of women (top) and men (bottom) about intra-household food consumption, by region (Silke STOEBER, Engsone SISOMPHONE 2013)

Insect consumption

Insects are a frequently consumed foraged food across Lao PDR, with the most common including weaver ant eggs, crickets, grasshoppers, and cicadas. A survey in 96 villages across 16 provinces found that nearly all adults ate insects, and 80 percent considered them to be a meal (rather than just a snack), but half of respondents only consumed them a few times a year. As with other NTFPs, availability of insects is highly seasonal. Children also ate insects, preferring softer ones like worms, larvae, and ant eggs, and mothers indicated both an awareness of nutritive values of insects and a willingness to feed insects to their children more frequently if they were more available (Barennes et al. 2015).

Attitudes to micronutrient powders

Analyses of MNPs in Lao PDR are primarily related to the SuperKid MNP distributed through UNICEF's public-private partnership (as mentioned in previous sections). Caregivers surveyed mostly considered MNPs to be medicine, and only sought them out if their child had a recurring illness, loss of appetite, or other health problem (UNICEF n.d.). In Saravane province, where distribution of SuperKid MNP through the public sector began, half of all caretakers had heard of MNP; in the other four provinces where SuperKid has since become available only 5 percent or fewer of caretakers had

heard of it. More than half of those caretakers heard about it from another person, most commonly a health professional. Of children whose caretaker had heard of SuperKid, about half had consumed it in the past six months, with no significant variations according to location, wealth, or ethnolinguistic group. Of children who had consumed MNPs, 90 percent had not consumed the recommended minimum 60 sachets, likely resulting in an insufficient dose to increase hemoglobin and decrease anaemia prevalence (Ministry of Health & Ministry of Planning and Investment 2016).

A separate acceptability study on MNPs found that caregivers had mostly positive perceptions after using them, reporting that their children had increased appetites and activity levels. Possible barriers to uptake include the traditional practice of giving pre-masticated rice to young children, which prevents mixing MNPs into the food. Alternative food vehicles identified for Lao PDR included pumpkin, cooked egg, or mashed bananas. Another possible barrier was caregiver concerns about contamination or counterfeiting of MNPs, although this reflects a high level of trust in health centers as caregivers suggested distribution be only through these official channels (Michaux et al. 2014).

Cost Optimization

Cost Optimisation

Key Highlights:

The ability of optimised diets based on locally available foods to meet nutrient needs for chosen target groups was assessed primarily using Cost of the Diet (CotD) software, with market price data collected in 5 provinces (Phongsaly, Oudomxay, Vientiane Capital, Savannakhet, and Sekong) and secondary data on household composition and expenditure from Laos Expenditure and Consumption Survey (LECS) 5.

For average households in each region, CotD modelled/illustrated lowest cost diets to meet requirements for energy, protein, fat and 13 micronutrients, with at least one serving per day of the key local staple, glutinous rice (nutritious/SNUT diet).

- ➔ It is possible to consume a nutritious/ SNUT diet that meets a household's nutrient needs using foods available in the local markets in all provinces surveyed. Blood, offal, green leafy vegetables, seeds, various pulses and fish were identified as inexpensive foods that were available and rich in nutrients.
- ➔ A nutritious/SNUT diet for an average household size of 5 people cost 28,000 LAK per day (3.39 USD) and was the most expensive in Sekong province (88,649 LAK/10.80 USD) and the least expensive in Savannakhet (24,503 LAK/2.97 USD). A lactating woman and an adolescent girl were the most expensive individuals within the household, due to their increased needs for essential nutrients during these life cycle periods.
- ➔ Although the cost of the nutritious/SNUT diet for a child aged 12-23 months is not very high in comparison to the other household members, it will still be challenging to meet the nutrient needs for this individual as they require the nutritious foods selected by the software as well as fortified complementary foods in small amounts, regularly. This would require households to be able to access markets on a regular basis and for an effective cold chain to be implemented throughout the country, which ensured the sustained availability of meat, offal and fish.
- ➔ Based upon an assumed 65 percent of total expenditure being spent on food, average unaffordability of the nutritious/SNUT diet was 45 percent, ranging from 17 percent (VTE) to 95 percent (SKG) at the provincial level. Unaffordability and stunting prevalence were correlated across the five provinces analysed (correlation = 0.56).
- ➔ Food availability was not found to be a barrier to households consuming the nutritious/ / SNUT diet in the provinces surveyed. The CotD market survey found that there were between 61 (Sekong) and 184 (Savannakhet) foods from 12 different foods groups being sold in markets.
- ➔ The nutrients for which the software had difficulty meeting requirements of key target groups for were calcium, vitamin B1, folic acid, iron, and zinc.

The Cost of the Diet (CotD) software developed by Save the Children was used to estimate minimum cost nutritious diets at the province level through linear optimization. This tool models the cheapest possible diet for each household member based on the available foods and in accordance with their individual recommended nutrient intakes (RNIs) and the portion size each individual is expected to consume.

A CotD market survey[19], analysis and modelling was conducted by MoH in collaboration with WFP in February 2017 in five provinces: Vientiane Capital (VTE), Oudomxay (ODX), Phongsaly (PSL), Savannakhet (SVK) and Sekong (SKG) (see Figure 46). The selection of provinces was based on their differing rates of stunting and their differing livelihoods, in order to develop an understanding of the diversity of the national situation in respect to access to and availability of nutritious foods.

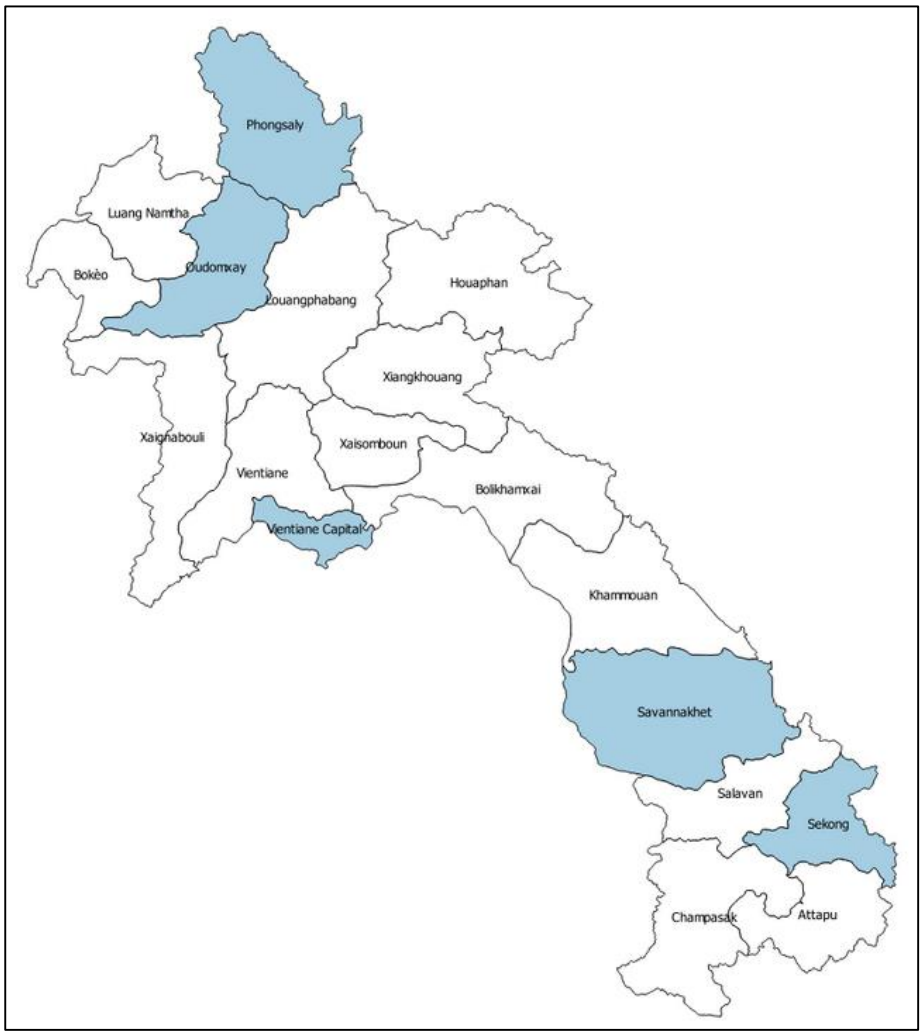


Figure 46: Map of Lao PDR highlighting the provinces surveyed

The survey covered 20 markets in total, more than half of which were formal markets located in the district town while the rest were rural markets or community-level markets. All the markets surveyed operate daily and did not report disruption of services or any activities. The number of

[19] Using the methods described in the Cost of the Diet Practitioner's Guidelines (Save the Children, 2014)

retailers ranged from 20 to 101 shops, of which a few retailers engaged in minor wholesale activities. 60 percent were food based shops. The market managers reported an annual increase in the number of customers and 15 out of 20 market managers said that the market would be able to respond to increasing demand.

Provincial household composition and household expenditure data were extracted from the Lao Expenditure and Consumption Survey 2012-13 (LECS 5) to estimate the percentage of households that could not afford the costs of an adequately nutritious diet. Three different methods were used to estimate affordability of a nutritious diet: 1) assumed food expenditure, estimated to be 65 percent of total expenditure[20]; 2) monetised food expenditure, where own production and foraging are monetised and included; 3) actual food expenditure on the market. Assumed food expenditure was used for the purposes of modelling different interventions, as the ability to consume through own production and foraging is highly variable and is currently under threat. 65 percent is a conservative estimate of food expenditure, but given the poverty rates in Lao PDR this figure seems highly feasible when accounting for expenditure on other essential items such as transportation, housing and education (see discussion of expenditure in Access section above).

The household composition used was based both on LECS 5 data and on target groups for the FNG analysis as identified by key stakeholders. Households in all regions thus included a child 12-23 months of age, a lactating woman and an adolescent girl (14-15 years old) – the three primary target groups impacting the critical window of the first 1000 days of life – as well as a child 6-7 years of age and an adult man. In Oudomxay and Sekong, the average household sizes were larger (6 and 7 respectively), so an elderly woman (over 60 years old) was modelled in both and in Sekong a child aged 10-11 years was also modelled.

WFP's analysis uses a staple-adjusted nutritious diet (nutritious/SNUT diet)[21] that is based on a nutritious diet (NUT) that meets recommended intakes for energy, protein, fat and 13 micronutrients. The nutritious/SNUT diet includes staple foods that will generally be eaten every day for all household members except for young children, and constrains for foods that would be taboo for specific household members. For Lao PDR the staple food in all provinces was glutinous rice (also referred to as sticky rice), which was therefore included in the nutritious/SNUT diet at least once a day for all individuals apart from the child aged 12-23 months. It should be noted that for the preliminary analysis in Lao PDR no taboos have been included, as the secondary data and stakeholder consultation did not identify any that were strong enough to be particularly relevant to the modelled family composition. Optimal breastfeeding levels were assumed for the child under 2.

Food Availability

The CotD market survey indicated wide availability of a variety of food items, ranging from 61 to 184 different foods available in each of the five different provinces assessed. The chart below (Figure 47) displays the availability of different food groups by province. Savannakhet (SVK) had the highest number of foods available (184) with a particularly wide range of meat, seafood/amphibians and vegetables found on the market. Sekong (SKG) had the lowest availability of foods with 61 foods found in total, but foods from all food groups were found on the market. Phongsaly had the second lowest availability with 74 foods, but again all food groups were found to be available except for supplements and infant foods. This corresponds to the map displayed in Figure 40 which shows that

[20] This includes the value of non-purchased foods

[21] Note in the graphs and table this will be referred to as SNUT, but essentially it stands for a nutritious diet that is adjusted to reflect staple food preferences

Sekong followed by Phongsaly are two of the areas with the lowest levels of physical access to markets due to multiple factors including road network and elevation; this probably impacts the supply chain of foods to the markets as well as inhibiting people's access to markets.

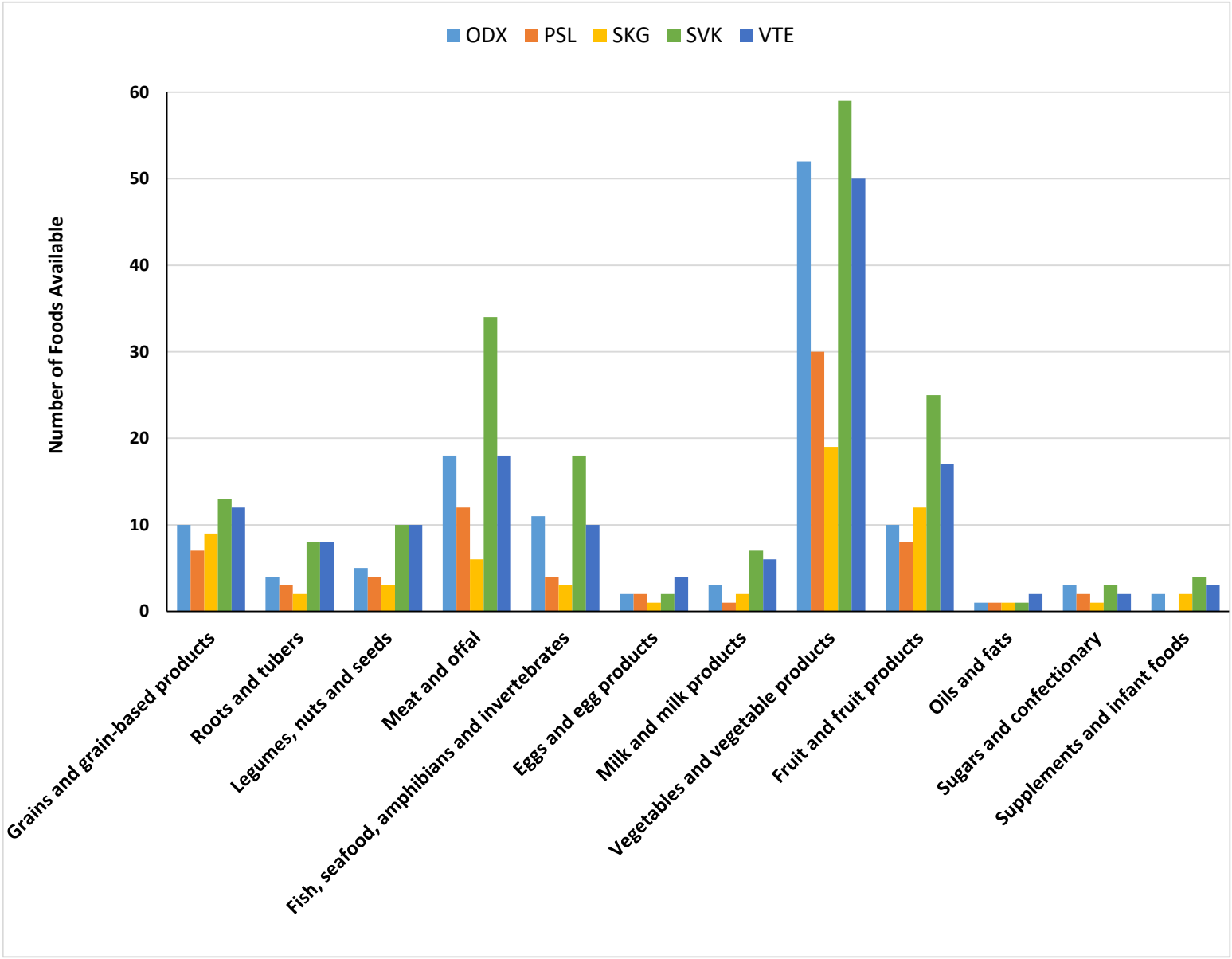


Figure 47: The number of foods available from each food group in each of the provinces surveyed

Prices varied across the country, in particular for pulses and vegetables. Figure 48 shows the variation in prices of the main foods picked up by the CotD. In general food prices were highest in Sekong.

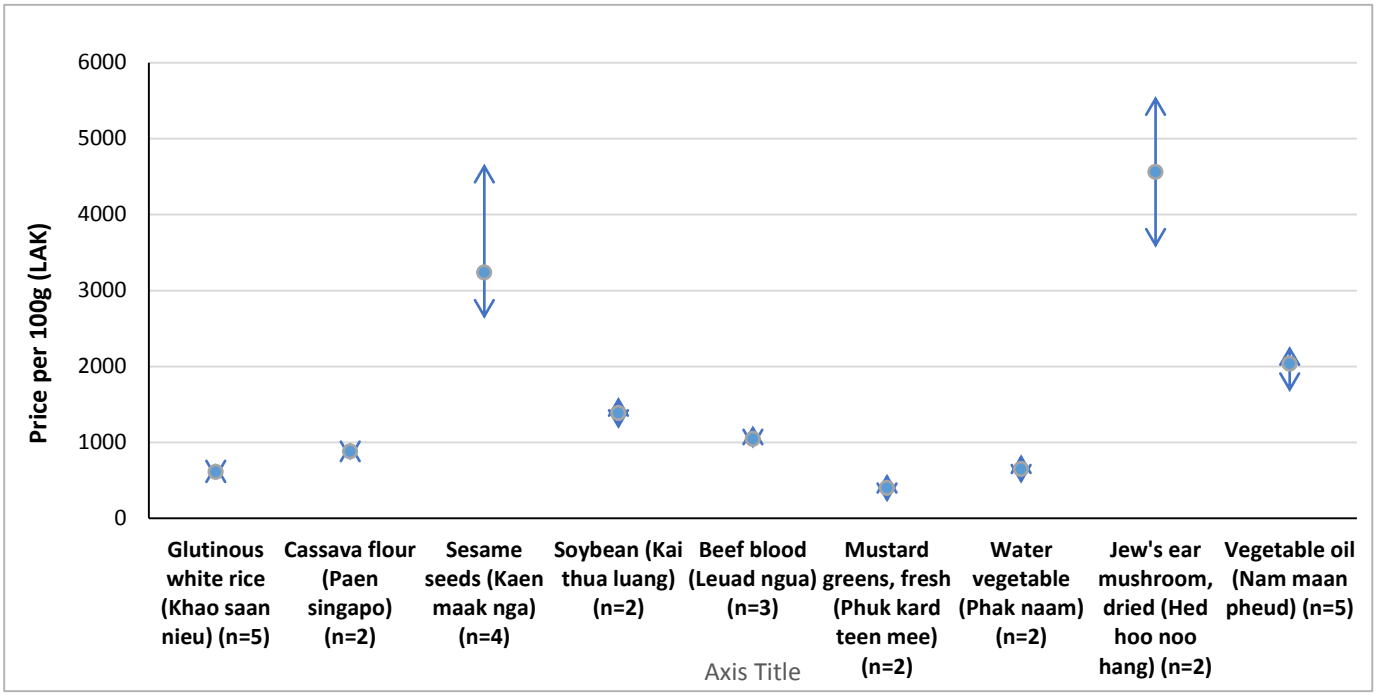


Figure 48: Price variation of certain foods selected by the software for each province

Results

The CotD software was able to create a diet that met the nutrient requirements of all household members in all provinces, whilst including a daily portion of glutinous rice[22]. A range of 8-11 different foods in each province (and breastmilk for the child under 2 years of age) were selected in the diet as the cheapest source of nutrients, as shown in Table 9. In addition to the staple (glutinous rice) the software identified a number of different foods as rich, relatively inexpensive sources of nutrients, including blood, offal, green leafy vegetables, seeds, various pulses, fish, vegetable oil and cassava.

Table 9: The foods selected by the CotD software for the nutritious/*SNUT diet in each province*

Food groups	**Foods Selected for** nutritious/**SNUT diet**	**ODX**	**PLS**	**SKG**	**SVK**	**VTE**
Grains	Glutinous white rice (Khao saan nieu)	X	X	X	X	X
	Job's tears (Nai maak deuy)				X	
Roots and tubers	Cassava, white (Maan ton)				X	
	Cassava flour (Paen singapo)		X			X
	White sweet potato (Man daang khao)			X		
Legumes	Sesame seeds (Kaen maak nga)	X	X	X		X
	Sunflower, seeds (Kaen ta wen)	X				
	Pumpkin seeds (Kaen maak eu)					X
	Beansprouts (Norlao)				X	
	Soybean (Kai thua luang)				X	X
	Black bean (Nai thua daam)			X		
Meat	Beef blood (Leuad ngua)	X			X	X
	Pork blood (Leuad mou)		X			

[22] For all household members except for the child under 2

	Beef liver (Taab ngua)					X
	Pork liver (Tab Mou)				X	
	Pork kidneys (Khai lang mou)			X		
Fish	Tilapia, dried (Paa nin haeng)					X
	Freshwater fish (Paa dook sod)			X		
Vegetables	Bracken, fresh (Phak kood)	X				
	Chinese kale, fresh (Phak kaad na)	X				X
	Agathi leaf, fresh (Bok ful shak)	X				
	Amaranth leaf, fresh (Phuk hom)			X		
	Mustard greens, fresh (Phuk kard teen mee)		X	X		
	Tiliacora triandra leaf (Bai yaa naang)				X	
	Agasta (Dok khair khao)				X	
	Phaak toum teng		X			
	Water vegetable (Phak naam)	X	X			
	Jew's ear mushroom, dried (Hed hoo noo hang)	X				X
Fats	Vegetable oil (Nam maan pheud)	X	X	X	X	X
Breast milk	Breast milk	X	X	X	X	X

The pie chart in Figure 49 displays the percentage quantity of each food group that the software selected for the nutritious/SNUT diet (average of the five provinces). When compared to the current sources of energy in the typical Lao diet (see figure 42), it can be seen that in order to obtain a minimum cost diet that meets nutrient needs the Lao diet needs to shift to consume more vegetables and pulses and seeds, and away from consuming as much cereal (i.e. rice).

