

Morgan, Peter J.; Maddawin, Angelica; Azhgaliyeva, Dina; Kodama, Wataru; Long Quang Trinh

**Working Paper**

## Food insecurity, inflation and government aid: Evidence from a household survey in developing Asia

ADB Working Paper, No. 1480

**Provided in Cooperation with:**

Asian Development Bank Institute (ADBI), Tokyo

*Suggested Citation:* Morgan, Peter J.; Maddawin, Angelica; Azhgaliyeva, Dina; Kodama, Wataru; Long Quang Trinh (2024) : Food insecurity, inflation and government aid: Evidence from a household survey in developing Asia, ADB Working Paper, No. 1480, Asian Development Bank Institute (ADBI), Tokyo,  
<https://doi.org/10.56506/UVHK3280>

This Version is available at:

<https://hdl.handle.net/10419/305414>

**Standard-Nutzungsbedingungen:**

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

**Terms of use:**

*Documents in EconStor may be saved and copied for your personal and scholarly purposes.*

*You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.*

*If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.*



<https://creativecommons.org/licenses/by-nc-nd/3.0/igo/>



## **ADBI Working Paper Series**

### **FOOD INSECURITY, INFLATION AND GOVERNMENT AID: EVIDENCE FROM A HOUSEHOLD SURVEY IN DEVELOPING ASIA**

---

Peter Morgan, Angelica Maddawin,  
Dina Azhgaliyeva, Wataru Kodama,  
and Long Q. Trinh

No. 1480  
September 2024

**Asian Development Bank Institute**

Peter Morgan is senior consulting economist and advisor to the dean, Angelica Maddawin is a research associate, Dina Azhgaliyeva is a senior research fellow, and Wataru Kodama is a research associate, all at the Asian Development Bank Institute, Tokyo, Japan. Long Q. Trinh is a lecturer at the Ho Chi Minh University of Banking.

The views expressed in this paper are the views of the author and do not necessarily reflect the views or policies of ADBI, ADB, its Board of Directors, or the governments they represent. ADBI does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequences of their use. Terminology used may not necessarily be consistent with ADB official terms.

Discussion papers are subject to formal revision and correction before they are finalized and considered published.

The Working Paper series is a continuation of the formerly named Discussion Paper series; the numbering of the papers continued without interruption or change. ADBI's working papers reflect initial ideas on a topic and are posted online for discussion. Some working papers may develop into other forms of publication.

Suggested citation:

Morgan, P., A. Maddawin, D. Azhgaliyeva, W. Kodama, and L. Q. Trinh. 2024. Food Insecurity, Inflation and Government Aid: Evidence from a Household Survey in Developing Asia. ADBI Working Paper 1480. Tokyo: Asian Development Bank Institute. Available: <https://doi.org/10.56506/UVHK3280>

Please contact the authors for information about this paper.

Email: [pmorgan@adbi.org](mailto:pmorgan@adbi.org), [abmaddawin@adbi.org](mailto:abmaddawin@adbi.org), [dazhgaliyeva@adbi.org](mailto:dazhgaliyeva@adbi.org), [wkodama@adbi.org](mailto:wkodama@adbi.org), [longtq@hub.edu.vn](mailto:longtq@hub.edu.vn)

Asian Development Bank Institute  
Kasumigaseki Building, 8th Floor  
3-2-5 Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan

Tel: +81-3-3593-5500  
Fax: +81-3-3593-5571  
URL: [www.adbi.org](http://www.adbi.org)  
E-mail: [info@adbi.org](mailto:info@adbi.org)

© 2024 Asian Development Bank Institute

**Abstract**

Food insecurity has become of increasing concern following the economic downturn during the COVID-19 pandemic and the subsequent sharp rise in inflation, including food price inflation. To better understand the conditions of food insecurity and the impacts of inflation and other drivers of food insecurity in developing Asia, we carried out a household survey in 2023 in seven countries in Southeast Asia and nine countries in the Caucasus and Central Asia. The key results are as follows. First, households that had low income and experienced income declines and/or financial difficulties were more likely to experience food insecurity. Second, households that experienced high inflation, including food price inflation, also tended to have higher food insecurity. Third, among the coping strategies adopted by households, only applying for government aid had a significant effect on reducing food insecurity. Our study contributes to the literature because of both the large number of countries and the large number of variables covered in the analysis. These results highlight the need to develop effective measures to reduce food insecurity among vulnerable groups, which were identified in this study as households with low income, poor financial circumstances and larger family size.

**Keywords:** inflation, food insecurity, Central Asia, Caucasus, Southeast Asia, household survey, government aid

**JEL Classification:** D12, G50, E31, H55

# Contents

1.	INTRODUCTION.....	1
2.	REVIEW OF RELATED LITERATURE .....	3
2.1	Definition and Measures of Food Insecurity .....	3
2.2	Causes of Food Insecurity.....	4
2.3	Government Aid and Food Insecurity.....	5
3.	DATA AND STYLIZED FACTS .....	5
3.1	Data Sources.....	5
3.2	Summary Statistics.....	6
3.3	Measure of Food Insecurity Score (FIS) .....	9
3.4	Perceived Inflation.....	10
3.5	Coping Strategies.....	14
4.	METHODOLOGY .....	14
4.1	Equations for Food Insecurity Score .....	14
4.2	High Food Insecurity .....	15
4.3	Instrumental Variable Approach .....	15
5.	RESULTS.....	15
6.	CONCLUSION AND POLICY RECOMMENDATIONS .....	21
	REFERENCES .....	22
	APPENDIX.....	25

# 1. INTRODUCTION

Since the middle of 2020, food prices have risen sharply all over the world. The COVID-19 pandemic and the Russian invasion of Ukraine have exacerbated food inflation and increased the costs of importing food. Also, higher crude oil prices, as well as disruptions in fertilizer supplies, have pushed up fertilizer prices, which has raised the costs of producing food.

Following Russia's invasion of Ukraine, the number of countries imposing trade-related measures has surged. As of 28 May 2024, 16 countries had, between them, implemented 22 food export bans, and eight had implemented 15 export-limiting measures (World Bank 2024). The growing number of trade restrictions on food and fertilizer implemented by countries with the goal of increasing domestic supply and reducing prices has actually exacerbated the global food crisis.

A United Nations report estimates that the number of people in the world experiencing moderate or severe food insecurity increased to as many as 2.4 billion (29.6% of the world's population) in 2022, an increase of about 450 million since the outbreak of the COVID-19 pandemic. It also estimates that the number of those with severe food insecurity rose to around 900 million (about 11% of the world's population), an increase of about 100 million over the same period. The figures for Asia improved slightly between 2021 and 2023, but remained well above pre-pandemic levels, with the moderate and severe food-insecure population making up 24% of the total population and those with severe food insecurity making up about 9.7% of the total. The shares of the population with moderate or severe food insecurity in Caucasus and Central Asia (CAC) and Southeast Asia (SEA), the subject of our study, were 17.4% and 16.8%, respectively, while the shares for severe food insecurity were 4.6% and 2.6%, respectively (FAO et al. 2023).

Inflation became much higher in 2022–2023. Table 1 shows the development of overall consumer price inflation and food price inflation in the target countries of our study. Inflation was generally significantly higher in the CAC region than in SEA, with six CAC countries experiencing double-digit inflation rates (10% or above) in both 2022 and 2023. Inflation soared to 29% in Pakistan in 2023. In contrast, in S.E. Asia only the Lao PDR had very high inflation of over 20% in 2022 and 2023, while other countries saw inflation in the range of 1%–7%. Food price inflation was somewhat more extreme, averaging 16.7% in the CAC region and 7.5% in SEA in 2022. Among the CAC countries, eight had food price inflation well over 10% in 2022.

It is well known that the negative effects of poor nutrition include poorer health, limited physical development, and lower educational attainment, which lead to lower potential accumulation of human capital and the accompanying lower potential for economic growth, as well as lower labor force participation because of illness, and higher health-related costs. It is important to understand the main factors contributing to food insecurity in order to develop effective policies to reduce it.

Our study contributes to the literature in the following ways. *First*, this paper provides empirical evidence of the association between government aid and food insecurity. Such empirical evidence is minimal. Among the literature is the study of Petralias et al. (2016), which examines the effect of the DIATROFI program in Greece. *Second*, this paper provides empirical evidence of the effect of inflation, household income, and financial circumstances on food insecurity. To the best of our knowledge, there is no analysis in the literature of the effect of financial circumstances on food insecurity. *Third*, this study is one of the first to analyze the impact of the COVID-19 pandemic and

inflation on food insecurity in developing Asia. Previous studies on food insecurity or hunger have mostly focused on weather disturbances or natural disasters, while our study focuses on the shocks of the COVID-19 pandemic and the Russian invasion of Ukraine. While Swinnen and McDermott (2020) provided insights into and lessons on the implications of the COVID-19 pandemic on food security, their report focused on South Asia and Africa.

