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The Household Level Impacts of Increasing Food Prices in Cambodia

Environment and Natural Resources Management Working Paper 37

Environment Climate Change [Bioenergy] Monitoring and Assessment

by

Irini Maltsoglou, David Dawe, and Luca Tasciotti

Bioenergy and Food Security Project

Natural Resources Management and Environment Department

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS, FAO

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37

ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT WORKING PAPER

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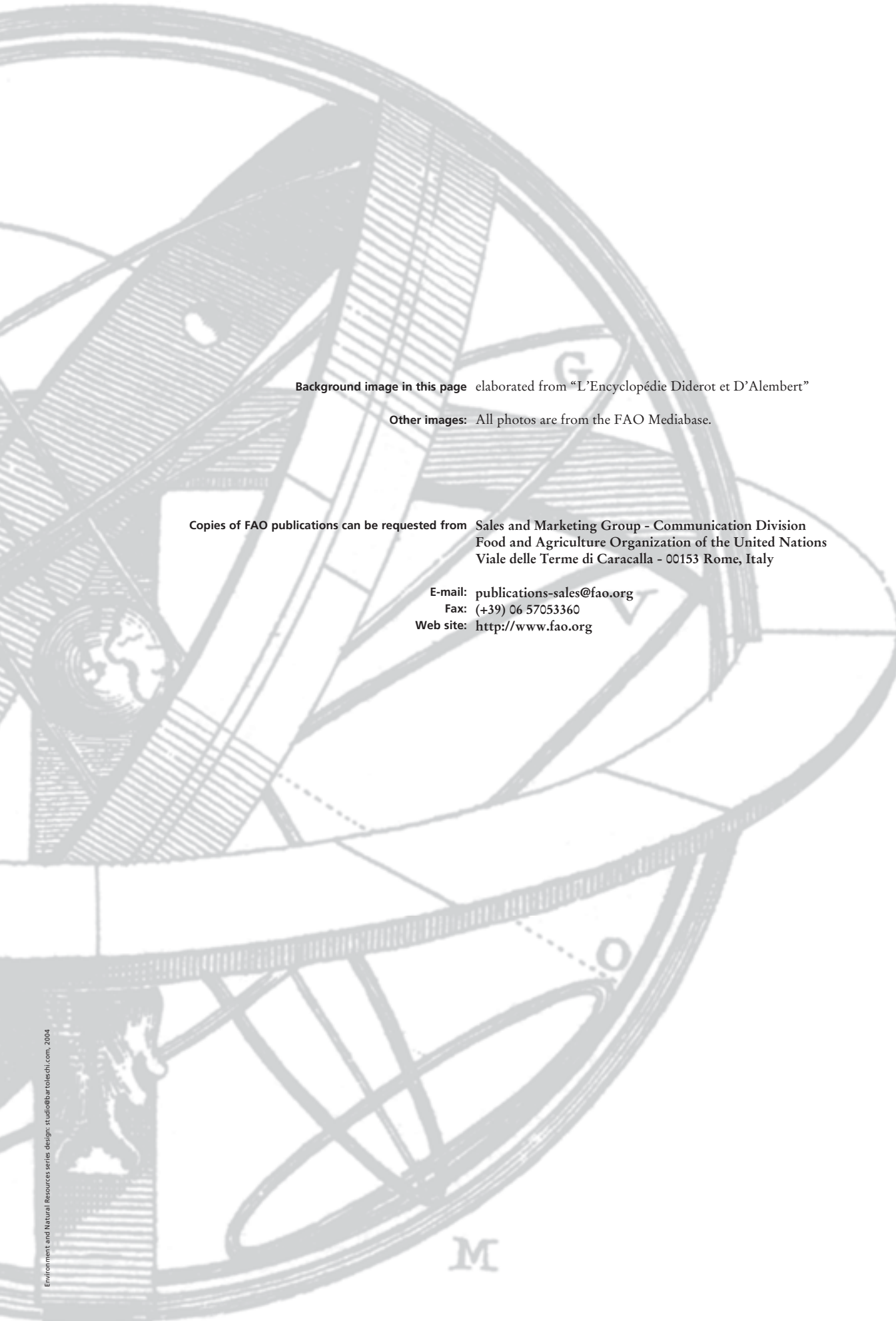

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37

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ENVIRONMENT [CLIMATE CHANGE] [BIOENERGY] [MONITORING AND ASSESSMENT]

Household level impacts of increasing food prices in Cambodia

Irini Maltsoglou, David Dawe, and Luca Tasciotti

BEFS

The Bioenergy and Food Security Project
Food and Agriculture Organization of the United Nations

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FOREWORD

The Bioenergy and Food Security (BEFS) project, with generous funding from the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV), was set up to assist countries with formulation and analysis surrounding bioenergy developments and potential food security impacts. During its term the BEFS has constructed an Analytical Framework (BEFS AF) that provides a basis for an examination of the costs and benefits that arise from bioenergy developments. The BEFS AF is comprised of four building blocks with a number of subcomponents. Each of these building blocks includes analytical tools and methods that have been developed by FAO and other organizations.

The household level food security analysis of the BEFS project for Thailand was in fact carried out in Cambodia. The reason for this was twofold: first the data required to carry out the analysis was not available for Thailand and second, applying the analytical tool to Cambodia permitted a demonstration on the use of the tool and also allowed an examination of how high food prices affect households in the Asian context.

Heiner Thofern
Senior Natural Resources Management Officer
BEFS Project Coordinator

ABSTRACT

There has been widespread concern regarding the surge in staple food prices over the last few years and biofuel developments have been widely recognized, although to a varying degree, as one of the key drivers of the recent price surge and increased price volatility. Within the Asian context, food security conditions are mostly related to rice production and the price of rice. The analysis presented in this paper sheds light on the impacts of the increase in the prices of key food staples on different household groups and identifies the vulnerable segments of the population. The analysis shows that generally Cambodia gains from an increase in the price of rice although particular segments of the poor stand to lose. The analysis concludes that from a food security perspective, the price of rice should be monitored closely while considering the identified vulnerable household groups.

