

Brianna Cole  
Valley High School  
West Des Moines, IA  
The Lao PDR, Factor 11: Malnutrition

### **The Lao People's Democratic Republic: Test Gardens and Soybeans**

Malnutrition refers to imbalances both in deficiency and excess of an energy and/or nutrient in a person's diet. This condition is split into two groups, one being "undernutrition", and the other lumps together obesity and diet-related noncommunicable diseases (including stroke, diabetes, heart disease, and cancer). Focusing on the former, undernutrition includes stunting, wasting, underweight and micronutrient deficiencies. Malnutrition affects every country around the world, with 462 million people underweight. An estimated 159 million children under the age of 5 years exhibit stunting, and 50 million exhibit wasting. Among women of reproductive age, 29%, or 528 million, are affected by anemia, of which approximately half would benefit from iron supplementation ("What is malnutrition?"). The Lao People's Democratic Republic is no stranger to any of these statistics.

The Lao People's Democratic Republic is situated in the heart of the Indochinese peninsula in Southeast Asia. Lao PDR is a landlocked country bordered by China to the north, Cambodia to the south, Vietnam to the east, and Thailand and Myanmar to the northeast. Of 236,800 square kilometers, 75% of the country's area holds mountains, plateaus and thick forest. Of the country's 6.2% of arable land, 10.6% is used for agriculture ("The World Factbook: LAOS"). Lao PDR also contains many rivers. A large part of Lao PDR's border with Thailand is formed by the Mekong River. The Mekong River and its basin provide much of the fertile soil on the Champassak Plain. Other important plains are the Vientiane and Savanna Plains. These plains contain much of Lao's farming populations. Lao's climate is primarily monsoon, with a rainy season from May to November and a dry season from December to April ("Geography of Laos"). As with many monsoon countries, the most common natural disasters experienced by Laos are floods and droughts. Beyond its farm land, other natural resources include timber, hydropower, gypsum, tin, gold, and gemstones ("The World Factbook: LAOS").

As of July 2016, Lao PDR has 7 million citizens, comprised of eleven separate ethnic groups. The median age is 22.7 years old with 54% of citizens under the age of 24. Only 38.6% of the total population lives in urban areas, with Vientiane, the country's capital, being the largest population center ("The World Factbook: LAOS"). Lao PDR maintains one of the lowest population densities in Southeast Asia. Much of the country's population outside of Vientiane is contained within numerous isolated valley communities located along rivers ("Geography of Laos"). These already isolated villages are deemed unreachable during monsoon season when floods cut the villages off from all outside contact. This isolation creates limited access to healthcare in a country with a physician density of only 0.18 in 1,000, and a hospital bed density of 1.5 in 1,000 ("The World Factbook: LAOS").

Laos holds the position of one of the fastest growing populations in Southeast Asia with a 2 % increase per year (Shean). The average woman has 2.76 children, with families consisting of 6.7 persons on average ("The World Factbook: LAOS"). These families are often comprised of three generations, ranging from six to twelve in exceptional cases. This broad variance results from bilateral and flexible kinship customs (Hays). Glutinous rice remains a household staple, comprising 69 % of the energy supply, and 64% of a household's protein supply per day. In a typical meal, this rice is accompanied by small portions of vegetables, mainly green leafy vegetables and fish ("Lao People's Democratic Republic Summary"). Generally, these types of meals are consumed three times per day. Lao PDR also falls behind in education. Laotian children spend an average of 11 years in school with 79.9 % achieving literacy ("The World Factbook: LAOS"). Of these children 11 % will also work in factories to some degree.

