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Food and nutrition security in Timor-Leste



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Food and nutrition security in Timor-Leste

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Summary

The island of Timor is located northwest of Australia and east of Indonesia. The Democratic Republic of Timor-Leste, also known as East Timor comprises the eastern half of the island. Based on the Human Development Index, Timor-Leste is ranked as the 6th least developed country in Asia and Oceania. In the 2010 Comoro Declaration, all ministers of the Government of Timor-Leste declared that they were “...committed to achieve food security for all and making an effort towards elimination of hunger and malnutrition...”

The agricultural sector is mainly based on subsistence gardens, but as the food requirements are not met by domestic production, the population is dependent on imported foods. Furthermore, remote areas face difficulties in transporting food because of poor infrastructure. Maize, rice and cassava are the main staples, supplemented with small amounts of few vegetables from the gardens. On average, 64% of the population suffers from chronic food insecurity, and many experience cyclical periods of food shortage. More fish is consumed in coastal areas compared to non-coastal areas, as the availability of fish in non-coastal markets is very low due to lack of infrastructure and access to ice.

The nutritional status of children below five years of age is very poor; almost 60% of these children are stunted (low height-for-age) and 18.6% are wasted (low weight-for-height). This indicates that the children's diets lack sufficient energy as well as micronutrients. The nutritional status of women (15-49 years of age) is equally poor; 15% are short (height < 145 cm) and 27% are underweight (BMI < 18.5 kg/m²), and this negatively affects the nutritional status of their newborn children.

The diet in the first 1000 days of a child's life (from conception to the child's second birthday) is crucial for optimal growth and development. Breastfeeding and complementary feeding practices are generally poor in Timor-Leste; the median duration of exclusive breastfeeding is 2.5 months, only 54% of children 6-23 months are fed the recommended number of food groups, and 55% are fed the recommended number of times per day. The recently endorsed Timor-Leste National Aquaculture Development Strategy (2012-2030) has the potential to contribute to increasing fish accessibility and improving food and nutrition security in Timor-Leste.

Preface

This report is a literature review on Food and Nutrition Security in Timor-Leste based on data from surveys conducted by the Timor-Leste National Statistics Directorate, as well as from national and international organizations working in Timor-Leste. This review was supported by the Australian Centre for International Agricultural Research (ACIAR)-funded project “Strategy for Investment in Fisheries in East Timor” (FIS/2011/068). This report describes the current food and nutrition situation in Timor-Leste for the purpose of planning and implementing interventions aimed at improving food and nutrition security, especially within aquatic agricultural systems. The potential role of aquaculture in improving food and nutrition security is considered, with reference to the recently endorsed Timor-Leste National Aquaculture Development Strategy (2012-2030) developed by the National Directorate of Fisheries and Agriculture, Ministry of Agriculture and Fisheries.

Definitions and terminologies

ANC - Antenatal Care:

- Recommended regular check-ups during pregnancy to identify pregnancy-related problems and to counsel women in healthy lifestyles that benefit both the mother and the child.

BMI - Body Mass Index [kg/m²]:

- Measure of thinness and fatness, often used for adults.

Communicable disease:

- Infectious and transmissible diseases resulting from the presence and growth of pathogenic organisms in a host. Transmission can occur in many ways, e.g., physical contact, contaminated food, airborne pathogens, and body fluids. Good hygiene practices are some of the most effective ways to prevent spread of pathogens.

Consumer Price Index:

- A measure of annual price changes expressed in percentage in the capital Dili, with December 2001 prices used as a reference. Included in the index are: food, alcohol, clothing, housing, health and other living expenses.

CSB - Corn Soya Blend:

- A precooked maize and soya product fortified with essential vitamins and minerals that can be cooked as a porridge.

DHS - Demographic and Health Survey:

- National surveys conducted periodically in several countries that provide representative data on e.g. population, health, nutrition and education.

EPI - Expanded Programme on Immunization:

- The current goal for EPI is to ensure full immunization of children less than one year of age in every district, by making vaccines available to all children throughout the world.

Food and Nutrition Security:

- "Food and nutrition security exists when all people at all times have physical, social and economic access to food, which is consumed in sufficient quantity and quality to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for a healthy and active life" (Committee on World Food Security 2012).

MDGs - Millennium Development Goals:

- Eight international goals for development: including reduction of child mortality, achievement of primary education and eradicating extreme poverty and hunger that 193 states and 23 international organizations have committed to achieve by 2015.

Minimum acceptable diet:

- Recommended complementary feeding practices for the 6-23 month old child, defined as continued breastfeeding, feeding at least the number of times recommended according to age, and feeding at least the recommended number of food groups per day.

Non-communicable disease:

- Non-infectious and non-transmissible diseases, often chronic. These include cancers, auto-immune diseases, cardiovascular diseases and diabetes. Risk factors for some of the non-communicable diseases are overweight, high blood pressure and high blood glucose which may be a result of an unhealthy diet and a sedentary lifestyle.

HDI - Human Development Index:

- Human development index is a broad definition of well-being that encompasses three areas: health, education and income.

Overweight:

- Adults with a BMI between 25-29.9 kg/m².
- Children with weight-for-age > +2 SD of the mean weight of the World Health Organization reference population at the same age.

Prevalence:

- The total number of cases of a given factor in a population at a given time.

PUFA - Polyunsaturated fatty acid:

- A polyunsaturated fatty acid has more than one double bond in the carbon chain. Essential fatty acids, omega-3 and omega-6 are both polyunsaturated fatty acids that must be supplied by the diet.

