Malnutrition in Cambodia: Evidence-based proposal strategy to address child stunting, micronutrient deficiencies and underweight-births in Cambodia.

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**ABSTRACT**

Malnutrition in Cambodia among children under the age of five remains a major public health concern with almost half of the children malnourished as measured by their height and weight. Based on information gathered from peer reviewed literature; the paper begins by giving a summary of the major health problems in Cambodia and captures the major mortality, burden of disease, nutritional status, and health systems of Cambodia. Subsequent discussion lays emphasis on malnutrition; highlighting the importance of the problem as well as important causes as relates to the cultural, social, behavioral, biological, and environmental factors that contribute to the health problem. Thereafter an evidence-based proposal strategy is drawn to address child stunting, underweight births and micro-nutrient deficiencies. Finally, anticipated program challenges and limitations are highlighted.

**Key words**: Micro-nutrient deficiencies, emphasis, anticipated.

**Introduction**

About one third of the Cambodian population still live below the poverty line and many children suffer from hunger and poor health. Previous research has associated childhood nutrition to different factors such as: education and nutritional status of mothers, employment of the head of the family, feeding practices, including breastfeeding, water supply and sanitation, access to healthcare, prevalence of infectious diseases, rural residence, social network and family support. An immense part of these
factors is the economic inequality rising in Cambodia. Getting enough nutrients generally depends on the availability of those nutrient foods. The problem of malnutrition in Cambodian children under five years of age is attributed to a number of immediate, underlying and basic causes that largely deal with poverty, low health literacy and social inequality; Interventions proposed are targeted to address the enumerated problems.

In Cambodia, communicable diseases such as acute respiratory infection, diarrhea and tuberculosis have been ranked as the three leading causes of death, affecting more than half (54%) of the Cambodian population according to an estimate performed by the World Health Organization (WHO). Other major health problems in Cambodia include HIV/AIDS, malaria, iodine deficiency and maternal mortality.²

According to recent studies, Cambodia is ranked poorly when it comes to Child health especially the access to health services. It has been shown that children that come from poor families receive less preventive and curative interventions than children of wealthier families.³ This study conducted by Victora et al also mentions that: “Cambodian children faired very poorly with the highest rate of children receiving zero interventions (13.3%), as compared to Nicaraguan children (0.8%)”.² This shows that even the little health service provided to the Cambodian population is not equally distributed to the community, especially those that need it most. As a result, children from poor families are suffering most. The preventive interventions provide health services such as immunization, mosquito nets, micronutrient supplementation, nutrition counseling (breastfeeding as well as other feedings), growth monitoring, and appropriate newborn care.² Malnutrition deaths among children in Cambodia is well documented and is an important concern that should be addressed.

Prior to USAID’s health system strengthening project in Cambodia, the majority of Cambodians who fell sick sought for care first from the private sector due to the high cost, poor quality and lack of accessibility of the public sector. However, aligned with the US global health initiative, USAID’s health system strengthening project focuses on improving health policy and access to health services for poorer populations through health financing schemes, improved service quality, health information systems and medicine quality monitoring all of which are in support of the Cambodians’ government’s 2008-2015 health strategy plan.⁴

The Health System of Cambodia focuses on educating mothers with proper way of feeding their children with more nutrient food especially breastfeeding which is important to fighting malnutrition in Cambodia. Breastfeeding is important in maintaining the immune system as

well as proper child growth development. The major issue regarding this concern is that there are not enough investment health support programs and education promoting breastfeeding by the Cambodian government and international organizations to influence infant feeding practices. The health system of Cambodia also aims to provide immunization program organizations and making sure these immunizations are well distributed among the population.

**Importance of the Health Condition**

Malnutrition can lead to a cascade of events ranging from; increased mortality, poor health in children and adults, impaired cognitive development, stunted growth, reduced learning capacity, inferior performance and ultimately lower adult work performance and productivity. The consensus on global scientific evidence indicates that lowering the rate of malnutrition is a vital step in any successful program to increase the quality of human capital and resources.

Improving the nutritional status of children is a priority in child health. Globally, the burden of undernutrition in children is alarming. More than 300 million children younger than five years are estimated to be chronically undernourished. Nutritional deficiency is an important factor contributing to childhood illness in the world. This accounted for 3.4% of the total global burden of diseases in 2010. The global burden of child malnutrition can be reduced by implementing adequate policies targeting the determinants of health, such as education, economic status and empowerment of women. Stunting and child malnutrition has reduced the economic output in Cambodia by more than $120 million.