Household level impacts of increasing food prices in Cambodia
by Irini Maltsoglou, David Dawe and Luca Tasciotti

Key words:
Household level welfare analysis, food price impacts, Cambodia

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CONTENTS

CHAPTER 1

INTRODUCTION

There has been widespread concern regarding the surge in staple food prices. Many reasons explain the rise in prices of which bioenergy is one explanation. Importantly the food crisis experienced by many countries has led to increasing concerns as to whether ongoing bioenergy developments will or will not have a marked effect on food prices. Over the last few years biofuel developments have been widely recognized, although to a varying degree, as one of the key drivers of the recent price surge and increased price volatility. In this context first generation bioenergy developments represent an additional source of demand for crop production which can lead to price increases, unless followed by adequate investment in agriculture and related infrastructure to support a supply response that would maintain stability in prices. Within the Asian context, food security conditions are mostly related to rice as rice is the major staple in the region, especially important for poor households. Since rice itself is not a major source of feedstock for biofuel production, the main link between bioenergy production and food security would therefore be through land use change. If rice production areas were to be used for alternative agriculture production such as bioenergy feedstock production, this could impact the production and consequently the price of rice unless followed by suitable increases in rice production through yield increases. In the absence of yield increases, bioenergy developments would likely impact on the price of rice. The analysis presented in this paper will shed light on the impacts of the increase in the prices of key food staples on different household groups and help identify the vulnerable segments of the population

The potential rise in the price of rice could have both positive and negative impacts at the country and household level depending on the country's and household's net position. At the country level, the price increase can have a positive impact for net rice exporting countries and a negative impact for net importing countries. Similarly, at the household level, price increases will have negative effects for net rice consuming households (*net-buyers*), but positive effects for net rice producing households (*net-sellers*). The degree to which households will, overall, be made worse or better off is measured by the net welfare impact.

From a policy perspective, it is necessary to understand how these price changes can impact firstly the country as a whole and, secondly, household level food security, particularly for the poorer segments of the population. This will allow an identification of those commodity price movements to which the country is most vulnerable and

which segments, amongst the poor, are most at risk. In the context of rising food prices, awareness of the vulnerable groups will be key in ensuring an adequate monitoring system is put in place.

The analysis presented ranks the key food staples in Cambodia, identifies which price changes the country is most vulnerable to, analyzes the household level impacts of rising food prices, identifies vulnerable household groups and finally examines recent price movements in key food staples. The key crops for the analysis are based on their contribution to caloric intake, which in the case of Cambodia, is mainly rice. The investigation is based on country level trade data, domestic price data and the household level dataset of Cambodia, the Cambodia Socio-Economic Survey 2004 (CSES 2004).

In order to target the poorest segments of the population and identify the vulnerable groups, households are initially divided by income quintile and urban rural location. Household typologies are then constructed so as to identify the vulnerable groups within the poor segment of the population. The analysis can also be undertaken at the regional level but this is beyond the scope of this stage of the analysis. Nevertheless, some information on regions is also included as an illustration of how the analysis could be extended and applied to the regions.

Following the introduction, Section 2 ranks the food commodities and outlines the net trade position of the country based on the food security list. Section 3 provides an overview of the methodology applied for the household level impacts assessment. Section 4 illustrates the household data and Section 5 presents the household level welfare impacts and the impacts by household groups. Section 6 looks at recent domestic price trends. Section 7 concludes.

CHAPTER 2

RANKING THE FOOD SECURITY CROPS

As a first step, it is necessary to understand which food crops are the most important in Cambodia. Once the list of food crops has been identified, the analysis will focus on the selected crops and will be crop specific. In order to identify the most important food security crops, we rank the food crops based on their contribution to calorie intake, this is shown in Table 1.

Based on the calorie ranking, in the case of Cambodia the vast majority of calories is provided by one single crop, namely rice. Rice alone provides two thirds of total calorie intake for Cambodian households. Maize provides 7 percent of total calories in Cambodia. Most other food items provide less that 5 percent of calorie intake. For sake of completeness, Table 1 also includes non-crop food stuffs as for example meat and fish. The ranking shows that access to animal products remains limited.

Table 1

Caloric contribution by commodity for Cambodia, 2004

Ranking	Commodity	Amount of calories (kcal/day/capita)	Calorie share (%)
1	Rice (Milled Equivalent)	1 382	65
2	Maize	159	7
3	Pigmeat	88	4
4	Sugar (Raw Equivalent)	82	4
5	Wheat	63	3
5	Freshwater fish	41	2
6	Cassava	23	1
6	Palm oil	20	1
7	Bananas	16	1
	Sub-total	1 874	88
Total Calories per capita (kcal/day/capita)			*2 131*

Source: FAOSTAT (2009)

From a food security perspective it is clear that in the context of Cambodia, food security mostly relates to household's access to rice. Thus, the analysis presented in this section will mostly focus on rice. Macro level maize data and domestic price data will also be discussed.

2.1 COUNTRY LEVEL VULNERABILITY TO PRICE CHANGES IN KEY FOOD STAPLES

Having defined the list of food crops, the analysis turns to the impacts of increasing food prices at the country level. In order to do this we use net trade data for the two selected commodities.

Price changes can affect a country in different ways depending on whether the country is a net importer or a net exporter of a selected commodity. A net-importer country is defined as a country that consumes more than it produces. On the other hand, a net exporter country will produce and sell abroad more than it consumes nationally. A self sufficient country is defined as a country that consumes all that it produces, i.e. a country for which production is equal to consumption. If a country is a net importer of a good, a price increase in that good is detrimental for the country's welfare. If, on the other hand, the country is a net-exporter of a commodity the country will benefit from an increase in the price of that commodity. Table 2 illustrates Cambodia's net trade position for rice and maize in 2009.

Table 2

Macro trade data for selected food crops in Cambodia

Item	Production quantity (Tonnes)	Import quantity (Tonnes)	Export quantity (Tonnes)	Net-exporter (%)*
Rice (Milled Equivalent)	4,520,000	50,000	800,000	17
Maize	400,000	0	300,000	75

** Calculated as (Exports-Imports)/Production*
Source: USDA (2009)

In 2009, Cambodia produced 4.6 million tonnes of rice and exported 17 percent of overall production. Production of Maize was equivalent to 400,000 in 2009, and exports were 75 percent of production. Cambodia is a net exporter of rice and maize, therefore at the country level price increases in these two commodities are beneficial for the country as a whole.

CHAPTER 3

HOUSEHOLD WELFARE IMPACT: METHODOLOGICAL BACKGROUND

This section determines whether potential price increases are beneficial or detrimental for households, and if detrimental, it allows identification of the most vulnerable segments of the population.