**Table 1: Consumer and Food Price Inflation**

	Consumer Price Inflation					Food Price Inflation				
	2019	2020	2021	2022	2023	2019	2020	2021	2022	2023
Developing Asia	3.2	3.2	2.6	4.4	3.3	3.7	5.7	5.9	12.0	9.8
Caucasus and Central Asia	6.8	7.4	9.6	12.9	10.5	8.1	10.5	11.8	16.7	10.1
Afghanistan	2.3	5.6	5.8	7.8	10.8	3.8	10.0	5.7	19.2	-6.8
Armenia	1.4	1.2	7.2	8.6	2.0	1.9	0.3	11.3	13.0	-0.4
Georgia	4.9	5.2	9.6	11.9	2.5	8.2	10.6	10.9	17.9	3.9
Kazakhstan	5.3	6.8	8.0	15.0	14.5	8.1	10.4	10.8	18.8	15.5
Kyrgyz Republic	1.1	6.3	11.9	13.9	10.8	1.4	11.6	18.1	16.2	8.5
Mongolia	7.3	3.7	7.3	15.2	10.4	10.7	7.1	13.8	18.6	15.8
Pakistan	6.8	10.7	8.9	12.2	29.2	10.6	15.5	10.6	24.7	38.7
Tajikistan	8.0	9.4	8.0	4.2	3.8	11.0	11.7	10.5	7.3	3.8
Uzbekistan	14.6	12.9	10.7	11.4	10.0	17.0	17.2	14.4	15.0	11.7
Southeast Asia	2.2	1.5	2.0	5.3	4.1	2.6	4.8	2.3	7.5	9.5
Cambodia	1.9	2.9	2.9	5.3	2.1	2.1	4.6	2.7	5.0	3.2
Indonesia	2.8	2.0	1.6	4.1	3.7	1.5	4.9	2.8	6.0	4.9
Lao People's Dem. Rep.	3.3	5.1	3.8	23.0	31.2	4.7	8.7	3.0	21.8	39.5
Malaysia	0.7	-1.1	2.5	3.4	2.5	1.7	1.3	1.8	5.7	4.9
Philippines	2.4	2.4	3.9	5.8	6.0	2.1	2.7	5.2	4.5	7.9
Thailand	0.7	-0.8	1.2	6.1	1.2	2.3	1.2	-0.1	6.9	2.6
Viet Nam	2.8	3.2	1.8	3.2	3.3	4.1	10.0	0.7	2.6	3.4

Source: Consumer price inflation is from Table A6 in Asian Development Bank (2024) and food price inflation is calculated by the authors as the annual average using monthly data from the Food and Agriculture Organization. The regional average consumer price inflation for Caucasus and Central Asia also includes Turkmenistan. The regional average consumer price inflation for Southeast Asia also includes Brunei Darussalam, Myanmar, Singapore, and Timor-Leste. Food price inflation is the average of all the countries in Caucasus and Central Asia and in Southeast Asia.

Most studies that have investigated food insecurity use survey data only in targeted areas at the local or district levels (Demi and Kuwornu 2013; Samputra and Antriandarti 2024), rather than using a representative sample of the whole country. Sisha (2020) used a nationally representative sample, but for only one country—Ethiopia. In contrast, our study uses primary and unique survey data covering 16 developing countries from SEA and CAC. It covers a broad range of country characteristics, considering rural and urban areas, and takes into account all types of employment status, income groups, and the education, gender, and age of the household head. The study also gathers detailed information on the respondents' perceptions of general and food price inflation and on their financial circumstances, which other studies have not covered. Our research analyzes the role of coping mechanisms for food insecurity, including government aid. Rozaki (2020) studied strategies for overcoming food insecurity after the COVID-19 pandemic, but this study looked solely at Indonesia's agricultural sector. Akim, Ayivodji and Kouton (2024) examined the role of past remittances in mitigating the effects of COVID-19 employment shocks on food security, but only in Nigeria. Moreover, our analysis of the

effect of government measures uses instrumental variables to deal with issues of possible endogeneity.

We obtain the following key results using a unique household survey of over 16,000 households to study food insecurity in 16 countries from developing Asia (the CAC and SEA regions). *First*, households that had low income or experienced a decline in income and financial difficulties were more likely to experience food insecurity. *Second*, households that experienced high inflation, including food price inflation, tended to have higher food insecurity. *Third*, among the coping strategies adopted by households, only applying for government aid had a significant effect on reducing food insecurity. These results highlight the need to develop effective measures to reduce food insecurity among vulnerable groups (those with low income, poor financial circumstances, and larger family size).

## 2. REVIEW OF RELATED LITERATURE

### 2.1 Definition and Measures of Food Insecurity

The Food and Agriculture Organization (FAO 2024) defines a person as having food insecurity when they:

lack regular access to enough safe and nutritious food for normal growth and development and an active and healthy life. This may be due to unavailability of food and/or lack of resources to obtain food. Food insecurity can be experienced at different levels of severity.

Severe food insecurity is defined as a person having run out of food and gone a day or more without eating. Moderate food insecurity refers to a situation in which a person's access to food is uncertain; they might have to sacrifice other basic needs to be able to eat, and when they do eat, their food might not be the most nutritious (FAO 2024).

Keenan et al. (2001) summarized the available instruments for measuring food security or insecurity, categorizing them into single items, scales measured at the household level and scales measured at the community level. Examples of the scales measured at the household level include the Community Childhood Hunger Identification Project (CCHIP) hunger index, the Radimer/Cornell measure, and the US Household Food Security Scale. The CCHIP was one of the first scales to be developed to measure hunger in families with at least one child under the age of 12. It comprises eight questions that indicate whether adults or children in the household are affected by food insufficiency, given the constraints on their resources. A score of 5 or more affirmative answers indicates a food shortage problem affecting everyone in the household, and a score of 1 to 4 indicates that the family is at risk of hunger. The Radimer/Cornell index was developed by Radimer and colleagues at Cornell University at about the same time as the CCHIP index. This scale was developed to measure women's food insecurity and hunger and child hunger. The US Household Food Security Scale is the scale for measuring household food security and household members' hunger that has been most widely used in recent years. It is an 18-item scale developed to measure the level of severity of food insecurity and hunger experienced within the household during the preceding 12 months. The score is calculated as the total number of affirmative responses to the survey questions. The scale value ranges from 0 to 10, with 0 indicating no evidence of food insecurity while scores close to 10 indicate the most severe degree of food sufficiency problems. The measure of food security used in this study is the six-item short form of the US Household Food Security Scale. See section 3.3 below.



## 2.2 Causes of Food Insecurity

The literature finds that food insecurity is caused by a variety of factors, including wars and conflicts in Asian and African countries (Messer and Cohen 2007; Shemyakina 2022; Rudolfson et al. 2024), natural disasters in Southeast and South Asian countries (Edwards, Gray, and Borja 2021; Randell et al. 2021), climatic conditions in Tanzania (Randell, Gray, and Shayo 2022) and Madagascar (Andrianarimanana, Yongjian, and Tanteliniaina 2023), and poverty (Matin and Hulme 2003; Grace et al. 2014; Farzana et al. 2017). Inflation in developing countries has been caused by global crude oil price shocks (Choi et al. 2018) and the interruption of supply chain management due to the COVID-19 pandemic (Chakraborty 2023).

Several studies have pointed out that the recent global crisis related to the COVID-19 pandemic has raised the inflation rate in many countries. This higher inflation occurred because of a combination of factors, including supply chain (and food supply chain) disruptions that affected international trade (Erokhin and Gao 2020), fiscal stimulus measures and more accessible monetary policies (Diaz-Bonilla 2020; Loayza and Pennings 2020), and higher energy prices (Khan, Su and Zhu 2022; Wang, Yang and Li 2022). Interestingly, Erokhin and Gao (2020) found larger effects of COVID-19-related trade disruptions in middle-income countries than in low-income countries, since the latter were less integrated into global food supply chains.

Food price inflation accompanied by the global economic downturn in 2007–2009 resulted in hunger in South Africa, especially among female-headed households (Jacobs 2010). Around the same time, Pakistan experienced food price spikes due to volatility in global agricultural commodity markets (Gazdar and Mallah 2013), which led to increased food insecurity in the country. Mahmood et al. (2023) found that inflationary pressure was one of the determinants of food insecurity in Pakistan. They argued that inflation lowers the household's purchasing power, resulting in food insecurity.

On the other hand, Verpoorten et al. (2013) argued that rural farm households may benefit from higher food price inflation if that translates into higher incomes for them. They found that self-reported food insecurity in Africa tended to fall for rural households and rise for urban households during the food price crisis in 2005–2008. However, this may be less likely when incomes are depressed by other factors, as happened during the COVID-19 pandemic. Clearly, the impact of food price inflation on food insecurity depends on the relative movement of wages and other income. Headey et al. (2024) examined the movement of wages during several food crisis periods in developing economies. They found that real “food wages” often fell by 20%–30% in a few months during such periods, pointing to an increased risk of food insecurity.

Low income and vulnerable groups have been found to be most susceptible to food insecurity. Singh et al. (2021) found, in their study in Province 2 of Nepal, that food insecurity among low income and disadvantaged families was a serious problem during the COVID-19 pandemic. Families from low socioeconomic backgrounds and disadvantaged communities were characterized as those working on daily wages or relying on remittances. Food insecurity affected their health and wellbeing, making them increasingly vulnerable to the COVID-19 infection. Samputra and Antriandarti (2024) surveyed female farmers in rural Indonesia and found that laborers with low incomes and low house values were more likely to experience food insecurity. Similarly, Sisha (2020) found that, in Ethiopia, households with low wealth were more prone to food insecurity. Gazdar and Mallah (2013) found that, in Pakistan, families without able-bodied male members were less able to obtain food through agricultural

activities. Mahmood et al. (2023) found that food insecurity in Pakistan was correlated with low income, low wealth, low education, and the experience of shocks (floods) and injuries. In general, vulnerable groups, such as those with low income and poor financial circumstances and those living in rural areas, tend to be most susceptible to food insecurity.

## **2.3 Government Aid and Food Insecurity**

In order to cope with food insecurity problems, households have adopted various self-coping mechanisms. For example, farming households in forest and coastal Ghana communities cope by eating less preferred food, rationing food and skipping a meal within a day (Demi and Kuwornu 2013). However, the impacts of these coping strategies are minimal. In Ethiopia, smallholder farmer households in rural areas who have high food insecurity problems because of exposure to shocks such as fire, loss of a job, floods, illness, death, theft, drought, price fall or rise, violence and local unrest reduce the variety of foods eaten to cope with food insecurity (Sisha 2020). However, this coping mechanism is temporary and insufficient.

As self-coping mechanisms are often insufficient, especially for poor households, the role of government aid to supplement self-coping mechanisms is important. Government aid may be financial or in-kind (food aid, fuel aid, etc.). Studies of the impacts of government aid on food insecurity are limited. Petralias et al. (2016) studied the potential impact of a large-scale school-based nutritional program implemented during the financial crisis in districts of Greece with low socioeconomic status. The families in the districts that participated in the program experienced high food insecurity levels, close to those of developing country averages. The study found that participation in the food aid program reduced food insecurity for children and their families. By contrast, Samputra and Antriandarti (2024) showed that dependence on government aid can increase food insecurity if the government aid is ended. They found that female farm laborers who had not received government support were less likely to experience food insecurity than those who had received aid temporarily but then lost eligibility.

