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Food Security and Nutrition in Cambodia: Pattern and Pathways

A Policy Discussion Paper



Olivier Ecker, Ph.D. Post-doctoral Fellow
Xinshen Diao, Ph.D. Senior Research Fellow
International Food Policy Research Institute, Washington, DC

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Contents

List of Figures and Tables.....	iv
List of Acronyms.....	v
Executive Summary	1
1. Introduction	3
2. Conceptual Framework and Drivers of Food Security	4
3. Food Security and Nutrition in Cambodia.....	7
3.1 The status quo in the context of regional development	8
3.2 Changes over time.....	9
3.3 Economic growth as driver of food security and nutrition	11
4. Summary and Future Research.....	16
References.....	17

List of Figures and Table

Figures

Figure 1: Conceptual framework of food security for country development strategy analysis	5
Figure 2: Trends of poverty reduction in Cambodia and selected other South and Southeast countries.....	11
Figure 3: Prevalence of undernourishment (% of population).....	12
Figure 4: Trends in prevalence of child stunting (% of children under five)	13
Figure 5: Under-five child mortality (per 1,000).....	13
Figure 6: Relationship between prevalence of undernourishment and per capita GDP	14
Figure 7: Relationship between prevalence of child malnutrition and per capita GDP.....	15
Figure 8: Relationship between child mortality rate and per capita GDP	16

Table

Table 1: The state of food security in Cambodia and comparable states in the process of other countries' development	10
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List of Acronyms

CDRI	Cambodia Development Resource Institute
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
NIS	National Institute of Statistics
NSDP	National Strategic Development Plan
WDI	World Development Indicator
NIPH	National Institute of Public Health
MAFF	Ministry of Forestry and Fisheries
MWRM	Ministry of Water Resource and Meteorology
TWG	Technical Working Group
FSN	Food Security and Nutrition
CARD	Council of Agricultural and Rural Development
CNIP	Cambodia Nutrition Investment Plan
CMDGs	Cambodia Millennium Development Goals
FSNIS	Food Security and Nutrition Information System
WHO	World Health Organization
GDCGM	Global Database of Child Growth and Malnutrition
FSS	Food Security Statistics
MDG	Millennium Development Goal
HAZ	Height-for-age z-scores
WAZ	weight-for-age z-scores
WHZ	weight-for-high z-scores

Executive Summary

This paper provides an overview of the food security and nutrition situation in Cambodia. From a regional perspective and through comparison with its neighboring countries and other countries in Asia, the paper analyzes the patterns of the hunger and malnutrition problem in Cambodia and possible pathways the country could follow in the future. Between China and Vietnam on the one side and India on the other side, the relationship between economic growth and the process of nutrition improvement differs greatly. We expect that these comparisons will help Cambodia identify a development pathway to let economic growth better trickle down to the impoverished population and significantly reduce poverty, hunger and malnutrition in the growth process.

The paper first provides an analytical framework for food security as part of country's development strategy. The framework emphasizes the multidimensionality of food security, the cross-sector nature of the problem, and the interactions between the macro and the micro levels of economic and social activities and policy interventions. This framework offers a useful tool for analyzing how policies, investments, programs, and external shocks such as the economic impacts of global crises, climate change, natural disasters, and epidemics travel through the economic system to affect food security and nutritional status. Thus, the framework can be applied to address a set of key strategy research questions such as how to leverage agriculture for better nutrition outcomes and which interventions are most effective in this regard.

After providing an analytic framework, the paper highlights the current food security situation in Cambodia, based on available data from various sources in combination with existing literature. To better understand Cambodia's development process in terms of food and nutrition, the analysis compares Cambodia's situation with that of other Asian countries both in the present and past. Cambodia's average GDP per capita remains low and about one-fourth of the population still lives under the international poverty line of \$1.25 a day, with particularly high poverty in rural areas. Hunger and malnutrition are still common: every fourth Cambodian suffers from undernourishment, 40 percent of children under five years of age are malnourished, and nine out of 100 children die before they reach their fifth birthday – one of the highest rates in South and Southeast Asia. These development and nutrition indicators suggest that Cambodia's current situation is similar to that in Lao PDR and Bangladesh today, Vietnam in the early 2000s, and Thailand in the late 1970s.

Nonetheless, findings also show that Cambodia has made considerable progress in reducing hunger and malnutrition, despite increased inequality and high population growth, especially in rural areas. Since 1993, staple food production has more than doubled, and poverty has dropped by more than one-third. Related to that, the prevalence of child malnutrition has declined at a similar rate as the prevalence of poverty, and the percentage of undernourished people has dropped at an even faster rate. This paper's analysis shows that there is a positive relationship between nutrition indicators and per capita GDP, and that growth has trickled down to reach impoverished people and substantially improve food security and nutrition. However, this progress has slowed recently. Effective policies, investments, and programs are therefore needed to bring the country back on the successful pathway of its early development, a pathway similar to China and Vietnam in their development process.

Based on the above findings this paper suggests more research is needed in order to answer the following key questions:

- In addition to economic growth, what are the other major drivers of hunger and malnutrition (including micronutrient deficiencies)? How are they linked with growth and interlinked among themselves, how can they be leveraged for better nutrition outcomes, and, in particular, what is the role of agriculture (including fisheries) and gender?
- Which groups are most vulnerable to hunger and malnutrition, where are they located, and how can they be better targeted?
- How can government interventions be prioritized through policies, investments, and programs to more effectively improve Cambodia's food security and nutrition situation?

1. Introduction

South and Southeast Asia has undergone rapid economic growth in recent years, fueled by the miraculous rise of China and India. Vietnam and Cambodia, though their economies are smaller, have also achieved impressive growth in this period. The boom in these emerging economies and the striking success of their recent development process have demonstrated different pathways to economic transformation and will provide lessons for fostering economic growth in other countries.

Thanks to the overall regional transformation, Cambodia's economic development has benefited from close links to its direct neighbors Vietnam and Thailand and other countries in the region such as China. Vietnam, Thailand, and China are important trade partners for Cambodia, and the two neighboring countries Vietnam and Thailand have also provided employment opportunities to Cambodians through cross-border migration. Moreover, Cambodia has kept a close eye on the progress and setbacks of development in both Vietnam and Thailand—the first is a rapidly growing emerging economy while the latter is a middle income country with sustainable rapid growth in the four decades before the Asian crisis. Against the background of regional economic integration and interactions, Cambodia's development process and the associated effects on food security and nutrition improvement will be better understood in comparison with the situation in other South and Southeast Asian countries. In addition, the experiences of Asian countries at their earlier stage of development and the pathways they took to achieve today's success can provide relevant information to evaluate Cambodia's stage of development and give evidence of the opportunities and challenges the country will face in the future.

Analysis of the causes and drivers of food security and nutrition in Cambodia is limited, in contrast to other South and Southeast Asian countries such as India, Bangladesh, China, Thailand, and Vietnam. Moreover, due to the country's history, longer-term historical data are either not available or lack credibility for drawing conclusions on food security and nutrition trends in the process of development. Most food security-related studies of Cambodia are descriptive in nature, and have often provided broad overviews of the food security and nutrition situation without rigorous analysis of causes of food insecurity and malnutrition, drivers of change, and options for possible improvements. Examples include Tucker (1996), who provides a general assessment of food security in Cambodia; the report of the standardized Demographic and Health Survey for 2005 (NIPH, NIS, and ORC Macro 2006); and the Nutrition Country Profile of Cambodia (FAO 1999). Other, more specific studies mainly use descriptive statistics or simple micro-econometric standard models to evaluate the effect of wealth inequality on child malnutrition (Hong & Mishra 2006), the role of food security in economic transformation in rural areas (Murshid, 1998), and the potentials of regional cooperation for improving food security and fostering development in the Mekong River Basin (Kristensen 2001). The methodology used in Fujii (2005) is more advanced, with small-area estimations used to assess the prevalence of child malnutrition at commune level. However, the study primarily focused on micro-level assessment and did not analyze regional malnutrition patterns, nor did it provide a reasonable explanation for the scattered picture and policy-relevant conclusions.