For rural families, life is reliant on subsistence agriculture. Despite recent economic advances for the country as a whole, including their admission to the World Trade Association in 2014, the lack of national government infrastructure and effective transportation has left most rural villages to develop self-sufficient lifestyles, effectively causing 79.7 % of the total population to engage in farming (“Laos - Agriculture”). Therefore, as the staple of all Laotian cuisine, rice remains the main crop with 93 % of available land devoted to its production. Farming is almost exclusively kept within families, with 97 % of farmers owning their own land. The average landholding is 1.62 hectares, with 27 % of households owning two hectares or more, and 36 % having less than one hectare. Farmers cultivate rice in two ways, wet-field rice paddies or the slash-and-burn cultivation system; a practice that has proven devastating for Laotian forests (Shean). These practices are not mutually exclusive, especially in lowland areas remote from major river valleys. After rice, the country’s only other extensive exports are opium, a major part of the country’s hill economy, and coffee. Tree farming is another important part of agricultural life in Laos. About 23 % of these farms have mango trees, 17 % coconut trees, 17 % banana trees, 11 % jackfruit trees, and 11 % tamarind trees. About 8 % of farmers also engage in aquaculture, usually rotated with rice paddies, and 71 % do other fishing. Roughly 31 % of farmers have cattle, 48 % water buffaloes, 49 % pigs, and 73 % chickens. The actual number per farmer, however, is limited and these livestock are often reserved for emergencies (“Laos - Agriculture”).

Nonetheless, since the 1990s the Lao PDR has continued to improve the lives of its citizens. Laotians have seen a drop in the poverty level due to steady economic growth over the past decade. In 1992, 46 % of Laotians lived on less than 1.25 dollars a day, a number that has dropped to 27.6 % in 2013 (Prabang). With foreign aid, the government has been able to improve the water source of 75.7 % of citizens and the sanitation facilities of 70.9 % (“The World Factbook: LAOS”). However, without fail, Laos still ranks among the highest malnutrition rates in Southeast Asia, second only to Timor-Leste (Prabang). In the Lao PDR, stunting affects 44 % of children under five years old and 20 % are already stunted by the age of six months. Despite international intervention, stunting has only decreased slightly since the year 2000. Mountainous regions and ethnic groups hold even higher stunting rates, reaching up to 61 % among Hmong-Mien and Chinese-Tibetan children. Prenatal factors such as maternal nutrition and low birth weight, which affects 15 % of births nationally, play an important role, as 20 % of children 0–6 months of age are already stunted (Chaparro, et al.). Wasting also affects on average 6 % of children under five, and can increase with variations in age and region with highs of 21 % in the Luang Namtha Province. Spikes in these numbers can be attributed to natural disasters common to Laos, which can further limit the country’s barely self-sufficient production of rice (Chaparro, et al.).

Laotians are also afflicted with anemia and micronutrient deficiencies. Nearly 63 % of children under the age of two are anemic, a condition caused by a lack of iron in the blood, and an estimated 34 % under five years are vitamin A deficient. Slightly over 34 % of women of reproductive age also suffer from anemia (“Lao People’s Democratic Republic”). This can be especially harmful for pregnant women, as UNICEF has identified the critical “window of opportunity” in preventing malnutrition to be from pregnancy to 24 months of age. Even after birth, childhood nutrition continues to deteriorate. Only 52 % of Laotian children ages 6-8 months received food in addition to breastfeeding, and only 43 % of children 6-23 months old are fed with age-appropriate frequency. Overall, infants are often only given steamed or pre-chewed rice, with essential proteins and fats largely missing from a young child’s diet (“Lao People’s Democratic Republic Summary”). Laotians are also found to have deficiencies in iodine. While a majority of Laotian households have access to iodized salt, in some regions, up to 20 % of the population does not receive adequate iodine.

These deficiencies can exist without the aforementioned stunting and wasting, and can cause disorders with motor and cognitive development (anemia), eyesight and the immune system (vitamin A deficiency) and mental ability (iodine deficiency) (“Lao People’s Democratic Republic”). The effect of these

deficiencies on the immune system can be devastating when viewed in context with the high infection rate of Laotians. Among food/waterborne diseases, bacterial and protozoal diarrhea, hepatitis A, and typhoid fever are among the most prevalent infections. In vector-borne disease, Lao PDR saw a rise in the infection rates of dengue fever and malaria (“The World Factbook: LAOS”). More than 5,000 infants die each year from preventable, nutrition-related health problems (Prabang).