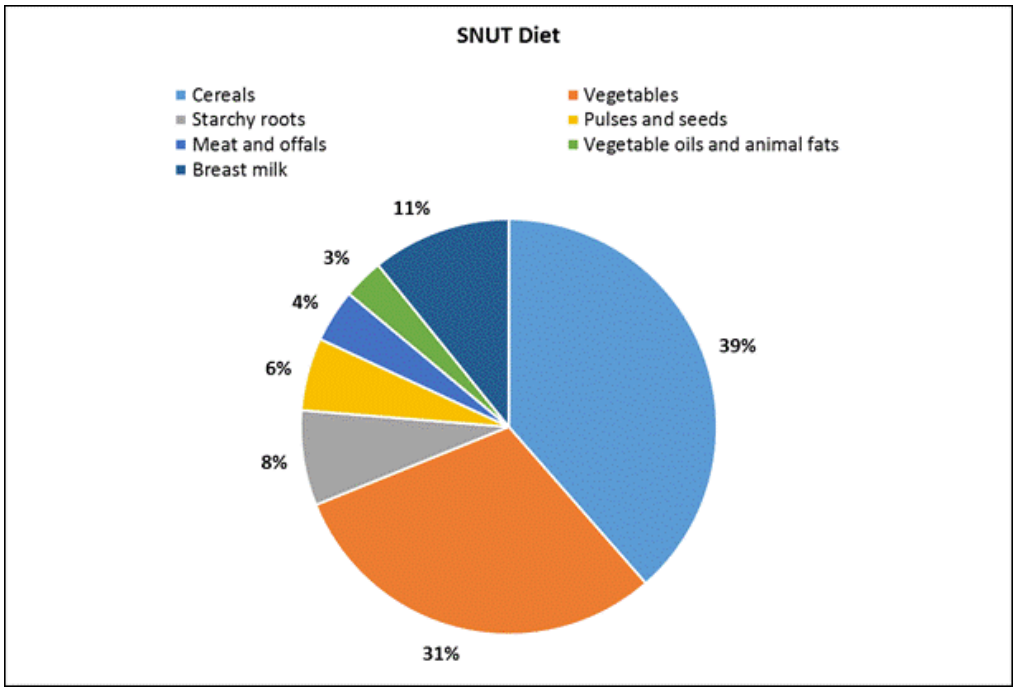


Figure 49: The quantity[23] of each food groups selected by the Cost of the Diet software for the staple-adjusted nutritious diet (average of 5 provinces)

[23] Raw/dried weight

Figure 50 displays the daily cost of the nutritious/SNUT diet for a household in each province, broken down by the cost to meet the nutrient needs of each individual within the household. As one might expect, the daily household cost was highest for Sekong (88,649.48 LAK/USD 10.75[24]) and Oudomxay (34,293.43 LAK/USD 4.16), where larger households were modelled with 7 and 6 members respectively, whereas households in the rest of the provinces had 5 members. When 5 person households were compared across the provinces, the household cost of the nutritious/SNUT diet was around 28,000 LAK (3.39 USD) in each province. For Savannakhet the cost of the diet for a 5 person household was slightly lower than the rest (24,503.71 LAK/USD 2.97). Sekong was notably more expensive, even just for a 5 person household (60,743.94 LAK/USD 7.36).

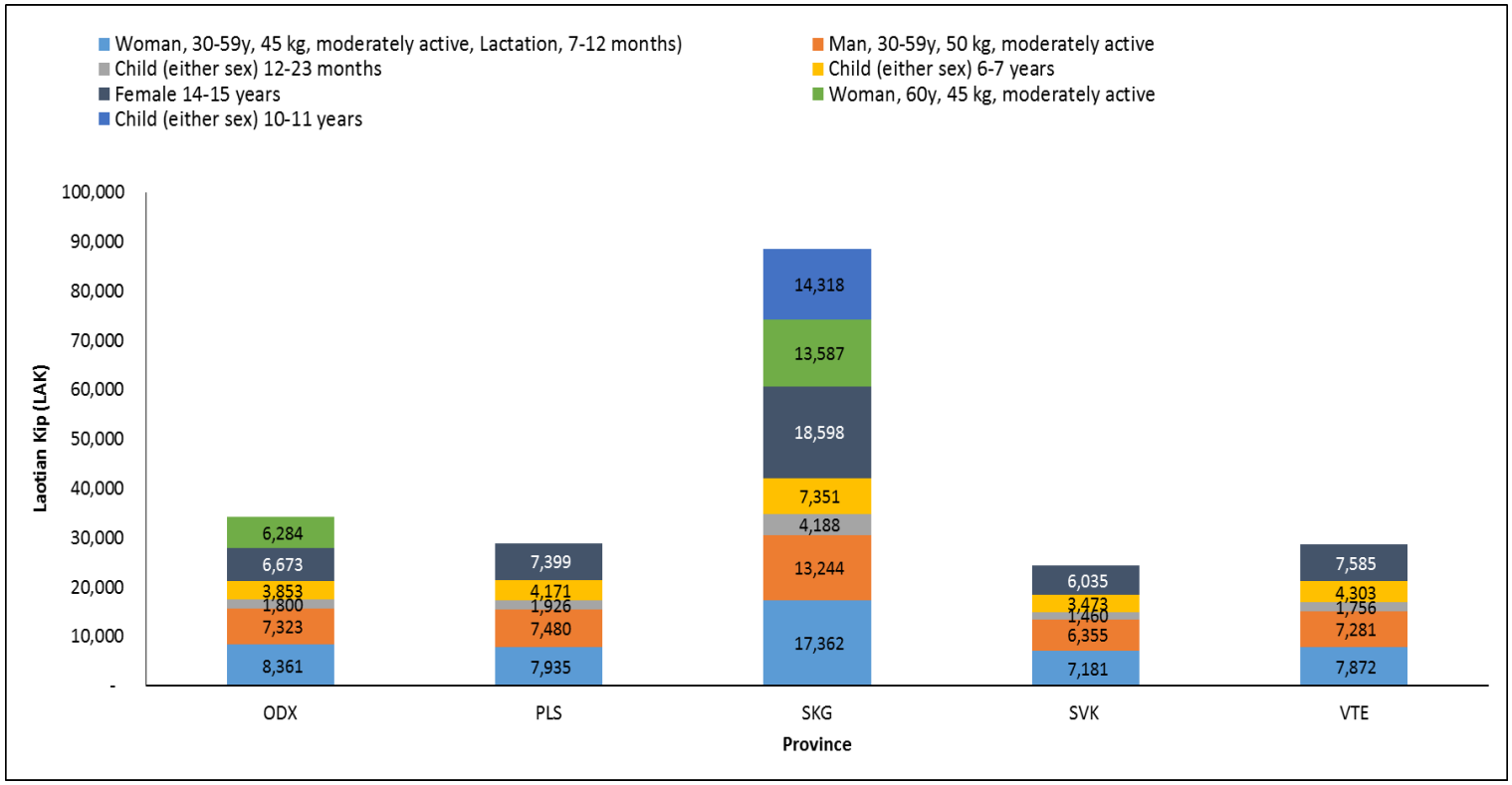


Figure 50: Household cost of the nutritious/*SNUT diet in each province broken down the cost of each individual household member*

In most provinces the lactating woman and the adolescent girl were the two most expensive household members, due to the high nutrient requirements during these periods of life. A lactating woman has high essential micronutrient requirements, needed to produce quality breastmilk that can provide a child with the nutrients required for growth. Adolescence is also a period of rapid growth and development, during which girls in particular have specific nutrient needs due to menarche. Their relatively low energy consumption also makes it costly to fulfil the micronutrients they require during this period, as the foods need to be of a high nutrient density and these foods are typically more expensive. This demonstrates the importance of developing specific programming to target these groups.

Although the cost of the nutritious/SNUT diet for a child aged 12-23 months is not very high in comparison to the other household members, it will still be challenging to meet the nutrient needs for this individual as they require the nutritious foods selected by the software as well as fortified complementary foods in small amounts, regularly. This would require households to be able to

[24] Conversion: 1 USD = 8,249.46 LAK, as of 9 June 2017

access markets on a regular basis and for an effective cold chain to be implemented throughout the country, which ensured the sustained availability of meat, offal and fish.

Affordability of a nutritious diet was shown to be an issue impacting household's access to a nutritious diet in each of the provinces assessed, with on average 45 percent of households[25] unable to afford a nutritious diet, as shown in figure 52. The highest percentage of households that could not afford the nutritious/SNUT diet was in Sekong, where 95 percent of households could not afford a nutritious diet. In Vientiane the proportion of households that could not afford a nutritious diet was the lowest, at approximately 17 percent. In Phongsaly and Savannakhet around one third of households could not afford a nutritious diet, and in Oudomxay over half the households could not afford a nutritious diet. Affordability is thus likely to be a major constraint to accessing a diet that meets nutrient needs for many households in Lao PDR. Figure 51 also displays the proportion of households that cannot afford a nutritious diet when using food expenditure calculated using monetised food consumption and declared expenditure on the market for food. As one might expect, when foraging and own-production are monetised as part of food expenditure, the proportion of estimated households that cannot afford a nutritious diet is lower, but on average it is still high at around 38 percent. As previously noted, own production and foraging are not stable sources of food as both are highly seasonal and vulnerable to shocks. Moreover, as seen previously according to secondary sources of data, the ability to access foods through these means is currently under threat and has declined in recent years. Using an estimation of food expenditure that includes own production and foraging might therefore underestimate the proportion of households unable to afford a nutritious diet. It is interesting to note that for Vientiane and Sekong non-affordability when using monetised expenditure and assumed expenditure was very similar. Using current food expenditure on the market, however, paints a much worse picture of affordability than it is likely to be in reality, as even if the ability to forage and obtain food from own-production is declining it still remains an important source of food for households. These figures do, however, demonstrate the potential problem that could occur if these sources of food do decline drastically, assuming that households do not have extra disposable income to buy food at the market as they are currently are spending it all on other essential expenses (such as housing).

[25] This was calculated using an average of affordability across the 5 provinces when the cost of the diet was assessed against food expenditure curves- for these calculations food expenditure was assumed to be 65 percent of total expenditure (see method 1 in the methods section).

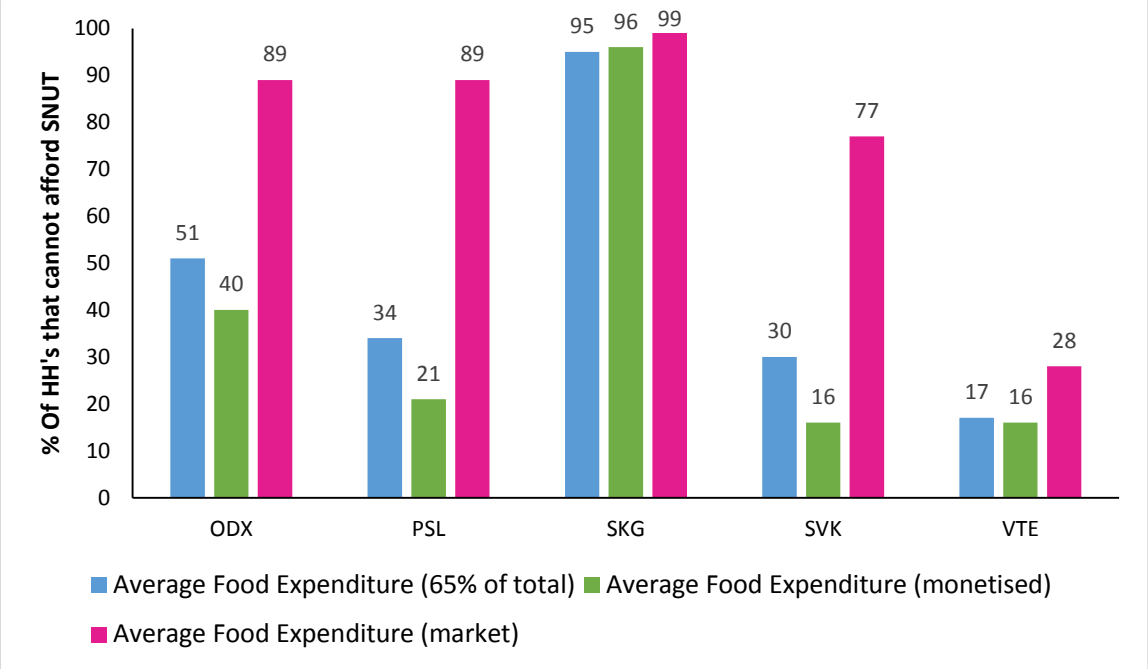


Figure 51: Percentage of households that cannot afford the nutritious/*SNUT diet using 1) assumed food expenditure, estimated to be 65 percent of total expenditure; 2) monetised food expenditure, including monetised own production and foraging; 3) actual food expenditure on the market*

Non-affordability of the nutritious/SNUT[26] diet and stunting prevalence are positively correlated, as shown in figure 52. This further highlights that the cost of a nutritious diet, and the inability of households to afford this diet, is likely to be a factor driving the high stunting prevalence in Lao PDR. Stunting and non-affordability are also positively correlated when using the different food expenditure assumptions, as shown in figures 1 and 2 in the Annex 4.

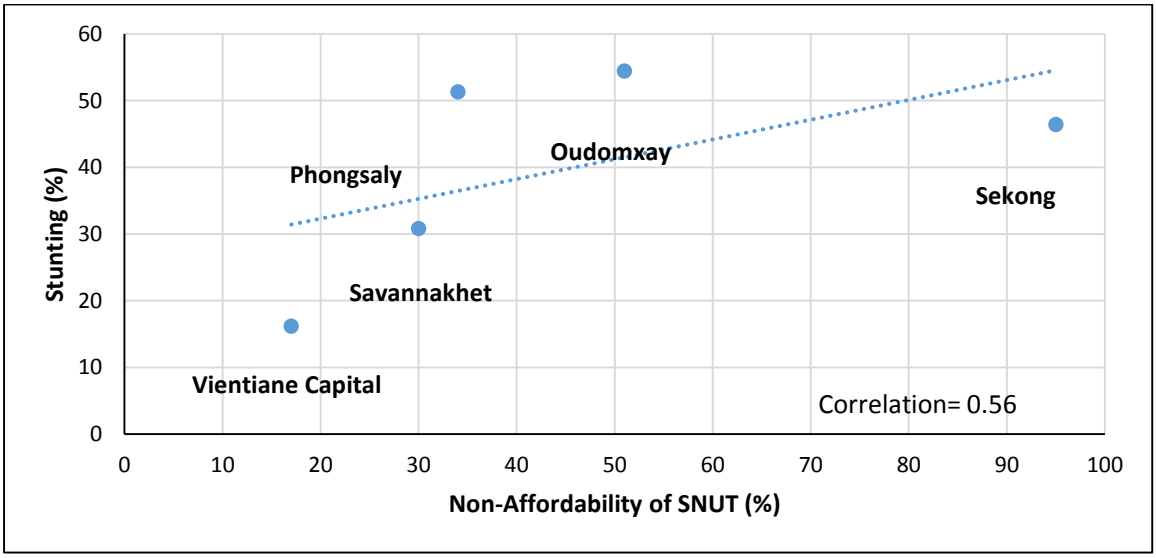


Figure 52: The correlation between stunting and non-affordability of a nutritious diet (calculated using assumed food expenditure of 65 percent of total expenditure)

[26] Calculated using assumed expenditure being 65 percent of total expenditure

Limiting and Problem Nutrients

A problem nutrient is defined as a nutrient for which the recommend intake could not be met by 100 percent with the foods available on the market. No problem nutrients were found in any of the provinces of Lao PDR for any household members when modelling the nutritious/SNUT diet. A number of limiting nutrients were found, however, as shown in table 10. Limiting nutrients are nutrients for which requirements are difficult to meet with the foods available on the market without exceeding the prescribed energy limit. This is indicated by the software meeting nutrient requirements by exact 100 percent. Calcium was the most common limiting nutrient for all the target groups (highlighted in red in table 10). Vitamin B1, folic acid and iron were other common limiting nutrients (highlighted in pink in the table). Zinc was also a limiting nutrient for the child under 2 in all provinces, except for Vientiane.

Province	Target group	Vitamin A	Vitamin C	Vitamin B1	Vitamin B2	Niacin	Pantothenic acid	Vitamin B6	Folic acid	Vitamin B12	Calcium	Iron	Magnesium	Zinc
ODX	Child 12-23 months			x	x				x	x	x			x
	Adolescent girl			x	x				x	x	x			
	PLW			x	x		x	x	x	x	x			
PSL	Child 12-23 months			x							x			x
	Adolescent girl			x						x	x			
	PLW			x	x				x		x			
SKG	Child 12-23 months										x	x		x
	Adolescent girl								x		x	x		
	PLW								x		x	x		
SVK	Child 12-23 months				x		x	x	x	x	x			x
	Adolescent girl			x	x		x		x		x	x		
	PLW			x	x		x	x	x		x	x		
VTE	Child 12-23 months	x					x				x	x		
	Adolescent girl	x					x			x	x	x		
	PLW	x					x			x	x	x		

Table 10 : Limiting nutrients for key vulnerable groups in each region (X indicates that the diet only just managed to fulfil 100 percent of the nutrient requirement).

Modelling /Illustration

Key Highlights:

To improve the affordability of the nutritious/ SNUT diet, interventions targeting individuals and households were modelled using CotD, including vouchers for locally available nutritious foods, market introduction of fortified rice and oil, specialised nutritious foods (SNFs), micronutrient supplements, and home gardening interventions, as detailed below. Cash transfers to the household of US$45, US$35, and US$23 were also modelled/illustrated based upon proposed programming options. Separate modelling/illustrations was conducted for each province.

Children 6-23 months: Two SNFs based illustrations/models were made. They were specifically targeting this group, either with vouchers or in-kind provision of 20g of Nutributter a day leads to the greatest reduction in the cost of the diet. This is followed by provision of 1g of Multi-Micronutrient Powders (MNPs) three times per week. Use of MNP reduces the cost of nutritious diet but since it lacks calcium and other macronutrients, use of SNF reduces cost of diet more.

Pregnant and Lactating Women: 2 SNFs, Multi-Micronutrient Tablets (MMTs), and vouchers for locally available animal source food and vegetables were modelled specifically targeting this group, with voucher or in-kind provision of 1g of MMTs a day leading to the greatest reduction in the cost of the diet in ODX, SKG and SVK. Provision of 20g Nutributter a day or 105g of energy bars (which contain more calcium) five times a week were more effective in PSL, while MMTs, Nutributter, and fresh food vouchers of 500g of green leafy vegetables and 250g of eggs or fish per week were all similarly effective in VTE.

Adolescent girls: Similarly to the lactating woman, provision of MMTs was most effective at reducing costs for adolescent girls in ODX (26 percent), SKG (25 percent) and SVK (16 percent). In PSL and VTE, however, the voucher for fresh foods were the most effective at reducing costs as they addressed more of the key limiting nutrients (e.g. also calcium) than the MMT and the iron and folic acid tablets.

School aged children: Energy bars provided at school (105g a day, five times a week) were most effective at reducing the cost of SNUT for this target group, with school meals that also use produce from school gardens[1] also leading to a decrease in cost.

Household Level: Fortified rice and oil made available on the market could somewhat reduce the cost of a nutritious diet and improve micronutrient intake. Home gardening interventions (vegetables, small animals and fruit) only slightly reduced overall costs due to small estimated yields. However a small animal production intervention was most effective in reducing the cost of a nutritious diet in PSL / SKG / SVK. Home vegetable gardens were most effective in ODX / VTE. Fortified rice and oil was slightly more effective in reducing the cost of the diet for the household compared to home gardening interventions.