Households can be both producers and consumers of crops at the same time. For example, a rural household that grows rice on the farm can both sell and consume rice. An urban household tends only to purchase rice and not produce it. In order to assess how households fare when food prices rise, it is important to consider the household's net position with respect to production and consumption. In fact, price increases can benefit net-producers of crops but can hurt net-consumers of crops.

Thus, due to the potential dual nature of the household, it is necessary to understand the net position of a household - whether a household is a net producer or net consumer. A net producer household is defined as a household for which total gross income derived from the crop exceeds total purchases. For net producer households price increases will be beneficial. A net consumer household is a household for which total gross income derived from the crop is less than total purchases. In this case an increase in the price of the selected crop hurts the household. The overall household impact is measured by the effect of the price change on household's net welfare, defined as the difference between the producer gains and consumer losses.

In order to calculate the household net welfare impacts, we use the methodology as described in Minot and Goletti (1999) and adapted as discussed in Dawe and Maltsoglou (2009). For further details the reader may turn to Appendix 1.

Note that, the literature and methodology applied to calculate the welfare impacts are based on a 10 percent price increase on the producer side. This hypothetical price change has to be cross referenced with price changes of interest. The percent price change can be compared with recent price changes as further discussed in Section 6 or, from a bioenergy development point of view, with simulations linking bioenergy developments with the impacts on increases in the price of rice.

CHAPTER 4

HOUSEHOLD LEVEL WELFARE IMPACTS

The household level analysis of Cambodia uses the national household dataset, the Cambodia Socio Economic Survey (CSES)[1] of 2004. The CSES 2004 survey covers a total of 12,000 households and was the largest of its kind ever collected in Cambodia. The sample is representative of the country and the distribution of households across regions reflects the distribution of the population. The dataset contains household income and expenditure data by crop required for the household level analysis.

Some general details of the household dataset in Cambodia will be initially presented and then the household level impacts will be described and discussed.

4.1 HOUSEHOLD DISTRIBUTION AND CHARACTERISTICS

Households in the survey are distributed across four geographic regions, the plain, Tonle sap, the coast and the plateau/mountain region, in addition to the capital, Phnom Penh, See Table 3.

Table 3

Poverty estimates by geographical zones

Geographical zone	Share of Population (percent)	Urban	Rural	Total	Urban	Rural	Total
		Index (%)			% of all poor		
Phnom Penh	9.3	1.11	8.92	4.60	1.9	1.1	1.1
Plain	42.6	13.74	32.86	32.07	8.9	42.3	39.7
Tonle sap	29.5	28.21	45.38	42.80	46.3	36.2	37.0
Coast	7.8	20.41	30.07	26.84	19.7	5.0	6.1
Plateau/mountain	10.7	32.61	56.34	52.02	23.2	15.4	16.0
Total	*100.0*	*17.62*	*37.82*	*34.68*	*100.0*	*100.0*	*100.0*

Source: A Poverty Profile of Cambodia 2004, Royal Government of Cambodia, Ministry of Planning, 2006

Approximately 9 percent of the population lives in Phnom Penh, 42.6 live in the plain area, 29.5 in the Tonle Sap region, 7.8 along the coast and 10.7 live on the plateau and mountain regions. High concentrations of the poorer segments of the population are found in the pleatau/mountains and the Tonle sap regions, although percentages are

1 This is Living Standards Measurement (LSMS) type data and is collected by the National Statistics Office (NSO).

high also in the plain and the coastal region. Overall, about 35 percent of the population in Cambodia live below the poverty line[2].

In order to target the most vulnerable groups amongst the poorer segments of the population, households are disaggregated by income quintile[3] and urban rural location. As shown in Table 3 it is possible to also disaggregate the data by geographic location. In the analysis presented here we will focus on the urban/rural and quintile disaggregation which is useful also for comparability across analyses of a similar nature. Nonetheless extending the analysis to the geographic disaggregation of Table 3 can be done and might be of interest if wanting to focus on a specific region of the country and wanting to target poverty in specific areas of the country.

Households in Cambodia mostly reside in rural areas: 79.9 percent of households live in rural areas and the remaining 20.1 percent live in urban areas, see Table 4. Within the poorest quintile of the population, 17.1 percent of total population live in rural areas while 2.2 percent of total population reside in urban areas, see Table 4.

Table 4

Household distribution and share by quintile and location (percent)

Description	Quintile					Total
	1	2	3	4	5	
Urban						
Number of households	267	278	340	477	1,030	2392
Share (percent)	2.2	2.3	2.9	4.0	8.7	20.1
Rural						
Number of households	2,034	2,021	1,999	1,937	1,506	9497
Share (percent)	17.1	17.0	16.8	16.3	12.7	79.9
Total						
Number of households	2301	2299	2339	2414	2536	11889
Share (percent)	19.4	19.3	19.7	20.3	21.3	100

Source: CSES 2004

Households in urban and rural areas of the countries overall are similar in size with an average of 5 family members, see Table 5. The average age of the household head is also

2 In addition the A Poverty Profile of Cambodia 2004, Royal Government of Cambodia, Ministry of Planning, 2006 includes the poverty gap and the poverty gap square (poverty severity) and food poverty line measures. The poverty gap is 9.2% while the squared poverty gap is 3.4% for Cambodia. For the food poverty line, the food poverty headcount ratio is 20 %, poverty gap is 4.3% and poverty severity index is 1.4%.

The first quintile represents the poorest segment of the population, namely the lowest 20 percent of total population. As is well know and documented in the literature, in the context of developing country analysis, total expenditure is a much more reliable measure of total household income, see for example Deaton (1997). Throughout the analysis total household expenditure will be used as a measure for total household income and quintile disaggregation is based on total household expenditure.

3 The first quintile represents the poorest segment of the population, namely the lowest 20 percent of total population. As is well know and documented in the literature, in the context of developing country analysis, total expenditure is a much more reliable measure of total household income, see for example Deaton (1997). Throughout the analysis total household expenditure will be used as a measure for total household income and quintile disaggregation is based on total household expenditure.

similar across quintiles and location. Access to education is low. On average the household head in urban areas has 6 years of education, while in rural areas this reduces to 4 years of education. The poorer segment of the population has very limited access to education. In urban and rural areas the poor on average receive 3 years of education.