These micronutrient deficiencies, as previously mentioned, stem from a lack of required vitamins and minerals in the Laotian diet. In Lao PDR, this is often a result of limited consumption of meats, fats, oils, and milk. There are definite cultural differences among the consumption of these foods among ethnic groups. The Sino-Tibetan groups tend to consume fats and oils more than three times a week, while Austro-Asiatians may only consume fat once a week. Most cultural groups consume insects as a source of protein and calcium, but the Hmong-Mien groups have limited consumption. Overall, however, poorer households may only eat meat, an important source of iron, once or twice a month. Vegetables, a source of vitamin A and B, are consumed frequently, but only when seasonably available. Unable to rely on other sources of nutrition, Laotians fall back on rice (“Lao People's Democratic Republic”). Attempts to diversify crops have been met with resistance as farmers are notoriously risk-averse with regard to financial matters, and generally refuse to engage in any sort of agricultural credit (Shean).

This lack of dietary diversity is often based on deep-seated cultural roots. Rice has long been cultivated in Laos, dating all the way back to 1,000 BCE. The Mekong River Valley and the many rivers of Laos, made rice an easy food source. Rice became so meaningful that the Laotian word for food became synonymous with rice. As the region began to evolve into a number of small political centers called “Muang”, rice became power. Control over rice-growing areas acted as the basis for the rise and fall of many of Laotian rulers. Rice is also part of many rituals. Even a majority of traditional cultural practices revolve around the cultivation and consumption of rice. These include traditional dances based on the cycle of rice cropping and the performance of plays and dances associated with rice. For the Laotian people, rice is associated with contentment in life (Schiller et al.). This association leads to harmful postpartum practices, such as a restricted rice and salt based diet that many women receive for three months after birth. Breastfeeding newborns is also often disregarded in favor of glutinous rice and a traditional dedication to the self-reliance of rice farming.

The climate also impacts the access to other food options. Laotians are particularly vulnerable to droughts, floods, and typhoons, as a majority of the country's population is contained in mountainous areas where villages are scattered, remote and cut off from large population centers. Villages suffer the most from this isolation during the rainy or lean season, where flooding and forest damage may cut off villages from the capital for several months at a time. In 2012, up to 20 % of households were affected by rain-induced landslides and storms that obstructed roads. A village in the central and mountainous Khammouane Province was cut off from all outside contact for nineteen days in 2011. These heavy periods of rain also spoil food stores, destroying any vegetables, fruits or meats that villages had obtained from forests and trade within the nation's capital during the dry season. This spoilage leaves villages dependent on their supplies of rice. However, rice crops are also vulnerable to pests. In 2012, up to 32 % of households reported suffering from food insecurity as a result of crop pests (Prabang). Analysis of the past 30 years has shown that Laos experiences a serious drought or flood every year and a half. In 2008, it was severe flooding of the waterways in the mountains and the Mekong river. The flooding was accompanied by one of the worst rat infestations in over 40 years. In 2009, the country was hit by Tropical Storm Ketsana, which struck right before the harvest and destroyed over 60 % of the country's crops. In 2010, many regions of Laos reported drought conditions that delayed the planting of rice by several weeks (“Lao People's Democratic Republic”).

The Laotian diet should be diversified through promotion instead of trying to directly introduce new crops. The international community should allow Laotians to adopt the crops on their own. With rice

holding such an important place in Laotian culture, any forceful change will be looked upon negatively by villagers. The deviation from rice is often seen as a risk, and a break from the village and tradition. Instead, international organizations should set up test gardens, or cooperative gardens, around the country to expose villages to the benefits of the proposed crops, without forcing the crops on the citizens and allowing them more time to acclimate to dietary and agricultural change. These gardens would be a community-style garden run by community members in conjunction with members of the organization that sponsored the garden. The garden would introduce new crops to the members of the village and provide them with a chance to experience growing and consuming the crop without fear of failure. The crop could then be worked into the community naturally, without intrusive foreign influence. This solution would also combine with previous attempts to provide education on nutrition and farming. The garden's staff would provide agricultural information on farming techniques, nutrition and the benefits of diversification in a hands-on and community setting, without committal impact. Such community gardens could easily be modeled off of gardens already established in Africa. The Mari Women's Community Garden in Mari, Niger, instituted by the Rain for the Sahel and Sahara organization, would provide an excellent guide (Kanye and Nowak).