Thus, the causes and drivers of Cambodia's food security and nutrition situation, the available policy options, and the interventions most likely to be effective are all little understood. Moreover, available studies fail to look at Cambodia's food security and nutrition situation from a regional development perspective or to identify common or different patterns between Cambodia and other countries in the region, so that lessons learned from these countries can be utilized for designing effective development strategies and practical food security and nutrition interventions in Cambodia. More

research in this direction is clearly needed to support and realize the objectives of Cambodia's Food Security and Nutrition Strategy (CARD 2008, MAFF & MWRM 2008). Against this background, the purpose of this paper is twofold: As a stocktaking exercise, it tries to understand Cambodia's food security and nutrition situation within the context of regional economic transformation, and, with that understanding, it serves as a basis for discussion of future policy research topics.

The rest of the paper is organized as follows. The next section presents a conceptual framework for food and nutrition security analysis from a development strategy perspective. The framework emphasizes interactions and linkages of factors that affect food security and nutrition status at both macro and micro levels. The third section analyzes the trends and current situation of Cambodia's food security and nutrition in the regional context. The role of economic growth as a driver of food security and nutrition is highlighted using available data and various key development and nutrition indicators. The last section concludes by proposing some future research topics relevant to policy decisions.

2. Conceptual Framework and Drivers of Food Security

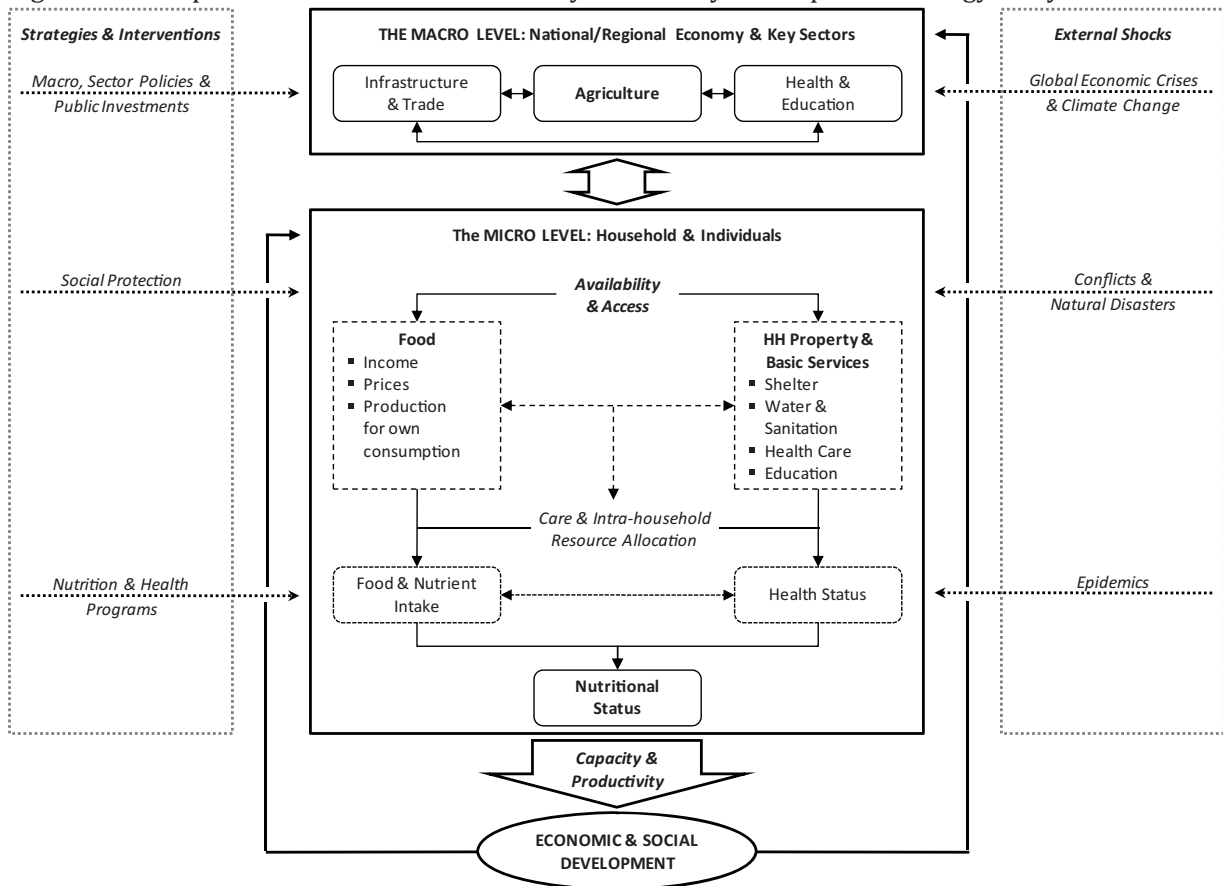
The concept of food security – as understood today – offers a useful and comprehensive framework for analyzing people's food and nutrition situation and understanding the key drivers. Today's common definition was coined at the World Food Summit of 1996. Food security is achieved “when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (FAO 1996). To achieve such a situation requires concerted action at individual, household, national, regional, and global levels (FAO 1996). At the World Summit of Food Security of 2009, the international community reconfirmed this concept, specified the “four pillars of food security that are availability, access, utilization, and stability”, and emphasized that “the nutritional dimension is integral to the concept” (FAO 2009). This multi-dimensional and integrated definition of food security underlines this paper and is consistent with the guiding principle of the Royal Government of Cambodia.

In the late 2004, the Cambodian government created a cross-ministerial Technical Working Group on Food Security and Nutrition (TWG-FSN) to promote mainstreaming food security and nutrition into sector policies and strategies and to support its integration in the decentralized planning process. The coordinating body of the TWG-FSN is the Council for Agricultural and Rural Development (CARD). The Food Security and Nutrition Information System (FSNIS)—the information and communication platform of the TWG-FSN—notes: “Food security is a cross-cutting issue ... the elimination of food and nutritional insecurity in Cambodia, and the attainment of Cambodian first Millennium Development Goal to eradicate extreme poverty and hunger, demands a specific, comprehensive and integrated approach focusing on ... [food] availability, access and use and utilization. Furthermore, food security and vulnerability need to be tackled at the national, household and individual level. Food security and nutrition are at the forefront of discussions among Cambodia's policy-makers, who are incorporating food security and nutrition-related goals and objectives in national strategies and frameworks such as the Cambodia Nutrition Investment Plan (CNIP) 2003-2007, the Cambodia Millennium Development Goals (CMDGs), the Rectangular Strategy and the National Strategic Development Plan (NSDP) 2006-2010” (FSNIS 2010).

A conceptual framework to integrate food security into a country's development strategy analysis is presented in Figure 1. Exploring effective strategies and policy instruments to achieve food security as defined by the World Food Summit requires a comprehensive and integrated approach that considers the cross-sector and multi-level nature of the food insecurity problem and identifies efficient pathways and suitable bodies within a country's government for taking action.

