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Philippines: Moringa to Improve Nutrition and Combat Climate Impacts on Agriculture

Introduction

Malnutrition in the Philippines exemplifies a crisis with consequences on health, development, and economic growth. One in three, or 29% of children in the Philippines experience stunted growth due to persistent malnutrition, with some regions where the impacted population is over 40%. This problem reflects a severe food security challenge driven by poverty, inequitable access to nutritious food, natural disasters, and climate vulnerabilities. The Philippines experiences a triple burden of malnutrition, meaning that undernutrition, micronutrient deficiency (hidden hunger), and increasing cases of childhood obesity coexist in many communities. These challenges frequently affect development, stunt growth, and future opportunities, which affects children especially (UNICEF Philippines, 2024). A commonly overlooked, locally grown plant in the Philippines can help address these challenges. Moringa oleifera, a nutrient-dense, climate-resilient, and environmentally beneficial plant, has the potential to revolutionize nutrition in the Philippines and protect the health and development of vulnerable populations. A moringa based program is a sustainable, environmentally friendly approach to address this crisis. By connecting farmers with local schools and existing child feeding programs, the program would not only improve food security, but also provide jobs in agriculture and bring the community together.

Country and Family

The Philippines is an archipelago consisting of over 7,000 islands and a population of approximately 114 million people located in South East Asia. The Philippines is surrounded by the Pacific Ocean, and is located within the Pacific typhoon belt and ring of fire, making it highly prone to extreme weather events (The Information Architects of Encyclopedia Britannica, 2025). In 2021-2023, around 44.7% of the population experienced moderate to severe food insecurity, making it the country with the most food insecure in South East Asia (Denya, 2024). According to the Philippines Statistics Authority (2022), 54% of the population lives in urban areas and 46% lives in rural areas. The Philippines currently has a constitutional republic and representative democracy style government. Since 2022, the president has been Ferdinand Romualdez Marcos Jr. (Philippine Consulate General, 2024). A barangay is the smallest political unit in the Philippines, similar to a village. Barangays are led by a barangay captain (punong barangay) and elected council members, which establishes both a local governing system and a community. These local governments provide a forum for regular people to engage in governance. At the barangay level, officials and residents regularly interact face to face (PhilAtlas, 2026).

The Philippines has a tropical and maritime climate. There are generally high temperatures, high humidity, and significant rainfall. The mean annual rainfall varies between 965 to 4,064 millimeters. The average humidity is between 71 and 84 percent. Typhoons have a significant influence on the weather in the Philippines. A large amount of the rainfall, humidity, and cloudiness is contributed by typhoons (PAGASA, 2014). These conditions directly affect agriculture. Strong winds and flooding destroy crops, damage infrastructure, and reduce soil quality. About 42% of the overall land in the Philippines is cultivated (World Bank, 2022). The average farm size is 0.83 hectares, which is about the size of one and half American football fields, or two acres. The small farm sizes often decrease economic efficiency and make it harder to recover from crop loss and damage. However, it supports local jobs. (Philippine Statistics Authority, 2024).

Typical Family Life

Filipino families in a rural area typically have three children, while families in urban areas tend to be smaller. In 2020, the average family size was 4.1 persons (Philippines Statistics Authority, 2022). For the average household, jobs available are likely to be jobs in agriculture, manufacturing, retail, and service. There is also a steady demand for domestic workers (nannies and maids). Across 193 occupations in 72 industries, the average monthly wage for time rated workers was 18,423 PHP, or 316.70 US dollars (Philippines Statistics Authority, 2023).

Diet

Commonly, in Filipino households, most meals center around rice. Rice is often the main source of protein and it is a reliable source of carbohydrates. However, it does not provide many vital nutrients, contributing to an unbalanced diet. Some families are more inclined to buy unhealthy, quick, or processed food options due to affordability, practicality, and advertising. Although this choice is not healthy, it often saves time and money. In both urban and rural areas, families likely rely on local community stores. These are known as “sari- sari” or wet markets. Supermarkets are often not a primary source for most low-income families due to inaccessibility and high cost. Around two out of five households gather food from rivers, seas, or farms throughout the week (Omaña, 2025). In extremely poor communities, such as the informal settlements of metro Manila, some families must resort to eating “pagpag”, which consists of recooked scraps of trashed food. People may fry or recook scraps found in dumpsters of fast food buildings. Eating pagpag is not healthy or stable, but some families must rely on it for survival and necessity (Chua, Mercadillo, Munoz, & Salud, 2024).

Education

Access to quality education is limited to those who can afford it, and the cost is rising. Availability to education is uneven and strongly influenced by income. Although basic education is often promoted to be affordable and accessible, this is not the case for many families, especially those who live in impoverished communities. Some families must constantly worry about barely having enough to survive, so schooling is not the top priority. In cases where families cannot send their children to school, children must work instead. In some communities, school and education are viewed as a luxury (Bai, 2023).

Challenge and Impact

Food insecurity in the Philippines is a dire challenge, especially in rural provinces where 1 in 4, or 25% of households rely on rice as both their primary calorie source and main income crop. Food security can be examined by looking at the four pillars, which are availability, access, utilization, and stability.