The first stage of building the community gardens would involve educating the community as a continuation of previous international activities, only scaled-down to each individual village community to directly address the culture and ethnic differences. The curriculum would focus on eliminating harmful practices such as slash and burn farming, rice feeding to postpartum women and newborns, and increasing the diversity in diets. The education focusing on diets would include the importance of micronutrients and how to obtain them in the necessary amounts. At first, crops grown in the gardens would be crops already grown in Laos to focus early efforts on providing an educational basis using known quantities to the villages. Garden staff would consist of volunteers receiving financial support through grants and required training would be given according to procedures already practiced by organizations such as the Peace Corps ("Preparation & Training"). After receiving basic training and training specific to their village, staff would instruct villagers on farming techniques that promote efficiency, sustainability, and nutrition. To create a sustainable system, garden staff would transition to assistants, as villagers become more accustomed to the gardens, and the garden would gradually transfer to their care. This transfer would allow for greater effect and reach, as villagers may be more comfortable learning from others in their community and the village-native teachers would have insight into how information should be shared and what actions would have the greatest benefit for their community. Despite the transfer of leadership, an original staff member would remain to allow for a channel of communication for new ideas and future actions.

The second stage of the garden would focus on crop diversification when the community is ready and would work in tandem with continuing education efforts. Diversifying the Lao PDR's crops would benefit the country immediately in nutrition followed by crop yield in the coming years. Creating a demand for crops other than rice will expand the country's diet, exposing them to nutrients that their current mono-diet is lacking. Furthermore, new crops, in rotation with rice, will introduce more nutrients to the soil and create greater yields in the following years. New crops may also provide a form of crop insurance. For example, if Laos experiences a drought, and rice planting must be postponed, other plants with a higher tolerance of heat will be able to survive and provide the family some nutrition until the rice crop is ready. These crops would provide Laos with a resilience to the country's frequent natural disasters. Food diversification would also allow Laotians to stagger their planting to avoid periods of sole dependency on food stores and devastation after a failed crop. In addition, new crops would increase the land available to farming, as previously non-arable land is now opened up. This would provide a larger food supply for mountainous regions, where rice farming is difficult, and increase food supply for all villages.

Crops chosen for the garden would be a decision between village ambassadors found during the education stage and experts in nutrition. This would allow both cultural and health considerations to remain an

integral part of the discussion. Crops will not be chosen on a national level as needs may differ across cultures and environments. Laos is a country of variation in both people and environment and decisions on new crops must reflect what is reasonable within the boundaries of this variance.

These community gardens would also work with children within the villages. While many of the education on farming techniques and nutrition will be prioritized in early stages to focus on adults to build community trust and find willing ambassadors, children are another important target group. Many of the harmful practices that the education initiative hopes to lessen are traditions within these communities and exposing villagers to alternatives at an early age may help create a longer lasting change. The garden, while open to the entire community, would be placed near schools to allow the school to have their children participate in the maintenance of the garden. Children participating in the maintenance of the garden will expose another social group to information and techniques that they can bring back to their own families. Produce harvested in the garden in the education and diversification stages could be used in school meals. This could provide another avenue of exposing villagers to new and diverse diets, while targeting children who suffer the most from mono nutrient diets.

The first attempt at diversification as a part of the test gardens should be soybeans. The consumption of soybeans would combat current Laotian deficiencies in both macro- and micro-nutrients. Soybeans are among one of the best sources of plant-based protein, with protein content ranging from 36-56 % of total dry weight. In a country where animal protein is hard to come by, this plant source may be an important alternative. Soybeans are also rich in fat, with 18 % of the legume dry weight made up of both polyunsaturated and monounsaturated fatty acids (Arnarson). Soybeans also contain large amounts of their own seed iron in the form of ferritin. If soybeans were made available to women and children in Laos, Laotians could see a decrease in the percentage of citizens affected by anemia. This statement is backed up by a study from the American Society for Clinical Nutrition in 2003 (Murray-Kolb et al.). Rotations of soybeans with other crops would also provide a source of nitrogen fixation for future plant cycles, allowing greater yields without the use of nitrogen-rich fertilizers. Furthermore, soybean production would be an easy transition for Laotians, as soybeans are already produced in Laos, albeit on a smaller scale. Currently soybeans are only grown in small amounts as a cash crop, but increased education on the agricultural and nutritional value of the legume could change that (“Laos - Agriculture”).