Table 5

Households' characteristics in Cambodia

Quintile	Urban areas			Rural areas		
	Household Size	Age of household head	Household head years of education	Household Size	Age of household head	Household head years of education
1	5.9	45.3	3.1	5.9	43	2.9
2	5.5	44.4	3.8	5.2	43.7	3.5
3	5.2	46.2	4.6	4.7	44.8	3.8
4	4.9	45.9	5.8	4.4	45.8	4.4
5	4.9	47.8	7.8	4.1	45.4	5.4
Total	*5.1*	*46.5*	*6*	*4.9*	*44.5*	*3.9*

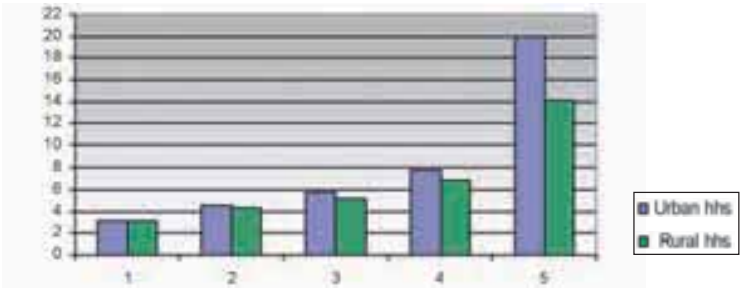
Source: CSES 2004

The poor have very limited access to modern forms of energy, both in rural and urban areas. Overall we find that only wealthier urban households have access to electricity while most urban and rural poor households still use kerosene lamps for lighting. See details of energy access to different sources of energy in Appendix 2.

Wealth distribution in Cambodia is very unequal, both in urban and rural areas, although more so in urban areas, see Figure 1, and differences between rural and urban expenditure levels are larger in the top share of the population, the fifth quintile. In urban areas, the expenditure level of the wealthier quintile is 10 times as high compared to the urban poor, while in rural areas the rural rich spend approximately 7 times more that the rural poor. Households in rural and urban areas spend the same amount over a one year period and as households become better off, the differences in expenditure levels between urban and rural areas increase.

Figure 1

Total household expenditure by quintile and location ('000 Riels)

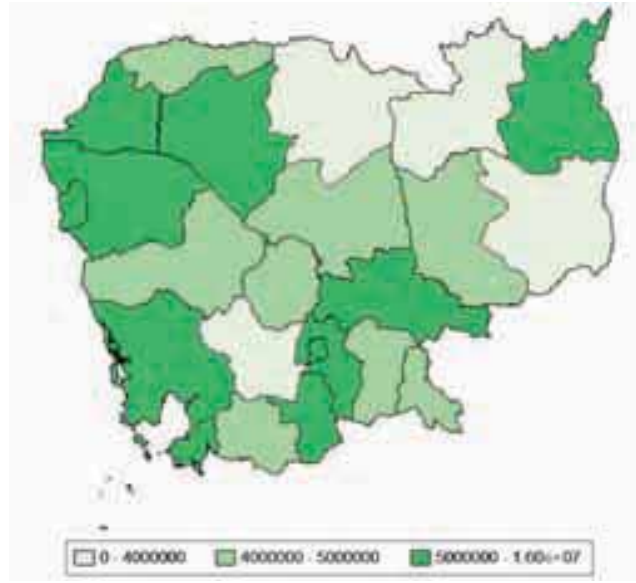


Note: Expenditure levels have been adjusted for purchasing power differences between urban and rural areas.
Source: CSES 2004, calculations by the authors

When taking a regional perspective across Cambodia and looking at regional average wealth distribution in terms of total expenditure levels, we find that the west part of the country and the area around the capital are the wealthier areas of the country, see Figure 2.

Figure 2

Regional distribution of total expenditure (Riels)



Source CSES 2004

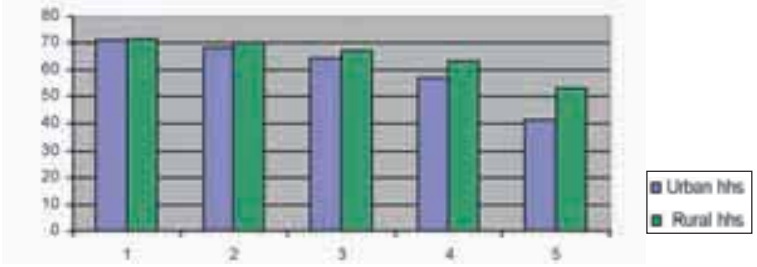
The east and the north east areas emerge as the poorer areas of the country. Note that the map is based on average expenditure levels for the region considered and therefore ignores distribution within the region. Consequently there might be some very poor segments within the wealthier regions.

As discussed, analyzing the dataset by region can assist policymakers in targeting particular areas of the country also in coordination with other particular ongoing programmes. The regional impacts will be touched upon in the analysis but not discussed in detail as beyond the scope of this paper but can illustrate how this type of analysis can be extended to a regional focus.

Based on the CSES 2004, food budget shares are still a large part of total expenditure in Cambodia, see Figure 3. On average, households in the first three expenditure quintiles spend between 60 and 70 percent of their income to buy food. For the lower quintiles, differences in terms of food budget shares between urban and rural households are small. The food budget share only falls below 50 percent for the wealthier urban part of the population in the fifth quintile.

Figure 3

Food budget share by quintile and location (percent)



Source: CSES 2004

4.2 HOUSEHOLD WELFARE IMPACTS DUE TO PRICE INCREASES

We now turn to the welfare impact analysis. In order to compute the net position of a household with respect to a specific crop, it is necessary to know how much money the household earns from that crop and how much the household spends on that crop. Once we compute the net position of the household, i.e. whether they are net producers or net consumers, we show the impacts of price increase across location and expenditure quintiles.