For analytical purposes, the framework differentiates food security at the national and regional level—the macro level—and at the household and individual level—the micro level. These are interconnected through various links.

Figure 1: Conceptual framework of food security for country development strategy analysis



Source: Own presentation.

Macro-level food security should not be misunderstood as food self-sufficiency; rather, it refers to the balance of food supply and demand for a particular country or region in which requirements in both food quantity and quality can be met through domestic/local production or by available and affordable imports. Thus, macro-level food security is determined by the structure and performance of the domestic economy. Key sectors for achieving a state of food security at the national and regional level are agriculture that provides available food domestically produced, and a food supply chain that moves food through the market from producers to consumers, which involves a trading system, infrastructure, and various market institutions. In early stages of development, the agricultural sector plays the central role for food security in most developing countries for various reasons. Most obviously, agriculture produces food and provides jobs to the vast majority of people, especially the poor. In addition, agricultural growth often drives overall economic growth and promotes more shared growth, while increased inequality is often associated with non-agricultural growth (Breisinger & Diao 2008, Diao et al. 2007). Given the interaction between nutrition, health, and education at the micro level (which will be discussed below) and the fact that nutrition-related intervention programs (for example, school feeding and food supplementation) are often under the responsibility of the ministry of education or the ministry of health or both, the health and education sectors constitute the third pillar of macro-level food security. The three pillars of macro-level food security are horizontally closely linked, creating competition and forming synergies. An example of competing links between agriculture and health is the alternative uses of

water for irrigation, livestock production, and food processing or for direct human consumption. An example of synergetic links between infrastructure and health and education is the road network connecting people to markets and enabling access to basic services such as primary education and health care.

Beyond the provision of goods and services, the macro level links to the micro level through the demand for capital, labor, and land held by the households and their compensation for the use of production factors. These vertical links mutually contribute to achieving food security at the macro and the micro level. However, macro-level food security is a necessary but insufficient condition for micro-level food security.

The micro level comprises the household and all individual members of a household. Micro-level food security is determined by the availability of sufficient and nutritious food, nutrition-relevant properties and basic services, as well as the access of the individual to these vital needs. In most cases, access is constrained by economic means, i.e. (absolute) poverty. Limited physical access can be often overcome by spending capacity, for example through paying for transportation to markets. Thus, the most important—but not sole—determinant of food security is household income and, in subsistence-oriented households, food production for own consumption. Given that most food insecure people live in agrarian, semi-integrated market economies, there is an absolute and seasonal tradeoff between income earning and food self-sufficiency that is essentially determined by the price for goods and production factors (wage) and transaction costs. But this tradeoff is also influenced by the availability of opportunities and alternatives, decision makers' assessment of risks, instances of emergency, and other factors. Farmers face decisions about the cultivation of cash or staple crops, time allocation for farm and off-farm activities, selling or storing of harvest, and other issues. Also, particularly for the poor in developing countries, who are usually net food buyers and who spend significantly more than half their income on food, food prices are a key factor for food security. High prices reduce a household's real income, and relative food price changes affect the food consumption patterns that might give rise to increasing micronutrient deficiencies (Ecker & Qaim 2010).

Beyond the availability of sufficient and nutritious food in the household, individual dietary intake is determined by a set of non-income factors. Individual access to proper food is subject to intra-household resource allocation and care for the individual, both of which in turn depend on the personality of the decision maker and gender roles, education and knowledge, available time, and cultural and social customs. Especially for the nutrition and health of young children, mothers' (or caretakers') health, ability, and capability are central. Since the children's mother is often also the person responsible for meal preparation, she is the most important other-person for the nutrition of all household members as well. Besides adequate dietary intake, individual health status affects nutritional status substantially. For example, highly prevalent infectious diseases such as malaria or diarrhea caused by intestinal parasites significantly reduce the absorption of nutrients (especially of micronutrients), so that higher nutrient intake is necessary to cover the losses, if such compensation is possible at all. On the other hand, poor nutrition weakens the human immune system and thus increases risk of infection. Living conditions also affect the health of all household members that depend on household property and access to basic (public) services, often limited due to poor infrastructural development. Proper shelter, clean drinking water, hygienic sanitation, and access to basic health care such as disease treatment, vaccination, and mother and child care programs all affect people's nutrition indirectly, through the link with health.

Healthy nutrition is fundamental for realizing the physical and mental capacity and productivity of people and their social potential. Thus, it is the basis for the well-being of individuals and households as well as for economic development and the formation of societies in communities

and countries. Even temporary food shortages and nutrient deficiencies can cause irreversible health impairments in individuals and serious long-term consequences for economic growth and development potential of a society. External shocks, such as global economic crises, climate change, conflicts, natural disasters, and epidemics, can threaten macro- and micro-level food security. The goal of development strategies in the context of food security is to increase the efficiency of existing measures and to propose effective alternatives strengthening the linkages described above in order to achieve better nutrition outcomes. Governments and their operational bodies have different options for intervening and governing at different levels that include structural and sector policies, public investments, social protection measures, and direct nutrition and health programs. In this context, research can assist by providing important knowledge and advice based on rigorous analysis.

3. Food Security and Nutrition in Cambodia

Historical evidence shows that economic growth generally leads to improvement in human nutrition, while the most obvious and direct pathway from economic growth to improved nutrition is via household income. If growth leads to higher income at household level, people are able to consume more food with higher nutritional value. This results in the improvement of nutritional status for a majority of the population. However, this trickle-down effect can be interrupted at different levels and at different points. For example, income distribution and the proportion of growth gains going to the poor matter substantially at the national level. Also, intra-household distribution is important in determining whether income growth benefits an individual family member. In addition, there are other pathways that cross and interact with the income pathway, as the previous section outlined. Another possibility by which growth results in better nutrition outcomes is public policy interventions. Economic growth generates more government revenue and enables the government to design nutrition-related programs such as school feeding, or to expand public health and education services.

The vast differences in nutrition situation and nutrition improvement over time among developing countries show that some countries' growth trickles down more than others', and that some governments have been more successful in leveraging economic growth for better nutrition outcomes, while others succeeded less and few even failed. Successful countries are those that have developed an effective policy package fostering high and stable income growth benefiting the poor, combined with interventions targeting the most vulnerable population groups. Although such a mix of policy options must be designed to country-specific conditions, successful countries that share similar initial conditions tend to have common patterns and follow similar pathways. Thus, identifying these patterns and understanding those pathways can help other, less progressed countries in creating their own success story. Country comparison analysis is often a powerful tool to deduce general lessons and pathways that latecomers might follow. When comparing food security progress across countries, it is important to consider initial conditions. Achieving high reduction rates in hunger and malnutrition tends to be easier in the countries with high prevalence rates, compared to countries that have already lowered prevalence rates in their early development.

We first focus on the current situation of development and food security in Cambodia and identify the time when other South and Southeast countries had achieved similar states. China, Lao PDR, Thailand, Vietnam, India, and Bangladesh are chosen in the comparison. The development indicators at the macro level are total GDP growth, agricultural growth, share of agriculture in GDP, and female adult literacy. The micro-level indicators are those that are used to measure poverty, hunger, child malnutrition, and child mortality. The data are compiled from various public sources, including the World Development Indicators (World Bank 2010), the Food Security Statistics database of

FAO (FSS 2010), and the Global Database of Child Growth and Malnutrition of the World Health Organization (WHO) (GDCGM 2010).

