FOOD SECURITY TREND ANALYSIS REPORT

CAMBODIA SOCIO-ECONOMIC SURVEYS
2004 AND 2009
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List of Acronyms

ASEAN Association of Southeast Asian Nations
CARD Council for Agricultural and Rural Development
CDHS Cambodia Demographic and Health Survey
CDRI Cambodia Development Resource Institute
CPI Consumer Price Index
CSES Cambodia Socio-economic Survey
DEC Dietary Energy Consumption
MDER Minimum Dietary Energy Requirement
EC European Commission
FAO Food and Agricultural Organisation
FAO RAP FAO Regional Office for Asia-Pacific
FSSM Food Security Statistics Module
GDP Gross Domestic Product
MAFF Ministry of Agriculture, Forestry and Fisheries
MDG Millennium Development Goals
MOH Ministry of Health
MOP Ministry of Planning
NIS National Institute of Statistics
USD United States Dollars
USDA United States Department of Agriculture
WFP World Food Programme
WHO World Health Organization
Foreword

The Ministry of Planning (MOP) of the Royal Government of Cambodia is pleased to present this report on Food Security Trends in Cambodia, based on food consumption data from the 2004 and 2009 Cambodia Socio-Economic Surveys (CSES).

Data analysis, interpretation of results and report preparation followed a participatory process led by the National Institute of Statistics (NIS), involving key specialists from different government ministries and agencies, including the National Institute of Statistics (NIS), the Council for Agricultural and Rural Development (CARD), Ministry of Agriculture, Forestry and Fisheries (MAFF), Ministry of Health (MOH) in collaboration with the Food and Agriculture Organization of the United Nations (FAO) with contributions from World Food Programme (WFP). This report continues on the work begun in 2007 with the publication of the first Cambodia Food Insecurity Report and is based on analysis of data collected from more than 12,000 households in 720 locations nationwide.

The report provides information on food security in Cambodia by comparing food consumption statistics gathered at the household level in 2004 and 2009. It summarizes the key trends over the five year period in undernourishment, dietary energy deficit, food access, dietary composition and macro-nutrient consumption.

The report serves as an important reference document and provides guidance to food security policy-makers, planners and researchers as they design, review and implement food security and nutrition strategies, programmes and projects across Cambodia. It will also be used as a point of reference in evaluating the achievements of the National Strategy Development Plan.

The report is the result of technical support of FAO provided to Cambodia under the EC-FAO Food Security Programme Linking Information and Decision-Making to Improve Food Security, and the MDG Joint Programme for Children, Food Security and Nutrition in Cambodia.

On behalf of the Royal Government of Cambodia, I would like to take this opportunity to thank FAO and its donors, the European Union and the Government of Spain for their generous support to make this report available.

Ministry of Planning
Phnom Penh, Cambodia
October, 2011

CHHAY THAN
Senior Minister
Minister of Planning
It is globally recognized that food insecurity is most directly experienced by individuals at the household level. With this in mind, it is with great pleasure that we present this important report on Food Security Trends in Cambodia, based on food consumption data from the 2004 and 2009 Cambodia Socio-Economic Surveys (CSES).

This report highlights key patterns of food insecurity in terms of the prevalence of undernourishment, dietary energy deficit, food expenditure and consumption patterns, and a host of other measures at both the national levels and sub-national levels by geographic and socio-economic factors. This represents the second such report produced by the National Institute of Statistics (NIS) with the collaboration of FAO, and builds on the work begun in 2007 with the publication of the first Cambodia Food Insecurity Report.

The substantial datasets developed by the CSES provided our analytical teams with extensive information pertinent to food security. With more than 12,000 households in 720 locations nationwide involved, the CSES is a key source of information for both government and its development partners.

The report provides an overview of food security trends in Cambodia based on household level food consumption statistics over a five year period (2004-2009). Using the Food Security Statistics Module (FSSM) developed by FAO, key trends in undernourishment, dietary energy deficit, inequality of access, dietary composition and macro-nutrient consumption are summarized in the report. Data are presented at the provincial level and by income quintiles.

With the second report now available, the Cambodia food insecurity reporting process based on CSES data is better established for the assessment and monitoring of food policies and programmes and progress towards achieving the MDG hunger indicator by 2015. We welcome feedback on this report, which will no doubt serve to improve future planning and decision-making processes. Our sincere thanks to all who supported and participated in developing this report.

San Sy Than
Director General, NIS

Nina Brandstrup
FAO Representative
Acknowledgements

Special thanks are due to H.E San Sy Than, Director General, NIS for his full support and to all the individuals who contributed to the development of this report. Using a collaborative approach throughout, participants approached the work with a high degree of commitment and interest, solid technical expertise and unfailing good humour.