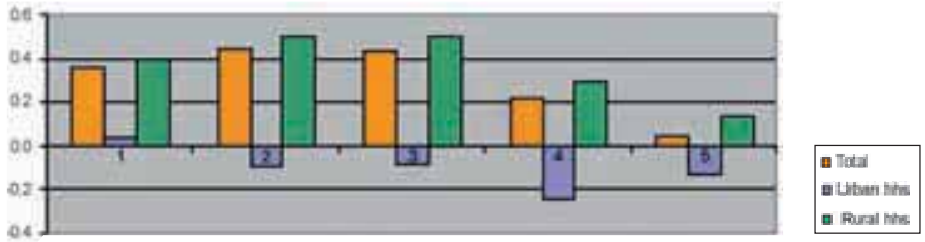
In the case of Cambodia, the analysis focuses on rice since this is the most important food crop. As the aim of the analysis is on assessing the impact of higher prices on the poor, as discussed, we divide households by quintile and urban and rural location. Distinguishing between rural and urban households is the key issue since rural households are more likely to be net producers of crops and benefit from the price increases. Once this first step of the analysis is undertaken we add more details on key household characteristics in an effort to further characterize the poorer segment of the population in Cambodia.

4.2.1 RICE HOUSEHOLD LEVEL IMPACTS

In the case of rice we find that all quintiles in Cambodia benefit from a 10 percent increase in the price of rice, see Figure 4. The first three quintiles of the population gain the most from the price increase. Poor households on average experience a welfare gain of 0.35 percent for a 10 percent price increase.

Figure 4

Household welfare impacts of rice price increases by quintile and location (percent)



Source: Calculations by the authors

When distinguishing between urban and rural households, it is still the case that all poor households gain, albeit to a different degree. The welfare gain in urban areas for such a price increase is minimal, but for rural areas a 10 percent price change results in an average 0.4 percent increase in households' welfare.

Figure 5

Household welfare impacts of rice price increases by region (percent)

Source: CSES 2004

Note that the welfare impact shown is an average effect so that there might be, as further discussed later, categories of households which overall are hurt by the price increase even if overall the welfare impact is positive. Secondly, the 10 percent price change should be compared with recent rice price movements in the countries. We discuss this in section 6 illustrating how recent rice price changes have been much larger. In this case the welfare impact should be multiplied by the size of the actual price change.

Impacts across regions are not homogeneous across the country. We find that for 5 out of the 23 regions in Cambodia the welfare impacts of the price change are negative, see Figure 5 (the results in tabular format are included in Appendix 2). The most negatively hit regions are Kaoh Kong and Phnom Penh.

4.2.2 RICE IMPACTS AND HOUSEHOLD CHARACTERISTICS

At this stage additional specific household characteristics are added to the analysis in order to identify potential vulnerable groups within the poorer segment of the population. By doing so and specifying some key household characteristics households can be grouped into detailed household typologies. For the purpose of the welfare and

vulnerability analysis, households are distinguished based on their land ownership status and whether the household head is a male or female. Once the vulnerable household groups are identified through the household typologies, the vulnerable groups should be closely monitored upon price increases and specifically targeted if safeguard programmes are put in place.

In the case of land ownership, we distinguish between households that are land owners and households that do not own land. In the case of gender we distinguish between households that are headed by a male and households that are headed by a female. We first discuss the land ownership results and then the gender findings.

4.2.2.1 RICE IMPACTS AND LAND OWNERSHIP

Approximately 31 percent of the urban population owns land while 77.6 percent of the rural population own land, see Table 6. In the case of the poor, 62.8 percent of the urban poor own land and 81.7 percent of the rural poor own land. This results in 0.7 percent of the total population being poor and landless in urban areas and 3.5 percent of the population being landless and poor in rural areas, equivalent to approximately 4 percent of the total population.

Table 6

Distribution and share of households by quintile, location and land owners

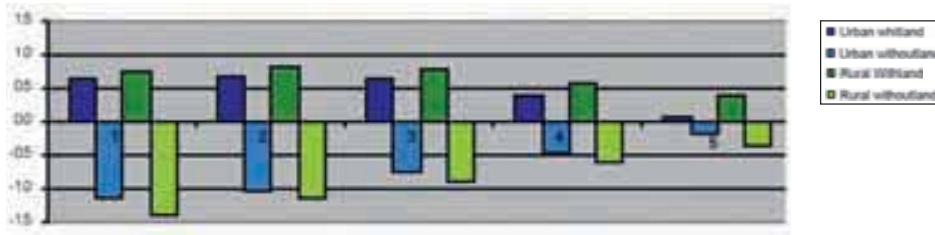
Household numbers (share of subsample in percentage)						
	Urban					
Quintile	**1**	**2**	**3**	**4**	**5**	***Total***
Land owners	167 (62.8)	145 (52.2)	159 (46.8)	2120 (5.2)	160 (15.5)	751 (31.4)
Land less	99 (37.2)	133 (47.8)	181 (53.2)	357 (74.8)	870 (84.5)	1649 (68.6)
Total	*266*	*278*	*340*	*477*	*1030*	*2391*
	Rural					
Land owners	1649 (81.7)	1672 (83.1)	1635 (81.9)	1463 (75.6)	924 (61.4)	7343 (77.6)
Land less	369 (18.3)	340 (16.9)	361 (18.1)	471 (24.4)	582 (38.6)	2123 (22.4)
Total	*2018*	*2012*	*1996*	*1934*	*1506*	*9466*

Note: Household numbers are listed with percentages in brackets
Source: CSES 2004

The results show that land ownership does influence the welfare impacts, see Figure 6. Poor households that do not own land, both in rural and urban areas, tend to lose from the rice price rises. For a 10 percent price increase, poor household in urban areas lose on average 1.1 percent of their welfare, while rural households lose even more, 1.3 percent of their welfare. Therefore for slightly over 4 percent of the total Cambodian population, price increases in rice will have a negative impact. When considering additional measures and development tradeoffs this share of the population should be safeguarded.

Figure 6

Household welfare impacts due to changes in the price of rice by quintile, location and land ownership (percent)



Source: Calculations by the authors

4.2.2.2 RICE IMPACTS AND GENDER

The proportion of female headed households is roughly similar in urban and rural areas, see Table 7. Approximately 1 in 4 households have a female head in the urban areas, while 1 in 5 is female headed in rural areas.

Poor urban female headed households account for approximately 0.4 percent of the total population or 18 percent of the urban poor. While rural female headed households account for 3.4 percent of the total population or 21 percent of the rural poor.