3.1 The status quo in the context of regional development

Cambodia is a low-income country with an average per capita income of US\$500 in 2008. Among the countries compared in this study, only Lao PDR and Bangladesh have lower per capita income levels. While 2008 per capita income in Vietnam and India is modestly higher, per capita income in China and Thailand is respectively four and five times that of Cambodia (Table 1, first panel and first column). Table 1 also reports the year in which each of the compared countries last had income levels on par with Cambodia's today. India and Vietnam reached Cambodia's current income level only a few years earlier, as per capita income is comparable between India in 2003, Vietnam in 2004, and Cambodia in 2008. On the other hand, China and Thailand reached per capita income level of US\$500 in 1993 and 1970, respectively (Table 1, first panel and second column).

The agricultural sector still plays a major role in Cambodia's economy, accounting for 35% of GDP. Agriculture has a similar share of GDP in Lao PDR as does Cambodia, while agricultural share of GDP is low in all other countries, including Bangladesh, where per capita income is lower than that in Cambodia at the present (Table 1, first panel and third column).

Literacy rate among female adults is an important social development indicator, and it is also important for child feeding practices and hence for improving child nutrition and health (Guldan et al. 1993). Thus, we consider this indicator in the comparison. As shown in the second panel of Table 1, in Cambodia, about 70% of all females aged 15 years and older are literate. While this rate is comparable with Lao PDR, it is considerably higher than in Bangladesh and India. As expected, a much higher rate of female literacy is observed in China and Vietnam as well as in Thailand.

Poverty and hunger (or undernourishment) still affect more than one-fourth of Cambodians today. Nonetheless, poverty is about half as prevalent as in Bangladesh and about two-thirds as prevalent as in India and Lao PDR. However, in contrast to the poverty patterns, the prevalence of undernourishment (hunger) in Cambodia, that is, the percentage of people consuming less than the minimum requirement of calories, is almost the same as that in Bangladesh and only slightly higher than that in India. On the other hand, the prevalence of undernourishment is lower in Lao PDR than in Cambodia, although Lao PDR has a higher level of poverty and lower level of per capita income than Cambodia does.

Three anthropometric indicators are used to measure the status of child malnutrition¹. As reported in the third panel of Table 1 and consistent with the income level, child malnutrition in Cambodia is higher than that in Vietnam, China and Thailand, but is less widespread than in Lao PDR, Bangladesh and India. However, the mortality rate among Cambodian children younger than 5 years is the highest among the compared countries.

Taken together, the indicators suggests that Cambodia's stage of development and food security situation is similar to that of Lao PDR and Bangladesh today, Vietnam at the beginning of the 2000, and Thailand in the late 1970s. The situation in India at the present and in the past somehow

1 These indicators are height-for-age, weight-for-height, and weight-for-age. Children are considered as moderately and severely underweight, stunted, or wasted, if their weight-for-age z-scores (WAZ), height-for-age z-scores (HAZ), or weight-for-height z-scores (WHZ) are below certain critical values. These three indicators have different implications for child nutrition and cannot be used interchangeably (WHO 1995).

differs from Cambodia's, particularly in terms of India's relatively advanced economic stage today and the worse nutrition situation among children.

3.2 Changes over time

Using the same data sources discussed in the previous subsection, we further examine the trends in Cambodia's economic development and its progress toward food security in 1993–2008. Cambodia has experienced rapid economic growth since 1993, especially after the turn of the millennium (Naron 2009). Between 1993 and 1998, the GDP grew by 6.3% annually and by 9.5% between 1999 and 2008. For the agricultural sector, despite negative growth in 2000 and 2002, the sector's value added grew at 4.6% between 1993 and 2008 with little differences before and after the Asian crisis. Even more importantly, as suggested by FAO's food production index, food production increased by more than 2.5 times since 1993 (FSS 2010).

However, Cambodia's population is also one of the fastest-growing in South and Southeast Asia. From 1993 to 2008, population grew at 2.3% annually. The number of people who are economically active in agriculture grew more rapidly, with an annual rate of 3.0%. Given high population growth rate in the rural area, the agricultural value added per agricultural worker grew by 1.9% only, in contrast to the impressive per capita GDP growth rate of 6.3% annually. Income inequality, measured by the GINI coefficient, has been worsening in Cambodia during its rapid growth period. In 1994, the GINI coefficient was 38.3, and in 2007, it was 44.2. Thus, Cambodia becomes a country with the most rapid increase in GINI coefficient in South and Southeast Asia today.

In spite of the rapid increase of income inequality, poverty declined tremendously, from 47% in 1994 to 30% in 2007. While progress has been made in both rural and urban areas, the poverty rate is still as high as 35% in the rural area in 2007, much higher than the urban poverty rate. Fast economic growth in urban areas and relatively slow progress in rural poverty reduction might have contributed to increasing countrywide income inequality.

In reducing undernourishment and child malnutrition, Cambodia achieved notable success over the past two decades. Despite setbacks during the Asian crisis, the prevalence of undernourishment was brought down from 38% in 1992 to 25% in 2006. While 59% of all children under five years of age were stunted and 43% underweight in 1996, the indicators declined to 40% for stunting and 29% for underweight in 2008. Although progress in reducing child mortality has gathered pace, particularly since 2000, Cambodia seems unlikely to meet the fourth Millennium Development Goal (MDG) of reducing the under-five mortality rate by two thirds between 1990 and 2015. In 1980, 150 out of 1,000 children younger than five years of age died from malnutrition, poor health, or other preventable causes in Cambodia. The mortality rate declined to 117 in 1990 and 90 in 2008. While this progress is impressive, the gap between the achievement and the target of the fourth MDG is significant.

Table 1: The state of food security in Cambodia and comparable states in the process of other countries' development

	GDP per capita (constant 2000 US\$)		Agriculture value added (% of GDP)		Agriculture value added per worker (constant 2000 US\$)	
	2008	Comparable state in	2008	Comparable state in	2008	Comparable state in
Cambodia	511		35		388	
Bangladesh	462	-	19	1980	418	2006
Lao PDR	475	-	35	2008	516	1992
Vietnam	647	2004	22	1992	352	-
India	718	2003	17	1978	478	1994
China	1,965	1993	11	1970	504	2002
Thailand	2,640	1970	12	1961	705	1980
East Asia & Pacific	1,760	1991	12	1961	534	1999
World	6,007	<i>n.a.</i>	3	<i>n.a.</i>	878	<i>n.a.</i>