Del Ninno, Dorosh and Subbarao (2007) reviewed the impacts of international food aid on four major recipients—India, Bangladesh, Ethiopia, and Zambia. Their study looked at the effects on food production, trade, markets, consumption and safety nets, and policy responses to food emergencies. They suggested that food aid that supports the building up of production and market-enhancing infrastructure reduces the adverse effects of price increases on producers and helps reduce households' food insecurity.

## **3. DATA AND STYLIZED FACTS**

### **3.1 Data Sources**

This study utilizes data from the ADBI household survey that was conducted between September and December 2023 across seven SEA and nine CAC countries, namely Cambodia, Indonesia, the Lao PDR, Malaysia, the Philippines, Thailand, and Viet Nam for SEA, and Afghanistan, Armenia, Georgia, Kazakhstan, the Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, and Uzbekistan for CAC.

The interviews were conducted via telephone, and the survey questionnaire covered questions related to the household's expenditure, income, financial circumstances, perception of the general and food inflation situation, challenges to food security, and coping strategies, and various characteristics of the household head, including gender, age, and education. The survey respondent was a household member who was knowledgeable about the household's finances. The majority of the respondents were the head of the household or the spouse of the head of the household.

The data from the survey covers 7,034 and 9,270 households from the SEA and CAC regions, respectively. The sample for each country was at least 1,000 households (Table 2). The samples were designed to be representative of each country in terms of income distribution, regional and urban/rural distribution, and gender of household head. This ADBI survey was the fourth wave for the SEA region and the third wave for the CAC region. Studies that analyzed the previous waves of the ADBI household survey examined the impacts of the COVID-19 pandemic on households' consumption, business, employment, and children's learning (Morgan and Trinh 2021; Azhgaliyeva et al. 2022; Morgan, Trinh, and Kim 2022; Kodama et al. 2024; Maddawin et al. 2024).

**Table 2: Household Sample Size in SEA and CAC**

SEA	N	CAC	N
Cambodia	1,000	Afghanistan	1,181
Indonesia	1,029	Armenia	1,035
Lao PDR	1,000	Georgia	1,000
Malaysia	1,003	Kazakhstan	1,000
Philippines	1,000	Kyrgyz Republic	1,024
Thailand	1,000	Mongolia	1,010
Viet Nam	1,002	Pakistan	1,019
<b>Total</b>	<b>7,034</b>	Tajikistan	1,001
		Uzbekistan	1,000
		<b>Total</b>	<b>9,270</b>

### 3.2 Summary Statistics

Table 3 shows that, of the household heads in the dataset, 22%–25% are female, 32%–39% are self-employed and 25%–28% belong to the 1st income quartile, in CAC and SEA, respectively. The average household size is approximately five for both regions. About 21% in CAC reported that their income had decreased compared to the previous year, versus about 34% for SEA. Approximately 40% of households in both CAC and SEA reported that their household expenditure was unchanged or decreased. In SEA, 43% reported that their financial circumstances worsened, versus 35% in CAC. In CAC, 69% of households reported overall inflation to be up significantly, while this percentage was 55% in SEA. The mean district reported inflation in CAC was approximately 41% versus 28% for regions in SEA.

**Table 3: Summary Statistics**

Variables	Number	Mean	Standard Deviation	Min	Max
<b>Caucasus and Central Asia (CAC)</b>					
Gender ( <i>1=Female</i> )	9,270	0.22	0.41	0	1
<b>Education</b>					
Primary	8,647	0.03	0.18	0	1
Secondary	8,647	0.38	0.48	0	1
Vocational	8,647	0.20	0.40	0	1
University	8,647	0.10	0.29	0	1
Graduate	8,647	0.29	0.45	0	1
Don't know	8,647	0.00	0.06	0	1
<b>Age group</b>					
18–29	9,071	0.40	0.49	0	1
30–39	9,071	0.17	0.38	0	1
40–49	9,071	0.16	0.37	0	1
50–59	9,071	0.12	0.38	0	1
60+	9,071	0.14	0.35	0	1
Household size	9,264	5.62	3.27	1	42
<b>Location</b>					
Rural	9,270	0.52	0.50	0	1
<b>Work status</b>					
Self-employed	9,270	0.32	0.47	0	1
Wage-employed	9,270	0.36	0.48	0	1
Retired	9,270	0.16	0.37	0	1
Not working*	9,270	0.15	0.36	0	1
<b>Income quartile</b>					
1st quartile	8,379	0.27	0.44	0	1
2nd quartile	8,379	0.26	0.44	0	1
3rd quartile	8,379	0.25	0.43	0	1
4th quartile	8,379	0.22	0.41	0	1
<b>Income</b>					
Decreased	9,123	0.21	0.40	0	1
Unchanged	9,123	0.45	0.50	0	1
Increased	9,123	0.35	0.35	0	1
<b>General inflation</b>					
Up significantly	9,162	0.63	0.48	0	1
Up slightly	9,162	0.20	0.40	0	1
Unchanged or down	9,162	0.18	0.38	0	1
Average food inflation	7,379	33.5	25.1	0	250
<b>Expenditure</b>					
Unchanged or decreased	9,079	0.40	0.49	0	1
Increased by <25%	9,079	0.24	0.43	0	1
Increased by >26%	9,079	0.35	0.48	0	1
<b>Coping strategies</b>					
Government aid	9,270	0.9	0.29	0	1
Savings	9,270	0.6	0.50	0	1
Selling	9,270	0.2	0.40	0	1
<b>Financial circumstances</b>					
Worse off	9,234	0.35	0.48	0	1
Unchanged	9,234	0.39	0.49	0	1
Better off	9,234	0.26	0.44	0	1
<b>Food Insecurity Score</b>	9,270	2.7	0.96	0	1
Mean district inflation in CAC	9,270	40.7	13.6	17.8	74.1
<b>N</b>	9,270				

*continued on next page*

**Table 3** *continued*

Variables	Number	Mean	Standard Deviation	Min	Max
<b>Southeast Asia (SEA)</b>					
Gender (1=Female)	7,034	0.25	0.43	0	1
<b>Education</b>					
Primary	6,462	0.15	0.36	0	1
Secondary	6,462	0.49	0.50	0	1
Vocational	6,462	0.03	0.18	0	1
University	6,462	0.11	0.32	0	1
Graduate	6,462	0.18	0.38	0	1
Don't know	6,462	0.03	0.17	0	1
<b>Age group</b>					
18–29	6,776	0.07	0.25	0	1
30–39	6,776	0.24	0.43	0	1
40–49	6,776	0.26	0.44	0	1
50–59	6,776	0.24	0.43	0	1
60+	6,776	0.19	0.39	0	1
<b>Work status</b>					
Self-employed	7,034	0.40	0.50	0	1
Wage-employed	7,034	0.46	0.49	0	1
Retired	7,034	0.06	0.25	0	1
Not working*	7,034	0.09	0.28	0	1
<b>Income quartile</b>					
1st quartile	6,575	0.30	0.46	0	1
2nd quartile	6,575	0.24	0.43	0	1
3rd quartile	6,575	0.23	0.43	0	1
4th quartile	6,575	0.23	0.42	0	1
Household size	7,034	4.51	2.06	1	26
<b>Location</b>					
Rural	7,031	0.54	0.50	0	1
<b>Income</b>					
Decreased	6,981	0.34	0.47	0	1
Unchanged	6,981	0.38	0.49	0	1
Increased	6,981	0.28	0.45	0	1
<b>General inflation</b>					
Up significantly	7,034	0.55	0.50	0	1
Up slightly	7,034	0.35	0.48	0	1
Unchanged or down	7,034	0.10	0.30	0	1
Average food inflation	6,902	23.0	19.0	0	205
<b>Expenditure</b>					
Unchanged or decreased	6,969	0.41	0.49	0	1
Increased by <25%	6,969	0.30	0.46	0	1
Increased by >26%	6,969	0.29	0.46	0	1
<b>Coping strategies</b>					
Government aid	7,034	0.18	0.38	0	1
Draw down savings	7,034	0.72	0.45	0	1
Sell assets	7,034	0.31	0.46	0	1
<b>Financial circumstances</b>					
Worse off	7,034	0.43	0.49	0	1
Unchanged	7,034	0.33	0.47	0	1
Better off	7,034	0.27	0.43	0	1
<b>Food Insecurity Score</b>	7,034	2.4	2.1	0	1
Mean regional inflation in SEA	7,034	28.43	3.30	22.7	32.9
<b>N</b>	7,034				

Note: \*Not working includes being unable to work due to sickness or illness, not working and not looking for work, being a student, and not working for other reasons

### 3.3 Measure of Food Insecurity Score (FIS)

Our measure of the Food Insecurity Score (FIS) is computed as the number of affirmative responses to the six statements or questions that characterize food insecurity listed below (together with the scoring criteria). The questions are taken from the US Household Food Security Survey Module: Six-Item Short Form (USDA 2012).