Thanks are due to the technical team, namely His Excellency Srun Darith (CARD), Men Sothy (MAFF), Lay Chhan, Pich Pothy, and Yip Thavrin from NIS, Ms. Chea Mary (MoH), Long Yav (WFP), and to the FAO team who supported the exercise including Seeva Ramasawmy and Ana Moltedo who provided training on food security statistical analysis, and Jannie Armstrong and Chhay Seng who facilitated the interpretation of the analysis results and report writing by the Cambodia technical team.

We are also grateful for the efforts of WFP Cambodia, Oum Kosal at FAO Cambodia and Bruce Isaacson at FAO’s regional Office for Asia and the Pacific, who supported the process from the outset.

Finally, the generous support of the European Union and the Government of Spain is also gratefully acknowledged.
Executive Summary

This report presents a trend analysis of food security and food consumption data based on data from the 2004 and 2009 Cambodia Socio-Economic Surveys (CSES). Covering more than 12,000 households in 720 locations nationwide, the CSES is a key source of information for both government and its development partners alike.

The report provides an overview of food security in Cambodia based on food consumption statistics at the household level over a five year period (2004-2009). Using the Food Security Statistics Module (FSSM) developed by FAO, key trends in undernourishment, dietary energy deficit, inequality of access, dietary composition and macronutrient consumption are summarized in the report. Data are presented by both income quintiles and at the provincial level.

Since the last Food Insecurity Report in Cambodia (NIS and FAO, 2007), economic growth in Cambodia has been solid with 6.0 percent GDP growth in 2010 (MOP, 2010). GDP per capita stands at 739 USD. Poverty remains a prevailing policy issue, with 30.1 percent of the population under the poverty line in 2007 (CSES 2007) with high prevalence in rural areas. Although only 20 percent of the population live in urban centres, data contained in this report suggest that food insecurity is increasingly found in urban areas, while remaining an important issue in the rural context as well.

Of key importance in the period under review was the impact of the global food and fuel crises of 2007-2009. In early 2008, rice prices more than doubled over a six month period, peaking in July 2008. Although prices stabilized since then, the basic cost of food in Cambodia has remained high compared to the pre-crisis reference point of January 2007. This report demonstrates that this price increase has implications for households reliant on market purchases to meet basic food needs.

According to the 2009 CSES data, one third of Cambodians are undernourished; that is, that they are consuming less than the Minimum Daily Energy Requirement (MDER). Nationwide, the prevalence of undernourishment decreased slightly from 37 percent in 2004 to 33 percent in 2009. Prevalence of undernourishment among the poorest households (quintile 1) decreased from 80 percent in 2004 to 59 percent in 2009. In the third and fourth quintile, increases in undernourishment were noted, with rates rising from 22 to 25 percent, and from 13 to 19 percent respectively. Increases in undernourishment in quintiles three and four may be a result of reduced food expenditures among urban households, reflecting higher prices for market-reliant consumers.

Dietary Energy Unit Value, which refers to the cost of purchasing 1,000 Kcal in Riel increased over the five year period from 700 Riel in 2004 to just under 1,400 Riel in 2009, likely due to the 2008 high food prices. Household spending on staple foods including meat, fish, fruit and vegetables more than doubled over the five year period. Although prices have since come down from the highest recorded levels of 2008, food prices went up by about 29 percent over the five year period. The Engel Ratio, which describes the share of food expenditure in overall household spending, stands at 70 percent.

Data on macronutrient consumption indicates that reduction in the consumption of carbohydrates was accompanied by increases in protein and fat consumption. This is consistent with global trends whereby economic growth, poverty reduction and urbanization support increased fats and protein consumption (Delgado, 2003).

Overall, the data suggest that the trend of the key major food security indicators, including national level of undernourishment, undernourishment among the poorest population, and dietary energy deficit, show positive gains. However, the cost of food has increased dramatically across the country, notably in urban areas. The data on undernourishment indicate that the impact of food prices are not limited to poorer populations, but also impact higher income populations as well. This underscores that food costs are an issue for all Cambodians, and are not limited to poverty-related food insecurity.

Since the food price crisis, there has been extensive research and analysis about its medium and long term implications for Cambodia including World Bank 2011 and CDHS 2010. This report should be viewed as part of that larger body of work. It is hoped that this report makes a useful contribution to Cambodia’s ongoing efforts to better quantify and address food insecurity wherever it is found in the country.
Since the preparation of the 2007 Food Insecurity Report in Cambodia (NIS and FAO, 2007), the population of the country has grown to 13.4 million, of which 51 percent are female. Over the period 2007-2011, economic growth has remained robust, with 6.0 percent GDP growth in 2010 (MOP, 2010). Growth has been supported by a real estate boom in major urban areas and provincial towns, and increased rates of commercial agriculture in rural areas.