These interventions were combined to form packages. The results show that a combined package of interventions aimed at key target groups, plus a cash transfer, has the greatest impact on improving the affordability of a nutritious diet at the household level. These findings show the possibility of improving household's economic access to nutrients through food-based interventions provided by the public sector, in combination with the market. Model diets are theoretical and behaviour change communication is required to encourage adopting necessary dietary practices and purchasing choices to meet nutrient needs. These analyses serve to highlight from the target population's position, what type of interventions would be required to make a difference to their ability to access the nutrition they require.

In order to improve affordability of the nutritious/SNUT diet, a number of interventions were modelled targeting the key target groups: PLW, children under 2 and adolescent girls. A number of other interventions were also modelled also targeting school aged children and the household overall. These interventions were identified primarily through consultations with national stakeholders, with some identified from the analysis of the secondary data. It should be noted that interventions modelled are just potential interventions that could be pursued, they are not recommendations on what should be done but are explored in the modelling in order to show the potential impact that interventions of this nature could have on improving access to nutrients (particularly for vulnerable groups). Table 11 lists the interventions modelled for each target group and the modality with which the intervention was provided. In addition to these interventions to improve access to food, the following models were run based upon interest from stakeholders:

1) The impact of removing breastmilk on the cost of the diet of the child: the current model assumes optimal breastmilk intake for children under 2, which the data shows is not the case for the majority of the children in Lao PDR (see Nutrient Intake section)
2) The impact of pregnancy and lactation on the cost of the diet for the adolescent girl
3) The impact of consumption of certain snack foods on the diet of the child and her ability to fulfil the rest of her nutrient needs

For full details on how each of the interventions were modelled, please see the table in Annex 3.

Food Based Intervention	Target Group	Modality	Potential Entry Points
Multi-micronutrient tablets (MMT)	PLW Adolescent girl	Voucher	Health Social protection Markets (private sector)
Iron + Folic Acid Supplement	PLW Adolescent girl	In-kind	Health Social protection Markets (private sector)
Specialised nutritious food: Nutributter	PLW Child under 2	Voucher	Health Social protection Markets (private sector)
Energy bars[27]	PLW School aged child	Voucher	Education
Micronutrient powder: SuperKid (MNP)	Child under 2	Voucher	Health Social protection Markets (private sector)
Fortified rice[28]	Household	Market	Health Social protection Markets (private sector)

[27] See discussion of SNFs in previous section on Availability.
[28] At a 2 percent higher cost than the cost of the staple rice. See Annex 5 for composition.

Fortified oil[29]	Household	Market	Health Social protection Markets (private sector)
Fortified rice and oil combination	Household	Market	Health Social protection Markets (private sector)
Fresh foods: animal source food (ASF) + vegetable[30]	PLW	Voucher	Health Agriculture Social protection Markets (private sector)
	Adolescent girl		
Home gardening: small animals (chicken, fish, frogs)	Household	Own production	Agriculture Social protection Markets (private sector)
Home gardening: vegetable production	Household	Own production	Agriculture Social protection Markets (private sector)
Home gardening: fruit production	Household	Own production	Agriculture Social protection Markets (private sector)
Social safety nets (cash transfer)	Household	In-kind	Social protection Health Agriculture Education
School gardens (school feeding)	School aged child	In-kind	Education Agriculture

Table 11: The modelling plan of food based interventions

The effect of each of these interventions was modelled to measure the impact of each intervention on the target individual's cost of the diet. The most effective interventions were then combined to form two household packages, which were assessed for improvements in overall affordability. Cash transfers were then modelled in addition to these packages to assess how this could further improve affordability.

Modelling/Illustrations Results

Target Group: Children Under 2

A child aged 12-23 months was selected to represent the needs of children under 2. As displayed in figure 54, of all of the interventions modelled for the child under 2[31] the provision of Nutributter

[29] The same price as regular oil was assumed. See Annex 5 for composition.
[30] 1 ASF and 1 vegetable selected in each province based on market availability and price. See Table 1, Annex 3 for additional information.
[31] As detailed in table 11: MNP, Nutributter, fortified rice and fortified oil on the market (separately and in combination), and 3 home gardening interventions (small animals, vegetables, and fruit)

through a voucher/in-kind modality was the most effective at reducing cost for the nutritious/SNUT diet for this child in all of the provinces. Provision of a MNP was also highly effective, but Nutributter contains calcium and other macronutrients[32] and was therefore more effective in addressing a key limiting nutrient for this age group. See Figure 53 below for a comparison of providing MNP and Nutributter at zero cost wither through vouchers or in-kind.

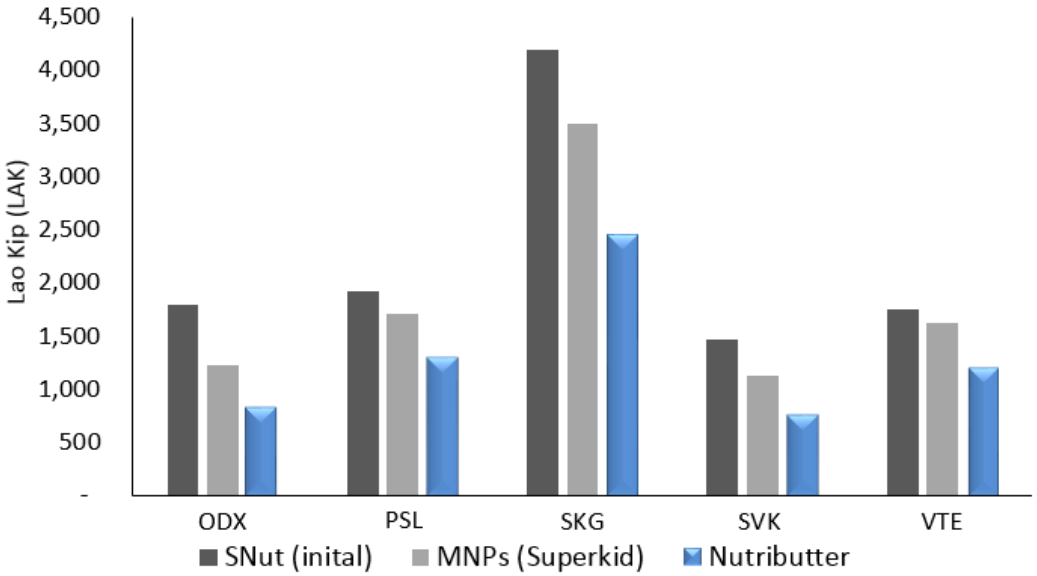


Figure 53: Impact of Nutributter and MNPs (provided at zero cost) on the daily cost of the diet for the child under 2 in each province

When fortified foods[33] were modelled/illustrated, including fortified rice as the daily staple helped to slightly reduce the cost of the diet for the child. Costs were reduced a little further when combined with market availability of fortified oil. Making fortified oil available on the market alone resulted in a slight reduction in the cost of the diet, but the impact was relatively small compared to provision of MNPs or Nutributter. This is as both MNP's and Nutributter had essential micronutrients which if acquired from local sources were more expensive. In the graph the impact of providing them at zero cost was modelled but during the analysis the cost of the Nutributter and MNP's included all associated logistics and handling costs were also compared. The details of the costs are considered are included in Annex 3.

Home-gardening interventions had a slight impact on reducing the cost of the diet of the child under 2. In most provinces, small animals rearing (chickens producing eggs, small fish and frogs) and vegetable production were more effective at reducing costs than fruit trees[34].

Target Group: Pregnant and Lactating Women (PLW)

[32] See Annex 5 for the compositions of MNPs and Nutributter modelled.
[33] It should be noted that fortified staples are fortified at lower levels than SNFs like Nutributter, as the level is set based on adult needs, who consume greater quantities of these foods per day compared to a young child. A young child also has high micronutrient needs relative to energy intake, and so requires foods with a great micronutrient density.
[34] It should be noted that for some of these fruit trees, such as mango, fruit will only be available at certain times of the year

A lactating woman was selected to represent the needs of PLW. As displayed in figure 55, of all of the interventions modelled for the PLW[35] provision of MMTs through a voucher/in-kind was the most effective in reducing the cost of the diet of the PLW in most provinces. In particular Oudomxay (32 percent), Sekong (31 percent) and Savannakhet (27 percent) displayed the greatest reduction in cost when an MMT was provided. In Phongsaly, however, MMTs had less impact because they do not contain any calcium, which was a major limiting nutrient. Energy bars and Nutributter, both of which contain calcium, were more effective in reducing costs in Phongsaly. In Vientiane, provision of MMT, Nutributter and the voucher for fresh foods (ASF and vegetable) all achieved similar reductions in reducing costs. In Sekong iron and folic acid supplements were also highly effective at reducing costs.

Similarly to the diet of the child, when fortified foods were modelled, including fortified rice as the daily staple also helped to slightly reduce the cost of the diet for the PLW. Costs were reduced a little further when combined with market availability of fortified oil. Making fortified oil available on the market alone resulted in a slight reduction in the cost of the diet, but the impact was relatively small compared to the other interventions.

Home-gardening interventions had some impact in reducing the cost, but these reductions were relatively small at the individual level. Similarly to the diet of the child, small animal rearing (chickens producing eggs, small fish and frogs) and vegetable production were more effective at reducing costs than fruit trees.

Target Group: Adolescent Girls

A girl aged 14-15 years old was used to represent the needs of adolescent girls. As shown in figure 56, in most provinces provision of MMTs was most effective at reducing the cost of her diet. Similarly to the PLW, this intervention was most effective at reducing costs in Oudomxay (26 percent), Sekong (25 percent) and Savannakhet (16 percent). In Sekong iron and folic acid tablets were also highly effective at reducing costs. In Phongsaly and Vientiane, however, the voucher for fresh foods was most effective at reducing costs, as they addressed more of the key limiting nutrients (e.g. calcium) than the MMT and the iron and folic acid tablets.

When fortified foods were modelled they showed a similar pattern of cost reduction as they did for the PLW and the child under 2. Fortified rice had some impact in reducing the cost of the diet for the adolescent girl, which was reduced slightly further when fortified oil was made available on the market. Fortified oil on the market alone reduced the cost of the diet but only very slightly.

Home gardening also had some impact, but again it was small. Small animal rearing and vegetable production had a bigger impact on reducing cost than did fruit trees.

Target Group: School Aged Children

A child aged 6-7 years old was used to represent the needs of school aged children. Energy bars were the most effective intervention at reducing the cost of the diet for this group in all provinces, as shown in figure 57. School gardens (100g of rice in-kind and a portion of oil, green leaves and beans from

[35] [35] As detailed in table 11: MNP, Nutributter, fortified rice and fortified oil on the market (separately and in combination), and 3 home gardening interventions (small animals, vegetables, and fruit)

assumed garden yields) were also highly effective at reducing the cost of the nutritious/SNUT diet of this child. Fortified foods and home gardening displayed similar effectiveness for this group as they did for the other target groups. Fortified rice on the market had some impact, suggesting that if the rice given in the school meals was fortified, this intervention could have an even greater impact in reducing costs and improving nutrient intake for this target group. Similarly to the other individuals, small animal rearing and vegetable production were more effective at reducing the cost of the diet than growing fruit trees.

The bars in figures 53 to 56 are colour coded as follows:

- Yellow: Initial nutritious/SNUT diet
- Red: Foods provided in-kind or through a voucher
- Blue: Fortified foods available on the market
- Green: Home production and gardening

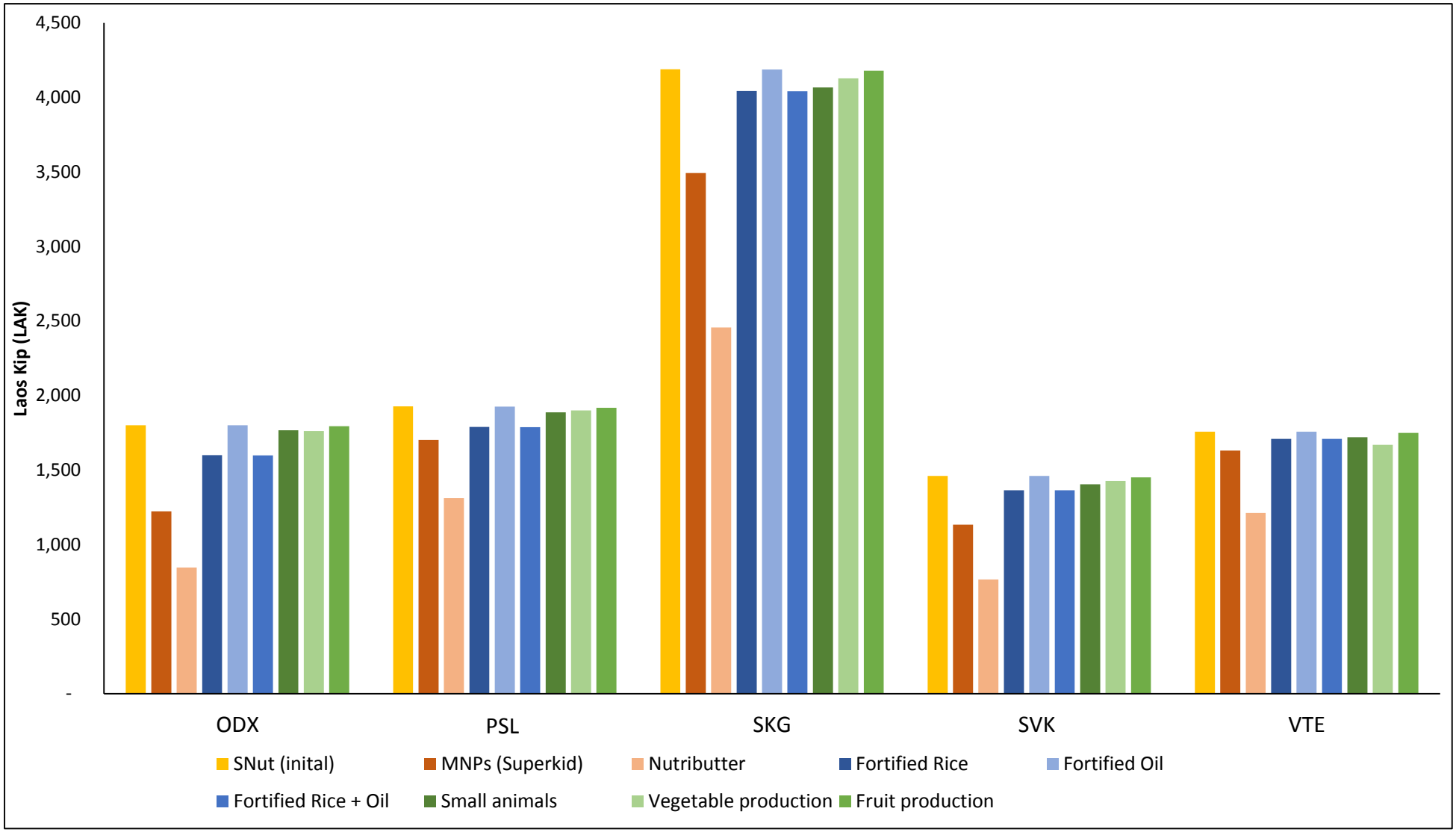


Figure 54: Impact of different interventions on the daily cost of the diet for the child under 2 in each province (bars in orange are provided in-kind/voucher; blue are provided through the market; green are home gardening interventions)

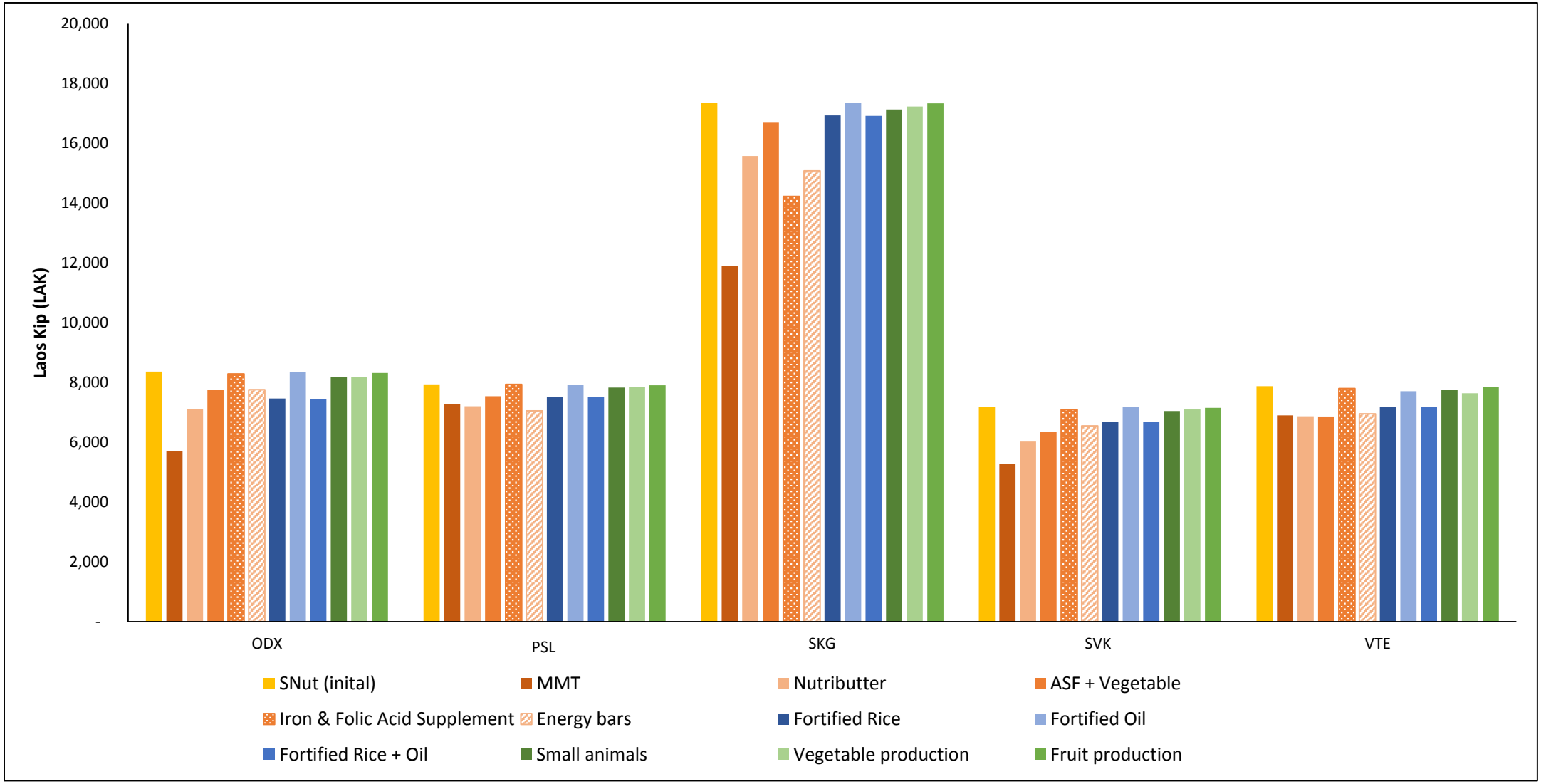


Figure 55: Impact of different interventions on the daily cost of the diet for the lactating woman in each province (bars in orange are provided in-kind/voucher; blue are provided through the market; green are home gardening interventions)