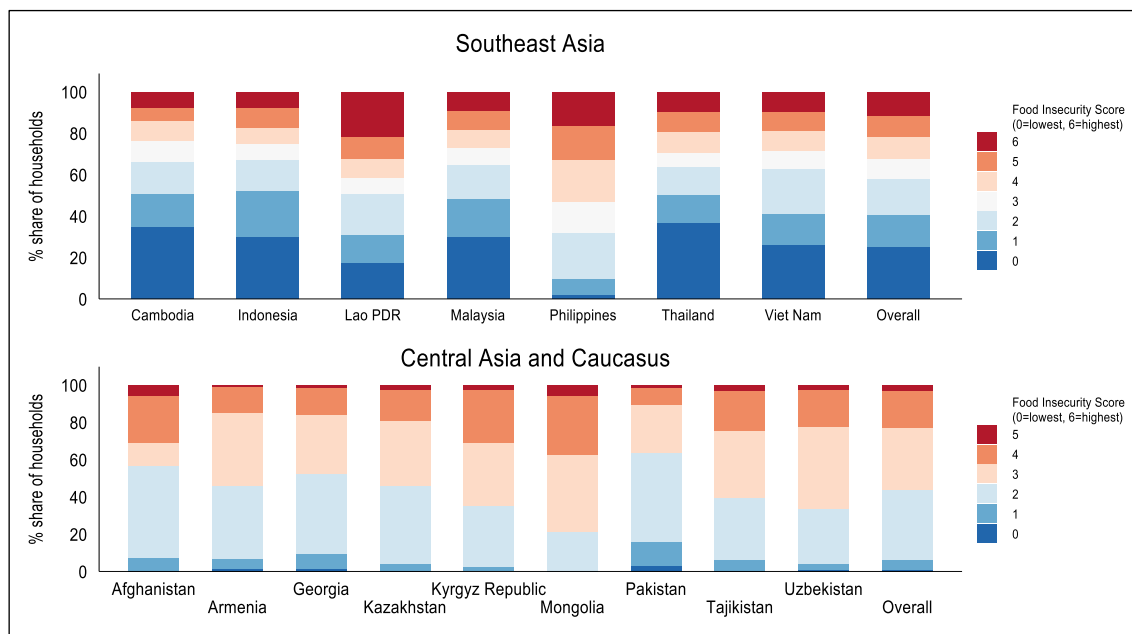
1. The food that we bought didn't last and we didn't have money to get more. (1=often true or sometimes true; 0=never true)
2. We couldn't afford to eat balanced meals. (1=often true or sometimes true; 0 otherwise)
3. In 2023 to date, did you or other adults in your household ever cut the size of your meals, skip on protein (meat, seafood, eggs) or skip meals because there wasn't enough money for food? (1=yes; 0=no)
4. What was the frequency of cutting the size of meals, skipping protein (meat, seafood, eggs) or skipping meals because there wasn't enough money for food? (1=almost every month or some months but not every month; 0=only 1 or 2 months)
5. In January 2022 – December 2022, did you ever eat less than you felt you should because there wasn't enough money for food? (1=yes; 0=no)
6. In January 2022 – December 2022, were you ever very hungry but didn't eat because there wasn't enough money for food? (1=yes; 0=no)

The replies give raw scores ranging from 0 to 6, with 0 indicating no food insecurity and scores close to 6 indicating a high degree of food insecurity. For the SEA countries, all six questions were asked in the survey questionnaire so the highest score for food insecurity is 6. However, for the CAC countries, question 4 was not asked, so only responses to five of these questions were available from the dataset. Hence the highest score for food insecurity for CAC countries is 5.

Figure 1 shows the distribution of the estimated average food insecurity scores for the individual countries and the SEA and CAC regions. As noted above, the maximum score was 6 for SEA countries and 5 for CAC countries. In SEA countries about 10% of households reported the highest score of 6 and another 10% reported a score of 5, indicating high food insecurity. The Lao PDR and the Philippines showed considerably higher shares of households with scores of 5 or 6, about 30% for both, versus shares of 20% or less for the other five countries. About 25% of households in SEA countries reported a score of 0 (i.e., no food insecurity). In CAC countries only a very small fraction of the population reported a score of 5, while almost 20% reported a score of 4. Afghanistan, the Kyrgyz Republic, and Mongolia reported the highest shares of households with scores of 4 or 5. Interestingly, almost no households reported a score of 0 for food insecurity. These scores are roughly comparable with those in the UN report (FAO et al. 2023).

The proportion of households for each food insecurity index in each country is shown in Figure 1. The darker red shade shows the proportion of households with high food insecurity and the darker blue shade shows the proportion of households with low food insecurity. Comparing the CAC and SEA regions, we can see greater inequality/extremes in SEA. Figure 1 shows that there is a larger proportion of households with extremely high (from 4 to 6) and extremely low (0 or 1) food insecurity in SEA compared to CAC, where a larger proportion of households have a moderate food insecurity index (2 or 3) and very small proportion of households have a food insecurity index of 0 or 1.

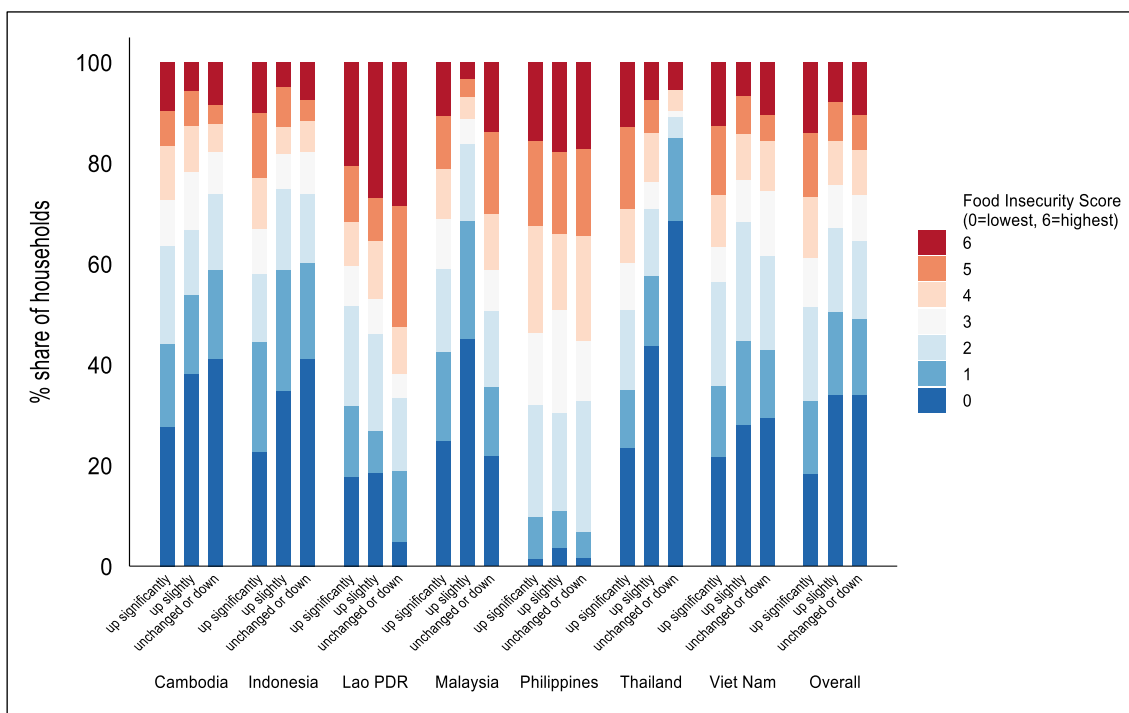
**Figure 1: Food Insecurity Scores of SEA and CAC Countries**



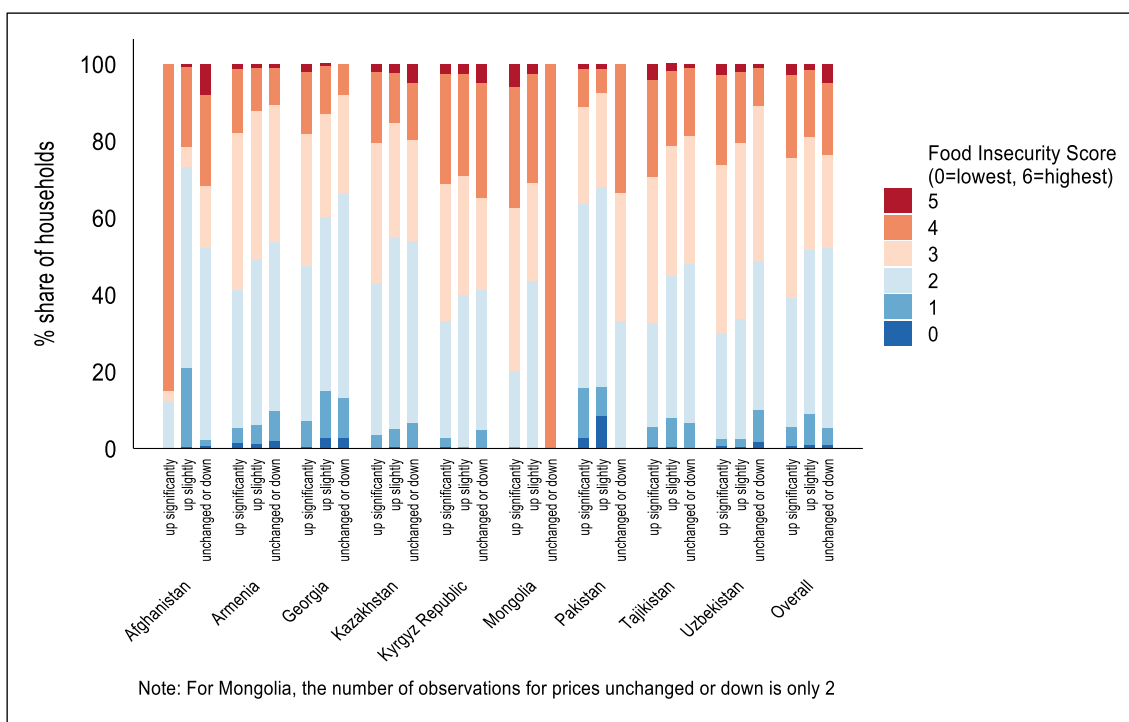
Source: Authors' estimates from survey data.

### 3.4 Perceived Inflation

Figures 2 and 3 show the food insecurity score against the degree of perceived inflation for the SEA and CAC countries, respectively. The perceived general inflation is divided into three categories: (1) prices have gone up significantly; (2) prices have gone up slightly; and (3) prices are unchanged or have gone down. In SEA overall, the highest scores of food insecurity are found among households that reported high perceived inflation, but there was significant variation by country. On average, there is not a strong relationship between food insecurity and perceived inflation in the CAC countries, although, again, there is substantial variation by country, with the most extreme readings in Afghanistan and Mongolia (Figure 3).

**Figure 2: Food Insecurity Score by Perceived General Inflation in Southeast Asia**

Source: Authors' estimates from survey data.