**Discussion of Health Issue**

There are immediate, underlying and basic causes of malnutrition in Cambodia. The immediate causes include inadequate dietary intake and infectious diseases such as diarrhea and respiratory infections. At the immediate level in the context of undernutrition, insufficient dietary intake and/or poor health due to infection can lead to a negative balance in nutrients and energy. In early childhood, infection and undernutrition are often interlinked in an ongoing cycle. Infections such as diarrhea and intestinal infestations can reduce appetite, impair absorption and lead to a loss of nutrients, whereas systemic infections such as pneumonia or measles increase the need for nutrients. This cycle leads to nutrient deficiencies. Adequate supply of nutrients is especially important in early childhood, when many of the body’s immune and cognitive functions are being developed. Once these systems are compromised, repair and catch up are very difficult.

On the underlying level, several environmental determinants including food,
living, social and health environments underpin individual-level health behaviors and biological factors. In the context of undernutrition, the ability to ensure adequate dietary intake at all times depends on household food security which includes the availability and physical and economic access to sufficient amounts of nutritious and culturally accepted food to meet dietary requirements. Inadequate care for mothers and children, young maternal age and low BMI of mothers, maternal tobacco smoking, gender inequalities all account for underlying causes of malnutrition in Cambodia. Health-promoting care and feeding practices depend on supportive social environments that, for example, empower mothers to breastfeed and equip households and communities with resources to access services. Lack of affordable, good quality health services or barriers to access of these services, unhygienic, overcrowded living conditions and poor access to clean and safe water and sanitation facilities further increase the risk of undernutrition. Other factors that account for the underlying causes of malnutrition in Cambodia are geographic inequalities between rural and urban areas, as well as inadequate health education leading to educational inequalities.

There are several significant environmental and biological factors that Cambodians face contributing to malnutrition, which influences a successful intervention in Cambodia. Natural disasters strongly affect Cambodia. Due to its geographical location, it experiences severe rains and flooding during the monsoon season in the Mekong and Tonle Sap Basins, and droughts in the plains regions. These floods can severely damage crops, and also are limiting in what foods can be grown within these regions. Rice is a crop that historically does well in very wet conditions, but even that cannot survive a region that is subject to heavy flooding.

On the basic level, different system-level factors can act as directional forces for the underlying and immediate factors and ultimately for malnutrition. For instance, economic growth has the potential to improve household food security, regulate food markets for processed foods and beverages, support social environments that encourage health-promoting practices and deliver good quality and comprehensive preventive and curative health care. The quality of governance is also thought to be a major driver of the strength of determinants and responses to malnutrition. From quality of service delivery, to the ability to co-ordinate across sectors, quickly prioritize actions, regulate and incentivize different public and private actors and learn from interventions, the quality of governance is important for managing and reducing malnutrition.

In a study that assessed the trends of nutritional status of children under age five in Cambodia.
Cambodia, over four demographic health surveys (DHS) from 2000 to 2014, Undernutrition was a public health problem in all surveys. Despite consistent improvement over the years, stunting still affected 32.5% of children in 2014. Wasting prevalence did not improve since 2005 and affected 9.6% of children under five in 2014. Anemia prevalence in Cambodia was high and remained at 45%. Worse still was the fact that in 2010 the risk of neonatal death in Cambodia was 85%.9

In yet another study comparing the double burden of malnutrition among 9 countries in South East Asia and the pacific, Cambodia was shown to predominantly experience undernutrition. However, Cambodia was one of the strongest performers across the program indicators. Nevertheless, Cambodia had low rates of antenatal care visits and, low rates of female secondary education (which is a useful marker of the status of girls and is a risk factor for early marriage and pregnancy, themselves a risk factor for poorer birth outcomes)3. From reviews of the literature, stunting, underweight, and anemia were the most worrisome nutritional problems in both male and female children and would form the focus of our intervention.9

**Intervention/Proposal Strategy**

Community-based interventions to improve maternal, newborn, and child health would be delivered by health-care personnel or lay individuals, and implemented locally in homes, villages, or any defined community group. A full spectrum of promotive, preventive, and curative interventions can be delivered via community platforms including provision of basic antenatal care which promotes optimal birth weight; preventive essential newborn care; breastfeeding counselling; management and referral of sick neonates; development of skills in behavior change communication; and community mobilization strategies to promote birth and newborn care preparedness. For example, a review of community-based packages of care suggested that these interventions can improve rates of facility births by 28% and result in a doubling of the rate of initiation of breastfeeding within 1 hr.10