Rice remains the primary agricultural product and mainstay of the Cambodian diet, with 7.9 million tonnes harvested in 2010. Production of maize, soybean, mungbean and cassava for export markets have increased consistently over the five year period.

GDP per capita stands at 739 USD, and the country is ranked 124th on the 2011 Human Development Index. Poverty remains a prevailing policy issue, with 30.1 percent of the population under the poverty line in 2007 (CSES, 2007) with high prevalence in rural areas. Although only 20 percent of population live in urban centres (relatively low by regional standards) this report will suggest that food insecurity, which has been consistently linked with poverty, has increasingly important urban characteristics.

Malnutrition is persistent in the Cambodian context, with the 2010 Cambodia Demographic and Health Survey (CDHS) indicating that there has been little decline in rates of stunting or underweight since 2005 (40 and 28 percent respectively) and slight increases in the rates of wasting of children under five, rising from eight percent in 2005 to 11 percent in 2010.

Of key importance in the period under review was the impact of the global food and fuel crises of 2007-2009. In early 2008, rice prices more than doubled over a six month period, peaking in July 2008. Although prices have since stabilized, the basic cost of food in Cambodia has remained substantially higher compared to the pre-crisis reference point of January 2007. As this report will demonstrate, this has had implications for households’ reliance on market purchases to meet basic food needs.

Map 1: Administrative Map of Cambodia

Map provided by WFP Cambodia VAM Unit.
This report provides an overview of food security in Cambodia based on food consumption statistics at the household level over the period of 2004 to 2009. Using the Food Security Statistics Module (FSSM) from FAO for data analysis, this report summarizes key trends in undernourishment, dietary energy deficit, inequality of access, dietary composition and macronutrient consumption. Data are presented by both income quintiles and at the provincial level. The data suggest that the cost and composition of the Cambodian diet have shifted since the last major survey conducted in 2007.

The intention of the report is to provide policymakers within Government and the development sector with a concise set of data and analysis on food insecurity trends in Cambodia in order to better inform efforts to reduce food insecurity across the country.

I. The Survey

The Cambodia Socio-Economic Surveys (CSES 2004 and 2009) were designed to provide information on social and economic conditions of households for improved poverty policy design, to record household level production and consumption levels for the national database and to update the consumer price index (CPI) of goods and services. The survey process also served as a platform for training and improvement of survey methods and analysis within the National Institutes of Statistics of Cambodia (NIS).

The CSES 2009 was conducted from January to December 2009. One thousand households were sampled per month, for a total of 12,000 households in 720 villages. This is the second largest multi-objective survey ever undertaken in Cambodia at the national level. Sample size and selection was consistent with CSES 2004 which surveyed 15,000 households from November 2003 to January 2005. Data collection for CSES 2009 used two different data collection methodologies, including recall questions similar to those used in previous surveys, and a monthly diary in which all household economic transactions were recorded. This required survey teams to spend more than one month in each surveyed village.

In addition to data on household consumption and a range of social indicators, the CSES 2009 collected data on sources of household income, land use at the village level, access to community and social services (such as roads, electricity, water, markets, schools and health facilities), and market price data from local markets for 93 food and non-food items.

It is noted that data collection took place during a period of dramatic price rises linked to the global food and fuel crises of 2007-2009, which had implications for a range of factors pertinent to this report. As a result, this may have introduced a time-specific bias to the data, although food prices had come down from their mid-2008 peak. Employment opportunities in 2009 were severely limited as a result of the global economic downturn (World Bank 2011). However, as the impacts of that crisis continue to resonate across all levels of Cambodian society, and given that subsequent studies have indicated that the crisis has had nutritional ramifications (CDHS 2010), the data captured by CSES remain the most comprehensive available for Cambodia.

A) The Sample

The survey sample was selected to be as geographically comprehensive as possible, and on this basis monthly samples of 1000 households were collected over a 12 month period, covering a total of about 57,000 individuals. Fieldwork started in January 2009 and was completed by December 2009.

The survey was designed to represent the whole country, including both urban and rural areas, and agro-ecological zones including Plains, Tonle Sap, Coastal, and Plateau/Mountain regions.

And at the end of the 12 months, reliable estimates were produced for 10 individual provinces: Kampong Cham, Kampong Speu, Kampong Thom, Kampot, Kandal, Phnom Penh, Prey Veng, Siem Reap, Svy Rieng and Takeo. The other 14 provinces were grouped according to zones (North, Northwest, Northeast, South Coastal, and West and Centre). A breakdown of those zones is included in the list below.