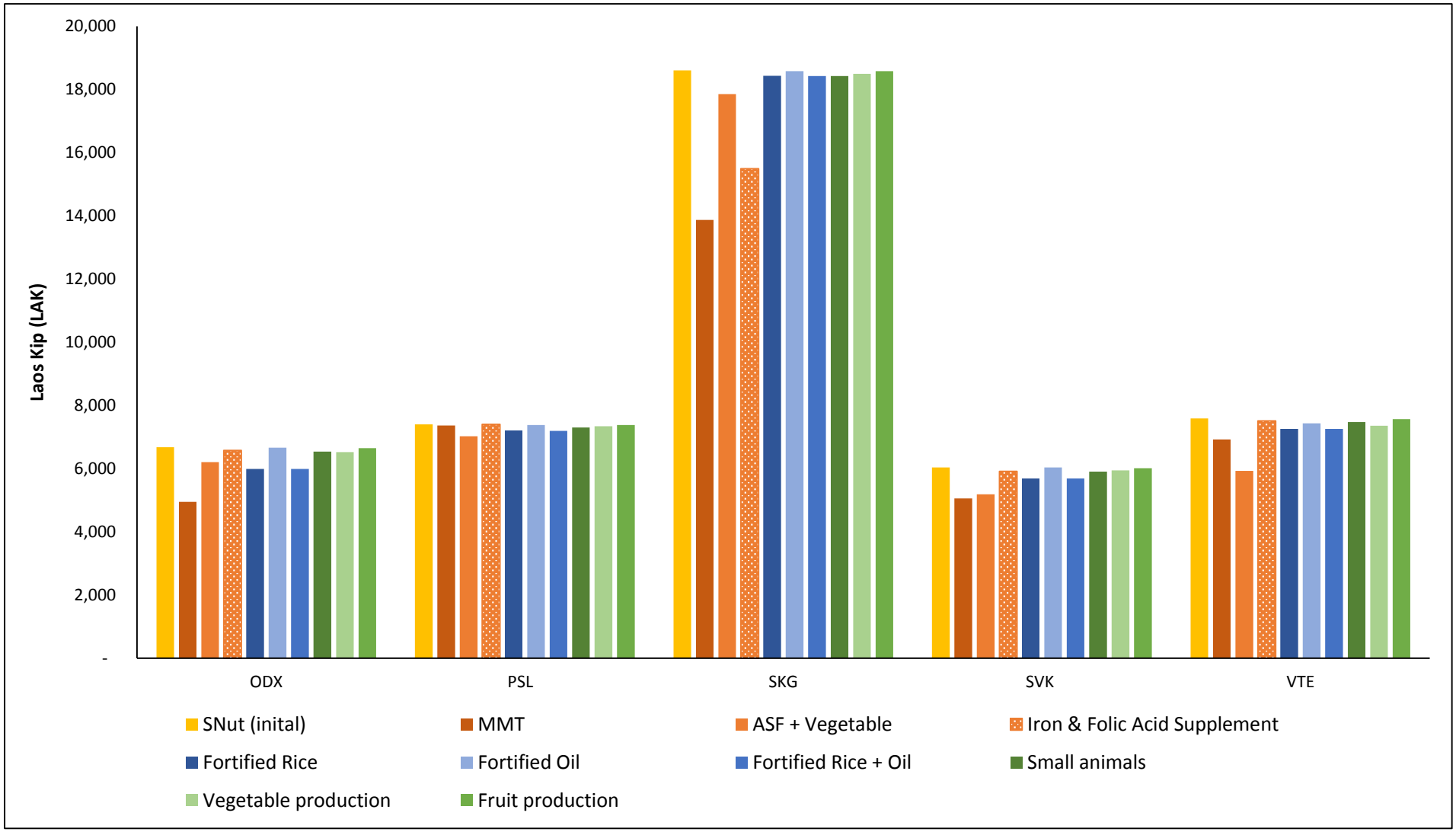


Figure 56: Impact of different interventions on the daily cost of the diet for the adolescent girl in each province (bars in orange are provided in-kind/voucher; blue are provided through the market; green are home gardening interventions)

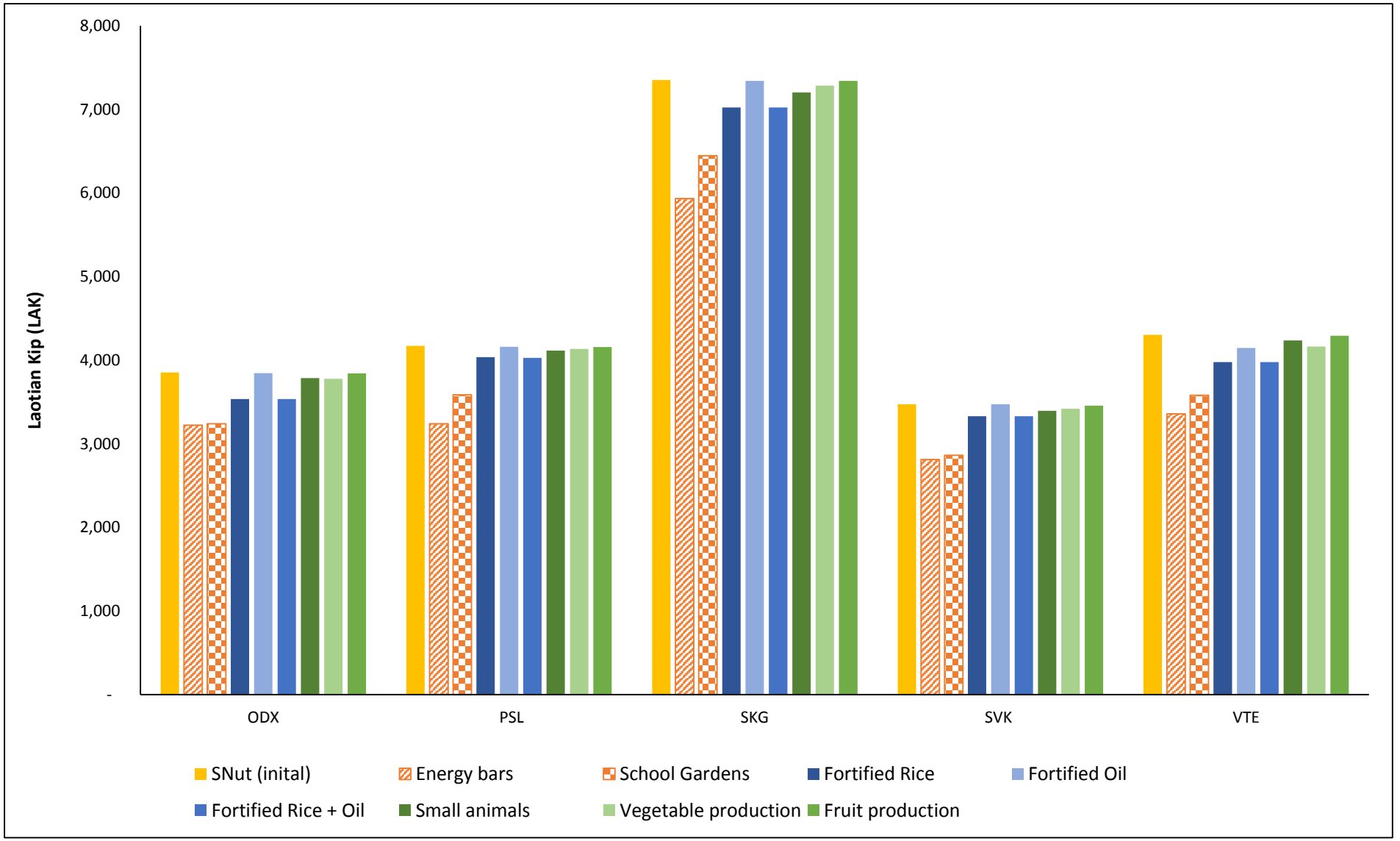


Figure 57: Impact of different interventions on the daily cost of the diet for the school aged child (6-7years)

Household Level

Fortified Foods on the Market

Figure 58 displays the impact on the overall cost for the household of making fortified foods available on the market. As rice is the key staple food, fortified rice has great potential to reduce costs and ensure a certain level of nutrient intake for the entire household. Even though fortified rice is assumed to be 2 percent more expensive than the unfortified glutinous rice, it still reduces the overall cost of the diet. Making fortified oil available on the market also had some impact on reducing the overall cost, but only very minimally; this is because oil is only fortified with 2 vitamins (A and D) whereas rice can be fortified with many more (8 micronutrients were modelled, as per De Pee, S., 2014).

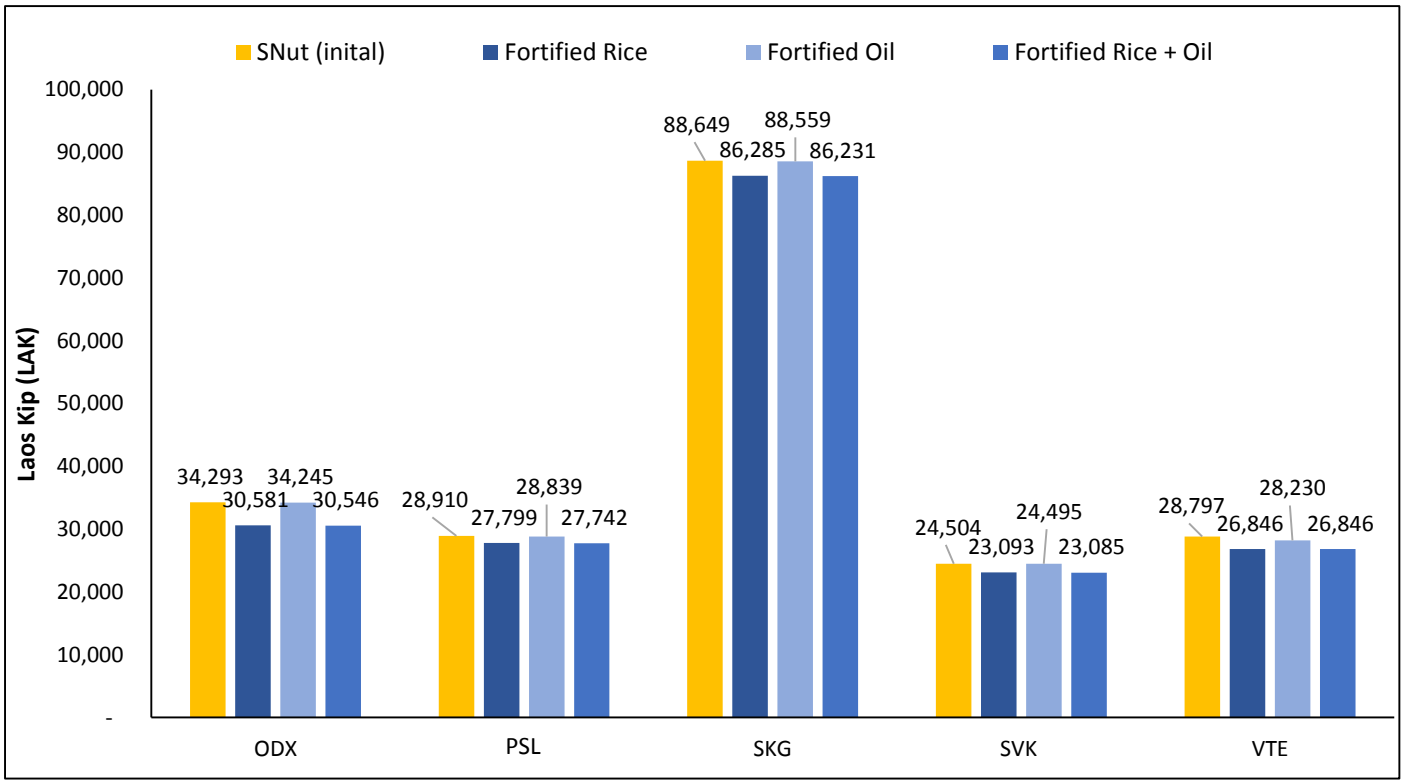


Figure 58: Impact on overall household cost of the diet of market availability of fortified foods

Home Gardening

At the household level home gardening had some impact in reducing overall costs, as shown in figure 59, but the impact was not as great as other interventions. Small animal rearing and vegetable production tended to be much more effective than growing fruit trees.

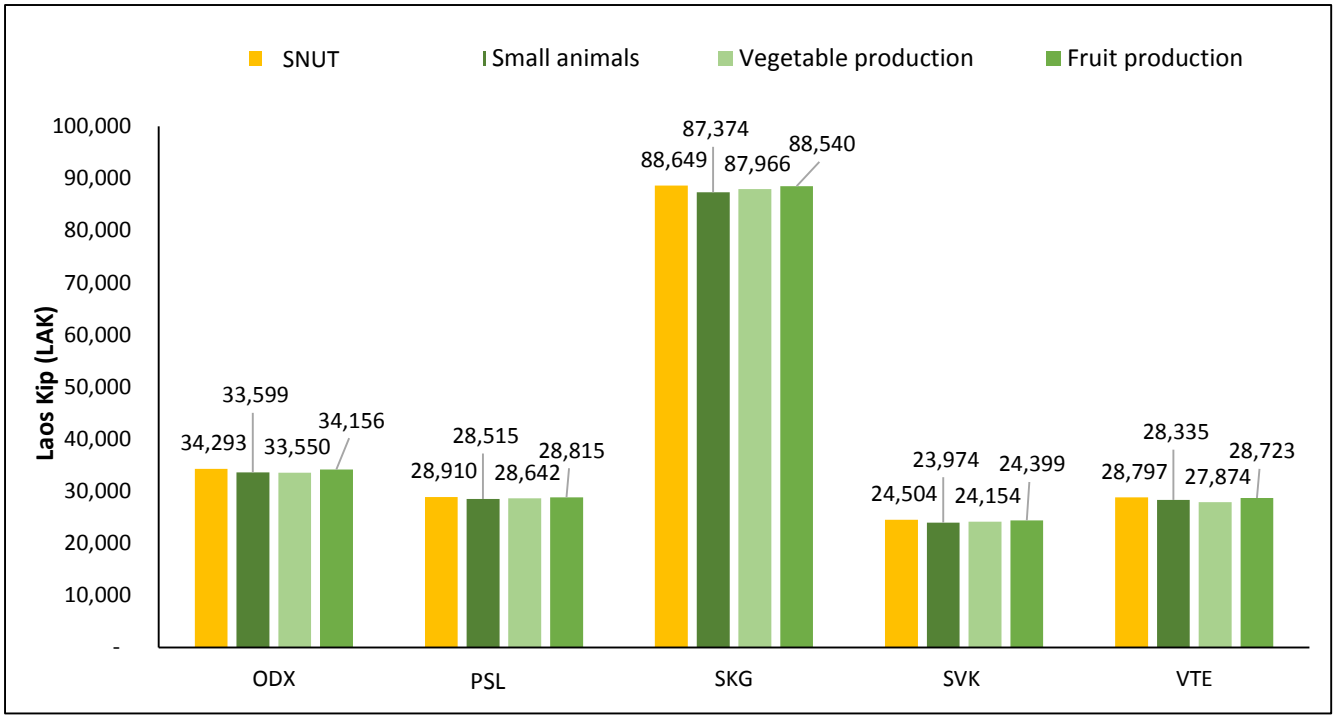


Figure 59: Impact of different home gardening interventions on overall household cost of the diet

Additional Models

Breastfeeding

In the initial models optimal breastmilk intake was assumed for the child under 2. In reality, however, only around 40 percent of children in Lao PDR are breastfed up until the age of 2 (Ministry of Health & Lao Statistics Bureau 2012). Figure 60 shows the impact that removing breastmilk as a food source has on the cost of the diet of a child aged 12-23 months. The cost of the diet increased in every province and by an average of 52 percent across the provinces.

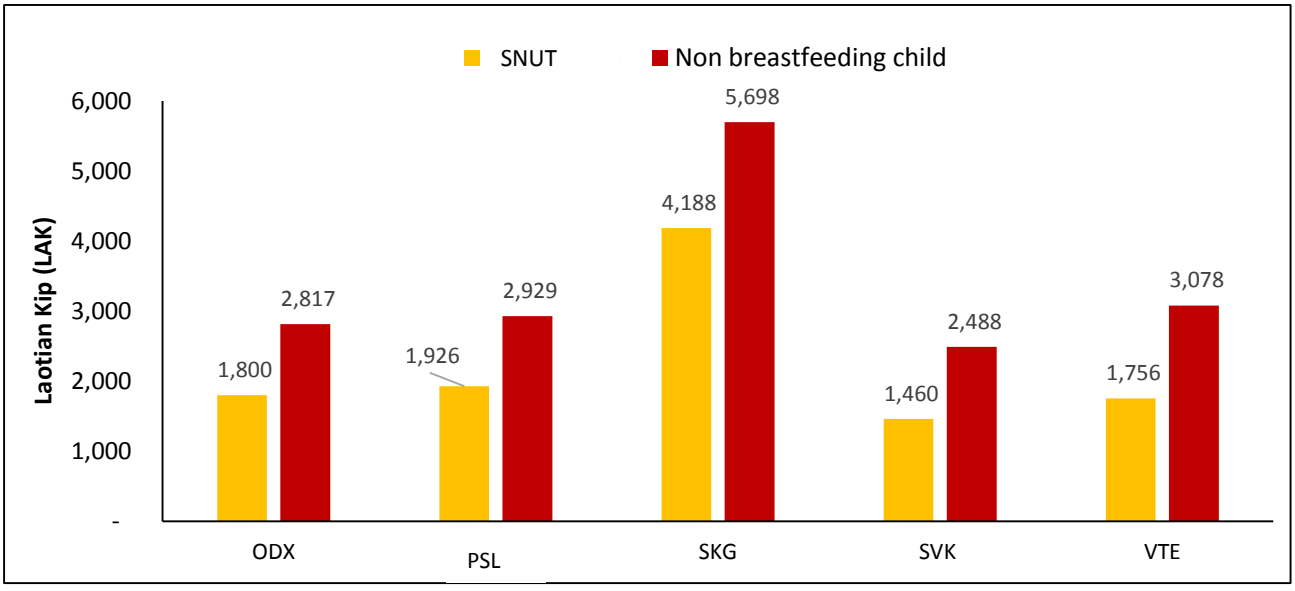


Figure 60: The impact on the daily cost of the diet for a child aged 12-23 months if she is not breastfed

Snack Food Consumption

In order to assess the impact that regular snack food consumption has on the diet of a child under 2 years of age, consumption of wafers, crisps and crackers was assumed based on data from the region on snack food consumption. Each of these foods was included into the child's diet twice a week at a market price assumed for the region. Figure 61 demonstrates that in every province consumption of these foods with high prices and low nutrient values caused the cost of the diet of the infant to increase, as it became more difficult for the software to meet the child's nutrient needs without exceeding her energy threshold. This demonstrates the importance of encouraging caregivers to avoid feeding their children snack foods (with low micronutrient content) as it may inhibit the child's ability to meet her nutrient needs and could contribute to a rise in childhood overweight/obesity, a pattern that is occurring in many other countries within the region.

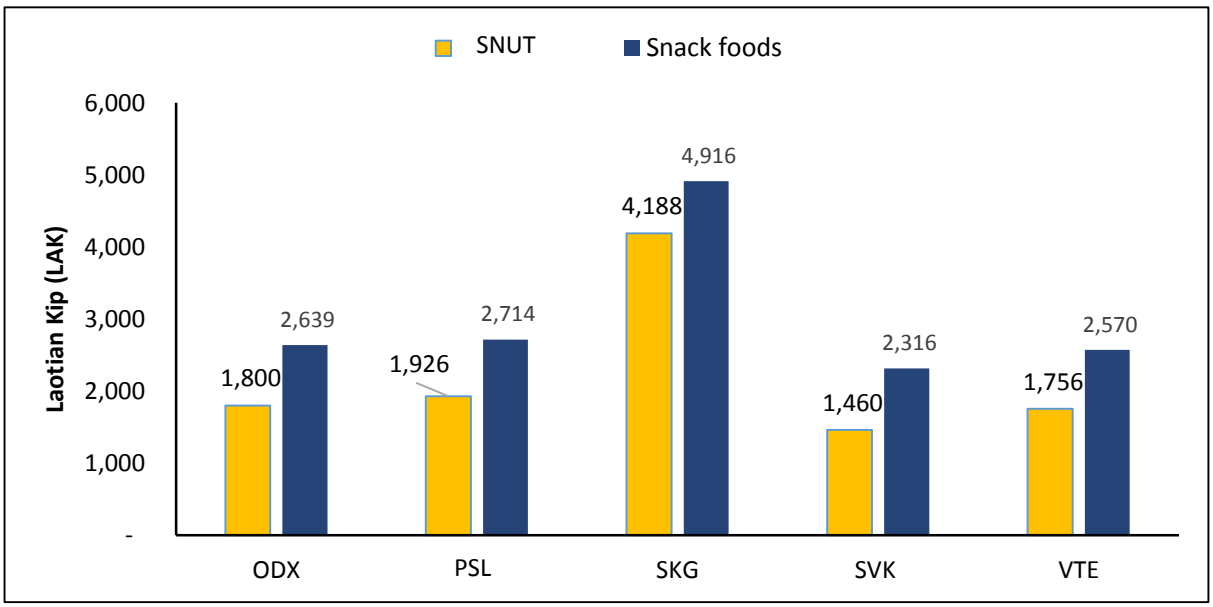


Figure 61: Impact on the daily cost of the diet for a child aged 12-23 months if she regularly consumes selected snack foods

Adolescent Pregnancy and Lactation

Lao PDR has the highest adolescent pregnancy rate in South East Asia, with 40 percent of women pregnant or already having given birth to their first child by the age of 19 (Ministry of Health & Lao Statistics Bureau 2012). As mentioned above, adolescent girls are one of the most expensive members of the household in terms of fulfilling their nutrient needs. In the likely event that these girls become pregnant and then need to breastfeed a child, their nutrient needs increase further. Figure 62 demonstrates the impact of pregnancy and lactation on the daily cost of the diet for the adolescent girl in each province. In all provinces, pregnancy and lactation were found to increase the cost of obtaining a nutritious diet. On average pregnancy during adolescence increased the cost of the diet for the adolescent girl by 13 percent and lactation increased it by 19 percent. To put these results into perspective, figure 63 compares the impact of pregnancy and lactation for an adolescent girl and a woman of reproductive age, averaged across the five provinces surveyed. This analysis shows that adolescent girls are particularly vulnerable during pregnancy and lactation, because of their high nutrient needs and consequently expensive diet. It further demonstrates the need to target adolescent girls with nutritional interventions and provides impetus to promote family planning and sexual and reproductive health education for this group.

