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Cambodia, Malnutrition

### **Cambodia: The Manifestation of Malnutrition Resolved With Dietary Diversity**

Cambodia is a country located in Southeast Asia with a population of 16.01 million people. For the past two decades, the country has had a stable decline of rural population, yet around 80% still reside in rural circumstances with 20% able to live in urban districts. The government is a Parliamentary Constitutional Monarchy with current king Norodom Sihamoni and prime minister Hun Sen. Of the country's 181,035 square kilometers 22.7% is arable land which grows rice, cassava, corn, soybeans, and a variety of tropical fruits. Major exports include rice, fish, tobacco, textiles, and rubber. On average, farms in Cambodia are 1.2 hectares or 2.25 American football fields. Cambodia is swamp-like and full of forests, rivers, mountains, and has a tropical, humid climate.

The average family in Cambodia has five people living within the household. Traditionally, houses are created out of wood and are stilted because of monsoons. Unlike in Western culture, Cambodians usually live together in a communal room. An average family's meal consists of rice, seafood, and vegetables due to their abundance and inexpensiveness. Rice in itself is  $\frac{2}{3}$  the calories consumed by Cambodians (Hays). Sustainable agriculture is a popular practice, but if one doesn't farm they typically purchase from a nearby market with unknown sanitation.

Agriculture is prominent as 48.7% work in the force, specifically in fisheries or on rice farms. The typical gross salary is around \$7,214.81 or 29,333,575 KHR (The World Factbook). Although the average family doesn't earn much money, Cambodia is classified as one of the top 10 fastest growing economies with the levels of poverty decreasing by 50% over the past 20 years. It's now classified as a lower-middle-income economy due to how fast the economy has improved.

Healthcare is difficult to obtain in Cambodia due to geographical and physical borders. Some trained health professionals are also reluctant to be in distant places that are isolated. Most of these places also lack antibiotics and other necessary medicines. Vaccines are unable to be shipped because of no cold storage facilities or proper transportation. Due to the lack of healthy water, sanitation, transportation, and communication there have been huge flaws in the health system which has caused the spread of major illnesses.

The Cambodian educational system sets children up for failure because children aren't prepared, experience poor teaching, lack basic school infrastructure, and attend school irregularly. The country has corruption due to the Khmer Rouge wiping out educational facilities and educators in the 1900's. The corruption has caused families to have to pay for tutoring sessions and other things to simply pass (IRIN). With these additional costs, most families can't afford it causing it to be more beneficial for the child to drop out. Children are developmentally behind because of their inadequate learning and insufficient nutrition.

Cambodians have poor infrastructure due to decades of civil war. Only 11.6% of the country's highways are paved, granted most families can barely afford motorized vehicles (Cambodia - Infrastructure, Power...). Much of the population in rural areas don't have access to basic electricity. Agriculturally the country hasn't advanced much as traditional forms like water wheels are still used. It's also said that over 3 million people in Cambodia cannot utilize clean water and around 6.5 million lack access to improved sanitation (Cambodia's Water Crisis...).

The lack of nutritional food is highly noticeable in rural areas. There is a strong lack of regulations on the sale of food and has been stated by Lim Rathanak, the director-general of the Department of Drugs and Foods at the Ministry of Health that, "If we apply the law firmly, 90 percent of the restaurants in the country will be closed." (Food Industry Set...). Cambodia experiences heavy amounts of malnutrition because of their poor diets and toxins in the water. It's estimated that at least 2.3 million Cambodians face food insecurity caused by malnutrition, however, Cambodians spend over 70% of their income on their diet.

Malnutrition occurs here because of low food diversity and lack of calories with 1/3 population eating less than the minimum daily requirement. In the country, 44% of children under five years old are stunted and 15% wasted (Greffeuille). Iodine Deficiency Disorder, Vitamin A Deficiency, and Iron Deficiency Anemia are most common amongst women and children. It was found that rural children are especially affected as around 22% had a vitamin A deficiency. Anemia affects more than 3 in 4 children under 2 and more than 50% of older children and pregnant women. Cambodia also has the highest rates of zinc deficiency in children in South East Asia, around 647,000 children under five years old are deficient (National Institute of...).

In countries like Cambodia, the lack of nutrients causes many development issues and malnutrition based diseases. It has been said that the first 1,000 days of a child's life are the most important because of opportunities to secure proper developments. During the first 1,000 days, the baby should be breastfed to obtain nutrients. It's recommended to breastfeed within the first hour of birth and to continue every 3 hours to maintain nutrition for the baby, however, in Cambodia 11% of newborns are breastfed in the first hour of life, and 1 in 4 during their first day of life heightening the chances of malnutrition in children. However, the mothers are already undernourished with 17.8% of women have low amounts of folic acid causing their babies to suffer as default (Wieringa).