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2 The full CSES reports are available from NIS, Ministry of Planning.
### Regions and Provinces of Cambodia

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<thead>
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<th>Region</th>
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<td>Banteay Meanchey</td>
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<td>Oddar Meanchey</td>
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<td>Northwest</td>
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<td>North East</td>
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<td>Stung Treng</td>
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<td>West and Centre</td>
<td>Kampong Chhnang</td>
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<td>Pursat</td>
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<td>South Coastal</td>
<td>Koh Kong</td>
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<td>Sihanoukville</td>
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<td>Kep</td>
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#### B) Questionnaires

Four different questionnaires or forms were updated based on CSES 2003/04. These included: (i) household listing forms, (ii) village questionnaire, (iii) household questionnaire, and (iv) expenditure and income diary forms. Several modules were included in the household questionnaire that provided a rich dataset with information used for preparing the 2004 Poverty Profile of Cambodia and for subsequent poverty analysis.

For the diary method, the diary sheet recorded information on:

1. Expenditure and consumption of own-produced food and non-food items (194 food and 396 non-food items) according to quantity and value, classified according to mode of acquisition, origin and purpose; and
2. Household income and receipts, classified as kind of income (cash, in kind, etc.) as well as type of income (wages/salaries, income from sales by main industry, etc.).

NIS classification of crops based on FAO standards provides a grouping of 23 food groups. These have been ordered into six main category groupings, namely cereals, tuber and leguminous plants, industrial temporary crops, vegetables, fruits and nuts, and industrial permanent crops.

#### C) Food data

The CSES 2004 and 2009 contained a range of information on the characteristics of households, including food and non-food consumption expenditures and income. Quantities and monetary values of food consumed by households were collected through diary questionnaires over a period of one month for 194 food items by source of acquisition, such as: purchased, received as gift or from stocks and own-production. Food consumed away from home was also identified using a specific code.

Data on food items were collected in eleven different quantity units of measurement, including a large number of locally devised units, not all of which have well established gram equivalents. The estimation of gram equivalent of local units without pre-established equivalents was made by using the unit value of relevant food items at regional level (Phnom Penh, Plain, Coastal, Tonle Sap and Plateau/Mountain).

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3 Industrial temporary crops include sugar, oilseed, fibre and other crops. Industrial permanent crops include rubber, spices and aromatic crops and flowers.
Finally, as Cambodia does not possess a food composition table to derive the nutrient values of each food item covered by the CSES 2004 and 2009, the ASEAN food composition table was used and complemented by that of USDA.

**D) Minimum Dietary Energy Requirement (MDER)**

The minimum dietary energy requirement is the weighted average of the minimum energy requirements necessary for each sex and age group. It is estimated by identifying the lowest acceptable weight-for-height and minimal levels of physical activity, equivalent to a sedentary lifestyle.

MDER is used as the cut-off point for estimating the prevalence of food deprivation within the overall statistical framework under the assumption that Dietary Energy Consumption (DEC) is distributed as lognormal (FAO, 1996).

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 Minimum Dietary Energy Requirement (MDER)

In the entire population, the minimum dietary energy requirement is the weighted average of the minimum energy requirements of the different sex and age groups in the population. In a specified sex and age group, the amount of dietary energy per person that is considered adequate to meet the energy needs for minimum acceptable weight for attained-height, maintaining a healthy life and carrying out a sedentary physical activity level.

The MDER was computed at national and sub-national levels using the age-sex structure of the population derived from the CSES 2009. At national level in 2009, MDER was estimated at 1,770 kcal/person/day (1,803 kcal/person/day among urban populations and 1,762 kcal/person/day for rural populations). This represents a slight increase from CSES 2004 values (Figure I).

**Figure I: Minimum Dietary Energy Requirement, National, Rural, Urban**

![Figure I: Minimum Dietary Energy Requirement, National, Rural, Urban](image)

II. Trend Analysis of Food Security Indicators

**A) Prevalence of undernourishment proxy indicator**

From the outset it is important to stress that the rate of undernourishment refers to the proportion of the population consuming less than the minimum daily requirement reported above 4. Populations consuming less than the MDER are considered underfed or food deprived (FAO, 2008). The technical

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4 In this context, undernourishment is distinct from underweight, which is a composite indicator based on stunted and wasted populations more than two standard deviations below the reference population, and is derived from direct anthropometric measurement.
guidelines for undernourishment can be found at the FAO website, and a glossary for all technical terms included in this document can be found in Annex 1.

According to the 2009 CSES, one-third of Cambodians are undernourished; that is, they are consuming less than the MDER necessary for a sedentary lifestyle (Figure II). Nationwide, the prevalence of undernourishment decreased slightly from 37 percent in 2004 to 33 percent in 2009. The rate of undernourishment in urban areas remained constant, although there was a five percentage point decrease in rural areas. Possible reasons for this reduction may be connected to economic growth, improved access to higher value foods, and increased consumption of protein rich food items such as fish, milk, etc.