Peri-conceptional folic acid supplementation during pregnancy would be promoted as folic acid supplementation improved mean birthweight, with a 79% reduction in the incidence of megaloblastic anemias in a particular intervention. Furthermore, no evidence of adverse effects was noted from folic acid supplementation in the program me settings.10 Despite strong evidence of benefit, reaching women of reproductive age in the peri conceptual period to provide folic acid supplements through existing delivery platforms remains a logistical challenge. Fortification of cereals and other foods appears to be a feasible way to reach the...
Food fortification would be promoted at three levels: mass or universal, targeted, and household. Mass or universal fortification has the potential to produce foods and food products that are widely consumed by the general population (e.g., salt iodization and flour fortification with iron and folate; currently operational in Cambodia though not as successful as other countries). Previous studies have shown that mass fortification is by far the most cost-effective nutrition intervention, particularly when produced by medium-to-large scale industries. Targeted fortification (e.g., nutrient fortified complementary foods for children aged 6–24 months) is important for subgroups of nutritionally vulnerable populations, and populations in emergency situations whose nutrient intake is insufficient through available diets. Home fortification involves addition of nutrients directly to food consumed by women, children, or both, in the form of micronutrient powders or small quantities of food-based fortified lipid spreads (e.g., lipid-based nutrient supplements).

Other strategies to be employed to address anemia in Cambodia include maternal multiple micronutrient supplementation. Preliminary data from a large trial comparing multiple micronutrient with iron-folate supplementation in pregnancy in Bangladesh showed a significant reduction in preterm births and the reduction in low birth weight with no adverse effects. Additionally, maternal calcium supplementation during pregnancy in women at risk of low calcium intake has been shown to reduce maternal hypertensive disorders and preterm birth, as such this strategy would be employed in our intervention. Maternal iodine supplementation or fortification is another strategy to be employed since in severe iodine deficiency, salt iodization alone might not be sufficient for control of iodine deficiency in pregnancy. In these circumstances iodized oil supplementation during pregnancy can be a viable option.

To address the problem of underweight babies in Cambodia, nutritional interventions targeting maternal wasting and food insecurity would be instituted. These include dietary advice to pregnant women, provision of balanced energy protein supplements, and high protein or isocaloric protein supplementation, which is an important intervention for prevention of adverse perinatal outcomes in malnourished women. A Cochrane review concluded that balanced energy protein supplementation reduced the incidence of SGA by 32% and risk of stillbirths by 45%.

Nutritional intervention in neonates would include vitamin A supplementation based on a Cochrane review of oral or intramuscular vitamin A supplementation to very low birthweight infants.
which showed reduced mortality and oxygen requirement at 1 month of age compared with placebo.

Another neonatal nutritional intervention to be employed includes delayed cord clamping; as a Cochrane review suggested that delayed cord clamping in term neonates led to significant increase in newborn hemoglobin and higher serum ferritin concentration at 6 months of age. Another review of studies in preterm neonates concluded that delayed cord clamping was associated with 39% reduction in need for blood transfusion and a lower risk of complications after birth.\textsuperscript{10}

Kangaroo mother care is yet another strategy to be promoted in the intervention as supported by a Cochrane review of randomized controlled trials of early skin-to-skin care in healthy neonates which showed a significant 27% increase in breastfeeding at 1–4 months of age and increased duration of breastfeeding.\textsuperscript{3} WHO recommends initiation of breastfeeding within 1 hr of birth, exclusive breastfeeding of infants till 6 months of age, and continued breastfeeding until 2 years of age or older.\textsuperscript{10}

The intervention would also promote dietary diversity and complementary feeding which is the timely introduction of safe and nutritionally rich foods in addition to breastfeeding at about 6 months of age and typically provided from 6 to 23 months of age. Demographic Health Survey datasets from low-income countries; consumption of a minimum acceptable diet with dietary diversity reduced the risk of both stunting and underweight whereas minimum meal frequency was associated with lower risk of underweight only.\textsuperscript{10}

Child health days would be introduced as an intervention to mitigate malnutrition in Cambodia. Child health days introduced in weak health systems rapidly enhance coverage of essential child survival interventions which commonly include delivery of vitamin A supplements, immunizations, insecticide-treated nets, and deworming drugs. Available evidence suggests that these days can achieve greater coverage than stand-alone campaigns in previously low-coverage countries.\textsuperscript{10}

In another dimension, Hunger and Nutrition Commitment Index (HANCI) ranked Myanmar and Cambodia as doing least well in social protection provision. The intervention would institute social protection programs, which can transfer resources to poor families and help them purchase nutrition inputs. Social protection programs can be unconditional or they can condition the receipt of transfers on certain types of health or education-related behaviors.