**Figure 3: Food Insecurity Score by Perceived General Inflation in Caucasus and Central Asia**

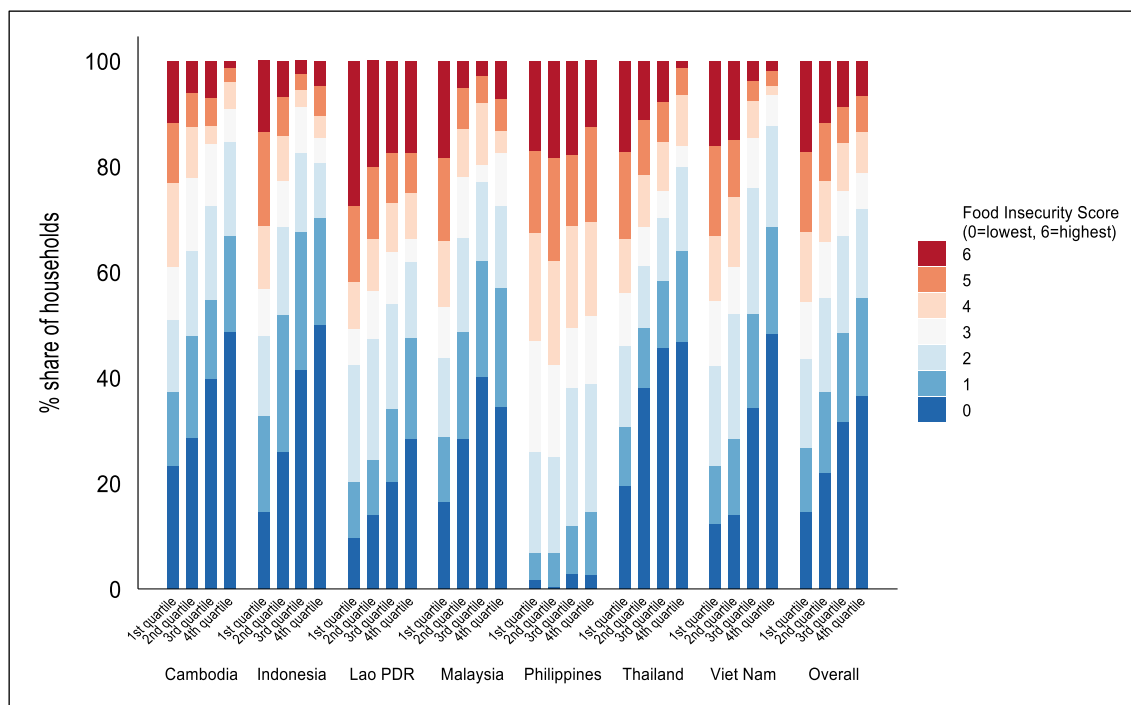
Note: For Mongolia, the number of observations for prices unchanged or down is only 2.

Source: Authors' estimates from survey data.



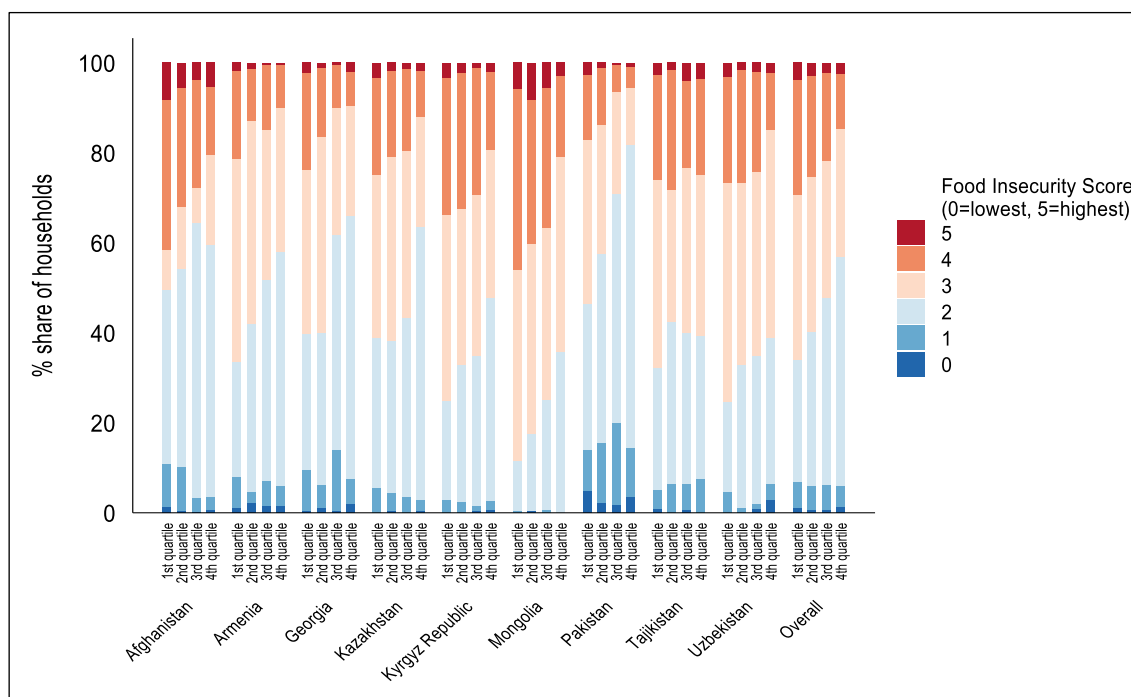
Figures 4 and 5 show the food insecurity score versus the income quartile in SEA and CAC, respectively. The figures clearly show that lower income groups suffered more from food insecurity than did higher income groups in both regions.

**Figure 4: Food Insecurity Score by Income Quartile in Southeast Asia**



Source: Authors' estimates from survey data.

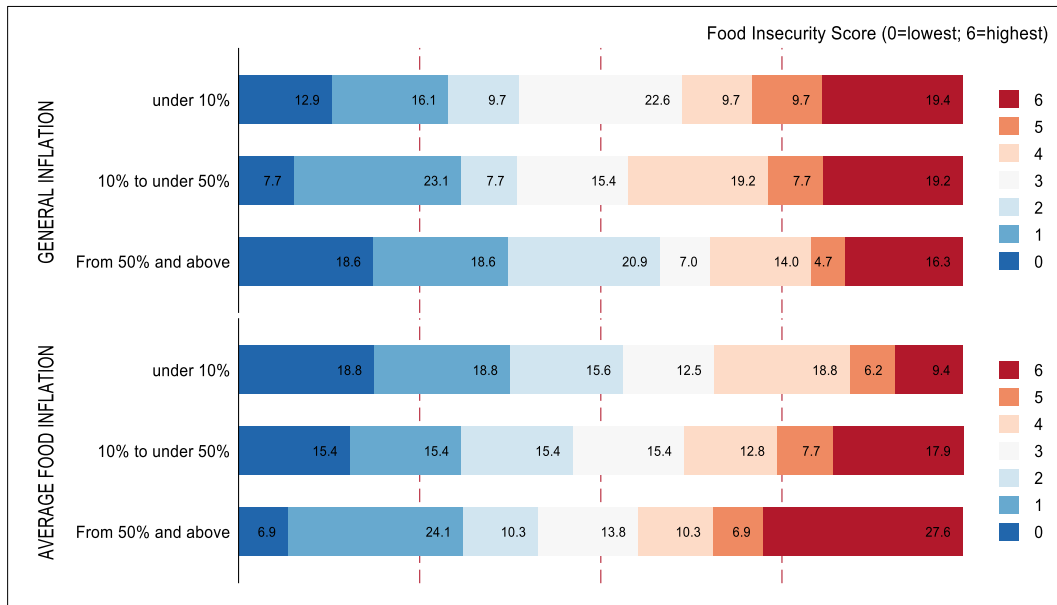
**Figure 5: Food Insecurity by Income Quartile in Caucasus and Central Asia**



Source: Authors' estimates from survey data.

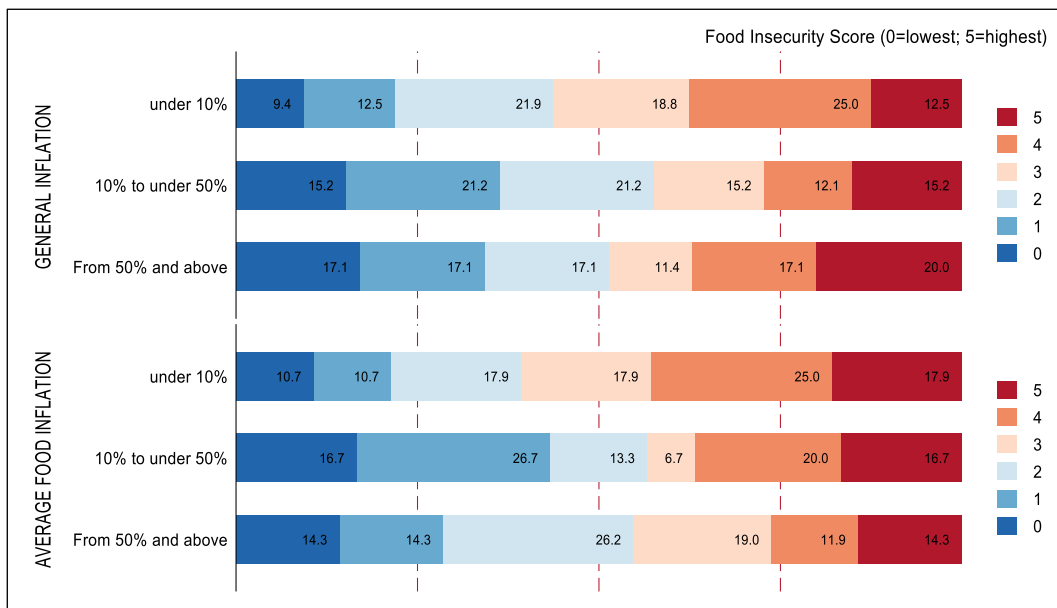
Figures 6 and 7 show the food insecurity score by general and food inflation in the combined sample of SEA and CAC. Food inflation is estimated as the unweighted average perceived inflation rate for all food items including rice, grains, vegetables, fruits, meat, fish, and dairy items. The figures suggest that the relation between average food inflation and food insecurity follows the pattern for general inflation for both SEA and CAC, although high food insecurity seems more closely related to high food price inflation in SEA.

**Figure 6: Food Insecurity by General and Food Inflation in Southeast Asia**



Source: Authors' estimates from survey data.