Table 7

Distribution of households by quintile, location and gender of household head

Household numbers (share of subsample in percentage)						
	Urban					
Quintile	**1**	**2**	**3**	**4**	**5**	***Total***
Male headed household	219 (82)	226 (81.3)	243 (71.5)	355 (74.4)	776 (75.3)	1819 (76)
Female headed household	48 (18)	52 (18.7)	97 (28.5)	122 (25.6)	254 (24.7)	57 (24)
Total	*267*	*278*	*340*	*477*	*1030*	*2392*
	Rural					
Male headed household	1596 (79.1)	1626 (80.8)	1540 (77.2)	1530 (79.1)	1162 (77.2)	7454 (78.7)
Female headed household	422 (20.9)	386 (19.2)	456 (22.8)	404 (20.9)	344 (22.8)	2012 (21.3)
Total	*2018*	*2012*	*1996*	*1934*	*1506*	*9466*

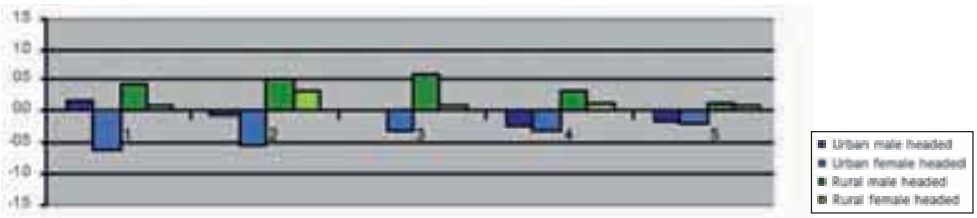
Note: Household numbers are listed with percentages in brackets
Source: CSES 2004

The results show that the gender of the household head has a significant impact on household welfare, see Figure 8. Urban female headed households lose from a price increase in rice, with poor female headed households losing 0.6 percent of their welfare on average.

In the case of rural households, the impact of a price increase is positive for both male and female headed households. Female headed households gain less though, compared to male headed households, due to the price increase.

Figure 7

Household welfare impacts due to changes in the price of rice by quintile, location and gender of household head (percent)



Source: Calculations by the authors

CHAPTER 5

RECENT PRICE MOVEMENTS IN KEY FOOD STAPLES IN CAMBODIA

As discussed, the welfare analysis is based on a hypothetical 10 percent price change. In this section, domestic price movements in Cambodia are analysed in order to establish general price trends and assess the degree to which domestic prices have been increasing[4] over the last few years.

Initially we look at international and national rice price movement. Secondly we focus on domestic rice prices analysing a number of different domestic rice varieties and assessing recent real price changes. Finally, trends in the price of maize. All prices are reported in Cambodian Riels and cover the period between 2000 and 2009. Prices have been adjusted for the effect of inflation and are in 2008 terms as this allows comparing all prices to the 2008 levels.

5.1 RICE PRICE MOVEMENTS IN CAMBODIA

Analysing a longer time period allows to put price movements into perspective and understand if the recent price levels in Cambodia are comparatively high or low with respect to previous periods. In the case of a traded good, as is the case for rice and maize, it is also important to understand broadly how international prices are inter-connected with domestic prices. We get a general sense of this by plotting international and domestic prices over time.

5.1.1 DOMESTIC AND INTERNATIONAL RICE PRICE MOVEMENTS

Figure 9 presents international and domestic rice price movements. The world price of rice is for Thai rice 5 percent broken. The figure also includes Thai rice 25 percent broken and Vietnamese rice 5 percent broken. The domestic Cambodian rice prices included are those of Somaly rice and mix rice. Rice mix is considered to be poor quality rice, and in the context of poverty analysis and vulnerable groups monitoring, it is the rice price of most interest. Somaly is a higher quality variety of rice.

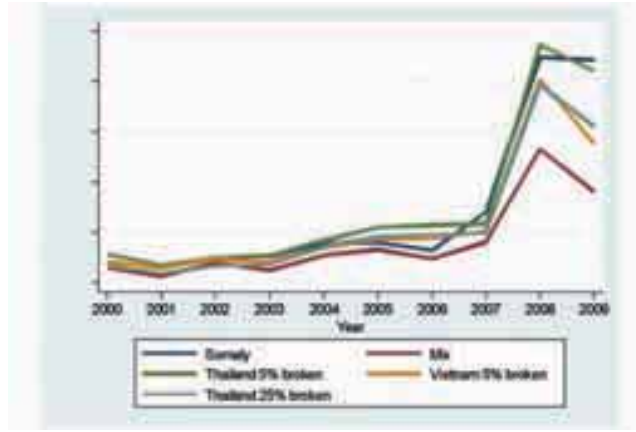
All rice markets seem to be integrated as the prices of rice all roughly follow very similar trends, see Figure 9. Following a decrease between 2000 and 2001, all rice prices have generally been following a steady upward trend. The price increase between 2001 and 2007 was relatively steady and continuous. In 2007 prices surged and more than doubled within a single year span.

4 Price data were obtained from the Agriculture Marketing office of the Ministry of Agriculture, Forestry and Fisheries in Cambodia.

The price of mix rice, the lower quality rice, generally followed a similar trend too but the increase between 2007 and 2008 was slightly less. The Somaly domestic price of rice, the highest quality, very closely follows the international prices of rice, with the exception of the period between 2004 and 2006.

Figure 8

Domestic rice price changes between 2006 and 2009 in 2008 (Riels)



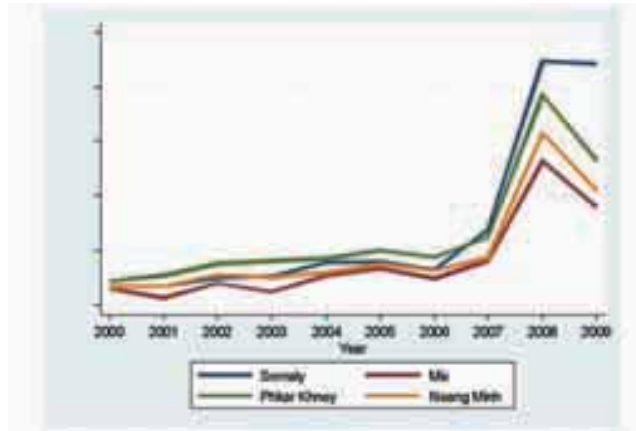
Source: Raw data from Ministry of Agriculture, calculations by the authors

5.1.2 DOMESTIC RICE PRICE MOVEMENTS

Figure 10 illustrates recent domestic price movements between 2000 and 2009 and includes the price of Somaly rice, Phkar Khney rice, Neang Minh rice and rice mix. Neang Minh rice is a middle quality variety of rice and Phkar Khney is a higher quality variety of rice.