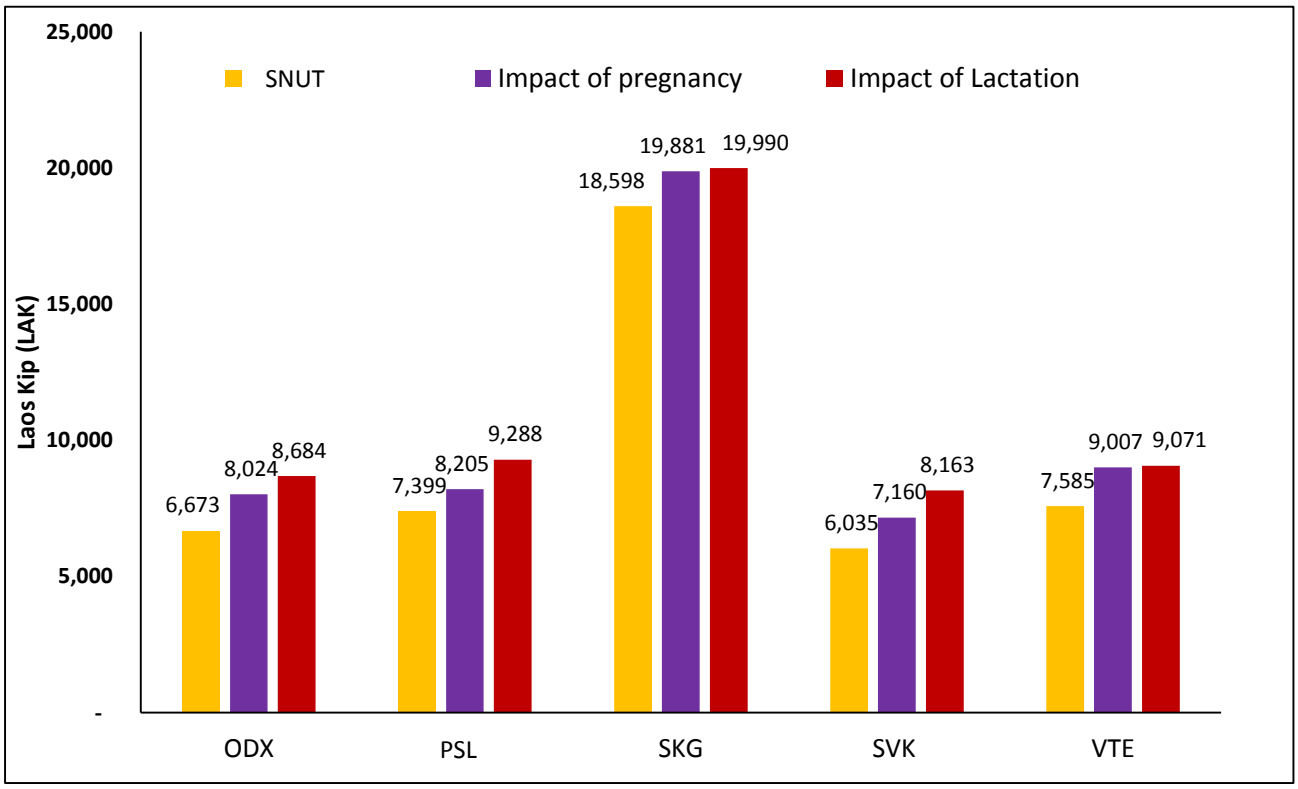


Figure 62: Impact on the daily cost of the diet for an adolescent girl (14-15 years) who becomes pregnant or is lactating

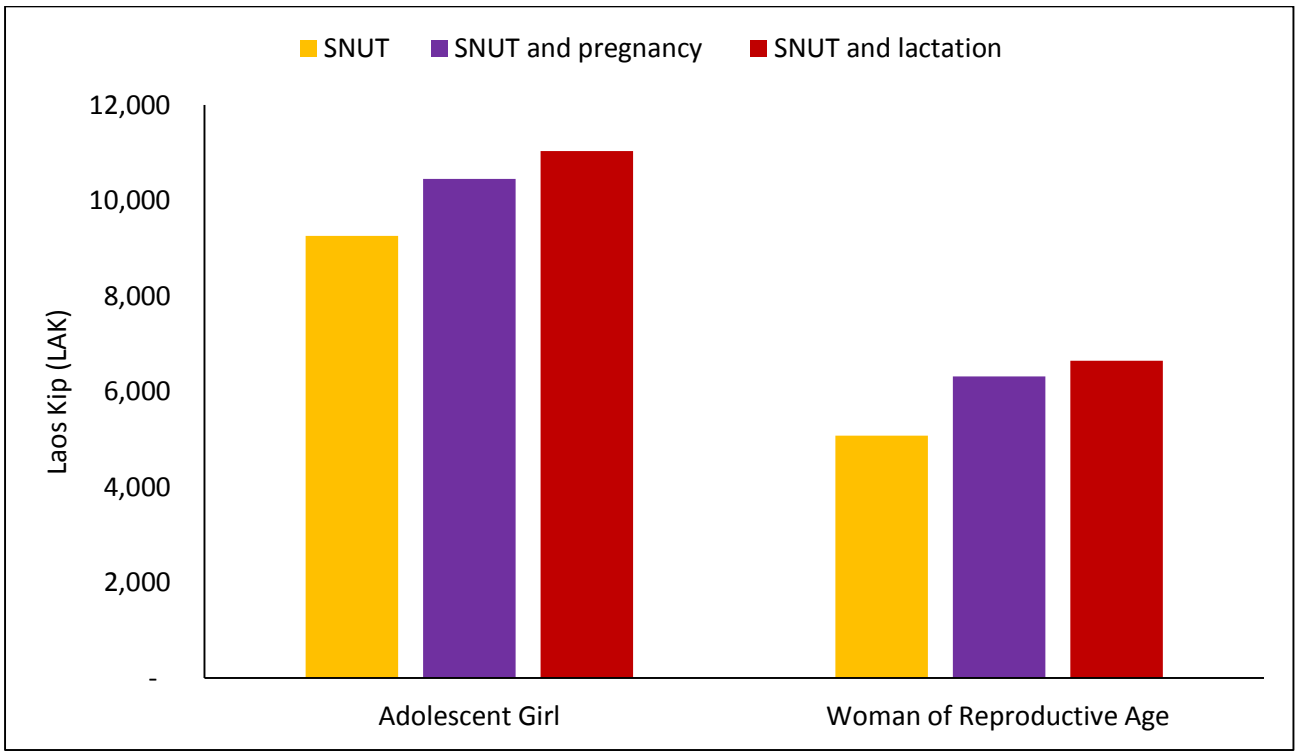


Figure 63: Impact on the daily cost of the diet for an adolescent girl (14-15 years) and a woman of reproductive age (19-29 years) who becomes pregnant or is lactating, averaged across the 5 provinces surveyed

Overall Changes in Affordability

In order to assess the overall impact that these interventions could have on improving affordability, the most effective interventions for each individual were selected and combined in a package to assess their impact on household affordability. Two packages were developed.

Package 1 comprised the most effective interventions using SNFs, which were:

- Nutributter for the child under 2
- MMT for PLW and the adolescent girl
- Energy bars for the school aged child

Package 2 comprised the most effective home gardening intervention in each province and a voucher for fresh foods for the PLW and the adolescent girl. For each province the following was included:

- ODX: vegetable gardening and ASF + vegetable voucher for PLW and adolescent girl
- PSL: small animal intervention and ASF + vegetable voucher for PLW and adolescent girl
- SKG: small animal intervention and ASF + vegetable voucher for PLW and adolescent girl
- SVK: small animal intervention and ASF + vegetable voucher for PLW and adolescent girl
- VTE: vegetable gardening and ASF + vegetable voucher for PLW and adolescent girl

These packages were then combined with the following three social safety net cash transfers:

1. Cash for Work scheme: Cash payments of USD 3 (24,748 LAK) per day would be provided on the condition of undertaking designated work. In this example, the beneficiaries would work a total of 15 days and therefore receive a total of USD 45 (371,226 LAK) per month. This transfer could be targeted at beneficiaries from poor households who require labour opportunities during the dry season before the rice harvest, when they are most food insecure.
2. Conditional behavior change cash transfer: Behavior change related to infant and young child feeding is critical in breaking the cycle of malnutrition. This social safety net would be targeted at PLW, who would receive the cash after fulfilling a set of conditionalities related to attending health screenings during pregnancy and/or infant and young child feeding training sessions. It was assumed that a cash payment of USD 7 (57,746 LAK) would be received by each member of a 5 person household, totaling USD 35 (288,731 LAK) per month.
3. An unconditional cash transfer of 192,000 LAK (USD 23) per household per month, based upon 2012-2013 poverty line figures from the LECS 5 (Lao Statistics Bureau and World Bank 2013).

The social safety nets proposed were identified as examples of programmes that could be implemented in Lao PDR, that would target those most vulnerable across the country or in certain provinces depending on the local context and need. In the models, it is assumed that all of the money given would be spent on food. Table 12 and figure 64 shows the impact that the three cash transfer values had alone on the affordability of the nutritious/SNUT diet.

	nutritious/**SNUT**	**CT1 ($45)**	**CT2 ($35)**	**CT3 ($23)**
ODX	51%	19%	28%	35%
PSL	34%	5%	9%	15%
SKG	95%	93%	93%	93%
SVK	30%	2%	5%	11%
VTE	17%	3%	4%	7%

Table 12: The percentage of households that could not afford a nutritious diet before and after the provision of 3 different cash transfer amounts

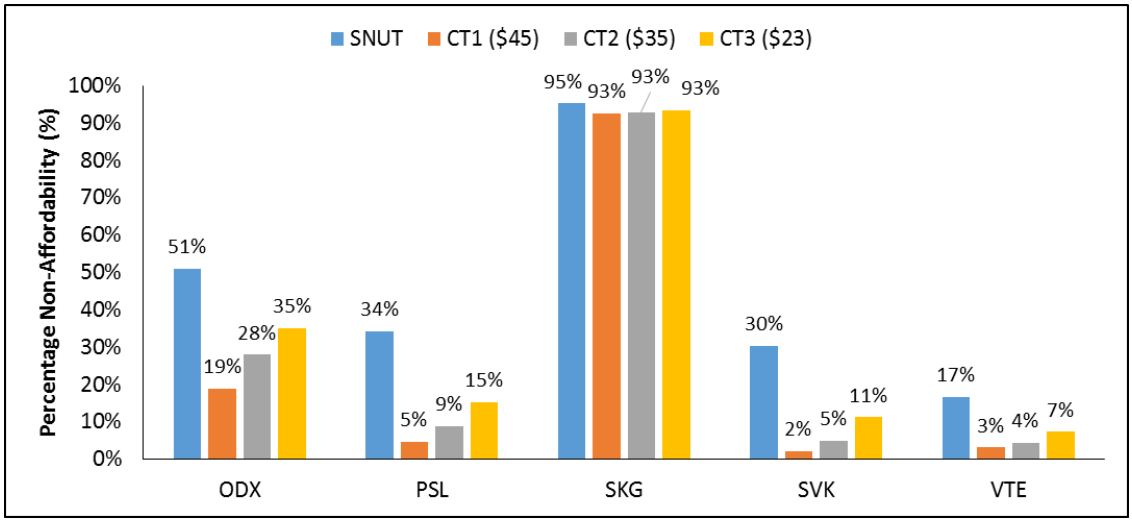


Figure 64: The impact on overall affordability of 3 cash transfer amounts

Tables 13 and 14 and figures 65 and 66 show the impact of these packages alone and combined with the different cash transfers on affordability in each of these provinces. As shown, Package 1 (SNFs) had a greater impact in reducing the percentage of households that could not afford a nutritious diet. Package 2 was less effective but did improve affordability, and had comparable impact to Package 1 in Vientiane. When these packages were combined with a cash transfer, the percentage of households that could not afford a nutritious diet dropped substantially in all provinces, with the exception of Sekong.

	SNUT	Package 1	Package 1 + CT1 ($45)	Package 1 + CT2 ($35)	Package 1 + CT3 ($23)
ODX	51%	37%	5%	10%	18%
PSL	34%	26%	3%	5%	10%
SKG	95%	92%	87%	89%	90%
SVK	30%	17%	0%	1%	4%
VTE	17%	11%	1%	3%	4%

Table 13: The percentage of households that could not afford a nutritious diet before and after the provision of Package 1 interventions and 3 different cash transfer amounts

	SNUT	Package 2	Package 2 + CT1 ($45)	Package 2 + CT2 ($35)	Package 2 + CT3 ($23)
ODX	51%	47%	13%	22%	30% percent
PSL	34%	29%	3%	8%	13%
SKG	95%	94%	92%	93%	93%
SVK	30%	25%	1%	3%	7%
VTE	17%	10%	1%	3%	4%

Table 14: The percentage of households that could not afford a nutritious diet before and after the provision of Package 2 interventions and 3 different cash transfer amounts

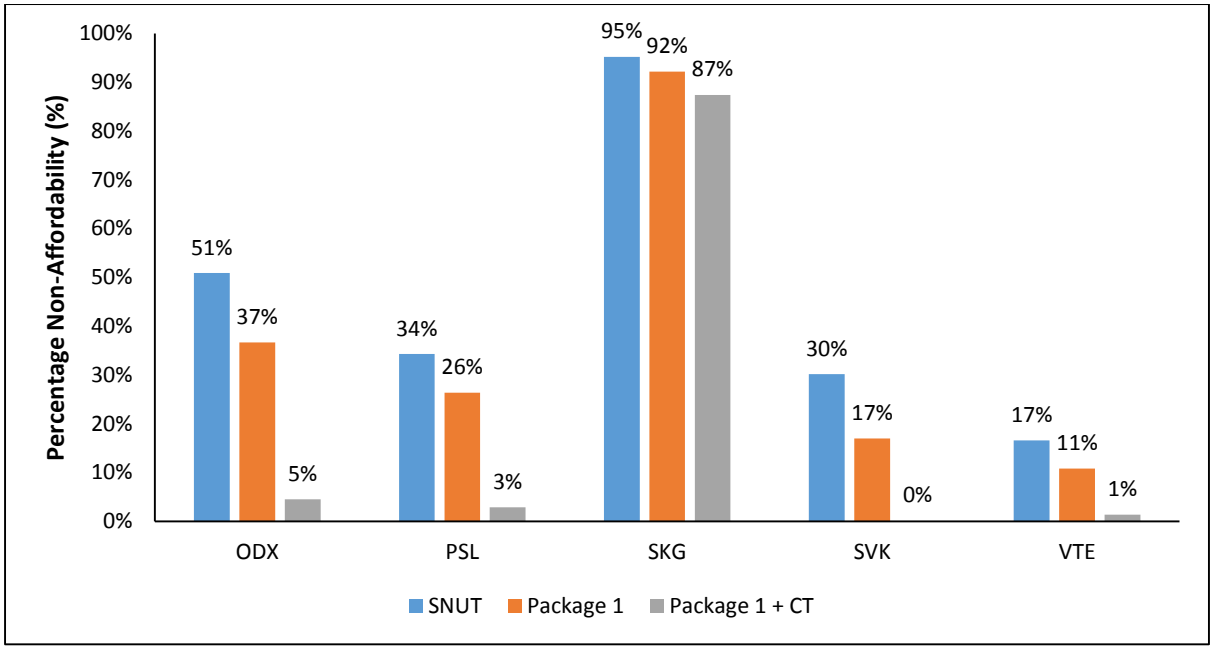


Figure 65: The impact on overall affordability of Package 1 (fortified foods) and a cash transfer of $45 per household per month in each province

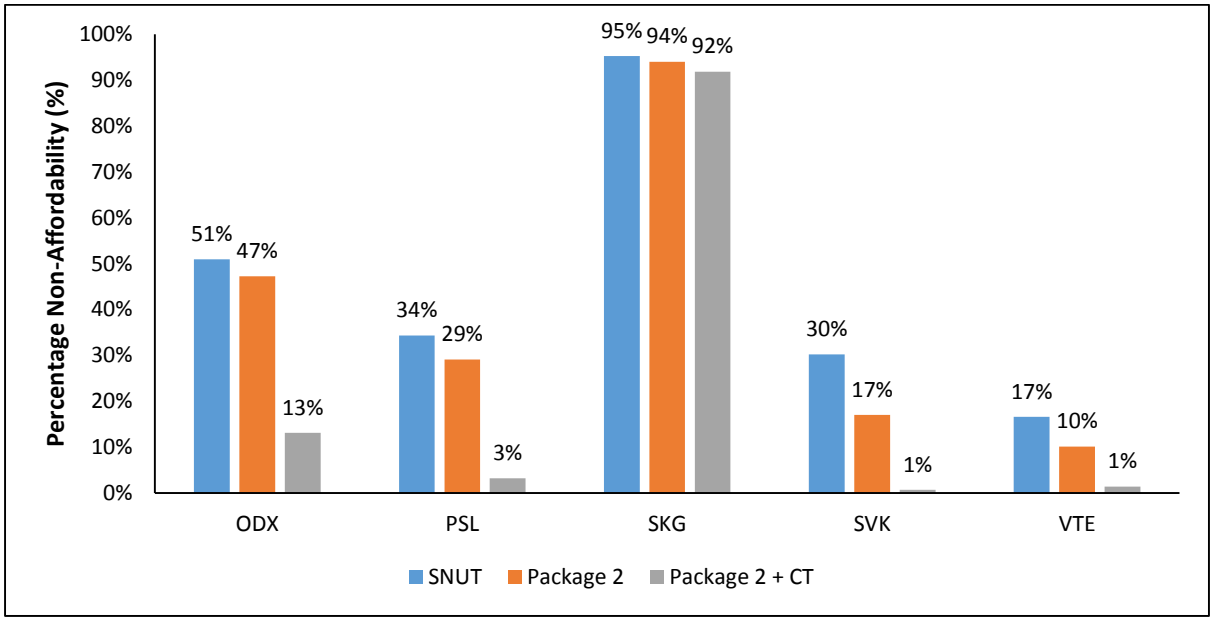


Figure 66: The impact on overall affordability of Package 2 (fresh foods) and a cash transfer of $45 per household per month in each province

Cost-Efficiency

In order to determine effectiveness of the interventions, it is important to also consider the costs of providing them. Some interventions might be highly effective in reducing the cost of the diet of an individual or a household but very expensive to provide, and it may ultimately be more efficient to provide a less expensive intervention that is slightly less effective at reducing household level costs. In order to understand which interventions are the most efficient, the monthly cost of providing the intervention was calculated for each individual and compared against the monthly cost of the diet

for that individual post-intervention. It should be noted that at the time of writing it was not possible to obtain good estimations of programming costs (e.g. logistics), so only the input costs of the intervention were assessed (i.e. the cost of the food/product)[36]. Only interventions provided through similar delivery modalities were compared to minimise the possibility that the programme costs will be very starkly different, though there will probably be some cost differences in reality.

Figure 67 displays the cost in each province of providing MNP and Nutributter for the child under 2 and the cost of the diet for this child post-intervention. As shown, Nutributter resulted in a lower cost of the diet in all provinces. However, Nutributter is a more expensive commodity than MNP. When this commodity cost was taken into consideration, MNP is shown to be slightly more cost-efficient in all provinces with the exception of Sekong. It should be noted that Nutributter addresses more of the key limiting nutrients for a child, such as calcium (which MNP does not contain), so this intervention has a greater nutritional impact than MNP. In Sekong, even when the cost of the product was considered, Nutributter still resulted in a lower cost as compared to MNP.