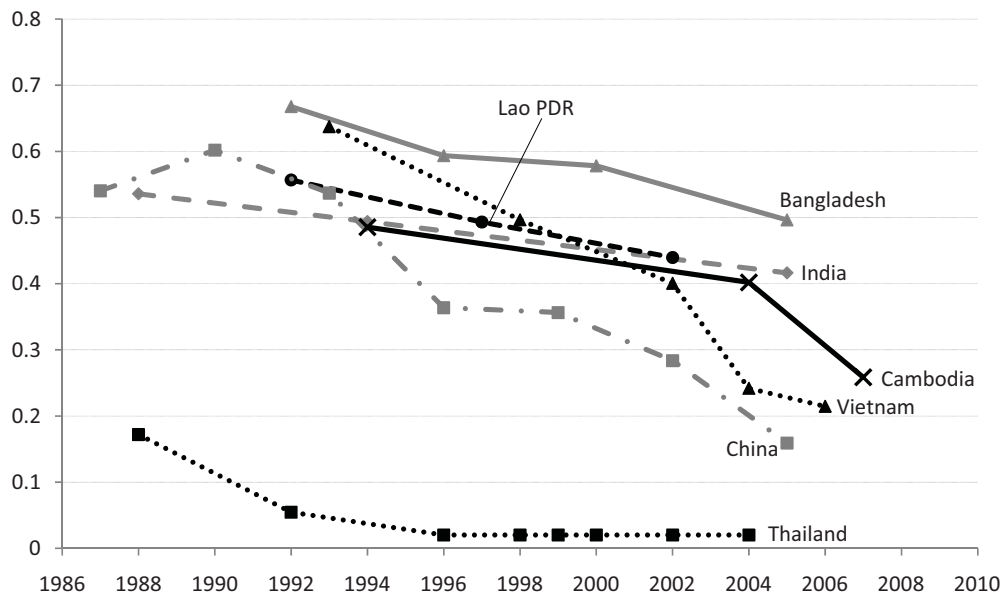
	Female adult literacy rate (% of females aged 15 and above)		Poverty headcount ratio at \$1.25 a day (PPP) (% of population)		Prevalence of undernourishment (% of population)	
	2005-08	Comparable state in	2005-07	Comparable state in	2005-07	Comparable state in
Cambodia	69		26		25	
Bangladesh	50	-	50	-	26	-
Lao PDR	63	-	44	-	19	1997
Vietnam	90	<1979	21	2004	13	1994
India	51	-	42	-	22	1992
China	91	<1982	16	2002	10	<1992
Thailand	92	<1980	2	<1981	17	1994
East Asia & Pacific	90	<1980	17	2002	12	<1992
World	76	<1980	<i>n.a.</i>	<i>n.a.</i>	14	<i>n.a.</i>

	Prevalence of child stunting (% of children under 5)		Prevalence of child underweight (% of children under 5)		Under-5 mortality rate (per 1,000)	
	2006-08	Comparable state in	2006-08	Comparable state in	2008	Comparable state in
Cambodia	40		29		90	
Bangladesh	43	-	41	-	54	2000
Lao PDR	48	-	32	-	61	1999
Vietnam	36	2002	20	1998	14	<1975
India	48	-	44	-	69	2001
China	22	<i>n.a.</i>	7	<i>n.a.</i>	21	1974
Thailand	16	<1987	7	<1987	14	1973
East Asia & Pacific	27	<i>n.a.</i>	12	<i>n.a.</i>	29	1976
World	35	<i>n.a.</i>	22	<i>n.a.</i>	67	1992

Note: * Estimates are from 2002.

Source: WDI 2010, FSS 2001, GDGGM 2010.

Figure 2: Trends of poverty reduction in Cambodia and selected other South and Southeast countries



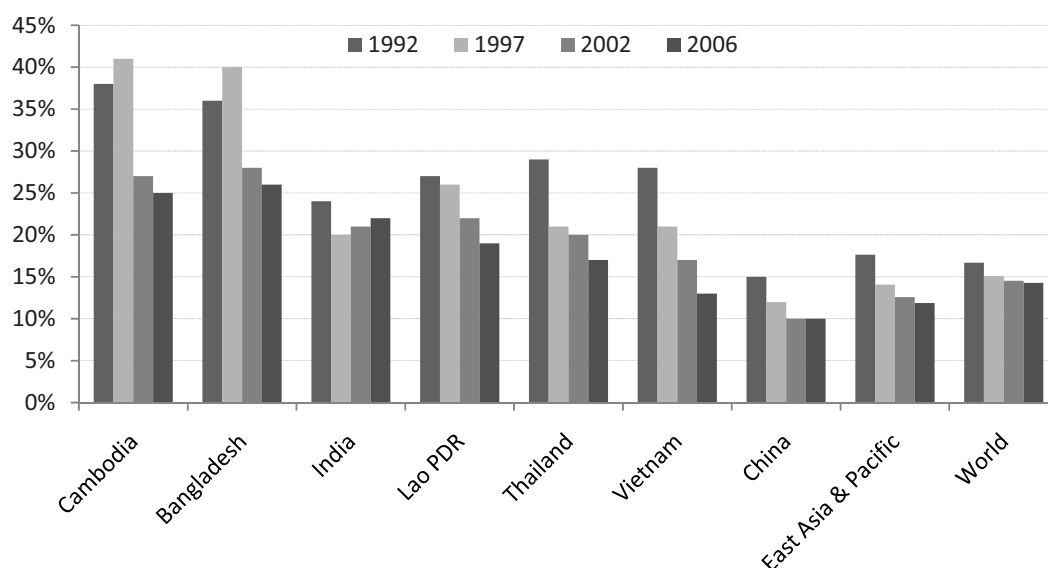
Source: WDI 2010.

3.3 Economic growth as driver of food security and nutrition

We now compare Cambodia's development with the development of other countries and discuss which direction Cambodia is likely to go in the future. As per capita GDP and household income increase, poverty decreases, and human development indicators in general improve. However, the progress of growth and improvement in human development indicators can be different. In some countries, economic growth and poverty reduction has come along with improvement in human development, while in others, economic growth did not improve people's nutrition and health significantly. It is necessary to review such differential processes in order to draw lessons from some countries and learn from the experiences of others. We first compare poverty reduction across countries in Figure 2.

As shown in Figure 2, economic growth in Cambodia and other countries compared in this study has been associated with poverty reduction, while the progress in poverty reduction considerably varies across these countries. Starting from similar poverty rates in the late 1980s, China has seen faster decline in poverty than Cambodia, thanks primarily to rapid growth in the Chinese economy. While poverty in Vietnam was higher than in Cambodia in the late 1980s, poverty rates become lower in Vietnam than in Cambodia in 2002–2007. On the other hand, poverty reduction in Cambodia is faster than that in Lao PDR, India, and Bangladesh in the same period. While Cambodia had a similar poverty level as India and Lao in the late 1980s, poverty level became significantly lower in Cambodia than in these two countries, as well as in Bangladesh, which had the highest poverty rate in recent years.

Figure 3: Prevalence of undernourishment (% of population)



Source: FSS 2010.

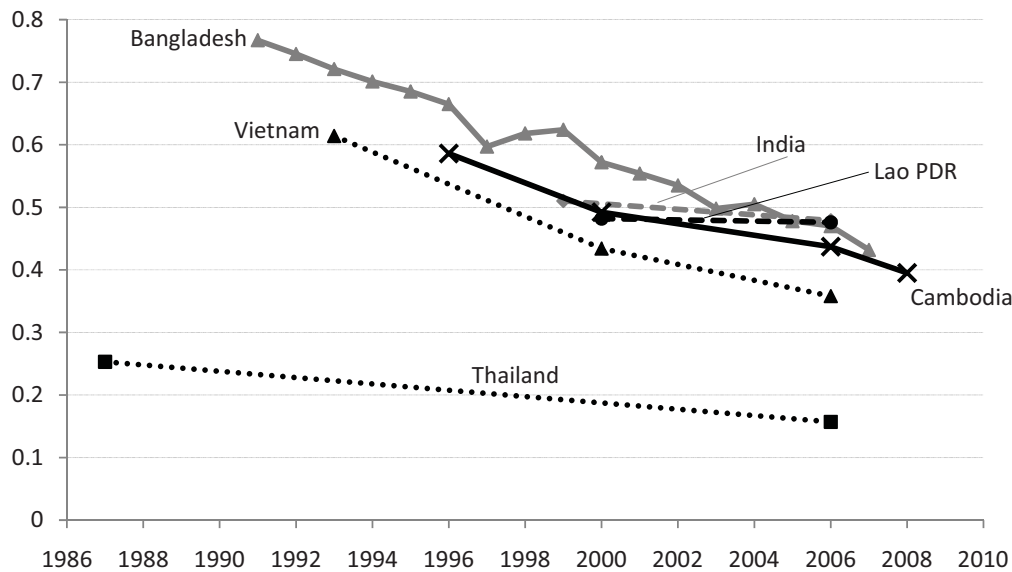
For some countries, the trend patterns in poverty reduction are very similar to the trend patterns in the reduction of undernourishment and child malnutrition, whereas these trend patterns substantially diverge for others (Figures 3 and 4). Consistent with the trend in poverty reduction, Vietnam achieved significant reduction rates in the prevalence of undernourishment and child stunting since the early 1990s, while the prevalence of undernourishment in China has been consistently low since 1992. Surprisingly, in Thailand, reduction in undernourishment and child stunting was slower than the poverty reduction, which might be explained by unequal intra-household distribution of resources and/or due to certain measurement issues. The undernourishment patterns of Cambodia and Bangladesh are very similar. After an increase in the prevalence of undernourishment from 1992 to 1997 due to the Asian crisis, both countries managed to reduce it at similar rates afterwards (Figure 3). However, Bangladesh was more successful in reducing child malnutrition than Cambodia (Figure 4). While the initial level of undernourishment in India and Lao PDR was lower than that in Cambodia and Bangladesh in 1992 and 1997, these countries did not make the same progress as occurred in Cambodia and Bangladesh. Alarming, prevalence of undernourishment in India has increased since 1997 (Figure 3), while the trend of child stunting remains unchanged at a rate of close to 50% in Lao PDR (Figure 4).