An ideal organization to assist with the development of these gardens would be The Bill and Melinda Gates Foundation. This foundation shows the greatest promise to lead funding efforts and early project structure. As an important facet of the foundation, malnutrition programs such as the one presented in this paper would be of high priority for funding. The organization’s focus on early childhood nutrition, including the 1,000-day window, immediate and exclusive breastfeeding, complementary feeding, and food fortification and supplementation, would match well with current issues facing communities in Laos. Strong partnerships with leading universities including Cornell University, Johns Hopkins University, Oxford University, University of California, Davis, and University of Colorado would open up access to experts on nutrition and additional strategies that could be implemented with the gardens. A connection to these universities would also allow students to complete study abroad internships working in the gardens with the communities and learning from them. While the organization has not implemented programs in Laos previously, their work in other high-burden countries such as Bangladesh, Burkina Faso, Ethiopia, India (with a focus on Bihar and Uttar Pradesh), and Nigeria, show promise of a successful partnership with Laos (“Nutrition”).

Additional funding aid may be found by forming a partnership with The International Fund for Agricultural Development, or IFAD, a specialized agency of the United Nations in conjunction with the World Food Prize. As a partner in fifteen projects in Laos, including the “Community-based Food Security and Economics Opportunities Programme”, and the “Southern Laos Food and Nutrition Security and Market Linkages Programme”, the IFAD’s current activities would work well with the community

garden approach (“IFAD in Lao People's Democratic Republic”). The World Food Prize’s commitment to similar goals of “strengthening the self-reliance of communities by promoting changes in people’s behavior” would provide an organization on the ground to help build successful gardens (“Lao People's Democratic Republic”).

Partnerships with the local government may prove difficult, as education and malnutrition have only recently been introduced to the leaders as an issue. Communication between the government in the capital and the majority who live in small villages is very low (“The World Factbook: LAOS”). The best partnership between local governments and this program would be fiscal. CANTEEN, “Collaboration And Networking To Enhance Education and Nutrition”, would be a prime local project to assist in bridging the gap between local governments and the community garden efforts. The CANTEEN project is funded by the EU and works to strengthen the capacity of Lao Civil Society Organizations and Local Authorities to work in partnerships contributing to the achievement of national development goals, with a focus on food security and nutrition (“CANTEEN”)

In conclusion, by implementing community gardens, Laotians would be exposed to new crops and educated on optimizing crop output and improving nutrition in a noninvasive fashion. The average family would be able to become a member of the garden community, participating in the maintenance of the garden and attending classes to further their knowledge and involvement. These citizens could then go back to their families and implement what they have learned to start production of their own crops. As previously mentioned, despite improvements in the nation's economy, the Lao PDR still ranks second in high malnourishment in Southeast Asia, despite being on track to achieving middle-income status by 2020. Much of the source of this malnutrition lies with the high cultural reliance on rice, and the lack of micronutrients such as iron and iodine. The introduction of new crops, such as soybeans, that could supplement the consumption of rice could provide Laotians with these nutrients. Current farming practices, such as slash-and-burn, are limiting already scarce farmland. Education, as a part of these two-fold community gardens, would provide Laotians with the knowledge to increase nutritional output in a way that is sustainable. The Lao People’s Democratic Republic is struggling with malnutrition, and effective long term change will require a shift in Laotian culture as a whole. In spite of that, change is possible with non-invasive education and guided experience that would allow Laotians to change for themselves.