RFLP - Regional Fisheries Livelihoods Programme for South and Southeast Asia:

- Seeks to improve the livelihoods of fisher folk and their families while fostering more sustainable fisheries resources management practices in small-scale fishing communities in Cambodia, Indonesia, Sri Lanka, Timor-Leste and Vietnam.

Stunting:

- Children with height-for-age < -2 SD from the mean height of the World Health Organization reference population at the same age. Severely stunted children have a height-for-age < -3 SD.

1,000 days:

- Refers to the first 1000 days of a child's life; nine months of pregnancy and up to the child's second birthday. Nutrition of the pregnant and lactating woman, as well as breastfeeding and complementary feeding of the infant have a major impact on the child's growth and development.

Underweight:

- Children with weight-for-age < -2 SD from the mean weight of the World Health Organization reference population at the same age. Severely underweight children have a weight-for-age < -3 SD.

Under-five mortality:

- Number of deaths in children under five years per 1000 live births.

Wasting:

- Children with weight-for-height < -2 SD from the mean weight of the World Health Organization reference population at the same height. Severely wasted children have a weight-for-height < -3 SD.

Introduction

The island of Timor is located northwest of Australia and east of Indonesia. The Democratic Republic of Timor-Leste, also known as East Timor, comprises the eastern half of the island, two small nearby islands (Atauro and Jaco) and Oecusse, an exclave situated within the western part of Timor Island. The capital, Dili is located in the Dili district, one of 13 districts of the country (Figure 1). The population is estimated to be around 1.1 million, growing with an annual growth rate of 2.4% (National Statistics Directorate 2010a).

Timor-Leste has a long history of colonization. The Portuguese colonized the island from the 16th century until 1975, when it got its independence. However, 9 days later and until 1999, Indonesia colonized it. In 2002, Timor-Leste was declared an independent democracy. The Portuguese colonization in the 19th century was characterized by minimal investment in infrastructure, health and education. During World War II, Timor-Leste was invaded by Japan, many people died, and the land was left in misery. After World War II and until independence in 2002, first the Portuguese, and later the Indonesians tried to rebuild the country, but with slow progress. Today, the country is poorly developed, has a high poverty rate and high levels of food and nutrition insecurity (Government of Timor-Leste 2012).

The human development index (HDI) of Timor-Leste is estimated to be 0.495, with a rank of 147 out of 187 countries. The global HDI range is from 0.943 (Norway) to 0.286 (Democratic Republic Congo), making Timor-Leste the 6th least developed country in Asia and Oceania. The HDI is a composite measure of three essential dimensions in human development: health, education and income (United Nations Development Programme 2011).

In October 2010, all ministers of the Government of Timor-Leste signed the Comoro Declaration which states that they are "...committed to achieve food security for all and making an effort to always move towards the elimination of hunger and malnutrition in Timor-Leste, with a view to reducing the number of malnourished people to half the current numbers in 2015" (Government of Timor-Leste 2010). As a follow-up to the Declaration, the government developed the Timor-Leste Strategic Development Plan (SDP), with policies and goals, as well as implementation plans to be carried out in three phases: short-term (2011-2015), medium-term (2016-2020) and long-term (2021-2030). The four main focal areas of the SDP are: social capital, infrastructure development, economic development and institutional framework (Government of Timor-Leste 2011). Income from oil export is becoming important in the Timor-Leste economy for financing national development (Costa et al. 2002).

Food availability and affordability

The consumer price index, which includes food, alcohol, clothing, housing, health and other living expenses, has almost doubled since December 2001 (index: 100). In May 2005, the consumer price index increased to 116.1, in May 2010 to 155.3, and in May 2012 to 195.9; an overall price increase of 95.9 percentage points since December 2001 (National Statistics Directorate 2009; National Statistics Directorate 2012).

The population's need for food is not met by domestic production, making Timor-Leste dependent on food imports from other countries. In spite of food imports, the demand is not covered



Figure 1. Map of Timor-Leste showing the 13 districts.

because of lack of purchasing power in many households, as well as difficulties in transporting food to the remote areas due to inadequate infrastructure (World Food Programme 2005). There are almost no markets in rural areas and only a few in the district centers. On average, rural people walk around 20 km to reach a market, and therefore farmers have little opportunity to earn income from sale of their products (World Food Programme 2005). In recent years, this situation has improved with the expansion of roads. The majority of the population relies on subsistence agriculture and has only limited income; 46% of the population live below the national poverty line of USD 0.55 (Webb & Dazé 2011).

Nutritional status and child development

Nutritional status, mortality and morbidity rates of infants and children are the basic indicators for reflecting a country's level of development, and the population's quality of life. The National Statistical Directorate of Timor-Leste conducted a Demographic and Health Survey (DHS) in 2010; anthropometric measures were obtained from a representative sample of 8,171 children < 5 years of age (Table 1) (National Statistics Directorate 2010b).

Table 1. Percentage of children (6-59 months) classified as malnourished according to anthropometric measures (National Statistics Directorate 2010b).

	Total	Dili	Urban	Rural	Females	Males
Height-for-age						
< -2 SD	58.1	43.9	49.2	60.6	56.0	60.3
< -3 SD	32.9	16.1	21.5	36.1	31.2	34.5
Weight-for-age						
< -2 SD	44.7	30.1	34.9	47.4	43.8	45.5
< -3 SD	15.4	7.9	9.7	17.0	14.5	16.3
> +2 SD	0.7	1.0	0.9	0.6	0.6	0.7
Weight-for-height						
< -2 SD	18.6	14.5	14.9	19.7	17.0	20.3
< -3 SD	7.0	4.1	4.5	7.7	6.2	7.8

Children with height-for-age, weight-for-age and weight-for-height < -2 SD are defined as stunted, underweight, and wasted, respectively. < -3 SD is termed severe. Children with weight-for-age > +2 SD are defined as overweight.