Prevalence of undernourishment among the poorest households (quintile 1) decreased from 80 percent in 2004 to 59 percent in 2009 (Figure III). In the third and fourth quintile, increases in undernourishment were noted, with rates rising from 22 to 25 percent, and from 13 to 19 percent respectively. Increases in undernourishment in quintiles three and four may be a result of reduced food expenditures among urban households, reflecting higher prices for market-reliant consumers.

Figure IV below shows the level of prevalence of undernourishment by region between 2004 and 2009. There was a considerable decrease of undernourishment in most parts of the country, namely in Kompong Thom, North, Northeast, Phnom Penh, Takeo and West and Centre. However, in some

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6 A description of which provinces are included in which regions in included in Section II.
parts of the country such as Siem Reap, Northwest and South Coastal, the prevalence undernourishment increased. Possible reasons for this may be locally specific: South Coastal is a net deficit rice producing region, and small plot sizes in Siem Reap suggest that even rural households are net purchasers of rice.

![Figure IV: Percentage of Undernourishment, by Region](image)

B) Dietary energy deficit

Dietary energy deficit is measured as the food gap between the average dietary energy needs and the average dietary energy consumption of the food-deprived population. This measure is the expression in kilocalories of that food gap. In Cambodia, the food gap in 2009 was 744 Kcal/person/day, as compared to 755 Kcal/person/day in 2004 (Figure V). The 2009 food gap is equivalent to two hundred grammes of rice, which was needed to address the dietary energy deficit. The food gap improved marginally in rural areas and increased slightly in urban areas.

![Figure V: Dietary Energy Deficit, National, Urban and Rural, Male and Female](image)

While overall trends were consistent across male and female populations, the dietary energy deficit was slightly higher for females. The food gap among males decreased marginally from 746 Kcal/person/day in 2004 to 729 Kcal/person/day in 2009 and the food gap of females decreased from 773 Kcal/person/day in 2004 to 756 Kcal/person/day in 2009. Figure VI below shows the level of food gap by region in 2009.

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7Dietary Energy Deficit is also referred to as the “Depth of Hunger”.
C) Food Consumption and Expenditures

1. Dietary energy consumption

In Cambodia, average food consumption in terms of dietary energy increased from 2,010 Kcal/person/day in 2004 to 2,060 Kcal/person/day in 2009. The increase over the five-year period was about 200 Kcal/person/day in quintile one, while quintile five increased only 60 Kcal/person/day. However, average food consumption in dietary energy in the fourth quintile deceased from 2,300 Kcal/person/day in 2004 to 2,190 Kcal/person/day in 2009 (Figure VII).
Figure VIII above shows the average food consumption in terms of dietary energy by region between 2004 and 2009. There was a decrease in average food consumption in dietary energy in some parts of the country, namely in the North, Northwest, South Coastal, Siem Reap and Svay Rieng. In other parts of the country such as Kampong Speu, Kampong Thom, North, North East, Phnom Penh, Prey Veng, Takeo, West and Centre, the average food consumption in dietary energy increased. In Kandal, the average food consumption in dietary energy remained the same (1,950 Kcal/person/day) over the five-year period.

Figure IX below shows that poorer households with more members had lower average food consumption per capita, whereas wealthier households with fewer members had higher daily per capita consumption.

![Figure IX: Average Food DEC, by Income Deciles and Household Size](image)

2. Dietary Energy Unit Value

The figures in this section illustrate the Dietary Energy Unit Value in Cambodian Riel, split by population groups and by region over the five-year period. Dietary Energy Unit Value refers to the cost of purchasing 1,000 Kcal in Riel, and indicates a substantial increase over the five year period, likely due to the 2008 high food prices. Although prices have since come down from the highest levels of 2008, food prices went up by about 29 percent over the five year period.

In Cambodia, the dietary energy unit value nearly doubled in nominal terms from about 700 Riel in 2004 to just less than 1,400 Riel in 2009 (Figure X). In urban areas, unit values more than doubled, from 1,100 to 2,400 Riel, while in rural areas unit values increased from 600 to 1,200 Riel. These increases were spread across all population quintiles and regions.

![Figure X: Dietary Energy Unit Value](image)

8 1 USD = 4000 Riel (June 2011)
3. Engel ratio

The Engel ratio refers to the share of food expenditure as part of total household consumption expenditure (Figure XI). Nationally, about 70 percent of household total consumption expenditure went to food. This share was unchanged during the period from 2004 to 2009, even though the latter included the 2007-2009 high food prices. While the share of food consumption had reduced in quintile one through quintile four, the share in quintile five increased from 59 to 65 per cent, probably due to higher prices of high quality foods. The share of food consumption increased in urban areas while reduced in rural areas. This illustrates the impact of the food price crisis on net food buyers in urban areas compared to rural households with greater reliance on own-production. The cost of dietary energy value increased while the overall Engel ratio remained constant. This suggests that the overall volume of household expenditure has increased, such that the increased cost of food has been offset by increased levels of non-food purchasing.