As a key component of the intervention in Cambodia, a food policy change will be advocated for to make different types of healthy foods available, affordable and nutritious. Health policy can make sure breastfeeding is promoted and the
balance between preventive and curative, primary and other health care is appropriate.

As part of the intervention, introduction and education on how to care for strains such as the Swarna-SUB1 rice strain has the benefit of creating a more self-sufficient solution for Cambodia. The SUB1 rice strain has proven to be very successful during flooding conditions; it is able to recover much faster after experiencing a flood. This specific strain has already proven successful in areas of Bangladesh and India, and does not cost any more than normal strains of rice do\textsuperscript{11}. Access to micronutrient rich foods and adequate calories is important to combat malnutrition. There are different strains of genetically enhanced crops, like SUB1 rice, that also contain various micronutrient fortifications.

Golden Rice is one popular fortified strain of rice that contains vitamin A, one of the micronutrients that Cambodian children are most deficient in. According to current research, a 100-150g dose of Golden rice, or 50g dry weight, has 60\% of the required amount of vitamin A for a child of 6-8 years of age\textsuperscript{11}. This rice could be combined with normal strains of rice or other meals to effectively fortify malnourished children with enough vitamin A after several meals. Another benefit of using rice is that these countries have people that are already familiar with it as a food source. Using modified strains of rice to counteract the main environmental problems that Cambodia is facing could be successful, if a long term model is put in place to sufficiently educate and empower Cambodians to maintain agricultural production after the intervention takes place.

In order to estimate the cost of nutrition intervention in Cambodia, the United Nations (UN) one health tool will be utilized, allowing for regional variation due to personnel cost. Cost estimates will be constructed for interventions to eradicate malnutrition in Cambodia. Based on the total cost, funds will be solicited from donor organizations such as WHO, UNICEF, and the UN.

To realistically implement an intervention to successfully decrease malnutrition in Cambodia, financial funding must be present as well as support from the government to communities, specifically to communal agriculture. Logistical infrastructure is very expensive to create and maintain; ideally it is best to try and reach out to every community possible and not rely on production and distribution of foods. Rice could not be grown naturally everywhere in Cambodia, but seeds of Golden Rice or other foods could be distributed by the intervention group to communities across Cambodia. With enough potential funding, greenhouses or individual family gardens could be created over time. Additionally, this funding could be used to implement micronutrient, educational,
food supplementation, women empowerment and other interventions as previously highlighted.

**Program Challenges and Limitations**

Cambodia is one of the poorest countries in the world. Poverty poses a major challenge. 22.89% of the population living below the new official poverty line of 3871 riel (about US$1) per day, with a significant number still lingering just above the poverty line of US$1.25 per day. These statistics pose a challenge because without future government funding the intervention will not be sustainable. The initial funding provided by donor groups must be supported by the Cambodian government to ensure sustainability. The issue of malnutrition in Cambodia covers the entire country, so the interventions can only realistically cover areas where malnutrition is highest.

A large proportion of evidence cited from previous nutritional interventions were derived from efficacy trials as opposed to effectiveness studies, and hence variations exist in estimates of effect size for various interventions. An intervention that works in one country might not work in another country due to different variations that exist between countries. Furthermore, Community based nutrition programs require meticulous planning, a right based framework for engagement of communities and other sectors, and piloting. Other pillars crucial to intervention success including training and support for community health workers, strengthening of the supply chain, monitoring and regular feedback could not be ascertained given the complex logistics and constraints of the intervention.

The difficulty of reaching women early enough in pregnancy is a major limitation in ensuring adequate uptake of interventions for a reasonable length of time. Particularly in parts of the world like Cambodia with high rates of maternal malnutrition, micronutrient deficiencies and small gestational age (SGA) births. These factors remain major determinants of stunting in early childhood. These findings underscores the need to address determinants of undernutrition early in the life cycle.9

**References**

3. Reinbott A, Jordan I. Determinants of child malnutrition and infant and young child feeding approaches in Cambodia. *World Review of
Malnutrition in Cambodia: Evidence-based proposal strategy to address child stunting, micronutrient deficiencies and underweight-births in Cambodia.