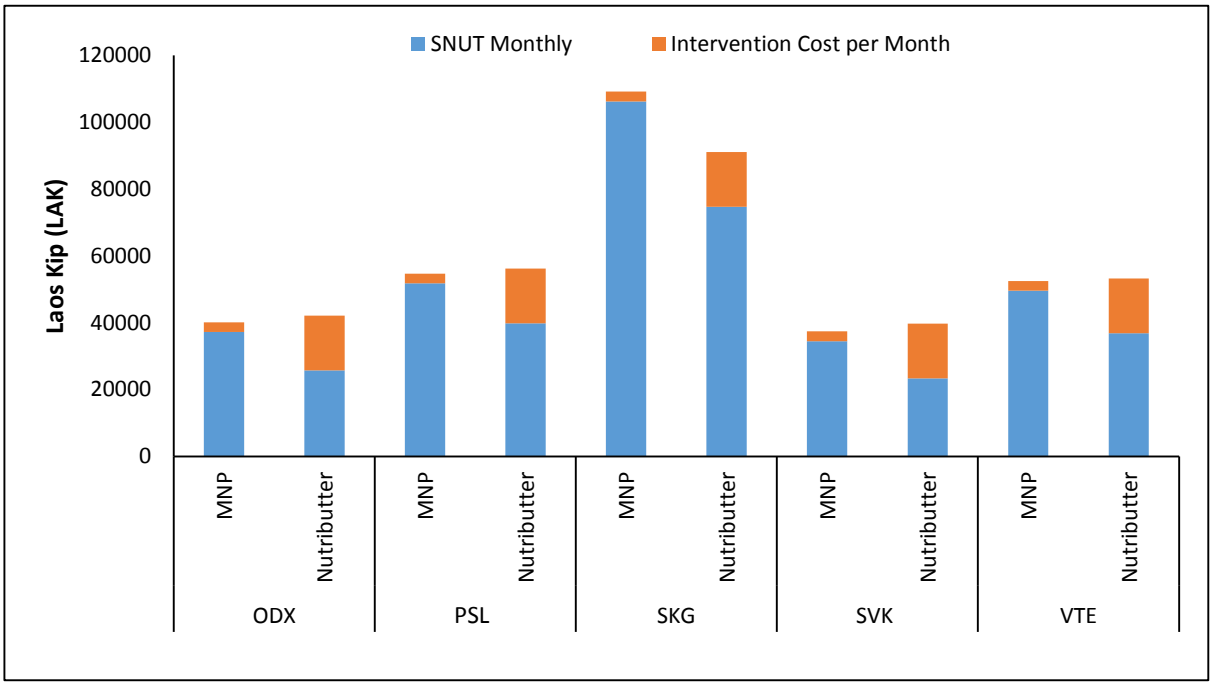


Figure 67: The cost of the diet of the child under 2 when food based interventions are provided (in blue) and the cost of the intervention per month (in orange)[37]

Figure 68 displays the cost in each province of providing energy bars and school feeding (including school gardens) for the school aged child and the cost of the diet for this child post-intervention. Energy bars were more effective than the school meals in reducing the cost of a nutritious diet for this child but the costs of providing the energy bars were far higher, so overall school feeding is shown to be more efficient at reducing costs in all provinces. Moreover, it is possible that school feeding would further reduce costs if fortified rice was included in the ration.

[36] We were unable to find costs in country for a MMT, so the cost was assumed to be the same as a MNP.
[37] Note that programming costs are not included, only the cost of the commodity itself.

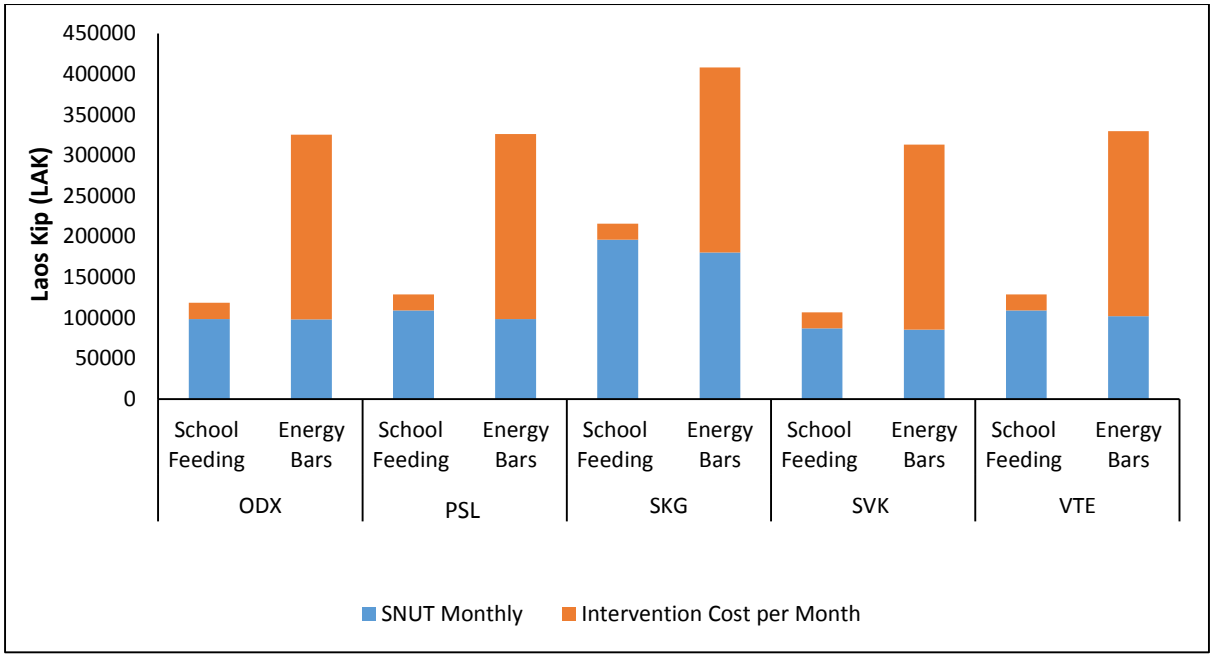


Figure 68: The cost of the diet of the school aged child when food based interventions are provided (in blue) and the cost of the intervention per month (in orange)[38]

The cost of interventions targeting the PLW and the cost of her diet post-intervention in each province is displayed in figure 69, with a more zoomed in version in Figure 71. When cost of the intervention is included, MMT appears to be the most efficient at reducing the cost of the diet of the PLW. In Phongsaly iron and folic acid tablets appear to display a similar efficiency to MMTs at reducing costs when the cost of providing the intervention is included. Energy bars and a voucher for fresh foods (calculated as the market prices of the foods provided in each province) are extremely expensive to provide, so even in provinces where these interventions were the most effective at reducing the cost of the diet (Vientiane and Phongsaly) they do not appear to be the most cost efficient overall.

Similarly, for the adolescent girl MMTs appear to be the most efficient at reducing the cost of her diet (figure 70). As was the case for the PLW in Phongsaly, iron and folic acid tablets and MMTs display similar efficiency at reducing the cost of the diet when the costs of provision are factored in. Furthermore, a voucher for fresh foods (calculated as the market prices of the foods provided in each province) is extremely expensive to provide, so even in provinces where this intervention was the most effective at reducing the cost of the diet (Vientiane and Phongsaly) it does not appear to be the cost efficient overall.

[38] Note that programming costs are not included, only the cost of the commodity itself.

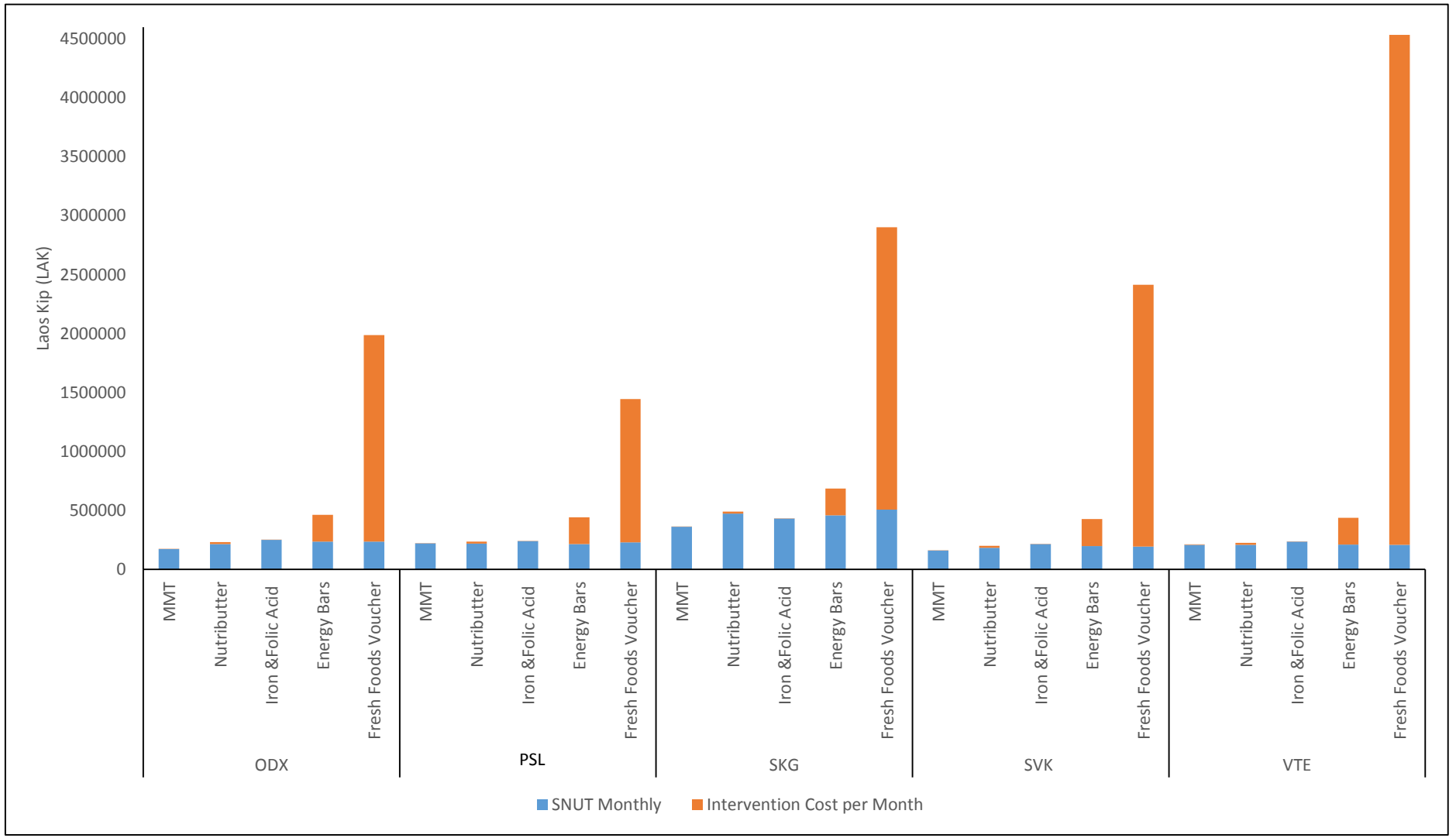


Figure 69: The cost of the diet of the lactating woman when food based interventions are provided (in blue) and the cost of the intervention per month (in orange)[39]

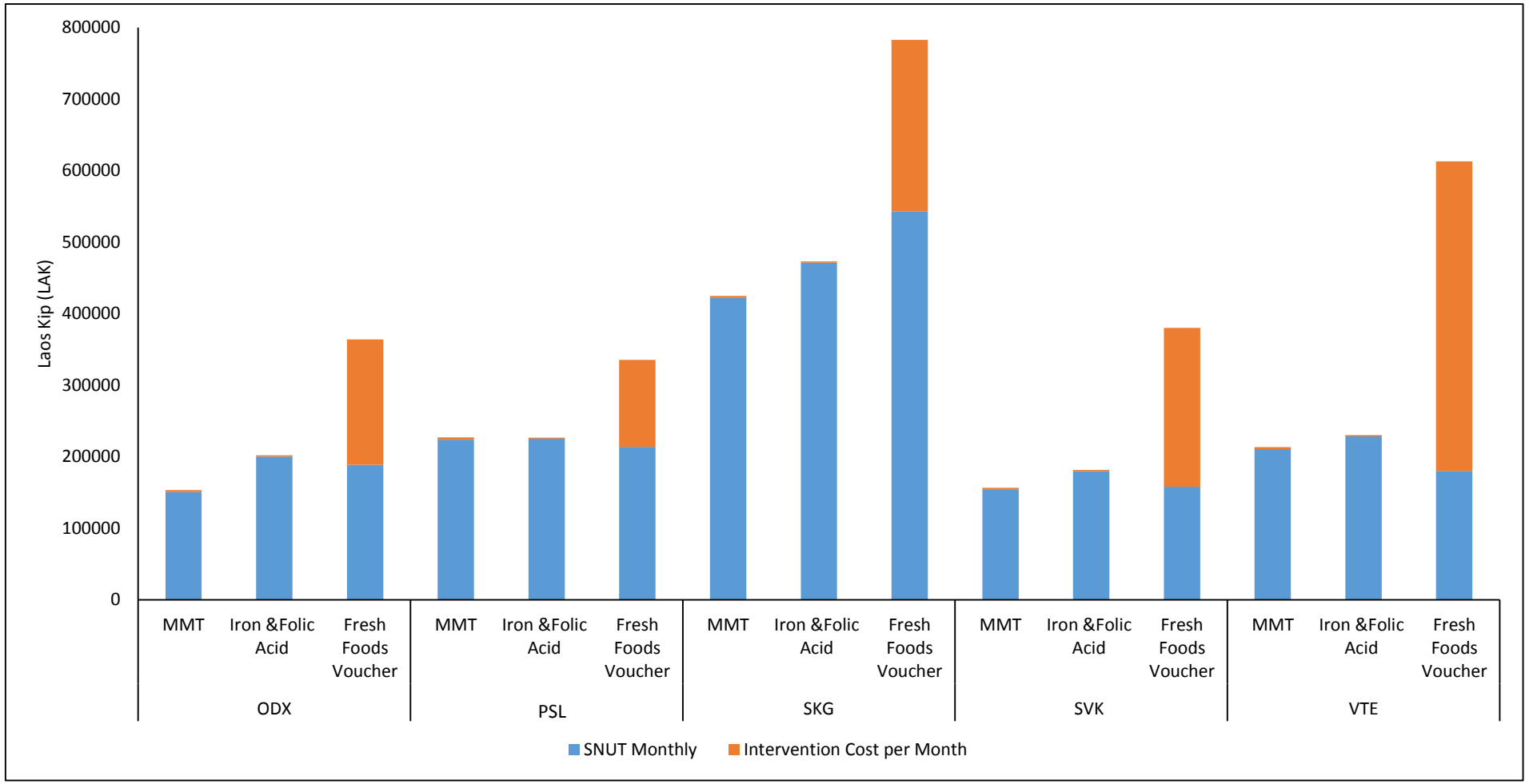


Figure 70: The cost of the diet of the adolescent girl when food based interventions are provided (in blue) and the cost of the intervention per month (in orange)[40]

[39] Note that programming costs are not included, only the cost of the commodity itself.

[40] Note that programming costs are not included, only the cost of the commodity itself.

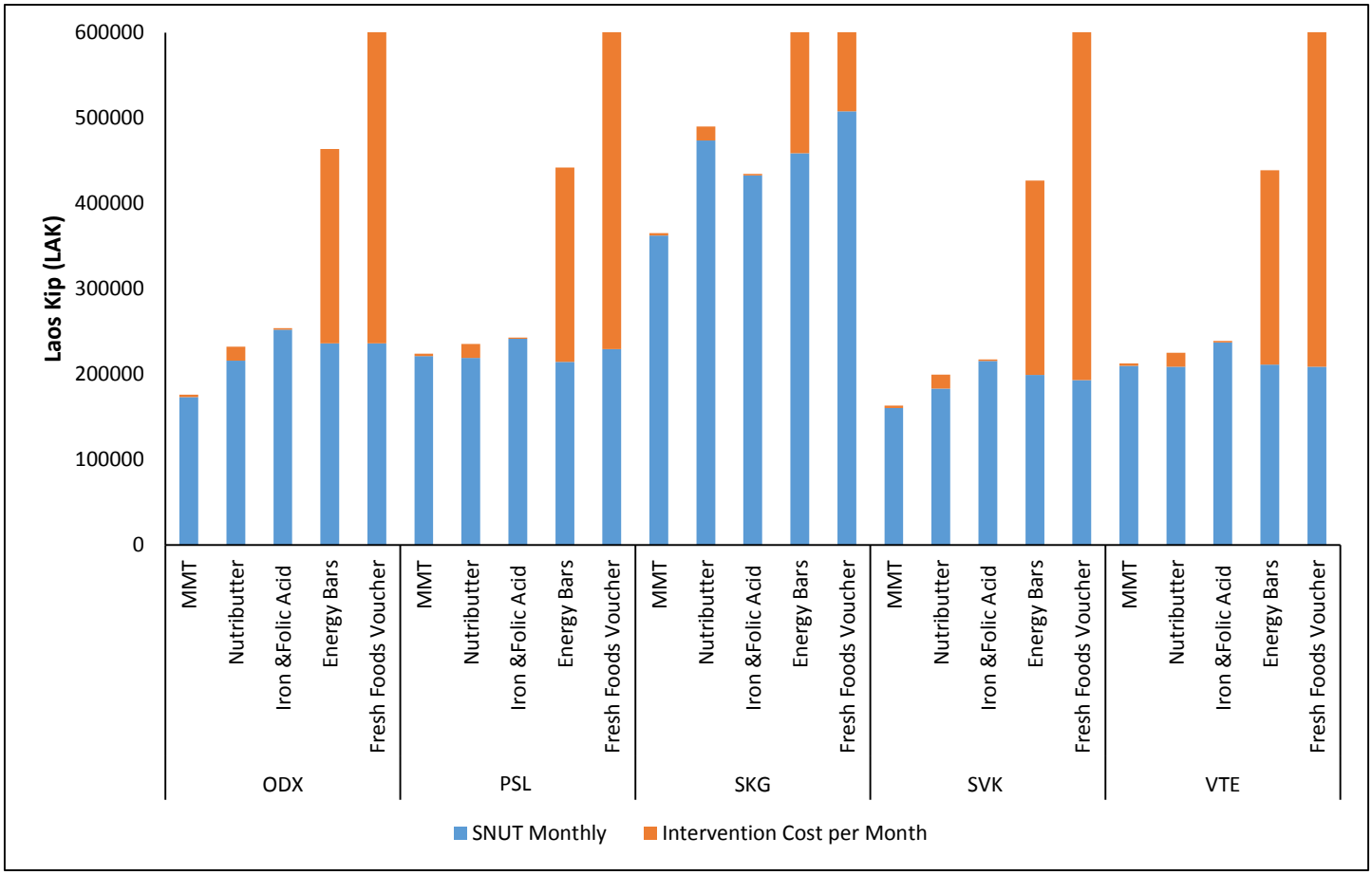


Figure 71: A ZOOMED in bar chart displaying the cost of the diet of the lactating woman when food based interventions are provided (in blue) and the cost of the intervention per month (in orange)[41]

Home gardening input costs were only available for vegetable production[42], so figure 72 displays the overall household cost pre-intervention and then post-intervention with these input costs included.