Cambodia has had health issues with Arsenic for over centuries with the issue being recently recognized in Southeast Asia. 16% of rural drinking water is classified as safe compared to the urban populations 55% safe water (The World Factbook...). Arsenic is to blame for the poor drinking water and is the main reason why it's deemed toxic in most cases. It's naturally in the groundwater and the Mekong River basin. Kandal has been reported to have the highest amount of arsenic in the country with more than 35% of the 15,000 wells samples exceeding the national limit of the toxin (Barron). Besides drinking the water, the consumption of rice has also been noted to be a major way to be exposed to arsenic. The rice grows in the contaminated river causing the roots to suck up the arsenic and distribute it to the grains. The government has recently been promoting the growth of rice through the dry season which makes the rice farmers forced to access the poisonous groundwater to irrigate their paddies.

The country suffers from poor eating habits full of nutritious and diverse food. Crop diversity is essential to ensure and protect food security. Cambodia mainly focuses on producing rice and fish because of high demand, yet it doesn't give the citizens a chance to be introduced to other nutrients. With the implementation of a variety of foods, Cambodians would be able to have a diverse diet, unlike in previous years. Keeping with Cambodia's climate and culture a few foods that would help halt malnutrition and enforce dietary diversity would be corn, soybeans, and lima beans.

Yellow corn is often unrecognized for its capabilities of producing Vitamin A. This type of corn produces a carotenoid called beta carotene which is responsible for Vitamin A. There has been a researcher at Cornell University who linked the high levels of beta-carotene to a single gene which would allow farmers to easily move the gene into other corn varieties if Cambodia doesn't culturally desire yellow corn (Charles). Corn is easily susceptible to a pest called the Asiatic corn borer, which terrorizes much of Southeast Asia, however, in the Philippines, a genetically modified type called bt corn has proven to be resistant to the pest. The implementation of the GMO has now caused the tropical Philippines to be self-sufficient in corn production (GMO corn is...). On top of that, corn is relatively high in Zinc as it produces 0.7mg of Zinc per cup with 11mg being the recommended daily value (200 Vegetables...).

Grown in Cambodia's upland sandy soils are soybeans, but the general public doesn't have access to such, yet the crop would benefit the masses. Soybeans and byproducts are loaded with iron and contain around 8.8 mg per cup, half the amount of recommended daily intake. Soybean sprouts, when stir-fried, are high in Zinc producing 2.1mg per 100 grams (200 Vegetables...). Although not common in Cambodia, lima beans have the capabilities of being grown there because of a similar climate to its native region. Lima beans are high in Iodine and 10% of the recommended daily intake (Weinblatt). Lima beans are also very high in Zinc producing 1.3mg per cup (200 Vegetables...).

Cambodia is reliant on rice, yet exposure to a different type may bring in more nutrients. Fragrant Rice and White Rice are the two main types of rice grown. Basmati rice tends to be more beneficial and has the least amount of arsenic within it naturally. Per one cup, Basmati rice has 205 calories, 4.3 grams protein, 11% iron based on the recommended daily value. Not only is it beneficial but would remain a staple for Cambodians. Researchers from the Indian Agricultural Research Institute have developed varieties of this rice with high yield and ample amounts of Zinc.

The way to ensure food is arsenic-free is by filtering the toxin out of the water itself. Phytoremediation is the best option since it's inexpensive and environmentally friendly. One plant that filters out arsenic is the Chinese brake fern which thrives in tropical and subtropical areas. In a study done, it was found the plant sucks out the arsenic and puts it in the frond, causing it to be the first notable multicellular organism to do so. The researchers also did a study where they discovered the gene that makes them tolerant of arsenic. The gene moves the arsenic into the vacuole, storing it away from the cytoplasm so it doesn't affect the plant. Potentially rice and other staples could be modified with this gene to aid the arsenic issue (Wilke).

Cambodia would benefit from embracing dietary diversity by growing more staple foods full of the nutrients they lack, while also filtering out the arsenic-filled water that damages their seafood, water, and crops. The diet suggested aligns with Cambodian's current diets so it doesn't seem unreasonable to assume Cambodians would be likely to try crop diversification. Education would be necessary to maintain and introduce nutrition in Cambodia. Organizations could send experts to show local teachers, scientists, and farmers how to incorporate the food into their diets, cook, and plant the new crops.

The United Nations has expressed interest in solving malnutrition in Cambodia before and with a simple push, they may be able to set off a chain reaction that could aid the country. Many non-profit organizations are set on fixing the water crisis in Cambodia such as UNICEF, Action Against Hunger, and Water.org. These organizations are very successful due to their popularity and partnering around the globe as well as their adaptability. To maintain support of these organizations it's necessary to have funding, which the previously mentioned ones have.

The government would have to make a push towards its farmers to grow the new products, yet it may be difficult to make the government want to help. As with other governments with corruption, it's often necessary for the citizens to address the flaws by publicly protesting. For example, the USA refused to acknowledge segregation for years until protests eventually brought attention to the issue. However at the same time, if the issue isn't noticed, such as police brutality in the USA, the people begin to riot until change is eventually brought. The civilians of Cambodia may be forced to protest or eventually riot to draw more attention to the issue of malnutrition. In the end, whether the civilians are supported by their governments doesn't matter as long as the issue of malnutrition is resolved so all Cambodians can rest easily knowing they're safe.

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