**Figure 7: Food Insecurity by General and Food Inflation in Caucasus and Central Asia**

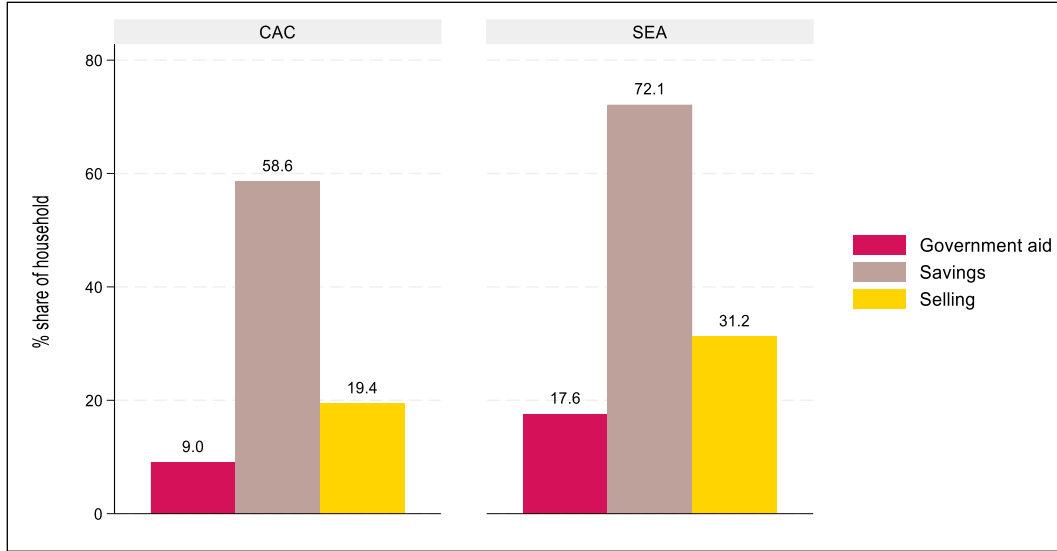


Source: Authors' estimates from survey data.

### 3.5 Coping Strategies

Households were asked “What actions has your family taken to overcome high inflation in the last year?”. In both regions, most households coped with high inflation through the use of savings or by drawing down cash, borrowing from friends, relatives or microfinance institutions, or deferring payments and debt repayments (72.1% of households in SEA and 58.6% of households in CAC), followed by selling homemade foods or other products at lower prices or pawning property (Figure 8).

**Figure 8: Coping Strategies by Region**



Source: Authors' estimates from survey data.

## 4. METHODOLOGY

### 4.1 Equations for Food Insecurity Score

This study uses a linear regression model to analyze the effects of inflation and other economic conditions of households in SEA and CAC on their food insecurity score, as shown by equation 1:

$$FIS_i = \beta_0 + \beta_1 IncQ_i + \beta_2 Inf_i + \beta_3 Incchg_i + \beta_4 FS_i + \beta_5 Aid_i + X_i\theta + \epsilon_i \quad (1)$$

where  $FIS_i$  is the normalized food insecurity score of household  $i$ . The food insecurity score is normalized in order to ensure comparability and consistency of values across households in different countries, for easier interpretation.  $IncQ_i$  is a dummy variable that denotes the income quartile of household  $i$ , with the 1<sup>st</sup> income quartile as the reference variable.  $Inf_i$  is a dummy variable that represents the general inflation experienced by household  $i$ , with prices unchanged or down as the reference variable.  $Incchg_i$  is a dummy variable that indicates the income change of household  $i$ , with income increased as the reference variable.  $FS_i$  is a dummy variable that describes the financial circumstances of the household  $i$ , with “better off” as the reference variable.  $Aid_i$  is a dummy variable that represents applying for government aid as a coping strategy to alleviate food insecurity.  $X_i$  is a vector of controls that include household characteristics such as the gender, age and education level of the household head, the

rural or urban nature of the location, household size, work status, coping strategies, mean inflation at the district level for CAC and the regional level for SEA, and country fixed effects.

## 4.2 High Food Insecurity

In order to understand the probability of having high food insecurity, this study also uses a probit model to estimate the probability of a household suffering from food insecurity, based on household characteristics. The probit model is given by equation 2:

$$Pr(High\ FIS_i) = \alpha_0 + \alpha_1 IncQ_i + \alpha_2 Inf_i + \alpha_5 Incchg_i + \alpha_4 FS_i + \alpha_5 Aid_i + X_i\theta + \epsilon_i \quad (2)$$

where  $High\ FIS_i$  is a dummy variable that equals 1 if the FIS is 4–6 for SEA and 4–5 for CAC, and 0 otherwise. We use the same set of explanatory variables as in equation 1.

## 4.3 Instrumental Variable Approach

There was concern about the possible endogeneity of the government aid variable. For example, people with high food insecurity are more likely to apply for government aid, so there is reverse causality. To address this potential problem, following Kodama et al. (2024), we use as an instrumental variable the average level of government aid applications at the district and regional levels for SEA and CAC countries, respectively, which are not influenced by individual characteristics. The instrumental variable (IV) probit model is also applied to equation 2 to address potential endogeneity in the estimation of the probability of high food insecurity.

## 5. RESULTS

The results for equation 1 are presented in Table 4. Columns 1–4 give the estimates for the ordinary least squares (OLS) estimates, while columns 5–6 give the IV estimates. Columns 1, 3 and 5 present the regression estimates for the SEA sample, while columns 2, 4 and 6 present the regression estimates for the CAC sample. Columns 1 and 2 present the result for models without general inflation but including average food inflation. Columns 3 to 6 present the results for models with general inflation but excluding average food inflation. The regressions with average food inflation (Columns 1 and 2) were separated from the regressions with general inflation (Columns 3 to 6) to avoid any issue with multicollinearity between general inflation and food inflation.

*First*, the results identify the following vulnerable household groups which are at greater risk of food insecurity. Households in the lower income quartiles experienced more hunger than those in the higher income quartiles. Households whose financial circumstances grew worse experienced more hunger. Households with a higher number of family members (household size) showed higher food insecurity. The above results are significant for both the SEA and the CAC samples. The above results are as expected and are consistent with the existing literature which shows that groups who are vulnerable to food insecurity are those with low income (Singh et al. 2021; Mahmood et al. 2023; Samputra and Antriandarti 2024), poor financial circumstances, and larger family size (Farzana et al. 2017).

In addition, the following groups were found to have significantly higher food insecurity but only in SEA: those households whose heads were less educated or were not working. The results are consistent with the existing literature which shows greater food insecurity among those who do not work (Endris Mekonnen and Kassegn Amede 2022) and those who are less well educated (Mutisya et al. 2016).

*Second*, inflation is a significant factor in SEA (columns 3 and 5). A large increase in general inflation significantly increases the degree of food insecurity. This result is also consistent with the literature, which shows evidence of a connection between food price inflation and hunger (Jacobs 2010; Gazdar and Mallah 2013; Mahmood et al. 2023) because inflation lowers the purchasing power of the household. However, the above result does not hold for CAC (columns 4 and 6).

*Third*, coping strategies, including applying for government aid, drawing down savings and selling assets, did not mitigate the risk of hunger according to the OLS results (columns 1 to 4). However, the IV estimates show that applying for government aid is effective in decreasing the intensity of food insecurity, as shown by the negative and significant coefficients of aid in both SEA and CAC countries (columns 5 and 6). We expect that these IV estimates are more reliable than the OLS estimates because they address the possible endogeneity issue at the household level with government aid possibly being correlated with other factors that affect the food insecurity outcome. Using the average level of government aid as an instrument addresses the potential bias as this instrument is not influenced by other factors. The first-stage F-statistics are 233.4 for the SEA observations and 217.8 for the CAC observations, which are well above the threshold of 10, indicating a strong instrument (see Table A1 in Appendix). Although the drawdown of savings and the sale of assets show a positive correlation with food insecurity, we suspect that this is due to reverse causality. It is likely that the use of personal savings and assets may not be enough to solve the problems of food insecurity. Hence, supplementary aid from the government is needed to satisfy food insecurity issues. This result is consistent with the existing literature (Petralias et al. 2016). However, dependence on government aid could lead to greater food insecurity in the future if that aid is subsequently ended (Samputra and Antriandarti 2024).

Households with older household heads tend to have lower food insecurity, although the coefficients are not consistently significant, except when the head was aged 60 and over. Households living in rural areas did not have significantly higher food insecurity in most cases, and the gender of the household head was not significant, either.

Those who are self-employed, who are often involved in running their own business, have significantly lower scores of food insecurity than those employed for a wage. This may be partly due to the fact that a large share of the self-employed workers in the survey are farmers who can produce their own food. Those who have no work had significantly higher levels of food insecurity, which suggests that social safety nets may be inadequate. Figure A1 shows that the majority of self-employed households in CAC are in the agricultural sector while the majority of self-employed households in SEA are in the retail industry.