According to World Bank Group (2025), food availability refers to the physical presence of food, which is mainly determined by production, economics and trade. Natural disasters and weather have a severe impact on agriculture and economics in the Philippines. Due to its geographical location, the Philippines is very prone to typhoons and flooding. As a result of these natural disasters, crops are damaged, which leads to an increase in food price and disrupts the transportation of food (Jamille, 2024). According to World Data (2022), the Philippines is one of the most affected countries by typhoons; they experience approximately 18-20 per year. Due to climate change, the chance of a category 3-5 typhoon has increased by 25% (Climate Centre, 2024). The economic loss is significant. For example, the tropical storms Crising, Dante, and Emong caused P1.12 billion (about 19.6 million US dollars) in agricultural losses. 59.9% of the damage was on rice farms (Department of Agriculture, 2025).

Food access is people being able to obtain a sufficient amount of food, physically and economically. Rural populations are more directly affected by agricultural loss. Agricultural jobs are the primary source of income for low-income families living in rural areas, and in many households it is the only source of income. Approximately 36 percent of those in rural areas are classified as poor, compared to 13 percent in urban areas. Rural areas have higher unemployment rates, and those who are employed likely work on farms. (International Fund for Agricultural Development, 2023).

Utilization focuses on dietary quality and making sure that people have sufficient energy and nutrient intake. In the Philippines, micronutrient undernutrition is prevalent due to over reliance on low-cost staple foods such as rice, which provides calories, but lacks essential nutrients (World Bank Group, 2025). Rice contributes up to 58% of the average Filipino's energy intake. Poorer families depend even more heavily on rice (Omaña, 2025). This nutritional imbalance leads to micronutrient deficiencies, especially in children, which can lead to stunted growth and development issues.

Finally, stability of these pillars must occur, meaning that the access and utilization must be consistent and reliable. Climate change further increases these challenges by increasing the frequency and intensity of extreme weather events. The decrease in agricultural growth especially affects low income or impoverished families. When agricultural output decreases, it causes higher food prices, making fresh, healthy food even less accessible to low-income families, worsening food insecurity (NICCDIES, 2018).

Exploring Existing Solutions

There are existing solutions that address some aspects of food insecurity in the Philippines. The Philippines Department of Agriculture collaborated with the International Rice Research Institute (PhilRice) to develop biofortified rice (Golden Rice) enriched with beta carotene, a source of vitamin A (Jahic, 2025). According to the International Rice Research Institute (2021), rice is the most consumed food in the Philippines, so adding Golden Rice into their diet does not require any behavioral changes. Golden rice addresses vitamin A deficiency, which is a common cause of childhood blindness and weakened immune system. However, this solution only addresses a single nutrient deficiency, leaving a population that still lacks dietary diversity. Importantly, it does not address how people will get access to this food, as poverty and high prices will remain the same. There are many other essential nutrients that must be incorporated into their diets.

According to Miraflor (2020), vertical farming is the solution to reduce hunger in the Philippines. Vertical farming is a method of growing crops in stacked layers, usually indoor/in buildings. Vertical farms take up limited space and allow farming in a controlled environment. This ensures that safe food can be affordable and accessible even in urban areas. This method avoids damage from flooding and natural disasters. This method also requires less land and water, which addresses the struggle of small farm sizes. Another urban farming method is hydroponics. Hydroponics is the practice of growing plants in nutrient rich water, which eliminates the need for soil. These urban farming methods can be implemented in communities or in people's backyard. This reduces or eliminates the challenge of transportation of food (Climate Change Commission 2024).

After COVID-19 many rural populations had travel and transportation limitations, so community based solutions were established. Dr. Nelda Gonzaga helped rural communities in the Philippines by encouraging families to farm to produce food on their own (Australian Center for International Agricultural Research, 2021). The Rise Against Hunger organization established mobile kitchens to provide urgent meals. This is a short term aid, but is not a stable food source for families. A longer term solution provided by the rise against hunger organization is the "Good Food Farm" established in 2020 which is able to provide fresh food such as vegetables, fruits, fish, and eggs, to over 3000 Filipino families per week. This farm focuses on sustainable agricultural practices, which supports

self-sufficiency. This also provided over 30 jobs. By providing jobs, many families gained a stable source of income. (Luckadoo, 2024; Payne, 2024). While these existing approaches address some aspects of food insecurity, they do not fully address the issues related to climate resilience, sustainable income, and nutrition specific to the country. By combining and integrating the ideas of community based farming initiatives, bio-modification, and existing feeding programs, a comprehensive, sustainable solution utilizing a locally grown plant can simultaneously strengthen these pillars.

Recommendation and Implementation

Why Moringa?