In terms of changes in child mortality, however, the patterns are similar across all countries. Starting from different initial levels, all countries made significant progress in reducing the under-five child mortality between 1970 and 2008 (Figure 5). 1970's child-mortality data is not available for Cambodia. In 1980, its child mortality rate was similar to India's. However, the progress of reducing child mortality was slower in Cambodia than in India, and a significant gap between the two countries started to appear in 2008. Actually, Cambodia's child mortality rate in 2008 is similar to that in India in 2000, suggesting that Cambodia is eight years behind India in reducing child mortality (Figure 5). Cambodia is also behind Lao PDR in reducing child mortality. Starting at a mortality level higher than Cambodia's in 1980, Lao PDR had by 2008 achieved a level lower than that of India.

The above trend analysis describes the progress of improvement in nutrition over time, but comparability across countries is rather questionable, given that the initial stage of development and the relationship between growth and development outcomes are not taken into consideration.

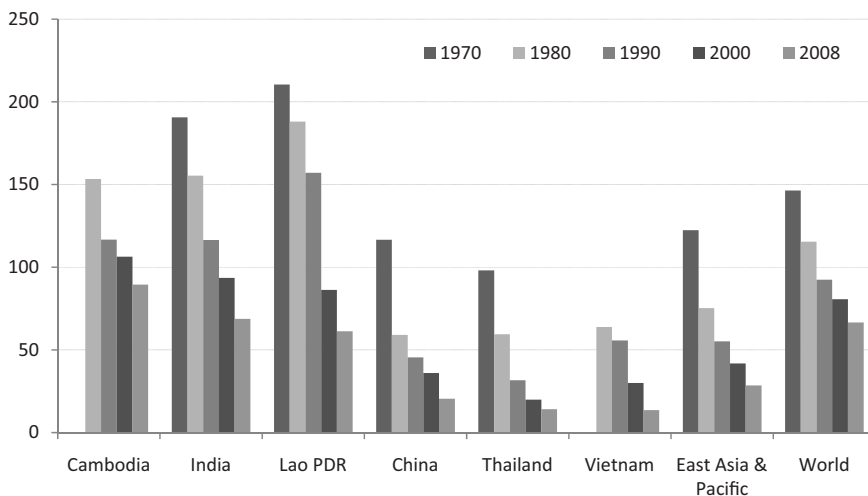
To overcome such shortcomings, we present the overtime per capita GDP and the prevalence rates of nutrition outcomes together in a series of two-dimension charts (Figures 6-8).

Figure 4: Trends in prevalence of child stunting (% of children under five)



Source: GDCGM 2010.

Figure 5: Under-five child mortality (per 1,000)



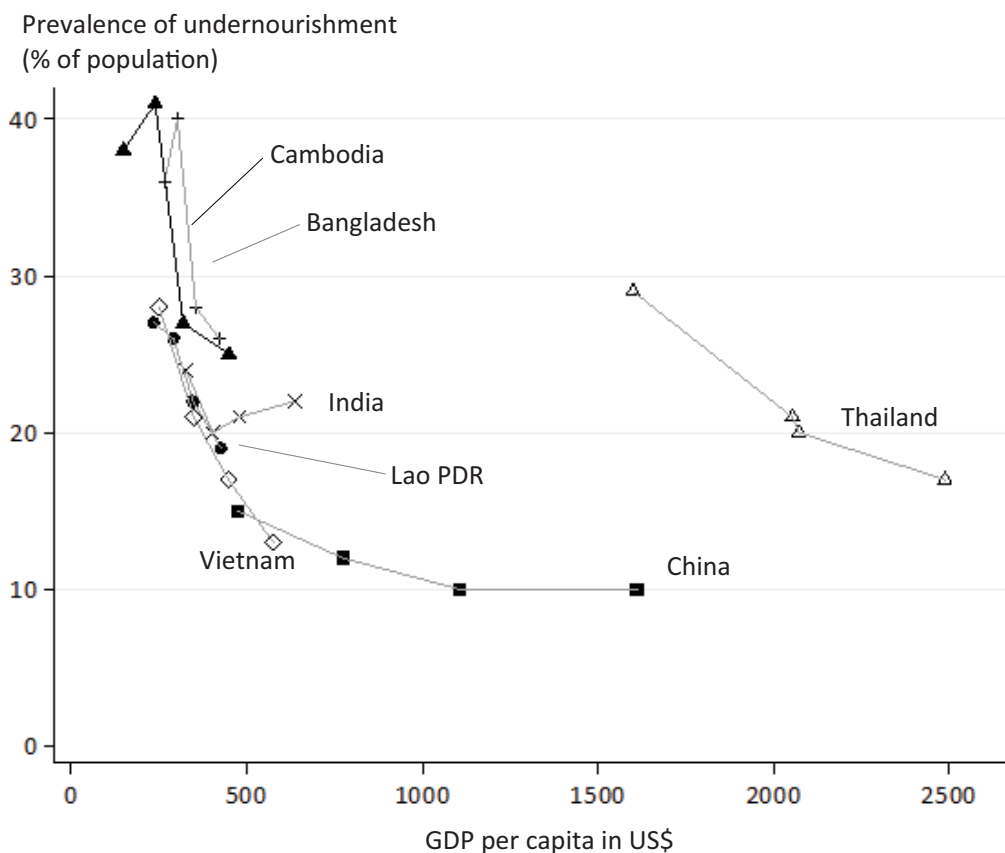
Source: GDCGM 2010.

Figure 6 first presents the prevalence of undernourishment against level of per capita GDP for Cambodia and other selected countries over time. It shows that, in general, undernourishment declines with increased income level. Moreover, the speed of such decline is relatively rapid at the income level where per capita GDP is below US\$500. This is true over the entire time period for Cambodia, Bangladesh, Lao PDR, and Vietnam, and is only partially true during an early period for India. The second observation is that, while Cambodia managed to significantly reduce hunger during the early growth period, the hunger reduction started to slow down in the late period. The third observation is that the relationship between undernourishment and income level is very similar in Vietnam and China, as the graphs representing the two countries perfectly form a

single graph. Thus, China's past seems to be able to closely predict Vietnam's future in terms of the relationship between hunger reduction and income growth. The fourth observation is that, while for Thailand per capita income at the starting point of the graph is the highest among the selected countries, the prevalence of undernourishment in Thailand is much higher than it was in China when China reached a similar per capita income level at the ending point of the graph. Although the reduction speed in Thailand is faster than in China relative to their income growth speed, at a much higher income level, Thailand's prevalence of undernourishment is surprisingly higher than that in China. The final observation is that India is the only country in which prevalence of undernourishment rose against more rapid income growth in the recent period (Figure 6).