![Figure XI: Engel Ratio, Food Expenditures as a percent of Total Expenditures](image)

Over the five year period, the share of food consumption to total consumption in monetary value decreased in most provinces and regions (Figure XII). While Kampong Cham, North, South Coastal and Svay Rieng observed the highest reductions, food expenditures increased in Prey Veng and Takeo. In Phnom Penh, the share of food consumption rose from 65 to 80 per cent.

![Figure XII: Share of Food Consumption to Total Consumption in Monetary Value (%), by Region](image)

4. Share of food consumption from different food sources

Figure XIII below indicates the sources of food consumed, including purchases, own production, foods consumed away from home, and obtained free from relatives, friends, etc. At national level, there has
been negligible change in the share of dietary energy consumption from purchases and own production. In urban areas food purchases have increased as own production has dropped. By contrast, the rural populations reduced food purchases and increased own production during the five year period.

**Figure XIII: Share of Food Consumption in Dietary Energy Consumption by Food Sources**

D) Diet Composition

1. Macronutrients consumption

Overall, data on macronutrient consumption indicates that a reduction in the consumption of carbohydrates was accompanied by increases in protein and fat consumption. This is consistent with global trends whereby economic growth, poverty reduction and urbanization support increased fats and protein consumption (Delgado, 2003).

Compared to 2004, nationally the average protein consumption increased from 54.5 g/person/day to 62.8 g/person/day in 2009 (Figure XIV). In rural areas, the protein consumption increased from 53.5 g/person/day in 2004 to 60.1 g/person/day in 2009, equivalent to a 12 percent increase. In urban areas, protein consumption increased from 59.9 g/person/day in 2004 to 75.1 g/person/day in 2009, an increase of 25 percent.

**Figure XIV: Average Protein Consumption (g/person/day)**
At national level, carbohydrate consumption (g/person/day) decreased from 370.5 in 2004 to 354.2 in 2009 (Figure XV). In urban areas, the decrease (from 359.9 g/person/day in 2004 to 322.1 g/person/day in 2009) was more pronounced than in rural areas (from 372.4 g/person/day in 2004 to 361.4 g/person/day).

**Figure XV: Average Carbohydrates Consumption (g/person/day)**

In Cambodia the average fat consumption (g/person/day) increased from 28.7 in 2004 to 36.3 in 2009, an increase of 31.5 percent (Figure XVI). In urban areas, the increase (from 36.7 g/person/day in 2004 to 46.5 g/person/day in 2009) was higher than in rural areas (from 27.3 g/person/day in 2004 to 34 g/person/day in 2009).

**Figure XVI: Average Fat Consumption (g/person/day)**

2. **Food diet composition**

Household spending on staple foods more than doubled over the five year period (Figure XVII below). Expenditure on meat, and fruits and vegetables increased by 155 and 133 percent respectively. Expenditure on fish, a key protein source in the Cambodian context, increased by 120 percent. Despite reduced consumption of carbohydrates expressed as macronutrients, household spending on rice increased by 67 percent in nominal terms.
Dietary Energy Consumption (Kcal/person/day) of all food groups except cereals, vegetables and roots and tubers had increased from 2004 to 2009 (Figure XVIII).

Figure XVIII: Dietary Energy Consumption by Food Commodity Groups (Kcal/person/day)

Figure XIX below shows the increase in protein consumption per food group (expressed as g/person/day), indicating the increasing importance of meat, fish and processed food as sources of protein. The fish commodity group had been one of the main contributors of the increase in protein consumption in Cambodia from 2004 to 2009.
Compared to WHO global macronutrients recommendations for a balanced diet, the average Cambodian diet had improved from its 2004 level. In 2009, data showed that consumption of macronutrients were within the recommended norms. However, carbohydrate consumption was still higher than the WHO recommended level, in spite of the decrease from 76 to 71 percent between 2004 and 2009 (Figure XX).

**E) Inequality in Income and Food Consumption**

1. **Inequality in access to food**

Inequality in access to food, measured by the coefficient of variation (CV) of the dietary energy consumption distribution, is a key parameter in estimating the prevalence of food deprivation using the FAO approach. The CV is measured as the aggregation of the variation of DEC due to income level and the variation of DEC due to energy requirement among sex and age population groups in the total population.
In Cambodia, in 2009, the inequality in access to food due to income was 19 percent in urban area and 17 percent in rural area (Figure XXI). This rate shows a reduction in both urban and rural areas compared to 2004, by 2.4 and 3.0 percentage points respectively. Inequality in access to food by gender also decreased between 2004 and 2009 (Figure XXII).