Stunting (low height-for-age) is caused by long-term inadequate dietary intake and/or frequent exposure to illness (Michaelsen et al. 2009). With a national prevalence of 58%, Timor-Leste has one of the highest stunting rates in the world, with only Afghanistan, Burundi and Yemen having similar rates (Save the Children 2012). Furthermore, the rate of severely stunted children – 33% – is alarmingly high. More boys (60%) than girls (56%) are stunted, and the rate is much higher in rural (61%) compared to urban areas (49%), as well as in inland compared to coastal areas (National Statistics Directorate 2010b).

Underweight (low weight-for-age) prevalence is also high in Timor-Leste, with 45% being underweight and 15% severely underweight. Weight-for-age takes both chronic and acute malnutrition into account, as height as well as the thinness/fatness of the child are reflected. Overweight is not a major problem in Timor-Leste, only 1% of all children have high weight-for-age (National Statistics Directorate 2010b).

The prevalence of wasting (low weight-for-height) in Timor-Leste reflects that children are not just short but also thin. Nineteen percent of children are categorized as wasted, and 7% as severely wasted. Wasting reflects acute malnutrition - a child's weight is negatively affected by short-term food shortage e.g. due to seasonal changes (National Statistics Directorate 2010b).

To prevent malnutrition, it is important that the diet provides adequate energy as well as essential micronutrients, such as vitamin A, iron, zinc and iodine. In addition to food, lack of care, sanitation water and hygiene (Checkley et al. 2004; Smith et al. 2003) also have grave effects on malnutrition. This is reflected in DHS data from Bangladesh, Indonesia and Timor-Leste, showing that children with a minimum acceptable diet (children who received minimum dietary diversity and minimum meal frequency during the day) have very different rates of stunting. Timor-Leste and Indonesia have almost the same proportions of breastfed children receiving a minimum acceptable complementary diet (30% and 34%, respectively), but the stunting rate in Indonesia (37%) is only two-thirds of that in Timor-Leste (58%). In Bangladesh, the proportion of breastfed children receiving a minimum acceptable diet is low (11%), but the stunting rate is not very different from that in Indonesia (43% and 37%, respectively) (Foote & Beun 2012). These results underline the importance of having comprehensive, integrated interventions to prevent malnutrition.

No improvement in nutritional status was seen in Timor-Leste in the 7 years between DHS 2003 and the newest DHS in 2010; the rates of stunting and wasting increased by 9 and 7 percentage points, respectively, whereas underweight was similar, with a minimal decrease of 1 percentage point (National Statistics Directorate 2003; National Statistics Directorate 2010b). More than one-third of all child deaths globally are linked to malnutrition, but in spite of increasing malnutrition rates in Timor-Leste, a decrease in the under-five mortality rate from 83 per 1000 live births in 2003 to 64 per 1000 live births in 2010 was reported (National Statistics Directorate 2003; National Statistics Directorate 2010b). From 1990 until 2012, the under-five mortality in Timor-Leste decreased by more than 60%, making Timor-Leste close to achieving Millennium Development Goal 4, that obligates countries to reduce child mortality by two-thirds from 1990 to 2015 (United Nations 2012). The reasons for the drop in under-five mortality are unknown, but may include a slowly improving health care system, and better child immunization coverage (National Statistics Directorate 2003; National Statistics Directorate 2010b).

Table 2. Percentage of women (15-49 years) classified as short, underweight and overweight.

	Total	Dili	Urban	Rural
Height				
< 145 cm	14.8	7.1	8.8	16.9
BMI				
< 18.5 kg/m ²	27.2	21.6	24.4	28.5
≥ 25.0 kg/m ²	7.0	4.1	4.5	7.7

Underweight: Body mass index (BMI) < 18.5 kg/m²; Overweight: BMI 25-29.9 kg/m²; Short: < 145 cm.

The nutritional status among women (15-49 years of age) is as poor as childhood nutritional status; 15% are short with a height < 145 cm, and 27% are underweight (Body Mass Index (BMI) < 18.5 kg/m²) (Table 2) (National Statistics Directorate 2010b). Poor nutritional status of the mother will negatively affect that of the child by resulting in a low birth weight which increases the risk of childhood mortality. Furthermore, low birth weight babies have a high risk of developing into short stature adults, which continues the vicious circle of the woman having a greater risk of giving birth to a low birth weight child (Save the Children 2012).

No information is available on men's nutritional status in the age group 15-49 years. However, in a study conducted by Ramke et al. (2012), anthropometric measures were obtained for women and men > 40 years (n=2003). The underweight prevalence in this age group was 37% and 39% for women and men respectively, whereas the overweight prevalence was 10% and 3%, respectively. This could indicate that the nutritional status of men is as poor as that of women, and worsens as they get older (Ramke et al. 2012).

Nutrition during pregnancy, lactation and childhood

Good breastfeeding practices are essential for child development and survival. The World Health Organization (WHO) recommends that breastfeeding be initiated within one hour after birth, followed by six months of exclusive breastfeeding. From six months up to the child's second birthday, continued breastfeeding is recommended along with the introduction of appropriate complementary foods that are rich in energy and macro- and micronutrients.