We then present prevalence of child malnutrition against the level of per capita income for the five countries over time. Starting from different initial levels both for per capita income and prevalence of child malnutrition, almost all countries managed to reduce child malnutrition during growth, with the exception of Lao PDR, in which child malnutrition barely changed when per capita income increased from US\$300 to more than US\$400. The cross country comparison shows that, at a similar level of income, prevalence of child malnutrition differs significantly across the five countries. When per capita income was below US\$300, Cambodia's prevalence of child malnutrition is the lowest one in Figure 7, lower than both Bangladesh and Vietnam at similar income levels. However, in the period in which per capita income increased from US\$300 to more than US\$400, Vietnam significantly lowered its prevalence of child malnutrition, while the graph for Cambodia is much flatter than that for Vietnam in this period, indicating that similar growth of per capita income from US\$300 to US\$400 has had a smaller impact on child malnutrition in Cambodia than in Vietnam.

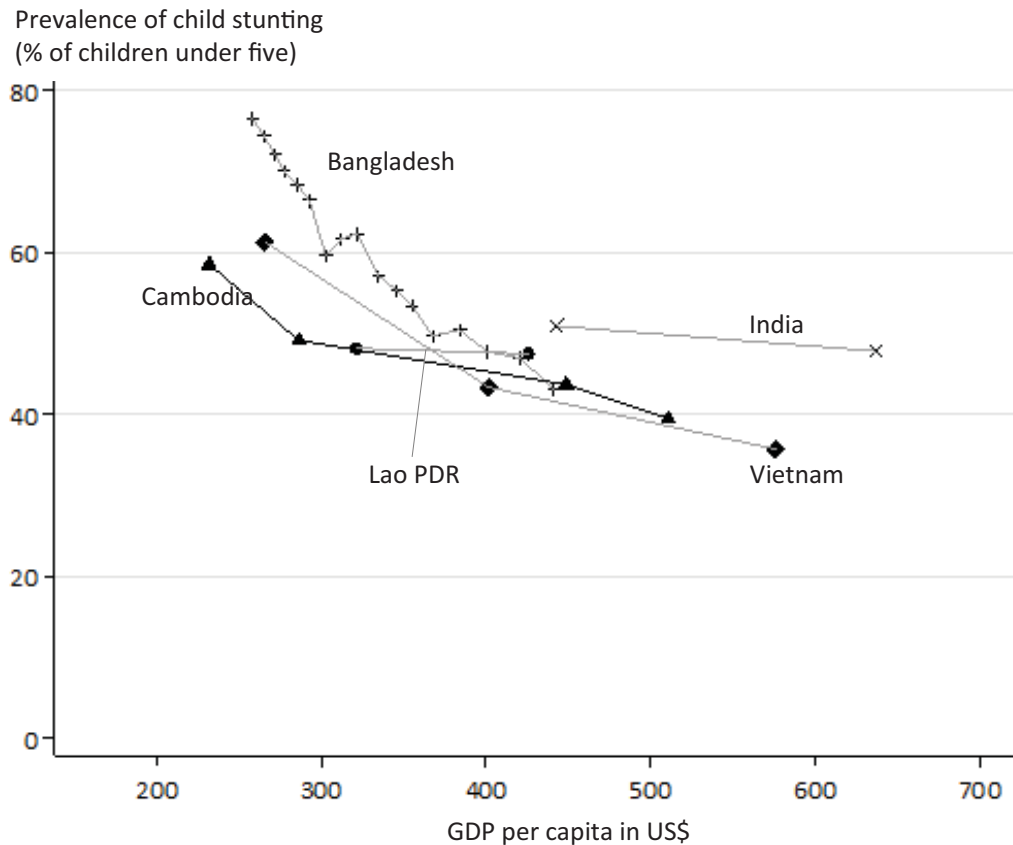
Figure 6: Relationship between prevalence of undernourishment and per capita GDP



Source: WDI 2010, FSS 2010.

When per capita income was low and below \$300, the prevalence of child malnutrition was highest in Bangladesh. However, with modest income growth, raising per capita income from US\$250 to US\$400, Bangladesh rapidly reduced its prevalence of child malnutrition. On the other hand, at the per capita income level close to US\$500, India had the poorest nutrition status for younger children. Moreover, when per capita income increased to more than US\$600 at the ending period of the graph for India, its prevalence of child malnutrition declined only modestly.

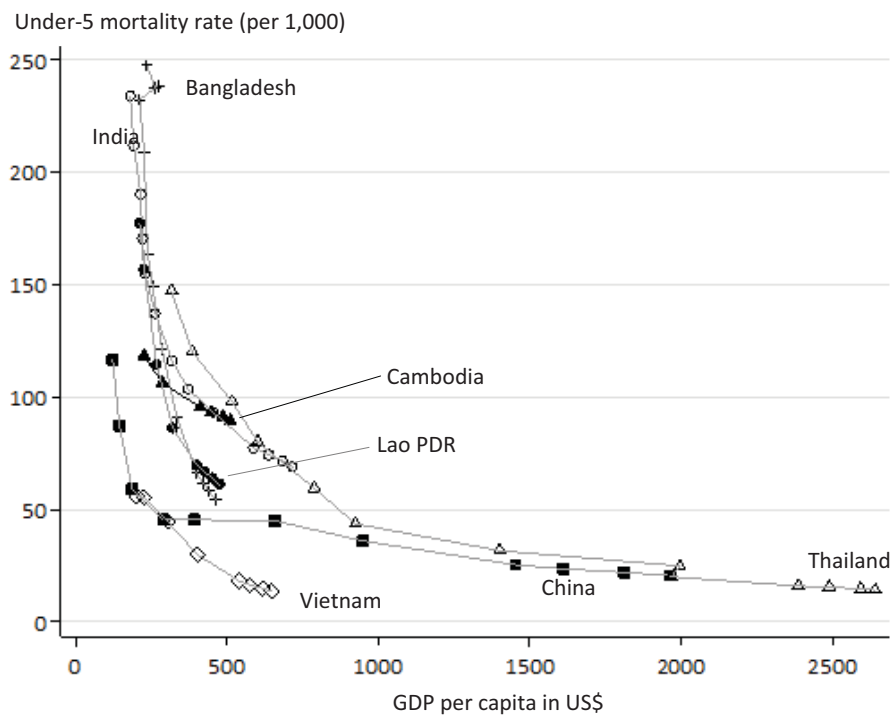
Figure 7: Relationship between prevalence of child malnutrition and per capita GDP



Source: WDI 2010, GDCGM 2010.

Finally, we turn to the child mortality rate plotted on per capita GDP over time in Figure 8. Similar to the result shown in Figure 6, the child mortality rate declines rapidly with growth when per capita income level is below US\$500. After the mortality rate falls to 50 per thousand children and income rises to more than US\$500 per capita, the reduction in child mortality slows. The only exception is Vietnam, in which child mortality continued to fall rapidly when the 50-per-thousand mortality rate was reached and per capita income reached more than US\$500. The third observation is that at the income level below US\$500, the graph for Cambodia is flattest among the selected countries. This finding seems to suggest slow progress toward improving well-being among the weakest Cambodian children. However, differences in child-mortality trends across countries might be related to factors other than growth and level of income. Such factors might include education, infrastructure, and health service provision at the macro level, and within-household characteristics and household dynamics at micro level. The role of these drivers and their interactions with growth/income drivers in the determination of food security and nutrition improvement over time deserve more study.