The decrease in inequality was observed across the regions (Figure XXIII), except in Prey Veng (highest inequality), and Kampong Speu (second highest inequality) where an increase was observed. The largest decrease was observed in the North region where the inequality declined from 30 percent in 2004 to about 21 percent in 2009.

In 2009, inequality in access to food due to income and other factors was 28 percent and 26 percent for urban and rural areas respectively (Figure XXIV). This level of inequality was higher among female headed households (28 percent) than male headed households (26 percent) (Figure XXV). These data represent small improvements since 2004.
F) Micronutrient Availability

The initial preparation of the CSES 2009 data using the FAO Food Security Statistics Module includes data on Vitamin A, Thiamin (B1), Riboflavin (B2), Pyridoxine (B6), Cobalamine (B12), Ascorbic acid, Calcium, Iron and Essential Amino Acids. These data will be revisited shortly, with a separate report produced in the near future.

Key Observations and Recommendations:

- CSES 2009 data were collected at a historical period of high global food and fuel price rises. Government and development partners’ response to the crisis in the short and medium term from mid-2008 onwards was extensive and is well documented (CDRI, 2008). From the present vantage point, the recommendations contained in this report are necessarily more medium to long term in focus, and should be understood in the context of Government actions taken since the data were collected, and not simply in terms of the data contained in this report.

- The trend of key major food security indicators, including the prevalence of undernourishment, undernourishment among the poorest population, and dietary energy deficit at the national level, show positive gains in Cambodia’s efforts to improve food security.

- As a result of the food and fuel crises, the cost of food has increased dramatically across the country, notably in urban areas. With the urban population reliant on market purchases for almost 75% (in 2009) of their food consumption, the implications of the crises are not negligible.

- The data on undernourishment indicate that the impact of food prices are not limited to poorer populations, but also impact higher income population quintiles as well. This underscores that food costs are an issue for all Cambodians, and are not limited to poverty-related food insecurity.

- While food consumption data indicate improvements at the national level as well as in four out of five quintiles, the preliminary findings of the 2010 CDHS indicate that micronutrient deficiencies, parasitic infections, diarrhoea and other concerns that affect food utilisation are limiting more durable improvements in the nutritional profile of the country. Future food insecurity studies should include expanded information on micronutrients and those issues mentioned above. To that end, it is noted that the FSSM statistical module provides extensive data on available micronutrients and protein quality (amino acid composition) at household level. These data are available for Cambodia, and resources and other priorities permitting, the possibility of developing a separate report could be elaborated in the course of the coming months based on consultations with key users of micronutrient data.

- Macronutrient consumption, especially expressed as increasing protein consumption and reduced carbohydrate consumption are consistent with global trends in developing countries, as economic growth, urbanization and greater availability of protein stimulates greater consumption. In 2009, most Cambodians had access to a balanced diet, as the contribution of carbohydrates, protein and fats are in line with WHO recommendations. Future studies should provide additional disaggregated data on protein and fat by sources, so as to provide a better understanding of the composition of this increased intake.

- Since the food price crisis, there has been extensive research and analysis about its medium and long term implications for Cambodia (World Bank, 2011 and CDHS, 2010). This report should be viewed as part of that larger body of work. It is hoped that this report makes a useful contribution to Cambodia’s ongoing efforts to better quantify and address food insecurity wherever it is found in the country.
References


National Institute of Statistics and Director General Health (2011). *Cambodia Demographic and Health Survey 2010.* Phnom Penh: NIS.


Glossary

**Average dietary energy requirement**
The average dietary energy requirement (ADER) refers to the amount of energy considered adequate to meet the energy needs for normative average acceptable weight for attained height while performing moderate physical activity in good health.

**Balanced diet**
The food consumption pattern is balanced when the contribution of energy-yielding nutrients to total energy is within acceptable ranges as follows: proteins from 10% to 15%, fats from 15% to 30% and carbohydrates from 55% to 75%.

**Critical food poverty**
The prevalence of critical food poverty (pCFP), refers to the proportion of persons critically food poor in the population at national and sub-national levels, i.e. living on less than the cost of the minimum dietary energy requirement (MDER) as acquired by the first income quintile consuming the most balanced diet.

**Degree of food deprivation**
A measure of the overall food insecurity situation in a country, based on a classification system that combines prevalence of undernourishment, i.e. proportion of the total population suffering from dietary energy deficit, and depth of undernourishment, i.e. magnitude of the dietary energy deficit of the undernourished population.

**Dietary energy unit cost**
The dietary energy unit cost is the monetary value of 1,000 kcals of edible food.

**Dietary energy deficit (depth of hunger)**
The difference between the average daily dietary energy intake of an undernourished population and the national average minimum energy requirement.

**Dietary energy (DEI)**
The energy content of food consumed.

**Dietary energy requirement**
The amount of dietary energy required by an individual to maintain body functions, health and normal activity.