The children of Timor-Leste are not breastfed according to recommendations; only 35% of children are exclusively breastfed at 4-5 months of age, and the median duration of exclusive breastfeeding is 2.5 months. The proportion of newborns being breastfed within one hour of birth is 82%, and 96% are breastfed within the first 24 hours of birth (National Statistics Directorate 2010b).

In 2009, a Breastfeeding Promotion Policy was developed in Timor-Leste. This was based on several issues relating to poor breastfeeding practices. Breastfeeding practices in Timor-Leste are affected by traditional beliefs and lack of maternal education; furthermore, health staffs have limited knowledge about the benefits of good breastfeeding practices and no knowledge about how to counsel women with breastfeeding problems. Efforts to decrease advertisement of infant formulas – which are harmful and can result in diarrheal diseases – are recommended. In addition, education and training of health staff, promotion of good breastfeeding practices in the communities, and building of baby-friendly accessible facilities are recommended (Ministry of Health 2009).

Along with continued breastfeeding, semi-solid foods two to three times per day are recommended for the 6-8 month old child, and solid and semi-solid foods three to four times per day for the 9-23 month old child. Furthermore, a varied diet is recommended by feeding more than three food groups to the 6-23 month old child. In Timor-Leste, only 54% of children from 6-23 months of age were fed the right amount of food groups per day, and 55% were fed the recommended minimum number of times per day (National Statistics Directorate 2010b).

The most common foods used for complementary feeding are grains and grain products, such as rice, maize, noodles, bread and fortified baby food; 97% of the breastfed children between 6 months and 2 years and 99% of the non-breastfed children had received grain-based foods the day prior to data collection. It is important that micronutrient-rich foods are used for complementary feeding; these include vitamin A-rich vegetables and fruits such as pumpkin, carrot, orange sweet potato, dark green leafy vegetables, mango and papaya, and animal-source foods, rich in iron, such as meat, fish and eggs. Only 54% and 44% of breastfed children received vitamin A-rich and animal-source foods, respectively; whereas, 82% and 57% of non-breastfed children, respectively, received these foods. This difference between breastfed and non-breastfed children in consumption of nutritious foods could be due to a difference in breastfeeding practices between socio-economic groups, with fewer better-off mothers breastfeeding, but at the same time, being more able to afford nutrient-rich foods. This was not, however, confirmed by data (National Statistics Directorate 2010b).

Good nutrition in pregnancy and during lactation is crucial for optimal child growth and development. Data on the diet of mothers with a child below three years were obtained from the latest DHS survey (National Statistics Directorate 2010b). The foods most consumed by the mothers are made from grains (these were eaten by 92% of women the day prior to data collection). The high intake of grains by both mothers and children is probably due to rice and maize being the main staple foods in Timor-Leste. Intake of vitamin A- and iron-rich foods is important in pregnancy and lactation, as vitamin A deficiency can cause night blindness and lead to an increased risk of maternal mortality (Black 2001), and iron deficiency can lead to anemia, as well as increased risk of maternal mortality (Black 2008). Vitamin A-rich foods were eaten by 88% of mothers, more commonly by those in urban areas (94%) than in rural areas (86%), and more commonly eaten by those with education higher than secondary school (97%) than without education (85%). Animal-source foods were more unequally distributed; 53% of women consumed animal-source foods; 46% of rural mothers and 74% of urban mothers; 89% of mothers with a high education, and only 42% of those without education (National Statistics Directorate 2010b).

The low intake of iron-rich foods is reflected in the prevalence of anemia in both mothers and children. Thirty-eight percent of children had anemia (hemoglobin < 11 g/dL), 13% were in a moderate state (hemoglobin 7.0-9.9 g/dL) and only 0.4% suffered from severe anemia (hemoglobin < 7.0 g/dL). The prevalence was higher in rural (39%) compared to the urban areas (33%). Among mothers, 21% suffered from mild anemia, 4% from moderate anemia, and 0.3% from severe anemia. The prevalence did not differ much between urban and rural areas: 19% and 22%, respectively.

In 2004, the Ministry of Health developed a National Nutrition Strategy focusing on improvement of nutrition and health, especially among women and children. A supplementation program is recommended in the strategy; pregnant and lactating women should receive multi-micronutrient supplementation, daily; and non-pregnant/non-lactating women, weekly. In addition, vitamin A supplementation should be given to mothers within 8 weeks of delivery. Weekly multi-micronutrient supplementation should be given to children between 6-12 months. Vitamin A supplementation should be given to the child twice a year, starting at six months of age, and until the child's fifth birthday (Ministry of Health 2004). The implementation of the strategy seems to have improved vitamin A supplementation coverage of children 6 months to 5 years old from 34% in 2003 to 51% in 2010, as well as the prevalence of mothers receiving vitamin A supplementation post-partum from 23% to 55% (National Statistics Directorate 2003; National Statistics Directorate 2010b). Even though these are major improvements, only half of women and children receive vitamin A supplementation, and greater coverage should be achieved. Other important components of the strategy are health and nutrition education of families, as well as monitoring of nutritional status of children and women (Ministry of Health 2004). It is not known whether these components have been implemented.

Antenatal care (ANC) is essential for the outcome of pregnancy; however, only 55% of pregnant women in Timor-Leste had more than four ANC visits, and 12% never had an ANC visit. Eighty percent of women give birth at home, without help from a skilled birth attendant, 49% deliver with only a relative assisting, while 3% deliver without any help. Furthermore, 68% of women and newborns do not receive a post-natal check-up, resulting in poor quality of birth weight data (National Statistics Directorate 2010b). It has been reported that some women stop eating nutritious food during pregnancy – as in many other developing countries – because they are afraid of dying due to a difficult delivery of a big baby (IRIN 2012).