**Table 4: Factors Affecting Food Insecurity**

Variables	Food Insecurity Score (standardized)					
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS SEA	OLS CAC	OLS SEA	OLS CAC	IV (Aid=Aid Regional Average)	IV (Aid=Aid District Average)
<b>Income quartile</b> (ref: 1st quartile – low income)						
2nd quartile	–0.21*** (0.03)	–0.05 (0.03)	–0.21*** (0.03)	–0.06* (0.03)	–0.19*** (0.04)	–0.11*** (0.04)
3rd quartile	–0.42*** (0.03)	–0.16*** (0.03)	–0.42*** (0.03)	–0.15*** (0.03)	–0.42*** (0.04)	–0.22*** (0.04)
4th quartile (highest income)	–0.48*** (0.04)	–0.22*** (0.04)	–0.49*** (0.04)	–0.20*** (0.04)	–0.49*** (0.04)	–0.35*** (0.04)
<b>General inflation</b> (ref: unchanged or down)						
Price gone up significantly			0.14*** (0.04)	–0.13*** (0.05)	0.24*** (0.05)	0.01 (0.05)
Price gone up slightly			–0.01 (0.04)	–0.30*** (0.05)	–0.03 (0.05)	–0.18*** (0.06)
<b>Food inflation</b>						
All food items	0.70*** (0.08)	0.32*** (0.06)				
<b>Income change</b> (ref: increased)						
Income decreased	0.10*** (0.04)	0.11*** (0.04)	0.12*** (0.04)	0.04 (0.03)	0.06 (0.04)	0.04 (0.04)
Income unchanged	0.02 (0.03)	0.06** (0.03)	0.03 (0.03)	0.09*** (0.03)	0.05 (0.03)	0.02 (0.03)
<b>Financial circumstance</b> (ref: better off)						
Worse off	0.29*** (0.03)	0.27*** (0.04)	0.29*** (0.03)	0.28*** (0.03)	0.26*** (0.04)	0.35*** (0.04)
Unchanged	0.04 (0.03)	0.08*** (0.03)	0.03 (0.03)	0.12*** (0.03)	0.01 (0.03)	0.12*** (0.03)
<b>Coping strategies</b>						
Government aid	0.23*** (0.03)	0.29*** (0.04)	0.24*** (0.03)	0.29*** (0.04)	–0.46*** (0.14)	–1.35*** (0.24)
Draw down savings	0.24*** (0.03)	0.19*** (0.03)	0.24*** (0.03)	0.23*** (0.03)	0.28*** (0.03)	0.33*** (0.03)
Sell assets	0.09*** (0.03)	0.18*** (0.03)	0.08*** (0.03)	0.19*** (0.03)	0.19*** (0.03)	0.26*** (0.03)
Gender (1=Female)	–0.03 (0.03)	0.05 (0.03)	–0.03 (0.03)	0.04 (0.03)	–0.03 (0.03)	0.04 (0.03)
<b>Education</b> (ref: primary)						
Secondary or high school	–0.15*** (0.04)	0.01 (0.08)	–0.14*** (0.04)	0.12* (0.07)	–0.14*** (0.04)	0.21*** (0.07)
Vocational	–0.15* (0.08)	0.04 (0.08)	–0.13 (0.08)	0.10 (0.07)	–0.05 (0.08)	0.14* (0.08)
University / college	–0.30*** (0.05)	–0.08 (0.08)	–0.28*** (0.05)	–0.07 (0.07)	–0.24*** (0.05)	–0.13* (0.08)
Graduate	–0.37*** (0.05)	–0.09 (0.08)	–0.36*** (0.05)	0.01 (0.07)	–0.45*** (0.05)	0.02 (0.08)
Don't know	–0.27*** (0.08)	–0.11 (0.32)	–0.26*** (0.08)	–0.03 (0.28)	–0.41*** (0.08)	0.03 (0.27)

*continued on next page*

Table 4 continued

Variables	Food Insecurity Score (standardized)					
	(1)	(2)	(3)	(4)	(5)	(6)
	OLS		OLS		IV (Aid=Aid Regional Average)	IV (Aid=Aid District Average)
	SEA	CAC	SEA	CAC	SEA	CAC
<b>Age group</b> (ref: 18–29)						
30–39	–0.03 (0.05)	–0.01 (0.04)	–0.03 (0.05)	–0.04 (0.03)	–0.07 (0.05)	–0.00 (0.04)
40–49	–0.06 (0.05)	–0.04 (0.04)	–0.07 (0.05)	–0.01 (0.03)	–0.11** (0.05)	0.02 (0.04)
50–59	–0.08 (0.05)	–0.06 (0.04)	–0.09* (0.05)	–0.01 (0.04)	–0.13** (0.05)	0.04 (0.04)
60+	–0.11** (0.05)	–0.01 (0.04)	–0.12** (0.05)	–0.04 (0.04)	–0.13** (0.06)	–0.08* (0.04)
Location (1=Rural)	0.03 (0.02)	–0.05** (0.03)	0.03 (0.02)	–0.01 (0.02)	–0.01 (0.03)	0.01 (0.03)
Household Size	0.04*** (0.01)	0.02*** (0.01)	0.03*** (0.01)	0.01 (0.00)	0.04*** (0.01)	0.01*** (0.00)
<b>Work status</b> (ref: wage employment)						
Self-employment	–0.07*** (0.03)	–0.12*** (0.03)	–0.08*** (0.03)	–0.08*** (0.03)	–0.10*** (0.03)	–0.06* (0.03)
Retired	–0.00 (0.05)	–0.02 (0.04)	0.01 (0.05)	0.03 (0.04)	–0.05 (0.05)	0.10** (0.04)
No work	0.12** (0.05)	0.04 (0.04)	0.13*** (0.05)	0.03 (0.03)	0.23*** (0.05)	0.06 (0.04)
Mean regional inflation in SE	–0.01* (0.00)		–0.01 (0.00)		–0.00 (0.00)	–0.01*** (0.00)
Mean district inflation in CAC		–0.00 (0.00)		0.01** (0.00)		
Constant	–0.21 (0.14)	–0.39** (0.17)	–0.23 (0.15)	–0.13 (0.15)	0.05 (0.14)	0.23** (0.11)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,711	6,132	5,792	7,416	5,792	7,416
R-squared	0.24	0.18	0.23	0.15	0.12	0.08
Adj R-squared	0.233	0.178	0.227	0.145		

Standard errors in parentheses are robust.

\*p&lt;.01; \*\*p&lt;.05; \*\*\*p&lt;.001.

Source: Authors' estimates.

Table 5 shows the correlates of high FIS from the probit regression model in equation 2. As before, columns 1, 3 and 5 show the results for the SEA region while columns 2, 4 and 6 give the results for the CAC region. Columns 1 to 4 present the results for the probit model while columns 5 and 6 present the results for the IV probit model.

The results in Table 5 are generally consistent with the results in Table 4. They suggest that households in the lower income group, and those that experience significant increases in general prices, decreases in income, and worsening financial circumstances, have a higher probability of having high food insecurity. Moreover, households whose heads have higher levels of education in SEA and are self-

employed have a lower probability of having food insecurity. In terms of coping strategies, based on the IV probit estimates, government aid lessens the probability of having high food insecurity.

**Table 5: Factors Affecting High Food Insecurity Scores**

	Probit	Probit	Probit	Probit	IV Probit (Aid=Aid Regional Average)	IV Probit (Aid=Aid District Average)
	(1)	(2)	(3)	(4)	(5)	(6)
	SEA (1=Score of 4 to 6; 0 Otherwise)	CAC (1=Score of 4 to 5; 0 Otherwise)	SEA (1=Score of 4 to 6; 0 Otherwise)	CAC (1=Score of 4 to 5; 0 Otherwise)	SEA (1=Score of 4 to 6; 0 Otherwise)	CAC (1=Score of 4 to 5; 0 Otherwise)
<b>Variables</b>						
<b>Income quartile</b> (ref: 1st quartile)						
2nd quartile	-0.24*** (0.05)	-0.05 (0.05)	-0.23*** (0.05)	-0.08* (0.05)	-0.19*** (0.05)	-0.12** (0.05)
3rd quartile	-0.51*** (0.05)	-0.16*** (0.05)	-0.50*** (0.05)	-0.16*** (0.05)	-0.48*** (0.05)	-0.23*** (0.05)
4th quartile	-0.58*** (0.06)	-0.32*** (0.06)	-0.58*** (0.05)	-0.30*** (0.05)	-0.54*** (0.05)	-0.45*** (0.06)
<b>General inflation</b> (ref: unchanged or down)						
Price gone up significantly			0.15** (0.07)	-0.19*** (0.07)	0.13* (0.07)	0.07 (0.05)
Price gone up slightly			-0.03 (0.07)	-0.32*** (0.07)	-0.05 (0.07)	
<b>Food inflation</b>						
All food items	0.86*** (0.11)	0.43*** (0.09)			0.90*** (0.10)	0.29*** (0.08)
<b>Income change</b> (ref: increased)						
Income decreased	0.13** (0.06)	0.20*** (0.06)	0.15*** (0.05)	0.10* (0.05)	0.09* (0.05)	0.18*** (0.05)
Income unchanged	0.04 (0.05)	0.11** (0.05)	0.05 (0.05)	0.12*** (0.04)	0.07 (0.05)	-0.00 (0.04)
<b>Financial circumstance</b> (ref: better off)						
Worse off	0.40*** (0.05)	0.37*** (0.06)	0.40*** (0.05)	0.38*** (0.05)	0.30*** (0.05)	0.40*** (0.05)
Unchanged	0.07 (0.05)	0.06 (0.05)	0.06 (0.05)	0.11** (0.05)	0.03 (0.05)	0.07 (0.05)
<b>Coping strategies</b>						
Government aid	0.26*** (0.05)	0.37*** (0.06)	0.27*** (0.05)	0.37*** (0.06)	-0.50** (0.21)	-1.53*** (0.19)
Draw down savings	0.30*** (0.04)	0.30*** (0.05)	0.30*** (0.04)	0.30*** (0.05)	0.31*** (0.05)	0.31*** (0.04)
Sell assets	0.15*** (0.04)	0.24*** (0.04)	0.13*** (0.04)	0.24*** (0.04)	0.22*** (0.05)	0.27*** (0.04)
Gender (1=Female)	-0.01 (0.05)	0.06 (0.05)	-0.00 (0.04)	0.04 (0.04)	0.00 (0.04)	0.06 (0.04)