**Dietary energy supply (DES)**
Food available for human consumption, expressed in kilocalories per person per day (kcal/person/day). At country level, it is calculated as the food remaining for human use after deduction of all non-food consumption (exports, animal feed, industrial use, seed and wastage). This food energy supply is for both private and public consumption.

**Food balance sheets**
The food balance sheets (FBS) are derived for each commodity using data on food production and imports and opening-year food stocks after deduction of food export and end-year food stocks and all non-food consumption (animal feed, industrial use, seed, wastage and other non-food use); this estimate refers to both private and public food consumption.

**Food consumption distribution**
Food consumption distribution refers to the variation of consumption within a population. It reflects both the disparities due to socioeconomic factors and differences due to biological factors, such as sex, age, body weight and physical activity levels.
Food deprivation
Food deprivation refers to the condition of people whose food consumption is continuously below body needs. FAO's measure of food deprivation is based on the distribution of food consumption expressed in terms of dietary energy.

Food expenditure share
The food expenditure ratio corresponds to the share of food consumption expenditure (Food in Monetary Value-FMV) in monetary terms in total consumption expenditure (TCEXP) also known as Engel ratio.

Food insecurity
A situation when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power or inappropriate distribution. Food insecurity may be chronic, seasonal or transitory.

Food security
A situation that exists when all people, at all time, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.

Gini Coefficient
The Gini coefficient is the ratio of the area between the equality line and the Lorenz curve to the area below the equality line. The Gini coefficient ranges from 0 (perfect equality) to 1 (perfect inequality). The Gini coefficient may refer to the overall inequality, for example when depicting income (%) and income receiving units (%). However, when it depicts dietary energy consumption (%) and income receiving units (%), it refers to the inequality of energy consumption due to income.

Household consumption expenditure
Total household consumption expenditure as defined in the United Nations guidelines is the sum of all monetary value or expenditure on goods and services intended for consumption, goods produced and consumed from own production or own-business stocks, including the imputed rent of owner-occupied housing, and goods and services received in kind.

Household food consumption expenditure
Household food consumption expenditure refers to the total household spending on food consumed by all members during a specified period, at home and outside the home, e.g. for example, at restaurants, bars, work place, school, etc. It includes food from all sources, purchased or from garden or farm. Deductions should be made to allow for wastage and losses occurring from acquisition to cooking and plate and kitchen wastage.

Household non-consumption expenditure
It refers to income taxes, other direct taxes, pension and social security contributions, remittances, gifts and similar transfers made by the household in monetary terms or in kind, including food such as given away raw or ready to eat.

Household expenditure
Consumption plus non-consumption expenditure made by the household, including food.

Household income
Income is the sum of all receipts, in money or in kind, which as a rule are received regularly and are of recurring nature, including food.

Income elasticity of food demand
The income elasticity of food demand (quantity, monetary or nutrient terms) measures the responsiveness of the quantity demanded of a good (quantity, monetary or nutrient terms) to a unit change of income.
Income inequality
Inequality refers to disparities in the distribution of income.

Inequality in food consumption due to income
The inequality refers to the variation of the food consumption level within a population due to disparities in the income distribution.

Inequality measure of access to food – coefficient of variation
The coefficient of variation of dietary energy consumption (CVx), as defined by FAO, comprises two main components; one reflecting the inequality of food consumption associated with socioeconomic levels (CV(x/v)) and the other associated with biological (CV(x/r)) factors (sex, age, body weight and physical activity) as follows:

\[ CV(x) = \sqrt{CV^2(x/v) + CV^2(x/r)} \]

Kilocalorie (kcl)
A unit of measurement of energy. One kilocalorie equals 1,000 calories. In the International System of Units (ISU), the universal unit of energy is the joule (J). One kilocalorie = 4.184 kilojoules (kJ).

Macronutrients
The proteins, carbohydrates and fats that are required by the body in large amounts and, available to be used for energy. They are measured in grams.

Micronutrients
The vitamins, minerals and certain other substances that are required by the body in small amounts. They are measured in milligrams or micrograms.

Minimum dietary energy requirement
In a specified age/sex category, the amount of dietary energy per person that is considered adequate to meet the energy needs for light activity and good health. For an entire population, the minimum energy requirements of the different age/sex groups in the population. It is expressed as kilocalories per person per day.

Nutritional status
The physiological state of an individual that results from the relationship between nutrient intake and requirements and from the body’s ability to digest, absorb and use these nutrients.

Overnourishment
Food intake that is in excess of dietary energy requirements continuously.

Undernourishment
Food intake that is insufficient to meet dietary energy requirement continuously.

Undernutrition
The result of undernourishment, poor absorption and/or poor biological use of nutrients consumed.