Food diversity and household food security

The Timor-Leste agricultural sector is mainly based on subsistence gardens. Due to low productivity and limited access to markets, only small amounts of produce are sold for income. Maize, rice and cassava are the main staples cultivated; other carbohydrate-rich produce include taro, sweet potato and arrowroot. Fruits produced are orange, pawpaw, jackfruit, mango, banana and coconut. Other produce from the gardens includes pumpkin, yam, various beans, squash, cabbage, onion and peanut. Most farmers produce mainly one staple crop (maize or rice), or perhaps two (cassava), and a few vegetables and fruits (Oxfam 2007; Webb & Dazé 2011). Maize is the major crop for 83% of farming households, and changes in rainfall and pest damage can have grave consequences for production, especially in poor households. Rice is cultivated in the lowland villages and is the most important crop for 13% of Timorese farmers. Rice is also affected by weather changes and pest damage, but production is more stable than for maize. Cassava is less influenced by environmental factors, and provides some food security if the maize or rice harvest fails (Webb & Dazé 2011).

Some farmers in the mountains produce coffee, which is the only cash crop grown in Timor-Leste. Coffee accounts for nearly all non-oil exports, with total export levels of Timor-Leste being low (Food and Agriculture Organization & World Food Programme 2007). Coffee producers seem to be a little better-off compared to households in the same area that survive mainly on subsistence gardens, but they are vulnerable to fluctuations in the international coffee prices (Food and Agriculture Organization & World Food Programme 2007; Webb & Dazé 2011).

The Timor island is divided by an east-west mountain range that creates two weather zones; the dry and hot northern half that has a rainy season lasting 4-6 months, and the southern half characterized by a longer wet season of 7-9 months, with two excessive monsoon rainfall peaks. The coastal areas in the north have an annual rainfall of around 500-1500 mm, while at 500 m above sea level, the rainfall varies between 1500-3000 mm. The same variation is seen in the south, but with more excessive amounts of 1500-2000 mm in the coastal areas, and 1700-3500 mm in the highlands. This creates some differences in the crops grown; the lowland climate and topography are suitable for rice production, whereas the highland is mainly suitable for maize and coffee production (Food and Agriculture Organization & World Food Programme 2007).

On average, 64% of the population suffer from chronic food insecurity and experience cyclical food shortage because of low agricultural productivity and lack of income to purchase food when stocks are depleted (Webb & Dazé 2011). This period of food shortage called the hunger period is experienced 2-3 months before the first maize harvest in February and March or rice harvest in April (Oxfam 2007). The intensity and duration of the hunger period can be affected by many factors, e.g., natural disasters, such as flooding, drought, locust attack, landslides, soil erosion and strong winds which are common occurrences in Timor-Leste. In October/November, when farmers plant the seeds for the next crop, they use their own stocks, reducing the food for household consumption (World Food Programme 2005). In the hunger period, households adopt coping mechanisms such as reduced number of meals per day, reduction in the amount of food eaten per meal and eating wild foods such as roots and leaves (World Food Programme 2005).

Subsistence farmer households are the most vulnerable to the hunger period, with around 40-45% of the population not engaged in income-generating activities other than farming (Food and Agriculture Organization & World Food Programme 2007). Some insecure households have the opportunity to work as daily laborers in the rice fields during the planting, weeding and harvesting seasons, and are often paid with a small share of

the harvest (Food and Agriculture Organization & World Food Programme 2007). The most common means of attaining cash income is through employment, loans and credit, and selling crops and livestock (Oxfam 2007). Often, food-insecure people are forced to take loans to cover non-food expenses such as school fees (Oxfam 2007).

The high proportion of food-insecure households is not only due to low production and productivity in the gardens, but also as a result of many other factors; limited access to markets, lack of effective demand, very high post-harvest losses, shortage of secure on-farm storage capacity, as well as absence of policies to promote domestic production that can compete with international produce, e.g., rice (Food and Agriculture Organization & World Food Programme 2007).

Animal-source foods

The Ministry of Agriculture and Fisheries estimates that around 5,200 fishers operate along the 700 km coastline of Timor-Leste, mainly engaged in coastal fishing. Small-scale coastal fisheries dominate the fisheries sector and almost all fish and other seafoods caught are sold and consumed in Timor-Leste (Food and Agriculture Organization 2009). Timor-Leste has important marine resources but, as in other developing countries, weak policy and illegal and unreported fishing threaten stocks (Andrew et al. 2011).

A survey conducted by AMSAT International as part of the Regional Fisheries Livelihoods Programme for South and Southeast Asia (RFLP) of the Food and Agriculture Organization investigated fish and animal protein consumption and availability in Timor-Leste. A total of 820 respondents were randomly selected from five districts (Baucau, Dili, Bobonaro, Covalima and Oecusse), for questionnaire interviews, individual qualitative interviews as well as focus group discussions (AMSAT International 2011).

Table 3. Annual fish and meat consumption (kg/capita/year) (AMSAT International 2011).

	Total	Urban	Coastal	Non-coastal
Fish consumption	6.1	6.0	17.6	4.0
Meat consumption	13.3	19.1	12.1	11.6

Chicken is the most consumed animal-source food; 54% reported that they most often consume chicken, followed by saltwater fish and other sea foods (14%), eggs (12%) and pork (8%). Freshwater fish is consumed by only 1.2%. When stratified into coastal, non-coastal and urban areas, some variations are seen; chicken is the most consumed in urban and non-coastal areas (69% and 55%, respectively), followed by eggs (15% and 11%, respectively). In the coastal areas, saltwater fish and other sea foods are the most consumed (45%), followed by chicken (32%) and eggs (12%). Freshwater fish is only consumed in the non-coastal areas (2%) (AMSAT International 2011).