Figure 9

Domestic maize price changes between 2006 and 2009 in 2008 (Riels)



Source: Raw data from Ministry of Agriculture, Forestry and Fisheries, calculations by the authors

All domestic rice prices constantly increased in the period between 2000 and 2009. Between 2000 and 2007 prices steadily increased and between 2007 and 2008 prices shot up dramatically. Depending on the variety of rice, prices then stabilized or decreased between 2008 and 2009. Nonetheless, in 2009 price levels were still much higher compared to previous periods.

Table 8 illustrates some of the real percentage changes in the domestic price of rice over the last three years. The price of the mix rice increased by 22 percent between 2006 and 2007, by 101 percent between 2007 and 2008 and then decreased by 23 percent between 2008 and 2009. The price of Phkar Khnev rice increased by 20 percent between 2006 and 2007, by 115 percent between 2007 and 2008 and then decreased by 25 percent over the following year. Consequently, although domestic prices did decreases between 2008 and 2009, price levels remained much higher than in previous periods.

Table 8

Real rice price changes between 2006 and 2009 in Cambodia

Year interval/commodity	Real percent change (%)	Real percent change (%)	Real percent change (%)
Year interval	2006-2007	2007-2008	2008-2009
Rice Mix	22	101	-23
Rice Phkar Khney	20	115	-25

Source: Raw data from Ministry of Agriculture, calculations by the authors

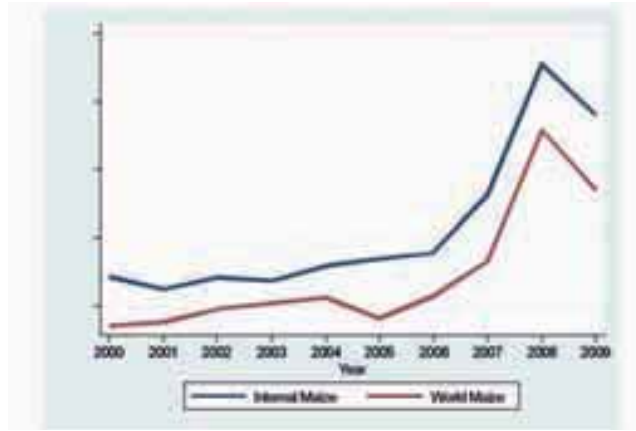
While the rice price increases on international markets were very large, biofuel demand was not a key driver of these movements. Price increases of this magnitude certainly have a large welfare impact on the poor, however.

5.2 MAIZE PRICE MOVEMENTS IN CAMBODIA

Figure 10 illustrates domestic and world maize price in 2008 real Riels over the period between 2000 and 2009. Overall between 2000 and 2009, the domestic price of maize closely followed trends in the international price of maize, with the exception of the years between 2004 and 2005. The trends suggest that generally the domestic Cambodian maize market is relatively well integrated with the international maize market.

Figure 10

International and domestic maize price between 2000 and 2009 in 2008 (Riels)



Source: Raw data from Ministry of Agriculture, calculations by the authors

The world maize price steadily increased between 2000 and 2004, declined between 2004 and 2005 and then rapidly increased until 2008. The price increase between 2005 and 2008 was dramatic. After 2008, the world price of maize declined.

Overall the domestic price of maize has been on an upward trend since 2000 with some initial fluctuation but then starting to rapidly increase since 2005. The initial price increase was slow and steady. Between 2006 and 2007 the domestic price of maize rose dramatically and prices increased by nearly 200 percent. As was the case for the world price, the domestic price decreased between 2008 and 2009, although prices remained high compared to the levels between 2000 and 2006. Table 9 illustrates some of the real percentage changes in the domestic price of maize over the last three years. The domestic price of maize increased by 31 percent between 2006 and 2007, by 53 percent between 2007 and 2008 and then declined by 14 percent between 2008 and 2009. Also for the case of maize, price levels in 2009 were higher compared to previous periods.

Table 9

Real maize price changes between 2006 and 2009 in Cambodia

Year interval/ Commodity	Real percent change (%)	Real percent change (%)	Real percent change (%)
Year interval	2006-2007	2007-2008	2008-2009
Maize	31	53	-14

Source: Raw data from Ministry of Agriculture, calculations by the authors

CHAPTER 6

CONCLUSIONS

Price increases in key food staple crops can hinder domestic and household level food security depending on whether the country and households are, respectively, net-importers or exporters or net-producers or consumers of the food crop considered. This component of the Bioenergy and Food Security (BEFS) analysis allows identification of the foods for which the country is most vulnerable to price shocks and the segments of the population that are vulnerable to these shocks.

Rice is the main food staple in Cambodia and for most Asian countries. We show that in the case of Cambodia 2/3 of total calorie intake comes from rice. Due to this, the analysis presented has primarily focused on rice. Cambodia is a net exporter of rice and therefore the country as a whole can benefit from price increases in the price of rice.

In the analysis households are initially disaggregated by quintile and location, i.e. urban and rural. Based on the CSES 2004, 2.2 percent of the poorest quintile resides in urban areas, while 17.1 percent live in rural areas.

The analysis shows that, at the household level, increases in the price of rice are beneficial for all segments of the population. This is also the case when distinguishing between urban and rural poor, although the benefit accrued by the urban poor is marginal. When adding household characteristics such as land ownership and gender of the household head, we find that some segments of the poor are hurt by the price increase. In the case of land ownership, all landless poor are negatively impacted by rice price increases. In the case of the gender of the household head, the analysis shows that urban female headed households are hurt by an increase in the price of rice. Overall, land ownership status has a larger impact on welfare results compared to gender status.

The welfare analysis presented is based on a hypothetical 10 percent price change on the producer side which can be compared to recent price movements or price movements obtained from economic simulations. Recent price movements are also discussed in the paper. Key food staples' prices surged in Cambodia between 2007 and 2008 and then tapered off during 2009, although remaining at high levels compared to previous periods. Between 2007 and 2008 the price of rice mix, the low quality rice, increased by 101 percent.

In conclusion, from a food security perspective, the price of rice should be monitored closely for particular segments of the population as described in the analysis, although overall the increase in the price of rice can be beneficial for Cambodia.