Figure 8: Relationship between child mortality rate and per capita GDP



Source: WDI 2010, GDCGM 2010.

4. Summary and Future Research

Cambodia has experienced high economic growth in recent years and such growth has led to significant reduction in poverty and remarkable progress toward the eradication of hunger and malnutrition. However, income inequality has increased along with growth and the population growth rate is still high. These factors challenge Cambodia's progress toward food security and healthy nutrition, especially when economic growth slows down as a consequence of the recent global recession.

Despite remarkable success in recent years, Cambodia remains one of the poorest countries in South and Southeast Asia, with one of the highest prevalence rates of undernourishment and malnutrition. This paper's comparison study suggests that Cambodia's food security situation is similar to that of Lao PDR and Bangladesh today, Vietnam in the early 2000s, and Thailand in the late 1970s. The development trends show that Cambodia largely followed the pathways of Vietnam and China, where high economic growth has trickled down to substantially reduce poverty, hunger, and malnutrition, in contrast to India, where development bypassed the impoverished population. However, in recent years, Cambodia has departed from the successful pathway of Vietnam and China—a pathway in which growth and better nutrition outcomes have occurred simultaneously. Thus, more efforts are required to bring Cambodia back to the effective pathway and to achieve food security and universal nutritional health in the growth process. While growth in Bangladesh is more modest than in Cambodia, Bangladesh's experiences suggests helpful models for Cambodia, as in Bangladesh more targeted actions have resulted in major improvements in child malnutrition.

This paper has only considered economic growth as a driver of food security and better nutrition outcomes. Differences in patterns and pathways among the countries compared in this study might be attributed to the differential roles of other drivers in achieving food security and better nutrition outcomes. These drivers include education, infrastructure, and health service provision.

Moreover, linkages and interactions among different drivers may differ across countries, and the dynamic process of such interactions may change over time. At the micro level, given that individual nutritional status is first and foremost determined by household-level factors, the immediate causes of hunger and malnutrition need to be studied in more detail at this micro level. In addition, vitamin and mineral deficiencies are highly prevalent in Cambodia, which can have serious and long-lasting consequences for individual well-being and for the country's economic and social development (MI et al. 2009). The causes of vitamin and mineral deficiencies deserve greater attention and require more research in the context of Cambodia.

Based on the findings of this paper, the following additional questions require more research in the future:

- In addition to economic growth, what are the other major drivers of hunger and malnutrition (including micronutrient deficiencies)? How are they linked with growth and interlinked among themselves, how can they be leveraged for better nutrition outcomes, and, in particular, what is the role of agriculture (including fisheries) and gender?
- Which groups are most vulnerable to hunger and malnutrition, where are they located, and how can they be better targeted?
- How can government interventions be prioritized through policies, investments, and programs to more effectively improve Cambodia's food security and nutrition situation?

References

- Breisinger, C. and Diao, X. 2008. *Economic transformation in theory and practice: What are the messages for Africa?* IFPRI Discussion Paper 797. Washington, DC, U.S.A.: IFPRI.
- CARD (Council for Agricultural and Rural Development). 2008. Strategic framework for food security and nutrition in Cambodia 2008-2012 (SFFSN). Phnom Penh.
- Diao, X., Hazell, P., Resnick, D. and Thurlow, J. 2007. *The role of Agriculture in Development: Implications for Sub-Saharan Africa*. IFPRI Research Report 153. Washington, DC, U.S.A.: IFPRI.
- Ecker, O., & Qaim, M. In press. Analyzing nutritional impacts of policies: An empirical study for Malawi. *World Development*: doi:10.1016/j.worlddev.2010.08.002. Accessed October 11, 2010.
- FAO (Food and Agriculture Organization of the United Nations). 1996. World Food Summit: Rome Declaration on World Food Security. <http://www.fao.org/docrep/003/w3613e/w3613e00.HTM>. Accessed October 11, 2010.
- _____. 1999. Nutrition Country Profile of Cambodia. Rome.
- _____. 2003. Measurement and assessment of food deprivation and undernutrition. Rome. <http://www.fao.org/docrep/005/y4249e/y4249e00.HTM>. Accessed October 11, 2010.
- _____. 2009. Declaration of the World Summit on Food Security. Rome. http://www.fao.org/fileadmin/templates/wsfs/Summit/Docs/Final_Declaration/WSFS09_Declaration.pdf. Accessed October 11, 2010.
- FSNIS (Food Security and Nutrition Information System). 2010. <http://www.foodsecurity.gov.kh/>. Accessed October 11, 2010.
- FSS (Food Security Statistics). 2010. Database of the Food and Agriculture Organization of the United Nations. <http://www.fao.org/economic/ess/food-security-statistics/en/>. Accessed October 11, 2010.
- GDCGM (Global Database of Child Growth and Malnutrition). 2010. Database of the World Health Organization. <http://www.who.int/nutgrowthdb/en/>. Accessed October 11, 2010.

- Guldan, G. S., Zeitlin, M. F., Beiser, A. S., Super, C. M., Gershoff, S. N., and Datta, S. 1993. Maternal education and child feeding practices in rural Bangladesh. *Social Science and Medicine* 36(7): 925-35.
- Hong, R. and Mishra, V. 2006. Effect of wealth inequality on chronic under-nutrition in Cambodian children. *Journal of Health, Population, and Nutrition* 24(1): 89-99.
- Naron, H. C. 2009. *Cambodian Economy: Charting the course of a bright future – a survey of progress, problems, and prospects*. Phnom Penh, Cambodia.
- National Institute of Public Health (NIPH), National Institute of Statistics (NIS), and ORC Macro 2006. Cambodia Demographic and Health Survey 2005. Phnom Penh and Calverton, Maryland.
- Ministry of Agriculture, Forestry, and Fisheries (MAFF) and Ministry of Water Resources and Meteorology (MWRM) 2008. Programme document for Food Security Support Programme 2009-2013. Phnom Penh.
- MI (Micronutrient Initiative); Flour Fortification Initiative, United States Agency of International Development (USAID); Global Alliance for Improved Nutrition (GAIN); World Health Organization (WHO); World Bank; United Nations' Children Fund (UNICEF). 2009. Investing in the Future: A United Call to Action on Vitamin and Mineral Deficiencies. Ontario.
- Murshid, K. A. S. 1998. *Food security in an Asian transitional economy: The Cambodian Experience*. Working Paper 6. Cambodia Development Resource Institute (CDRI) and United Nations Research Institute for Social Development (UNRISD). Phnom Penh.
- Kristensen, J. 2001. *Food security and development in the Lower Mekong River Basin: A challenge for the Mekong River Commission*. Asia and Pacific Forum on Poverty: Reforming Policies and Institutions for Poverty Reduction. Asian Development Bank, Manila February 5-9, 2001.
- Tucker, V. 1996. Food security in Cambodia: A preliminary assessment. United Nations Research Institute for Social Development (UNRISD) Discussion Paper 80.
- WDI (World Development Indicators). 2010. Database of the World Bank. (<http://data.worldbank.org/>). Accessed October 11, 2010.
- WHO (World Health Organization). 1995. Physical status: The use and interpretation of anthropometry. Report of a WHO Expert Committee. WHO Technical Report 854. Geneva.