The most consumed fish and sea food in Timor-Leste are sardine (58% of respondents), longtail tuna (36%), mackerel (23%), snapper (23%) and prawn (22%). In the coastal areas, however, squid, trevally and snail are also frequently consumed. Squid, prawn and crab are not often eaten in the rest of the country due to their high price (AMSAT International 2011; Food and Agriculture Organization 2009).

Deep frying was used in almost 100% of the households for preparation of fish, followed by grilling and steaming, which were much less used. Of processed animal-source foods bought,

the majority (31%) buy dried fish, followed by grilled (17%), and salted (13%); 24% never buy processed food. Animal-source foods are mainly eaten on special occasions, such as parties and traditional events (77% of respondents); they are more rarely eaten on a daily basis (48%). No general pattern is seen regarding intra-household distribution of animal-source foods: 31% reported that they eat together with other household members, 14% prioritize the elders and they eat first, 11% reported that the head of the household eats first. Not many reported differences in portion size between elders, women, men and children (AMSAT International 2011).

Frozen imported fish are the only fish available in supermarkets, as the quality of the local fish is found to be unsuitable. A participant from the AMSAT International in-depth interview claimed that the frozen imported fish from the supermarket were cheaper than fresh fish from the market. Around 75% of the landed fish are eaten fresh; the rest is dried and transported to inland areas (Food and Agriculture Organization 2009). Because of the topography of the country and lack of infrastructure and access to ice, it is difficult to distribute fresh fish to the inland areas (Food and Agriculture Organization 2009). Some inland freshwater fisheries activities are carried out, but these are limited to the monsoon season and are mainly for subsistence. In 2009, the government promoted some backyard fish farming with tilapia, milkfish and carp to support rural fish production (Food and Agriculture Organization 2009). Around 2,000 households were engaged in this small-scale fish farming, with average size of fish ponds smaller than 200 m² (Food and Agriculture Organization 2009).

The export of fish and marine products has decreased drastically from almost 5 tonnes in 2006 to around 0.2 tonnes in 2009. After independence, Timor-Leste did not have its own commercial fishing fleet and therefore made agreements that gave foreign fishing fleets limited access to the country's deep sea fishing. As Timor-Leste does not have the capacity to monitor fishing activities, many of these agreements were cancelled in 2009, causing dramatic decrease in the export of fish and marine products (Food and Agriculture Organization 2009).

Potential for increasing fish consumption

Fish is a nutritious food that provides highly bioavailable essential nutrients. All fish contain high quality animal protein, and, depending on the species, provide different levels of essential polyunsaturated fatty acids (PUFAs). These nutrients are important for optimal child growth and development – protein is important for growth, and omega-3 PUFAs are important for neurological development, visual maturation, motor skill development and cognitive development (Michaelsen et al. 2008). Some fish species are a good source of bioavailable iron and zinc which are important micronutrients for growth and immune function. In addition, fish enhances mineral absorption from other food items in the meal, and unlike plant-source foods, fish do not contain inhibitors, e.g., phytates and polyphenols of mineral absorption. Small fish which are eaten whole are extremely rich in bioavailable calcium. Some small fish species also contain high amounts of vitamin A (Thilsted 2012). The high content and bioavailability of these essential nutrients make fish a valuable food in the diet, in all stages of life, especially in the first 1000 days. Focus on the 1000 days entails the inclusion of fish in the woman's diet during pregnancy and lactation, as well as in the complementary food of the child from 6 months of age. Recognizing the potential of aquaculture in combating poverty and malnutrition, the National Directorate of Fisheries and Aquaculture, Ministry of Agriculture and Fisheries developed the Timor-Leste National Aquaculture Development Strategy (2012-2030), in collaboration with WorldFish, the Regional

Fisheries Livelihoods Programme and the Coral Triangle Support Partnership (National Directorate of Fisheries and Aquaculture, 2012). This strategy envisions a strong role for aquaculture in diversifying and improving livelihoods, and in building resilience among rural households and agro-ecological systems. It aims to contribute to an increase in per capita fish consumption in Timor-Leste from 6.1 kg to 15.0 kg by 2020, and an increase to 40% of domestic fish supply from aquaculture by 2030.

Presently, a major constraint of increased fish consumption in Timor-Leste is low availability of marine fish in the non-coastal areas due to poor infrastructure, limited preservation methods and low availability of ice. In a survey conducted in Timor-Leste, the participants were asked why they consumed fish; 46% reported because of the taste, and 23% because the family likes to eat it. They were also asked why they did not consume fish; in urban, coastal and non-coastal areas, the majority reported because of high price (94%, 94% and 71%, respectively). In the non-coastal areas, 56% reported that limited availability was the reason for not consuming fish; and 29% in the urban and 25% in the coastal areas gave the same reason. Low fish consumption is most probably due to low availability and affordability, rather than dislike (AMSAT International 2011).

Improvement, development and expansion of inland pond production of fish are prioritized in the Timor-Leste National Aquaculture Development Strategy to increase availability and affordability of fish in non-coastal areas. In addition, preservation such as drying, smoking and salting can be used to extend access and duration of the consumption season of marine fish, as well as ease transportation difficulties from the coast to inland areas. However, nutrition education and training of the households are also essential to spread knowledge of the benefits of including fish in the diet and improve dietary practices. Particularly, the importance of the benefits of fish in the first 1000 days needs to be imparted to household members, both women and men. This can be incorporated in the fish production training and demonstration sessions.