APPENDIX 1

METHODOLOGICAL BACKGROUND FOR THE ASSESSMENT OF NET HOUSEHOLD WELFARE IMPACTS

An outline of the procedure used to calculate the net welfare impacts of price changes at the household level is given here. For the full technical details the reader is referred to the complete BEFS Analytical Framework.

The methodology was initially provided in Deaton (1989), then followed by a number of empirical applications by other authors including Budd (1993), Barrett and Dorosh (1996), Minot and Goletti (1998, 2000) and, recently, Ivanic and Martin (2008). Here we apply the methodology as described in Minot and Goletti (2000).

The impact of a price change on household welfare can be decomposed into the impact on the household as a consumer of the good and the impact on the household as a producer of the good. The net welfare impact will be the difference between the two. Therefore if we set the demand and supply side elasticities equal to zero, thus ignoring consumer and producer side response to price changes, the short run welfare impact on households is calculated as

$$\frac{\Delta w^1}{x_0} = \%P_{p,i} \cdot PR_i - \%P_{c,i} \cdot CR_i \quad (1)$$

where $\frac{\Delta w^1}{x_0}$ is the first order approximation of the net welfare impact on producer and consumer households deriving from a price change in commodity i, relative to initial total income x_0 (in the analysis income is proxied by expenditure)
$P_{p,i}$ is the producer price of commodity i
$\%P_{p,i}$ is the change in producer price for commodity i
PR_i is the producer ratio for commodity i and is defined as the ratio between the value of production of i to total income (or total expenditure)
$P_{c,i}$ is the consumer price of commodity i
$\%P_{c,i}$ is the change in consumer price for commodity i.
CR_i, is the consumer ratio for commodity i and is defined as the ratio between total expenditure on commodity i and total income (or total expenditure).

Assumptions made on the producer and consumer price changes have proven to be crucial in the welfare impact assessment analysis[5]. In the analysis presented here we

5 For a technical discussion and proof on this assumption and its implications the reader may refer to Dawe and Maltsoglou (2008). The document shows the effects of these assumptions on the estimated net welfare effects.

assume that marketing margins are constant in absolute terms. This assumption entails that producer price changes will be larger than consumer price changes in percentage terms and that the percentage producer price change is equal to the percentage consumer price change weighted by the consumer to producer price ratio as shown in (2).

(2) $$\%P_p = \left(\frac{P_c}{P_p}\right) \cdot \%P_c$$

The consumer and producer price ratio can be calculated using commodity price data, aggregate survey data, macroeconomic data or a mixture of these. In the analysis presented in this paper we use aggregate survey and macroeconomic data to calculate the price ratio. It can be shown that in the case of a self-sufficient commodity the ratio of the consumer to producer price is equal to the total consumer expenditures *(**CE**)* divided by the gross production value *(**PV**)*, as showed in the following equation (3).

(3) $$\boldsymbol{P_C/P_F = CE/PV}$$

If the country is not self-sufficient in the production of the commodity being considered, an adjustment is needed to account for the consumption share of the good that is imported (or the production share that is exported). In this case the calculation is amended as shown in equation (4).

(4) $$\boldsymbol{P_C/P_F = CE'/PV}$$

where ***CE'= CE•(PROD/CONS)***, ***PROD*** is domestic production and ***CONS*** is domestic consumption. In the results presented we use a hypothetical price variation of 10 percent on the producer side and evaluate the consumer price change based on the calculations outlined above.

The analysis also accounts for purchasing power differences between urban and rural locations and processing factors depending on the crop being considered.

APPENDIX 2

ADDITIONAL TABLES

Household access to energy in urban areas, rural areas and for the whole country.

Table 10

Household energy access by quintile and location

Urban					
Quintile	**Public provided electricity**	**Privately generated electricity**	**Battery**	**Kerosene lamp**	**Other**
1	6.4	3	9.4	78.3	3
2	15.5	9	11.9	61.9	1.4
3	29.4	10	16.8	42.4	1.5
4	57.5	14.3	9.9	18.2	0.2
5	82	10.7	3.1	4.2	0.1

Rural					
Quintile	**Public provided electricity**	**Privately generated electricity**	**Battery**	**Kerosene lamp**	**Other**
1	1.1	0.8	16.3	80.4	1.4
2	1.8	2.2	25.4	69.6	0.9
3	2.5	3.9	31.3	61.6	0.6
4	6	9.8	35.5	48.4	0.3
5	20	18.9	31.5	28.9	0.5

Total					
Quintile	**Public provided electricity**	**Privately generated electricity**	**Battery**	**Kerosene lamp**	**Other**
1	1.7	1.0	15.5	80.2	1.6
2	3.4	3.0	23.8	68.7	1.0
3	6.4	4.8	29.2	58.8	0.7
4	16.2	10.7	30.4	42.5	0.3
5	45.2	15.5	20	18.9	0.4

Source: CSES 2004

Household level welfare impacts due to a 10 percent price increase for rice by region.

Table 11

Rice household welfare impacts by region (percent)

Region	Welfare change (percent)
Banteay Mean Chey	0.86
Bat Dambang	0.65
Kampong Cham	-0.01
Kampong Chhnang	0.26
Kampong Speu	0.71
Kampong Thum	0.18
Kampot	0.25
Kandal	0.06
Kaoh Kong	-0.32
Kratie	0.14
Mondul Kiri	-0.50
Phnom Penh	-0.24
Preah Vihear	0.01
Prey Veaeng	0.89
Pousat	0.32
Rattanak Kiri	1.20
Siem Reab	0.03
Krong Preah Sihanouk	-0.13
Stueng Traeng	0.79
Svay Rieng	0.30
Takaev	0.62
Oudor Mean Chey	0.75
Krong Kaeb	0.05

Source: Calculations by the authors

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There has been widespread concern regarding the surge in staple food prices over the last few years and biofuel developments have been widely recognized, although to a varying degree, as one of the key drivers of the recent price surge and increased price volatility. Within the Asian context, food security conditions are mostly related to rice production and the price of rice. The analysis presented in this paper sheds light on the impacts of the increase in the prices of key food staples on different household groups and identifies the vulnerable segments of the population. The analysis shows that generally Cambodia gains from an increase in the price of rice although particular segments of the poor stand to lose. The analysis concludes that from a food security perspective, the price of rice should be monitored closely while considering the identified vulnerable household groups.




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