## Works Cited

- Arnarson, Atli. "Soybeans 101: Nutrition Facts and Health Effects." *Authority Nutrition*, authoritynutrition.com/foods/soybeans/. Accessed 21 Feb. 2017.
- "CANTEEN." *INGO - Internet Directory of NGOs*, MCNV, 2017, www.directoryofngos.org/ingo2/project&id=691. Accessed 1 July 2017.
- Chaparro, et al. "Laos Nutrition Profile." *Fanta Project*, USAID, 2014, www.fantaproject.org. Accessed 22 Feb. 2017.
- "Geography of Laos." *Asia Pacific Parliamentary Forum*, 15 Jan. 2009, www.na.gov.la/appf17/geography.html. Accessed 17 Mar. 2017.
- Hays, Jeffrey. "Laos - People and Life." *Facts and Details*, 2013, factsanddetails.com/southeast-asia/Laos/sub5\_3b/. Accessed 7 Mar. 2017.
- "IFAD in Lao People's Democratic Republic." *IFAD*, 2015, operations.ifad.org/web/ifad/operations/country/home/tags/laos. Accessed 17 Mar. 2017.
- Kanye, Abdusalam, and Brian Nowak. *The Women's Community Garden Mari, Niger*. Rain for the Sahel and Sahara, Mar. 2014. Accessed 18 Mar. 2017.
- "Lao People's Democratic Republic." *World Food Programme*, www1.wfp.org/countries/lao-peoples-democratic-republic. Accessed 17 Mar. 2017.
- "Lao People's Democratic Republic Summary." *Nutrition country profiles*, Agriculture and Consumer Protection Department, www.fao.org/ag/agn/nutrition/lao\_en.stm. Accessed 16 Mar. 2017.
- "Laos - Agriculture." *Encyclopedia of the Nations*, Advameg Inc., 2017, www.nationsencyclopedia.com/economies/Asia-and-the-Pacific/Laos-AGRICULTURE.html. Accessed 23 Feb. 2017.
- Murray-Kolb, Laura, et al. "Women with low iron stores absorb iron from soybeans." *The American Journal of Clinical Nutrition*, vol. 77, no. 1, 2003, pp. 180–184. *The American Society for Nutrition*, ajcn.nutrition.org/content/77/1/180.full. Accessed 27 Feb. 2017.

“Nutrition.” *Bill & Melinda Gates Foundation*, 2017, [www.gatesfoundation.org/What-We-Do/Global-Development/Nutrition](http://www.gatesfoundation.org/What-We-Do/Global-Development/Nutrition). Accessed 1 July 2017.

Prabang, Luang. “As Laos prospers, child malnutrition persists.” *IRIN*, 1 Dec. 2015, [www.irinnews.org/report/98659/analysis-laos-prospers-child-malnutrition-persists](http://www.irinnews.org/report/98659/analysis-laos-prospers-child-malnutrition-persists). Accessed 21 Feb. 2017.

“Preparation & Training.” *Peace Corps*, [www.peacecorps.gov/volunteer/preparation-and-training/](http://www.peacecorps.gov/volunteer/preparation-and-training/). Accessed 1 July 2017.

Schiller, J. M., et al. *Rice in Laos*. Los Baños, Philippines, IRRI, 2006.

Shean, Michael. “LAOS: Sustainability of Future Rice Production Growth and Food Security Uncertain.” *Foreign Agricultural Service*, USDA, 13 Dec. 2011, [www.pecad.fas.usda.gov/highlights/2011/12/Laos\\_13Dec2011/](http://www.pecad.fas.usda.gov/highlights/2011/12/Laos_13Dec2011/). Accessed 17 Mar. 2017.

“What is malnutrition?” *World Health Organization*, World Health Organization, 8 July 2016, [www.who.int/features/qa/malnutrition/en/](http://www.who.int/features/qa/malnutrition/en/). Accessed 20 Feb. 2017.

“The World Factbook: LAOS.” *Central Intelligence Agency*, Central Intelligence Agency, 12 Jan. 2017, [www.cia.gov/library/publications/the-world-factbook/geos/la.html](http://www.cia.gov/library/publications/the-world-factbook/geos/la.html). Accessed 7 Feb. 2017.