Particular focus must be placed on the frequency of complementary feeding, the use of suitable nutrient-rich foods, and the preparation methods for semi-solids and mashed foods. Steps to develop pre-cooked, powdered complementary foods that include foods such as rice, vegetables, oil and fish combined can be initiated. These complementary foods can be distributed or sold to mothers attending health care facilities.

A school feeding program initiated by the Ministry of Education, Culture, Youth and Sports in collaboration with the World Food Programme and two development partners (World Vision and CARE Australia) provided a daily meal for children attending primary school. The meal was based on corn soya blend (CSB), a precooked maize and soya product fortified with essential vitamins and minerals, cooked as a porridge (Noij 2011). Oil, provided by the partners, and vegetables obtained from home and school gardens were sometimes added to the porridge. In 2010, 324,000 school children were included in the school feeding program (Regional Bureau of Asia 2010). With future interventions to increase availability of fish, the school feeding program can include a meal with fish once or twice per week, sourced from household and/or school ponds, as well as from marine fisheries. Presently, the World Food Programme is no longer a partner, but the Ministry is continuing the program in a limited number of schools.

Health and disease burden

The disease burden in Timor-Leste includes infectious diseases and maternal conditions, due to malnutrition, unsafe water supply, limited use of mosquito nets, poor hygiene and sanitation and limited access to maternal care (World Health Organization 2009). The utilization of health services is low, in particular for preventive services – one of the biggest challenges of the health sector. For example, the coverage of the expanded programme on immunization (EPI) is low; in 2010, 52.6% of children 12-23 months old had received all vaccinations, and 22.7% of children had received no vaccination (National Statistics Directorate 2010b). In spite of the low coverage of the EPI, there has been an improvement; in 2003, only 18% of children had received all vaccinations (National Statistics Directorate 2003).

Communicable diseases and maternal and nutritional conditions account for 61% of all deaths, in all ages, whereas non-communicable diseases such as cardiovascular diseases, cancer and diabetes account for 34% of all deaths (World Health Organization 2003). The most common diseases among children in Timor-Leste are diarrhea, stomach pain, malaria, cough and cold (World Food Programme 2005). Only limited data are available on risk factors for non-communicable diseases; in 2008, 6.9% females and 6.4% of males (> 25 years) had high blood glucose levels, 24.7% females and 28.2% males (> 25 years) had high blood pressure, and 4.3% females and 1.5% males (> 20 years) were obese (World Health Organization 2012).

HIV/AIDS is not a major problem in Timor-Leste; the first case was detected in 2003 and the number of identified HIV-infected individuals increased to 235 in 2011. It is suspected that the increase is not just a result of risky behavior, but also due to more people being tested because of an increase in community outreach and testing facilities (Ministry of Health 2012).

The health system is underdeveloped. When the Indonesians left in 1999, a lot of health staff and doctors left with them. Cuban doctors currently work in many health facilities and the universities in Timor-Leste are educating new doctors. Malnutrition, burden of communicable diseases, risk factors related to communicable and non-communicable diseases, high maternal and child mortality, limited access to health facilities, lack of knowledge about health in the population, and limited preparedness and response to emergencies are some of the challenges that the health system faces (World Health Organization 2009). A Health Sector Strategy Plan 2008-2012 was developed by the Ministry of Health to standardize the work for an improved health sector and guide the activities of collaborating and non-governmental organizations. The key focus of this plan is on the needs of mothers, children and the poor, as well as strengthening the health services with emphasis on implementing a revised basic service package for Primary Health Care and for hospitals (World Health Organization 2009).

Other constraints for optimal use of health facilities are the long distances and the poor infrastructure; the average travel time to a health facility for rural dwellers is around one hour, while urban dwellers take about 40 minutes to reach a health facility, thereby limiting the utilization of health services (National Statistics Directorate 2007).

Table 4. Work distribution in the home between women and men (National Statistics Directorate 2007).

	Total		Urban		Rural	
	Women	Men	Women	Men	Women	Men
Cook, clean, wash clothes						
Yes (%)	84.4	38.7	80.7	32.0	85.6	41.1
Hours per week	6.1	4.2	4.8	4.3	4.9	4.2
Take care of children						
Yes (%)	44.8	29.7	47.6	30.6	85.7	29.4
Hours per week	8.1	4.5	6.4	3.7	6.5	4.8
Fetch water						
Yes (%)	76.6	63.1	54.2	42.2	43.8	70.5
Hours per week	4.9	4.5	4.9	4.4	8.8	4.6

Gender inequity

In general, women have a lower social status than men in the Timor-Leste society. Women are generally not included in decision-making either in the household or at the leadership level. Reasons given for this include their inability to take part in economic activities due to domestic obligations, low status and low educational level (Webb & Daze 2011).

Violence against women is a serious problem in Timor-Leste; overall, 38% of women (> 15 years of age) included in the DHS 2010 had experienced physical violence, and 29% had experienced violence within the 12 months prior to the survey interview. Men who frequently get drunk are more prone to become violent towards their wives (National Statistics Directorate 2010b). There is a social acceptance of gender-based violence, and most men, as well as some women believe that wife beating is justified under certain circumstances e.g., when the wife argues with her husband or the wife leaves the house without seeking her husband's permission (National Statistics Directorate 2010c).