Moringa oleifera, often called the "miracle tree" or "tree of life", is an extremely nutrient dense, fast growing, and locally grown plant. Moringa is highly packed with vitamin A, vitamin C, vitamin E, vitamin B complex, calcium, iron, omega 3 fatty-acids and minerals, potassium, and phosphorus. It contains all nine essential amino acids. To compare it to commonly consumed foods, moringa oleifera is high in protein, contains seven times more vitamin C than oranges, seventeen times more calcium than milk, nine times more protein than yogurt, ten times more vitamin A than carrots, fifteen times more potassium than bananas, and twenty-five times more iron than spinach. These properties make moringa highly effective at addressing micronutrient deficiencies.

Every part of the moringa plant can be used, however the leaves have the highest concentration of nutrients. The leaves can be dried and turned into a powder, allowing it to be stored for long periods of time and available when needed. These supplements can boost immunity and growth (Kumar et al., 2025). In the long term, this has the potential to become a common household supplement. The leaves, fresh or dried, can be incorporated into a variety of dishes including rice dishes and soups.

Beyond Moringa's nutritional and economic value, it is also beneficial to the environment. The plant is effective at reducing and storing greenhouse gases like carbon dioxide from the atmosphere. It has a high capacity, and it can store up to twenty times more carbon dioxide than common tropical trees (Bayer Foundation, 2023). Additionally, moringa seeds can be used in water purification, as crushed seeds can act as a natural coagulant, further displaying its environmental and health benefits (Barecha Dandesa et al., 2023; Desta & Bote, 2021). In the Philippines, moringa is known as "malunggay" and is featured in traditional dishes such as tinola (Merano, 2021). The tree is commonly found in backyards. This familiarity is key, since it means the likelihood of community acceptance is high.

Moringa is drought and high temperature resistant, and currently grows well in the Philippines climate. However, there are some improvements that could be made for better long term results. The plant is not flood tolerant and there is often inconsistent quality among the harvested material. In the long term, biotechnology such as genetic modification, could potentially be used to develop more flood resistant varieties. Traditional methods such as selective breeding can also help solve this problem. Moringa trees in flooded areas can be observed, and the ones that demonstrate resistance can be collected and tested. Scientists can identify traits such as deeper roots, and apply them to the future crops to improve performance. These modifications to improve yield consistency and quality may increase profit for farmers and support poverty reduction. Additionally, moringa naturally grows fast, and after just three months it can grow a significant amount of harvestable material, reducing the risk of crop loss. (Trigo et al., 2020; Villegas-Vazquez et al., 2025).

To improve food security in the Philippines using a moringa based nutrition and agriculture program, implementation would realistically start on a small scale in a climate vulnerable community through partnering with local farmers, community leaders, and schools. The program should first start out by determining a climate vulnerable community and identifying the current nutritional status of children, moringa production, and farmer income. This baseline can be referred to throughout the program in order

to measure impact.The first step would be to educate the community and gain support. The barangay leaders, farmers, schools, families, and local nutrition and agriculture leaders should be brought together and provided information about the nutritional and agricultural value of malunggay. Demonstration of proper growing technique and of how it can be easily incorporated into familiar foods should be included. The involvement of barangay leadership builds on the existing community structure rather than introducing an entirely new system. The Philippines has experience in educating on bio-modified crops like Golden Rice, so similar meetings on moringa are feasible (ISAAA, 2017; 2022). Once community support is established, participating farmers would receive training and materials. Schools and community workshops could teach families how to utilize the existing moringa that is commonly found in backyards or how to grow moringa in available community spaces. Farmers would be able to harvest moringa, and process the leaves into dried powder. This powder will make the product easier to store, transport, and quickly mix into foods. This powder can be distributed to local schools and sold to markets, providing farmers with an additional source of income. This way, families with suitable space could cultivate moringa for household consumption, while farms would produce larger quantities to supply the school feeding program and distribute to local markets. Partnerships are essential to finance the initial start of the program and ensure long term financial stability. Existing organizations working towards a shared goal, such as UNICEF are potential primary resources. For long-term support, the program should plan on working with government programs and other international organizations for support.

Short-term and Long-term Impact

The program's short-term impact can be measured during the first year of implementation. By monitoring children's dietary diversity, agricultural production, farmer income, and community participation, the program's effectiveness can be evaluated. At the end of the first year, these results can be compared with the baseline data collected before implementation. Adjustments can be made based on these results and community feedback. If the program demonstrates positive results, it could be expanded to additional communities facing similar challenges. Over time, the revenue from the moringa program could help fund further research and create opportunities for more advanced improvements such as biotechnology. These improvements such as increasing flood tolerance and improving yield consistency could help ensure that moringa remains a stable source of nutrition and income in the long-term.

Food insecurity in the Philippines is not caused by a singular problem, so it requires a comprehensive approach that provides both short term relief and long-term resilience. This moringa-based nutrition and agriculture program utilizes a culturally-familiar, nutrient-rich, and climate resilient crop to strengthen the core pillars of food security. This solution not only aims to reduce micronutrient deficiencies, but also supports the economy and livelihood of farmers. Environmentally, moringa supports reducing carbon dioxide in the atmosphere, agroforestry, and climate adaptability. Ultimately, by using a locally grown and culturally familiar plant, this program has the potential to help the Philippines towards lasting food security.

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