[41] Note that programming costs are not included, only the cost of the commodity itself.
[42] These costs were derived from figures provided from SNVs programming

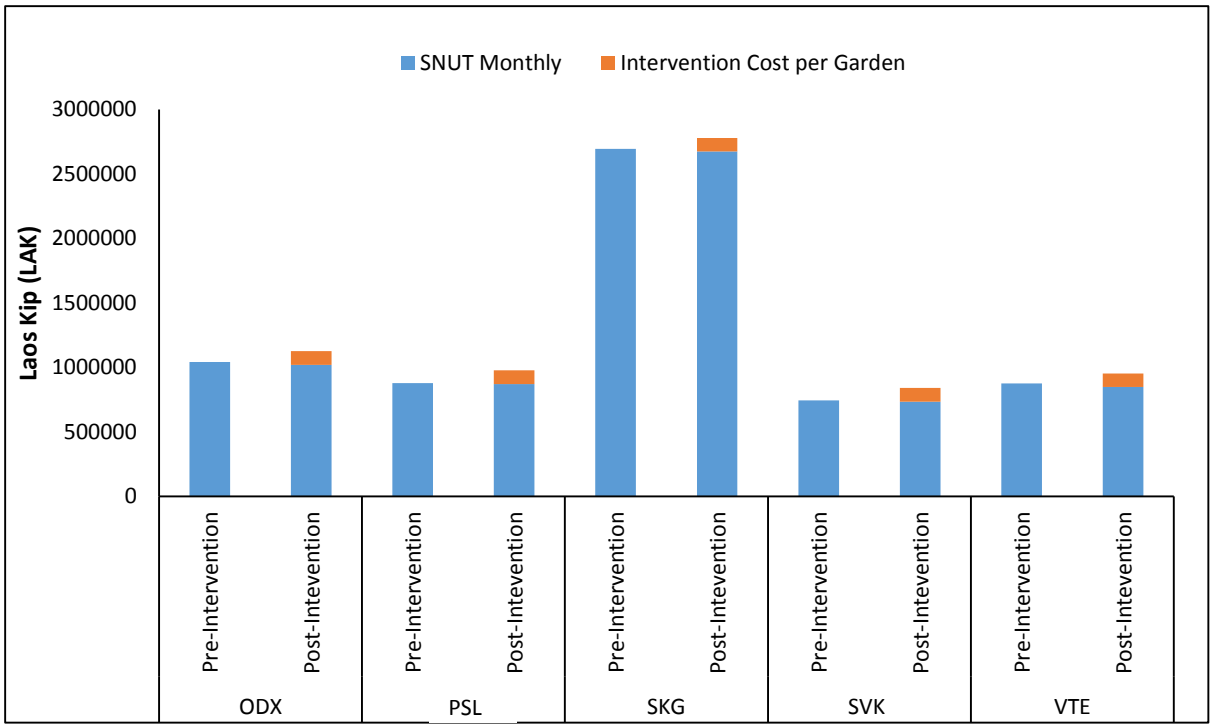


Figure 72: The cost of the diet of the household pre- and post- provision of a home gardening (vegetable production) intervention (in blue) and the cost of the intervention per month (in orange)[43]

These analyses serve to highlight from the target population's position, what type of interventions would be required to make a difference to their ability to access the nutrition they require. The costs to the public sector of providing these interventions would need to be estimated separately, as well as the most suitable distribution channels, programme eligibility criteria and support structure.

[43] Note that programming costs are not included, only the cost of the garden inputs.

Recommendations

The FNG analysis has identified the importance of improving availability and access to nutritious foods for key vulnerable groups and of increasing incomes, to ensure households can afford a nutritious diet. Recommendations on strategies to effectively address nutrient gaps in the identified target groups in Lao PDR were discussed during a multi-stakeholder workshop held in May 2017. During the workshop the key insights from the FNG analysis were presented to the stakeholders listed in Annex 1. Based upon plenary discussions after the presentation and a participatory group work activity led by key Ministry of Health and WFP Lao PDR staff, it was agreed that multi-sectoral and context specific interventions were required, reflecting the diversity of Lao PDR. The following recommendations were identified:

1. Increase the duration of exclusive breastfeeding for children aged 0-5 months and the demand for, availability of and access to nutritious and safe foods for children aged 6-23 months
2. Develop targeted strategies to improve the nutrient intake of adolescent girls
3. Develop targeted strategies to improve the nutrient intake of pregnant and lactating women
4. Explore food fortification strategies for new commodities
5. Ensure a combination of nutrition-specific and sensitive interventions across different sectors
6. Improve awareness and behaviours for a better nutrient intake through a communication for behavior change strategy
7. Maintain and expand political commitment
8. Establish a technical working group to translate the initial FNG recommendations into more detailed actions to be prioritized by different government sectors and stakeholders through specific investment/budget allocation
9. Conduct additional research to fill the identified data gaps

1. Ensure optimal duration of exclusive breastfeeding for children aged 0-5 months and the demand for, availability of and access to nutritious and safe foods for children aged 6-23 months

Nutrient needs vary by age group which necessitates targeted interventions. Children aged 0-5 months require early initiation and exclusive breastfeeding; this in turn requires that caregivers know the benefits of adequate breastfeeding practices and creating an enabling environment. Capacity building of health workers can help motivate communities to improve exclusive breastfeeding.

Women's necessity to return to work for income severely impedes their ability to exclusively breastfeed their children. Social and behaviour change communication (see more in recommendation 6) should promote the importance of exclusive breastfeeding and educate to women and their wider support network on the need for her to stay at home and breastfeed. A social safety net cash transfer scheme aimed at the first 1,000 days (see recommendation 5) in the short term and the enforcement of a

Statutory Maternity Leave and Pay Policy (see recommendation 7) in the long term and will support women to stay at home, bond with and breastfeed their children, without suffering income loss. Children aged 6-23 months require continued breastfeeding until 2 years or beyond and adequate dietary diversity and meal frequency using fortified commodities, to ensure adequate nutrient content in the diet. The results from the FNG analysis indicates that declining forest access and agricultural diversity, combined with high levels of non-affordability of a nutritious diet, may hinder the provision of nutritionally adequate diets to this key vulnerable group. It is therefore highly recommended that fortified complementary foods for this age group be developed in partnership with the private sector, either for in-kind distribution (through a social safety net), at a subsidised price, or for sale in local markets. The CotD analysis also shows that MNPs for home fortification could also have a positive impact in improving micronutrient intake for this age group. Social and behaviour change communication aimed at mothers and caregivers (see recommendation 6) should be undertaken to promote the use both of these products and of inexpensive local foods that are rich in essential nutrients, as highlighted by the CotD analysis.

A cash transfer scheme aimed at the first 1,000 days, perhaps with a conditionality requiring caregivers to attend cooking demonstrations, health centres or monthly health days, may also ensure that nutritious foods are purchased and fed to the child. In addition, a social enterprise scheme that encourages mobile food venders to blend (raw) or cook locally fortified porridges to sell, may also benefit mothers and/or caregivers who do not have the time to cook these foods at home. This model is currently being piloted in Cambodia by Plan International. Food fortification of foods for the general population would also be of some benefit for children of this age.

2. Develop targeted strategies to improve the nutrient intake of adolescent girls (10-19 years)

Adolescent girls have high and specific nutrient needs related to growth and menstruation and have been identified as a key target group for reducing stunting prevalence in Lao PDR, given that many women have given birth to their first child by the age of 18. The CotD analysis also highlighted that adolescent girls are especially vulnerable during pregnancy and lactation. Nutrition, family planning and sexual reproductive health programming should therefore be specifically tailored and targeted to this age group. Programming should aim to ensure that adolescent girls consume a diverse diet high in the inexpensive micronutrient rich foods identified by the CotD analysis. Fresh food vouchers could play an important role in this. Programmes targeted at this group should also highlight the importance of delaying marriage and pregnancy. Nutrition-specific interventions such as the provision of multi-micronutrient tablets (MMTs) or weekly iron and folic acid supplementation should also be scaled up throughout the country.

Multiple programming channels should be considered to reflect the diversity of this age group, including out-of-school and in-school girls, younger adolescents (10-14), and older adolescents (15-19). Recommendation 6 outlines the potential for schools as an entry point to provide in-school girls with supplements and nutritious (and fortified) meals, and to promote dietary diversity and reproductive health education. For girls not in school, social behaviour change and communication (see recommendation 6) that sensitises the general population on adolescent nutritional and reproductive health needs and issues should be prioritised. It is also recognised that health facilities should be better utilised to deliver education on nutrition. General food fortification would also benefit adolescent girls.

3. Develop targeted strategies to improve the nutrient intake of pregnant and lactating women

Pregnant and lactating women have high nutrient requirements related to pregnancy, lactation and, in the case of pregnant adolescents, their own growth. Specific needs for this group include adequate nutrient intake throughout pregnancy, knowledge of nutritional needs during pregnancy and lactation, knowledge of IYCF, access to good quality antenatal care (ANC) early and throughout the pregnancy, weight monitoring during pregnancy, obstetric care, birth spacing and family planning.

Nutrition specific interventions should deliver a combination of micronutrient supplements such as MMT (or iron and folic acid supplements) and balanced protein energy supplements[44] for women at risk of poor birthweight, as well as nutrition education and IYCF messages. Social safety net schemes (as mentioned in recommendation 5) that provide supplements, food vouchers or cash with an ANC conditionality are highly recommended to encourage attendance. In the case of adolescent pregnancies, ANC should be sensitive to the needs of adolescent girls. In addition, food fortification for the general population would also benefit women of reproductive age.

4. Explore food fortification strategies for new commodities

Other than salt iodisation and a small scale home fortification[45] programme for young children, food fortification in Lao PDR has been limited, although it is being considered as an important strategy for improving access to nutrients at a population scale.

Given the importance of rice in the diet, rice fortification has great potential to improve the micronutrient status of the population. Fortification of rice, the main staple, has great potential to improve micronutrient status. Supply of fortified rice to school meals programme could be a potential entry point for community sensitization. Noodles would also have potential, as would condiments such as oil, fish sauce and soya sauce, given their high consumption.
Producing local fortified complementary foods for children under the age of 2 years as well as a balanced protein energy supplement for PLW, for distribution via health centres or social safety net schemes or to sell in local markets, would be another important strategy to improve the access of nutrients for these two vulnerable groups.

Food fortification will require collaboration between the public and private sectors in order to set nutrient targets, formulate feasible standards and regulations and ensure food safety. It is recommended that the CotD analysis related to the limiting nutrients be referred to when prioritising nutrients to fortify. Although fortifying 100 percent of a commodity may not be feasible[46], it should be prioritised to the extent possible, particularly when it can reach the most vulnerable (e.g. food used for school meals, foods purchased by the poorer segment of the population or food distributed as part of a social safety net).

Conducting commodity landscape analyses to assess the food value chain is vital in identifying both opportunities to fortify and which consumers are reached by specific commodities (e.g. high versus lower quality rice). Considering specific contexts (e.g. urban, rural, remote) with combinations of market based and public sector channels (food assistance/social protection, community health facilities) is important in identifying appropriate entry points.

[44] Such as the energy bars modelled in the CotD analysis
[45] 1000 Days 'SuperKid' MNP project
[46] Particularly for rice, as households produce enough to meet their own consumption needs

5. Improve awareness and behaviors to improve nutrient intake through a communication for behavior change strategy

The recommendations made for interventions and programming within this section must be underpinned by a strong behaviour change communication strategy, which is currently in the process of being developed in Lao PDR. The results of the FNG analysis suggest that communities should be sensitised to the following in particular:

- The importance of adequate nutrition during the life cycle, particularly for key vulnerable groups such as children under the age of 2 years, adolescent girls and PLW
- The importance of dietary diversity: reducing the consumption of rice and increasing the consumption of the foods identified by the CotD analysis. This should aim to increase the demand of these foods, which should be supplied with support from the agriculture sector (see recommendation 5).
- The importance of fortified foods for vulnerable groups: this should aim to increase demand for these foods, which should be developed and supplied with support from the private sector
- The importance of feeding young children healthy snack foods, such as fruit, as opposed to processed foods such as biscuits, crisps and candy that are high in salt, sugar and trans fat
- The importance of food safety when and storing and preparing foods (particularly for children under the age of 2 years)
- The importance of women reducing their strenuous physical activity during pregnancy
- The potential harm that the food restrictions practiced by women postpartum may have on their nutritional status as well as their child's, particularly if these restrictions decrease the duration of exclusive breastfeeding
- WASH messaging such as hand washing and latrine use

The target groups should include adolescents, PLW, other caretakers, men (as household heads and decision-makers) and other key influencers such as community leaders and school teachers.

During the multi-stakeholder dissemination workshop, the following entry points for communication messaging were discussed:

- Mass media of all types
- Schools
- Women's union
- Social protection schemes

Other community entry points could be further explored, such as using smallholder farmer trainings to incorporate key messages related to nutrition and crop diversity.

6. Ensure a combination of nutrition-specific and sensitive interventions across different sectors

In addition to nutrition-specific interventions, multi-sectoral collaboration is required to enhance impact, including throughout the food system and by adding additional delivery platforms, and to address underlying and basic factors that affect nutrition. This was a key message from the multi-

stakeholder workshop. During the workshop the following recommendations were made and the following key entry points identified: health, education, agriculture, social protection, and infrastructure.

- Health:
    - Improve the coverage of micronutrient supplementation (vitamin A, iron or iron and folate and MMTs) where relevant for the key target groups (children under 5 years, adolescent girls, and PLW)
    - Increase awareness of the importance of adequate nutrient intake requiring a diverse, nutritious diet, including fortified commodities for children under 2 years of age
        - Build capacity of local health staff to deliver nutrition education and IYCF messages
        - Consider developing a community cooking demonstration programme, where women are shown how to cook nutritious meals for their children and family using locally available and affordable foods (as identified by the CotD analysis)
    - Link food and health systems, through providing vouchers for specific nutritious foods available in the market (such as fortified and/or fresh foods) for key vulnerable groups (i.e adolescent girls and pregnant and lactating women)
    - Reduce the incidence and severity of illness through the provision of timely vaccinations and effective Water, Sanitation and Hygiene (WASH) programing, especially in rural settings.
    - Ensure services are adolescent friendly

- Education
    - Continue and expand the school lunch programme and support communities to manage its implementation in the future
    - Add nutritional outcomes as an aim of the school lunch programme and increase the diversity and the nutrient quality of the meals provided by:
        - Supporting schools to grow school gardens and raise small animals such as insects, fish and frogs. Supporting improved water access for schools will be essential for this.
        - Exploring the possibility of processing tofu as a rich source of essential nutrients
        - Providing fortified foods such as rice or using MNP for point-of-use fortification
    - Ensure that school meals are cooked in a clean and safe environment
    - Use schools as an entry point to provide MMTs, MNPs or iron and folate supplements to adolescent girls who still attend
    - Limit or ban the sale and consumption of processed snack foods in and around schools (such as crisps, biscuits, crackers and candy) and promote healthy snacks such as fruit and vegetables
    - Integrate nutrition and reproductive health into the national curriculum, either within general knowledge, biology or gender classes. For adolescents (both boys and girls), hold cooking and nutrition song competitions as well as peer to peer learning where girls can share the impact of early marriage and pregnancy.

- Agriculture
    - Support households to diversify the foods grown or raised from predominantly rice to vegetables, fruits, small and medium sizes animals, fish and insects. This support would also include improving land access and management, as well as irrigation facilities, pest control and food storage.
    - Establish a food processing group as an income generating activity for women to preserve nutritious foods through traditional techniques such as drying and fermenting

- Strengthen the links between the farmer and the market through the involvement of the commercial and private sectors
- Monitor household level access to NTFPs with regards to both quantity and diversity. Undertake programmes that protect and preserve forests and the wildlife and foods within them.
- Ensure nutrition sensitive agriculture is defined in District Development Plans

- Social protection:
    - Currently there are limited social safety net schemes within Lao PDR. The CotD analysis highlights the importance of increasing incomes and access to nutritious foods, and social protection schemes could be an important short or long term mechanism for this. Possibilities include the use of cash transfers and/or vouchers for nutritious foods or supplements.
    - These schemes could comprise, for example: a one-off cash payment aimed at livelihood investment; a monthly cash payment and/or voucher for nutritious foods during a particularly vulnerable period of the life cycle, such as the first 1,000 days; or a subsidy for nutritious foods for the poorest households. The schemes developed should be sustainable, context-specific and aimed at the most vulnerable households.
    - Entry points include the health system and schools, with support from the private sector to support fortification or supply fortified products or home fortificants

- Infrastructure:
    - The secondary research review suggests that rural households without access to roads are particularly vulnerable to high levels of stunting and poor dietary diversity. Improving road infrastructure and physical access to markets, as well as the transportation and trade of goods, should be prioritised.

7.

8. Maintain and expand political commitment

Although there is high level political commitment for nutrition, as evidenced by the development of the National Nutrition Strategy to 2025 and Plan of Action (NNSPA) for 2016-2020, these policies must be implemented at all administrative levels, which still be further strengthened in Lao PDR. The following recommendations were made during the multi-stakeholder workshop:

- Disseminate the NNSPA to relevant agencies at the provincial and district levels
- Develop and implement a Social and Behaviour Change Communication Strategy
- Determine the vision for nutrition for the years 2020 to 2030
- Establish legislation to regulate and ensure nutritious and safe food in school

The following actions are also recommended, based upon the secondary data review:

- Develop a statutory maternity pay and leave policy, aimed at all women in employment, so that they can prioritise caring for, bonding with and exclusively breastfeeding their infants for the first 6 months of life, instead of returning to work early
- Develop a national fortification strategy and ensure nutritional quality and food safety of processed foods through development of standards and appropriate regulation, and adequate monitoring by authorities.

9. Establish a technical working group to translate the initial FNG recommendations into more detailed actions to be prioritized by different government sectors and stakeholders through specific investment/budget allocation

The multi-stakeholder dissemination meeting garnered thoughtful discussions, this was seen as the first step in understanding and using the FNG analysis to develop policies and strategies in Lao PDR.

The next step would be to establish a technical working group, which includes the Ministry of Health, the SUN Business Network and development partners to translate the initial FNG recommendations into more detailed short, medium and long term actions to be prioritized by different government sectors[47] and national stakeholders, and be translated into specific investment/budget allocation.

10. Conduct Additional Research to Fill Data Gaps

The FNG secondary review has revealed gaps in the data and information available within the context of Lao PDR. It is therefore recommended that additional research is undertaken on the following:

1. Micronutrient status of key vulnerable groups and anaemia prevalence: Currently data on the prevalence of anaemia in children under 5 years and PLW has only been published for 5 provinces as part of the 2016 Food and Nutrition Security Survey. The results indicated that anaemia prevalence could be fairly high nationally, reflecting the potentially poor quality diets that these vulnerable groups are consuming. Published data on anaemia in women of reproductive age was not found. Data regarding the micronutrient status or micronutrient deficiencies of key target groups is also limited. It is therefore recommended that anaemia data be collected during the next Demographic and Health Survey. It is also recommended, if resources allow, that a micronutrient survey be undertaken as part of the Demographic and Health Survey to identify the iron, vitamin A, calcium, folate, vitamin B12 and iodine status of children under the age of 5 years, women of reproductive age and pregnant and lactating women.

2. Minimum Dietary Diversity and Minimum Acceptable Diet for children under 2 years: Currently data on these two indicators have only been published for 5 provinces as part of the Food and Nutrition Security Survey (Ministry of Health & Ministry of Planning and Investment 2016). It is recommended that these indicators are included in the next Demographic and Health Survey to provide more information regarding the diets of this key target group at the national and subnational levels.

3. Minimum Dietary Diversity score for Women: This is a relatively new indicator for which data was collected within the 2016 Food and Nutrition Security Survey for 5 provinces (Ministry of Health & Ministry of Planning and Investment 2016). It is recommended that this indicator be included in the next Demographic and Health Survey, to provide more information on the diets of this key target group at the national and subnational levels.

4. Information regarding adolescent girls: The FNG research identified adolescent girls as a key target group for reducing stunting prevalence, given that a high number of women have given birth to their first child by the age of 18. Currently there is very little information on the micronutrient status of adolescent girls, the quality and diversity of their diet, or their access and to health services during pregnancy. It is recommended that formative research on these data gaps be conducted in provinces that have the highest rate of adolescent pregnancy.

5. Data on the increasing consumption of manufactured snack foods: Research and anecdotal evidence suggest that the consumption of packaged snack foods such as cakes, cookies, biscuits and crisps are

[47] Through continued interministerial collaboration

increasing in Lao PDR, particularly among children aged 6-59 months. It is recommended that further research be undertaken to understand the reasons why mothers and/or caregivers are providing these foods to their children, whether they know that these foods are not nutritious and the market prices of these foods. It is also recommended that these results, in conjunction with current trends in malnutrition and infant and young child feeding practices provide an impetus for discussions with manufactures to propose the development of healthier snack alternatives aimed at this age group.

6. Data on the price, nutrient content and safety of complementary foods: The secondary research and CotD market survey suggest that availability of fortified complementary foods is limited in Lao PDR. However there was anecdotal evidence provided by a stakeholders that women are making complementary foods and selling them on the market. More information is needed to understand what these foods are, their prices, how they are being prepared and how often children receive them.

- Establishment of a nutrition surveillance system and continue capacity building efforts for Government in data collection and analysis, in line with the 'Three Build'[48] directive

7.