A woman's empowerment in the household and community has a major impact on her nutritional status, as well as on that of her children; e.g. with a low level of empowerment being associated with low food intake in women as well as inadequate care and feeding of her children. Empowerment of women is more than education and participation in decision-making; it also includes factors such as the woman's access to resources, physical mobility, risk of domestic violence, as well as her mental health and self-confidence (Smith et al. 2003).

As shown in Table 4, housework is predominantly women's work, both in rural and urban areas. It is mainly the woman's job to do the housework such as cooking, cleaning and washing clothes, both in rural and urban areas. The distribution of responsibility regarding childcare and water collection differs between rural and urban areas, with more women in the rural compared to the urban areas taking care of the children and more men in the rural compared to the urban collecting water (National Statistics Directorate 2007). Unfortunately, no data are available on distribution of work in the gardens or responsibility for livestock.

Males have a slightly higher educational level compared to the females in the same age group (Table 5). The main problem in the education sector is a disrupted school system that needs rebuilding following the departure of Indonesian teachers in 1999, as well as the need for a complete change in textbooks and curriculum (National Statistics Directorate 2010b). Data from the DHS shows that the proportion of females and males without education decreases drastically by decreasing age, indicating improvements in school attendance.

Table 5. Educational level of females and males (National Statistics Directorate 2010b).

	Total		Urban		Rural	
	Females	Males	Females	Males	Females	Males
Education level (%)						
No education	37.4	29.6	21.9	16.5	42.0	33.8
Some or completed primary	34.5	38.7	32.5	36.0	35.1	39.6
Some or completed secondary	26.3	28.5	39.7	39.0	22.4	25.3
More than secondary	1.7	3.0	5.8	8.3	0.5	1.3
Median years completed (years)	1.8	2.7	4.9	5.2	1.0	2.0

Food production interventions

A number of organizations, both local and international, operate in Timor-Leste to improve the living standard of the population. These include the United Nations (UN) organizations: Food and Agriculture Organization (FAO), WFP, International Labour Organization (ILO), WHO, and United Nations Operations and Project Services (UNOPS). Other organizations, e.g., CARE international, Concern, Oxfam, World Vision, and the International Rice Research Institute (IRRI) are also present. Some of the main funding agencies are the Australian Agency for International Development (AusAID), Australian Centre for International Agricultural Research (ACIAR), Canadian International Development Agency (CIDA), European Development Fund (EDF) and Japan International Organization Agency (JICA). Many of the organizations collaborate across sectors to have a more comprehensive contribution to the development of Timor-Leste.

A joint project to address food insecurity and malnutrition in Timor-Leste by coordinating and combining the work done by many partners is being implemented in four districts (Aileu, Baucau, Manatuto and Oecusse) with community members leading the process of identifying and prioritizing nutrition and food security issues and appropriate interventions. This project addresses three components: 1) improved health and nutrition status of children under five years as well as pregnant and lactating women; 2) school feeding programs; and 3) the establishment of a food security and nutrition surveillance system. Increased production, availability and utilization of micro-nutrient rich foods through establishment of home gardens, and small livestock and aquaculture systems are some of the strategies to achieve these goals. However, at the mid-term evaluation in 2011, no progress towards the development of these interventions was reported. Furthermore, establishment of school gardens was delayed (Noij 2011).

A website that provides information about daily fish prices, records illegal fisheries, and provides maps of fishing grounds, dangerous areas and fishers' movements for Timor-Leste has been developed (www.peskador.org). It was developed as part of a bigger project implemented by RFLP and carried out by the National Directorate of Fisheries and Aquaculture. The aim of the project was to improve the living conditions of coastal small-scale fishers and their families by enhancing four main areas: fishery industry, fishery resources management, fish inspection and aquaculture. Specific interventions included development of a fisheries plan; promotion of marketing, including export and quality control; industry support services; and habitat protection. Several other organizations such as Caritas, Coral Triangle Initiative (CTI), Concern, JICA, Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), Oxfam, and World Vision are/have been operating in coastal communities.

Seeds of Life is a program within the Timor-Leste Ministry of Agriculture and Fisheries coordinated by The Centre for Legumes in Mediterranean Agriculture and the University of Western

Australia, and funded collaboratively by AusAID, the Australian Centre for International Agricultural Research (ACIAR) and the Ministry of Agriculture and Fisheries. The core focus is to increase yields of plant-source foods by selecting and distributing improved varieties of superior genetic quality – mainly maize, sweet potato, cassava, rice and peanut. Furthermore, new production methods are being developed to overcome climate variability and change, improve agronomic practices to reduce weed burden, increase soil fertility, and reduce post-harvest storage losses (Seeds of Life 2012).

Conclusion

Food and nutrition security in Timor-Leste is characterized by little food variety and dietary diversity and periods of hunger, reflected in very poor nutritional status of women and children. The foods consumed are mainly from subsistence gardens; the staple foods are maize, rice and cassava, supplemented with small amounts of few vegetables from the gardens. The consumption of animal-source foods is low. Fish is rarely eaten because of limited availability and affordability, especially in the non-coastal areas. The diets of women and young children in the first 1000 days of life are negatively affected by the lack of nutritional knowledge among mothers and caregivers, as well as among health professionals. Knowledge sharing, practical cooking lessons, fish in school feeding and a pre-cooked complementary food that includes fish could be some of the tools to increase fish consumption for all family members in the household. Implementation of the Timor-Leste National Aquaculture Development Strategy, emphasizing the integration of strong aquaculture–nutrition linkages, can contribute to improving food and nutrition security in Timor-Leste.

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