[48] A policy that decentralises public administration and the development of targeted villages

Annex 1: Stakeholder Consultations for Fill the Nutrient Gap

Fill the Nutrient Gap Inception Workshop Participants	Sector
Vice Minister of Ministry of Health (MOH)	Government
Deputy Director General of Department of Hygiene and Health Promotion (MOH)	Government
Staff from Department of Hygiene and Health Promotion (MOH)	Government
Staff from National Institute of Public Health (MOH)	Government
Staff from National Nutrition Center (MOH)	Government
Vientiane Capital Health Department (MOH)	Government
Cabinet of Ministry of Health (MOH)	Government
Department of International and Cooperation (MOH)	Government
Mother and Child Health Centre (MOH)	Government
WASH (MOH)	Government
Center of Information and Education for Health (MOH)	Government
Food and Drug Department (MOH)	Government
Ministry of Agriculture and Forestry	Government
Ministry of Education and Sport	Government
Ministry of Planning and Investment	Government
Ministry of Industry and commerce	Government
Lao Women's Union (LWU)	NGO
Ministry of Labor and Social Wellfare	Government
WFP	UN
UNICEF	UN
FAO	UN
WHO	UN
Save the Children	NGO
Plan International	NGO
Care	NGO
World Vision	NGO
SNV	NGO
SUN Civil Society Alliance	NGO
World Bank	Donor
European Union	Donor
United States Embassy	Donor
Singapore Embassy	Donor
Australian Embassy	Donor
Asian Development Bank	Donor
Phongsaly Provincial Health Office	Government
Oudomxay Provincial Health Office	Government
Savannakhet Provincial Health Office	Government
Sekong Provincial Health Office	Government

Follow-up Stakeholder Consultations	Area(s) of Interest
UNICEF	SBCC strategy and nutrition programming
Save the Children	SBCC strategy and nutrition programming
World Bank	Nutrition and agriculture programming
UNFPA	Adolescent nutrition and potential program activities
Lao-American Nutrition Institute	Possibility of informing nutrition curriculum from FNG results
National Institute of Public Health	Factors relating to poor nutrient intake
Population Services International	Special nutritious foods and multiple micronutrient supplements
SNV	Nutrition and agriculture programming
FAO	Agriculture programming

Annex 2: Current and Recommended Practices for Infant and Young Child Feeding in Lao PDR

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
Children ever breastfed: recommended	96 percent	97 percent		
Early initiation of breastfeeding: recommended within 1 hour of birth	39 percent (70 percent breastfed within 1 day)	62 percent (87 percent within 1 day)	• Some new-borns wait for up to 3 days before having their first breast meal. Existing belief that colostrum is harmful, bad for infants "Dirty milk" that should be discarded • Wealthier mothers tend to practice early initiation and feed colostrum to their infants Women who seek out TBAs for assistance at delivery will be least likely to observe early initiation	• Early initiation of BF most prevalent among mothers with higher education, those who receive ANC and those who deliver at a health facility • Widespread belief that colostrum is harmful and that it is normal for white milk not to appear for 2-3 days after birth • Distance of homes from the health facility influences giving colostrum to new-borns. • Mothers do not feed colostrum because: "is not real milk", "is hot, dirty, sour or bad tasting" and "is tradition not to give it" • Practices to "get breasts ready for breastfeeding include: showering both mother and baby so that they were both 'clean' and massaging the breasts to encourage creation of a hole in the nipple for the milk to drain through

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
Pre-lacteal feed: not recommended	33 percent receive pre-lacteal feeds	14 percent receive pre-lacteal feeds	• One third of infants below 6 months of age are given pre-lacteal feeds: water, rice water, formula, diluted condensed milk, pre-masticated sticky rice commonly given • Pre-lacteal feeds are introduced from as early as the first day of life • Mothers need to go back to work, unable to breastfeed regularly • Infants left in the care of grandparents who give them pre-lacteal feeds • Breastmilk insufficient for babies' needs → crying used as validation that baby has not received enough milk, need to be supplemented with rice	• Pre-lacteal feeding more common when traditional birth attendant present at birth compared to a professional skilled attendant, or even when assisted by an untrained family or friend. • Children born in public health facilities are less likely to receive pre-lacteal feeds (compared to out of facility births). Pre-lacteal foods include water, pre-masticated glutinous rice, masticated rice or water

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Exclusive breastfeeding: recommended for the first 6 months	40 percent	55 percent	• Mothers do not believe that infants do not need water, rice or other forms of milk to supplement breastmilk	• Breastfeeding rates are high, but among most populations, EBF for 6 months is not commonly practiced, with the exception of Hmong-Yao children exclusively breastfed until 4-6 months. • Barriers to EBF include returning to work, another pregnancy, and insufficient breastmilk. Support for breastfeeding is uncertain; only one-third of mothers receive advice or assistance with breastfeeding when they begin nursing. • Older women in the family and health care providers are sources

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
				of information on EBF and infant feeding. Lao mothers are highly influenced by their relatives in the decision-making process for/against breastfeeding, more so than health personnel.
Predominant breastfeeding < 6 months: in addition to breastmilk, the child may receive liquids, ritual fluids and oral rehydration salts, drops, or syrups	68 percent	70 percent		
Continued breastfeeding at 1 year: recommended	73 percent	78 percent	• Babies are breastfed on demand, across all ethnic groups but mothers' need to return to work is main reason to stop continued breastfeeding and introduce complementary feeding. • Mothers' desire to cease food restriction is another barrier to continued breastfeeding: ceasing	• Rural women continue breastfeeding longer than urban women. • Women state economic reasons for breastfeeding and that it is the best they could do for their baby. • Continued breastfeeding is affected by the need for mothers to return to work.

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
Continued breastfeeding at 2 years: recommended	40 percent	44 percent	breastfeeding is one way to introduce 'regular' food back into the diet • "Breastmilk is no longer good, loses its nourishment after 1 year" • Mother is pregnant again • Elders/Grandparents advocate for early weaning, introduces solids or non-breastmilk liquids to children while caring for them	• In the absence of the mother, caregivers provide masticated rice and water, and in some cases canned or powdered milk.
Duration of breastfeeding (months): recommended until 2 years of age or beyond	Any: 20 Exclusive: 3 Predominant: 9	Any: 20 Exclusive: 3 Predominant: 5		

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
Age-appropriate breastfeeding (0-23 months): exclusive breastfeeding is appropriate from 0-5 months of age, and breastmilk with solid, semi-solid or soft foods is appropriate from 6-23 months of age	37 percent	56 percent		
Introduction of solid, semi-solid or soft foods (6-8 months): recommended at 6 months of age	52 percent (higher in non-breastfed children)	76 percent	• Instances of late introduction of complementary feeding • Parents believe children are unable to digest foods before 12 months of age • Withhold feeding till child is at least 9 months old	• Children with educated mothers are more likely than children of non-educated mothers to be introduced to CF at the appropriate age. • Commonly introduced foods are rice and sugar and pre-masticated/mashed sticky rice. • Mothers report introducing foods early due to having to return to work. • Some parents use developmental milestones to decide when to initiate extra feeding.

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
Minimum meal frequency: solid, semi-sold or soft foods recommended twice per day for breastfeeding children 6-8 months and 3 times per day for breastfeeding children 9-23 months. For non-breastfeeding children 6-23 months, minimum meal frequency is 4 times per day.	43 percent (higher for non-breastfed children	67 percent	• Children not fed on demand, trained to eat 'on time' with the rest of the household • Some children receiving only 2 meals a day • Diets lack variety, food intake insufficient in quantity and quality • Children usually fed sticky rice. If soup is eaten, the broth and not the meat or vegetable is given to the child • Low consumption of fruits, vegetables, fat • Lack of variety and insufficient quantity fed to children possibly due to lack of knowledge of what to feed children, and how much to give them to eat • Rice is pre-masticated then fed to children – raises issues of hygiene • Parents belief that children know when and how much to eat • Mothers/Caregivers will stop feeding if child stops eating or refuses food • Child will be fed if he/she grabs at food or starts crying	• CF starts with consuming a rice porridge and then parents gradually introduce other foods, such as small pieces of barbecued fish or meat. • Consume mainly rice with some vegetable and small fish • Mothers provide meat with rice soup, and steamed mash bananas. Consume meat, but more likely to consume fish. • Children are fed more often than adults, although it is often up to them to demand food. If they did not want to eat, parents described trying to coax them, threatening them or giving up and buying candy • Feeding frequency, dependent on mother's workload, particularly when mothers are working in the field away from the house. • Children consume mainly rice with some vegetable and small fish. • When food is scarce children may only consume rice • Children from urban areas, with wealthy parents and educated mothers had the highest

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
			• But parents recognise that children need to eat particular foods to support growth	proportion of children meeting minimum dietary diversity • Some parents report waiting until 1 year of age to introduce more diverse foods, such as fruit due to lack of knowledge on how to prepare them for younger children • Lack of knowledge and awareness of foods to prepare for special meals for children affects food choices
Minimum dietary diversity: foods from at least 4 out of 7 food groups recommended (1. Grains, roots, tubers; 2. Legumes and nuts; 3. Dairy; 4. Flesh foods' 5. Eggs; 6. Vitamin A-rich fruits and vegetables; 7. Other fruits and vegetables)		29 percent	•	•

Feeding practices and WHO/UNICEF recommendations	**LSIS 2011/2012**	**FNSS 2015** (averaged across the 5 provinces surveyed)	**Overview: Assessment of current maternal, infant and young child nutrition practices in Lao, PDR** (UNICEF 2017)	**A Literature Review: Maternal, Infant and Young Child Nutrition and WASH Practices in Lao PDR** (USAID Nurture 2016)
Minimum acceptable diet: recommended minimum dietary diversity and minimum meal frequency for breastfed children, and an additional (uncounted) 2 milk feedings per day for non-breastfed children		16 percent	•	•

Annex 3: Assumptions for Modelling and Costing

Modality	Food Based Intervention	Target Group	Dosage/ Portion Size (g)	Frequency	Price Modelled (LAK)	Cost of Commodity (1 unit)
Voucher or in-kind	Multi-micronutrient tablet	PLW	1	1 tablet/ day	0	N/A
		Adolescent girl				
	Iron + folic acid supplement	PLW	1	1 tablet/ day	0	0.0071 USD
		Adolescent girl				
	Nutributter	PLW	20	1 sachet/ day	0	0.07 USD
		Child under 2				
	MNP (SuperKid)	Child under 2	1	3 sachets/ week	0	0.03 USD
	Energy bars	School aged child	105	5 bars/ week	0	
		PLW				
	ASF + vegetable	Adolescent girl	Egg: 40	4 portions/ week	0	
			Fish: 62.5			
		PLW	Leaves: 125			
Market	Fortified rice	Household	ODX: 2,338	1 portion/ day	538.74/100g	
			PSL: 1,916		697.30/100g	
			SKG: 2,144		739.50/100g	
			SVK: 1,383		523.59/100g	
			VTE: 1,192		627.92/100g	
	Fortified oil	Household	ODX: 220	1 portion/ day	1,665.17/100g	
			PSL: 204		2,025.12/100g	
			SKG: 264		2,270.04/100g	
			SVK: 81		1,967.39/100g	
			VTE: 90		2262.90/100g	
	Fortified rice and fortified oil combination	Household	As above			
	Snack foods	Child under 2	Wheat cracker: 20	2 portions each/ week	3,859/100g	
			Crisps: 22		10,251/100g	
			Wafers: 25		1,111.11/100g	
	School meals	School aged child	Rice: 100	5 portions/ week	0	
			Oil: 10			
			Long bean: 20			
			Green leafy vegetable: 20			

Table 1: Modelling assumptions and costing for voucher/in-kind and market interventions

Note for fortified foods the software was free to select as much as it would like within the constraints outlined in the frequency columns. The different dosages reflect the amount of each commodity selected by the software within these constraints.

Province	Food Based Intervention	Target Group	Food Grown/Raised	Portion size (g/week)	Price Modelled (LAK)	Cost of Commodity
ODX	Vegetables	HH	Pumpkin	344	0	13 USD per garden
			Green bean	223		
			Cabbage	327		
			Chinese kale	327		
			Lettuce	327		
PSL	Vegetables	HH	Green bean	223	0	13 USD per garden
			Long bean	223		
			Pumpkin	344		
			Morning glory	327		
			Lettuce	327		
SKG	Vegetables	HH	Pumpkin	344	0	13 USD per garden
			Cabbage	327		
			Onion	258		
			Morning glory	327		
			Lettuce	327		
SVK	Vegetables	HH	Cabbage	327	0	13 USD per garden
			Pumpkin	344		
			Tomato	103		
			Lettuce	327		
			Eggplant	258		
VTE	Vegetables	HH	Cabbage	327	0	13 USD per garden
			Pumpkin	344		
			Eggplant	258		
			Chinese kale	327		
			Long bean	223		
All provinces	Small animals	HH	Egg	274	0	Not known
			Frog	344		
			Small fresh fish	172		
	Fruit	HH	Banana	189	0	Not known
			Mango	189		
			Jujube	103		

Table 2: Modelling assumptions and costing for home gardening interventions

Annex 4: Further Correlations with Expenditure

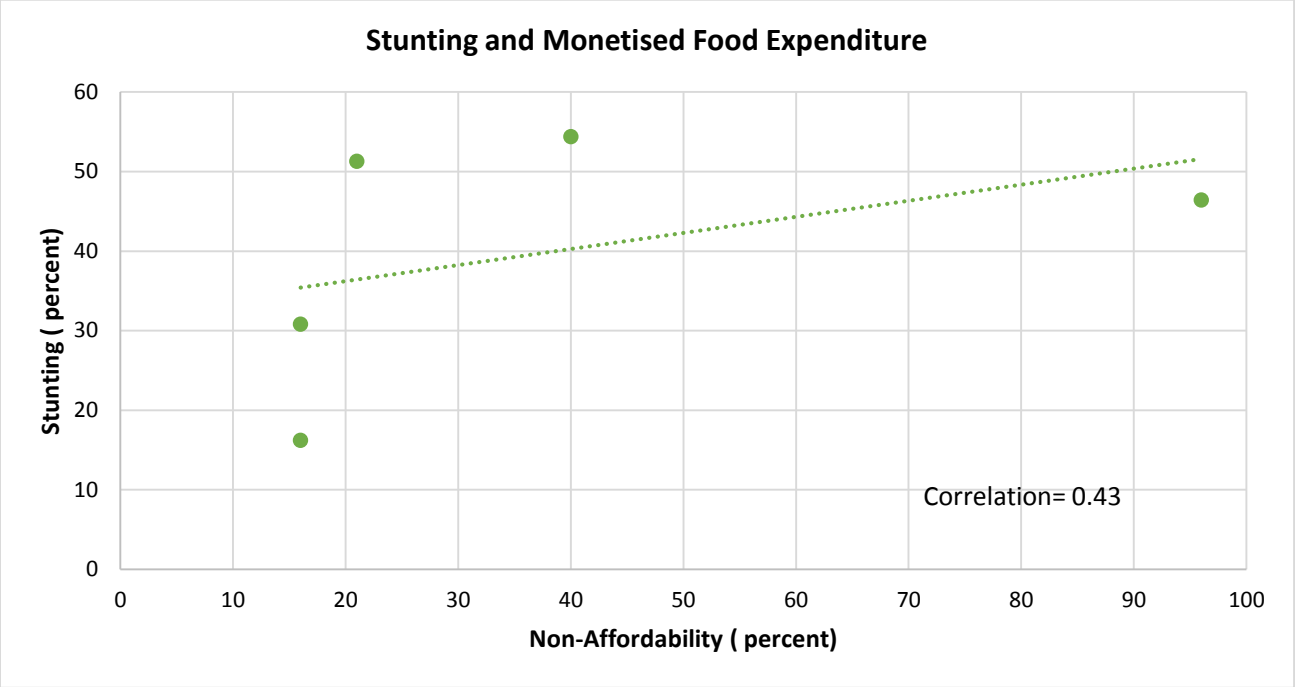


Figure 1: The correlation between stunting and non-affordability of a nutritious diet (calculated using actual food expenditure where foraging and own-production is monetised)

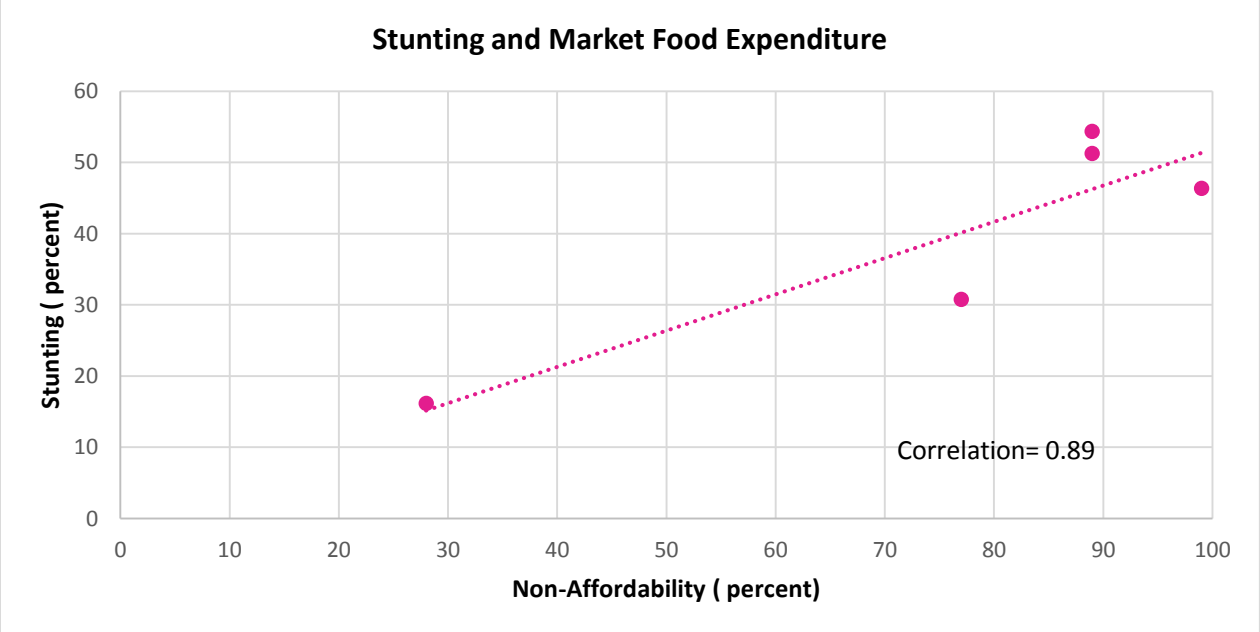


Figure 2: The correlation between stunting and non-affordability of a nutritious diet (calculated using actual market food expenditure)

Annex 5: Composition of Fortified Rice and Fortified Oil Modelled

	Per 100g
Energy (kcal)	361.6
Protein (g)	6.7
Total Fat (g)	0.6
Retinol Activity Equivalent (µg retinol)	150.2
Vitamin C (mg)	0.0
Vitamin B1 (mg)	0.6
Vitamin B2 (mg)	0.1
Niacin Equivalent (mg)	9.4
Vitamin B6 (mg)	0.7
Folate (µg)	221.0
Vitamin B12 (µg)	1.0
Pantothenic Acid (mg)	1.1
Calcium (mg)	8.0
Iron (mg)	1.0
Magnesium (mg)	36.0
Zinc (mg)	1.7

Table 1: Composition of fortified rice modelled

	Per 100g
Energy (kcal)	880.6
Protein (g)	0.0
Total Fat (g)	100.0
Retinol Activity Equivalent (µg retinol)	720.7
Vitamin C (mg)	0.0
Vitamin B1 (mg)	0.0
Vitamin B2 (mg)	0.0
Niacin Equivalent (mg)	0.0
Vitamin B6 (mg)	0.0
Folate (µg)	0.0
Vitamin B12 (µg)	0.0
Calcium (mg)	0.0
Iron (mg)	0.0
Magnesium (mg)	0.0
Zinc (mg)	0.0

Table 2: Composition of fortified oil modelled

Annex 6: Composition of MNPs and Nutributter Modelled

	Per 100g
Energy (kcal)	0
Protein (g)	0
Total Fat (g)	0
Retinol Activity Equivalent (µg retinol)	40000
Vitamin C (mg)	500
Vitamin B1 (mg)	50
Vitamin B2 (mg)	50
Niacin Equivalent (mg)	600
Vitamin B6 (mg)	50
Folate (µg)	15000
Vitamin B12 (µg)	90
Pantothenic Acid (mg)	0
Calcium (mg)	0
Iron (mg)	1000
Magnesium (mg)	0
Zinc (mg)	410

Table 1: Composition of MNPs modelled

	Per 100g
Energy (kcal)	530
Protein (g)	11.8
Total Fat (g)	37.8
Retinol Activity Equivalent (µg retinol)	2000
Vitamin C (mg)	150
Vitamin B1 (mg)	1.5
Vitamin B2 (mg)	2
Niacin Equivalent (mg)	20
Vitamin B6 (mg)	1.4
Folate (µg)	680
Vitamin B12 (µg)	2.5
Pantothenic Acid (mg)	8
Calcium (mg)	450
Iron (mg)	40
Magnesium (mg)	70
Zinc (mg)	18
Copper (mg)	0.9

Table 2: Composition of Nutributter modelled

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