*continued on next page*



Table 5 *continued*

	Probit	Probit	Probit	Probit	IV Probit (Aid=Aid Regional Average)	IV Probit (Aid=Aid District Average)
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	SEA (1=Score of 4 to 6; 0 Otherwise)	CAC (1=Score of 4 to 5; 0 Otherwise)	SEA (1=Score of 4 to 6; 0 Otherwise)	CAC (1=Score of 4 to 5; 0 Otherwise)	SEA (1=Score of 4 to 6; 0 Otherwise)	CAC (1=Score of 4 to 5; 0 Otherwise)
<b>Education</b> (ref: primary)						
Secondary or high school	-0.14** (0.06)	0.02 (0.12)	-0.13** (0.05)	0.16 (0.10)	-0.14*** (0.05)	0.18* (0.10)
Vocational	-0.10 (0.11)	0.04 (0.12)	-0.08 (0.11)	0.12 (0.10)	-0.04 (0.10)	0.13 (0.11)
University / college	-0.36*** (0.08)	-0.08 (0.13)	-0.34*** (0.08)	-0.11 (0.11)	-0.31*** (0.07)	-0.12 (0.12)
Graduate	-0.48*** (0.07)	-0.11 (0.12)	-0.47*** (0.07)	0.04 (0.10)	-0.54*** (0.07)	-0.02 (0.11)
Don't know	-0.39*** (0.13)	-0.31 (0.48)	-0.38*** (0.13)	-0.26 (0.45)	-0.56*** (0.13)	-0.19 (0.41)
<b>Age group</b> (ref: 18–29)						
30–39	-0.01 (0.08)	0.06 (0.06)	-0.01 (0.08)	0.01 (0.05)	-0.05 (0.08)	0.07 (0.05)
40–49	-0.04 (0.08)	-0.01 (0.06)	-0.04 (0.08)	0.03 (0.05)	-0.07 (0.08)	0.01 (0.05)
50–59	-0.02 (0.08)	-0.01 (0.06)	-0.03 (0.08)	0.05 (0.06)	-0.04 (0.08)	0.03 (0.06)
60+	-0.09 (0.09)	0.10 (0.07)	-0.10 (0.08)	0.05 (0.06)	-0.07 (0.08)	0.04 (0.06)
Location (1=Rural)	0.04 (0.04)	-0.09** (0.04)	0.03 (0.04)	-0.04 (0.04)	0.01 (0.04)	-0.05 (0.04)
Household Size	0.04*** (0.01)	0.03*** (0.01)	0.03*** (0.01)	0.01 (0.01)	0.03*** (0.01)	0.03*** (0.01)
<b>Work status</b> (ref: wage employment)						
Self-employment	-0.12*** (0.04)	-0.11** (0.05)	-0.14*** (0.04)	-0.07 (0.04)	-0.14*** (0.04)	-0.08* (0.04)
Retired	-0.11 (0.09)	-0.05 (0.06)	-0.10 (0.09)	0.02 (0.06)	-0.17* (0.09)	0.03 (0.06)
No work	0.22*** (0.07)	-0.00 (0.06)	0.23*** (0.07)	-0.01 (0.05)	0.28*** (0.07)	0.06 (0.05)
Mean regional inflation in SE	-0.01 (0.01)		-0.01 (0.01)		-0.01** (0.01)	
Mean district inflation in CAC		0.00 (0.01)		0.01** (0.01)		-0.01*** (0.00)
Constant	-0.86*** (0.23)	-1.20*** (0.26)	-0.88*** (0.24)	-1.12*** (0.22)	-0.36* (0.21)	-0.77*** (0.17)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	5,711	6,132	5,792	7,416	5,711	6,132
R-squared	0.136	0.106	0.132	0.0924		

Standard errors in parentheses are robust.

\*p&lt;.01; \*\*p&lt;.05; \*\*\*p&lt;.001.

Source: Authors' estimates.

## 6. CONCLUSION AND POLICY RECOMMENDATIONS

Using data from a household survey conducted between September and December 2023 across seven SEA and nine CAC countries, namely Cambodia, Indonesia, the Lao PDR, Malaysia, the Philippines, Thailand, and Viet Nam for SEA, and Afghanistan, Armenia, Georgia, Kazakhstan, the Kyrgyz Republic, Mongolia, Pakistan, Tajikistan, and Uzbekistan for CAC, we estimated a measure of household-level food insecurity and analyzed the factors affecting the level of food insecurity.

*First*, we calculated the household-level food insecurity index. Both regions showed substantial levels of food insecurity, although the SEA region showed greater extremes of food insecurity, at both the high and the low ends, than the CAC region. In SEA countries about 10% of households reported the highest score of 6 and another 10% reported a score of 5, indicating high food insecurity. On the other hand, about 25% of households in SEA countries reported a score of 0, or no food insecurity. In CAC countries only a very small fraction of the population reported a score of 5, while almost 20% reported a score of 4.

*Second*, we identified the following types of households as being vulnerable to food insecurity: those with low incomes, worse financial circumstances, and a larger family size (in both the CAC and the SEA regions). In addition, the following types of households were vulnerable to food insecurity only in the SEA region: households whose heads were less well educated or who were not working. High inflation also significantly increased the degree of food insecurity, because inflation lowers the purchasing power of the household. Applying for government aid was found to be an effective coping strategy for reducing the degree of food insecurity in both SEA and CAC.

Based on the above results we provide the following policy recommendations. Government aid can be used to reduce food insecurity, especially in those CAC and SEA countries where there is a substantial proportion of households with a high food insecurity index level (from 4 to 6 in Figure 1). Government aid should be directed to the types of households identified as being vulnerable to food insecurity: those with a low income, worse financial circumstances, larger family size, a household head who is less well educated and a non-working household head (the latter two groups are statistically significantly vulnerable to food insecurity only in SEA). In addition, government aid is needed more during periods of high inflation, as high inflation increases food insecurity due to a reduction of real purchasing power. In the longer term, governments should also promote good education.

## REFERENCES

- Akim, A. M., F. Ayivodji, and J. Kouton. 2024. Food Security and the COVID-19 Employment Shock in Nigeria: Any Ex-ante Mitigating Effects of Past Remittances? *Food Policy* 122: 102574.
- Andrianarimanana, M. H., P. Yongjian, and M. F. R. Tanteliniana. 2023. Assessment of the Importance of Climate, Land, and Soil on the Global Supply for Agricultural Products and Global Food Security: Evidence from Madagascar. *Food Policy* 115: 102403.
- Asian Development Bank (ADB). 2024. *Asian Development Outlook (ADO) April 2024*. <https://www.adb.org/publications/asian-development-outlook-april-2024>.
- Azhgaliyeva, D., R. Mishra, T. Long, P. Morgan, and W. Kodama. 2022. *Impacts of Covid-19 on Households' Business, Employment and School Education: Evidence from Household Survey in CAREC Countries* (No. 1335). ADBI Working Paper.
- Chakraborty, O. 2023. Inflation and COVID-19 Supply Chain Disruption. In *Managing Inflation and Supply Chain Disruptions in the Global Economy*, edited by U. Akkucuk. IGI Global.
- Choi, S., D. Furceri, P. Loungani, S. Mishra, and M. Poplawski-Ribeiro. 2018. Oil Prices and Inflation Dynamics: Evidence from Advanced and Developing Economies. *Journal of International Money and Finance* 82: 71–96.
- Del Ninno, C., P. A. Dorosh, and K. Subbarao. 2007. Food Aid, Domestic Policy and Food Security: Contrasting Experiences from South Asia and sub-Saharan Africa. *Food Policy* 32(4): 413–435.
- Demi, S. M., and J. K. M. Kuwornu. 2013. Assessing the Degree of Food Insecurity among Farming Households: Evidence from the Central Region of Ghana. *Research on Humanities and Social Sciences* 3(3): 51–61.
- Diaz-Bonilla, E. 2020. Fiscal and Monetary responses to the COVID-19 pandemic: Some thoughts for developing countries and the international community. IFPRI Blog <https://www.ifpri.org/blog/fiscal-and-monetary-responses-covid-19-pandemic-some-thoughts-developing-countries-and/>.
- Edwards, B., Gray, M. and Borja, J., 2021. The influence of natural disasters on violence, mental health, food insecurity, and stunting in the Philippines: Findings from a nationally representative cohort. *SSM-population health*, 15, p.100825.
- Endris Mekonnen, E., and A. Kassegn Amede. 2022. Food Insecurity and Unemployment Crisis under COVID-19: Evidence from sub-Saharan Africa. *Cogent Social Sciences* 8(1): 2045721.
- Erokhin, V., and T. Gao. 2020. Impacts of COVID-19 on Trade and Economic Aspects of Food Security: Evidence from 45 Developing Countries. *International Journal of Environmental Research and Public Health* 17(16): 5775.
- Farzana, F. D., A. S. Rahman, S. Sultana, M. J. Raihan, M. A. Haque, J. L. Waid,, ... and T. Ahmed. 2017. Coping Strategies related to Food Insecurity at the Household Level in Bangladesh. *PloS one* 12(4): e0171411.
- Food and Agriculture Organization (FAO). 2024. Hunger and Food Insecurity. <https://www.fao.org/hunger/en/> (accessed 28 June 2024).

- Food and Agriculture Organization (FAO), IFAD, UNICEF, WFP and WHO. 2023. *The State of Food Security and Nutrition in the World 2023. Urbanization, Agrifood Systems Transformation and Healthy Diets Across the Rural–Urban Continuum*. Rome, FAO. <https://doi.org/10.4060/cc3017en>.
- Gazdar, H., and H. B. Mallah. 2013. Inflation and Food Security in Pakistan: Impact and Coping Strategies. *IDS Bulletin* 44(3), 31–37.
- Grace, K., Brown, M. and McNally, A., 2014. Examining the link between food prices and food insecurity: A multi-level analysis of maize price and birthweight in Kenya. *Food Policy*, 46, pp.56–65.
- Headey, D., F. Bachewe, Q. Marshall, K. Raghunathan, and K. Mart. 2024. Food Prices and the Wages of the Poor: A Cost-effective Addition to Food Security Monitoring. *Food Policy* 125: 102360.
- Jacobs, P., 2010. Household food insecurity, rapid food price inflation and the economic downturn in South Africa. *Agenda*, 24(86), pp.38–51.
- Keenan, D. P., C. Olson, J. C. Hersey, and S. M. Parmer. 2001. Measures of Food Insecurity/Security. *Journal of Nutrition Education* 33: S49–S58.
- Khan, K., C. W. Su, and M. N. Zhu. 2022. Examining the Behaviour of Energy Prices to COVID-19 Uncertainty: A Quantile on Quantile Approach. *Energy* 239: 122430.
- Kodama, W., P. Morgan, D. Azhgaliyeva, L. Trinh, and K. Kim. 2024. Family Business during the COVID-19 Pandemic in Asia: Role of Government Financial Aid and Coping Strategies. *World Development* 182: 106653.
- Loayza, N., and S. M. Pennings. 2020. Macroeconomic Policy in the Time of COVID-19: A Primer for Developing Countries. *World Bank Research and Policy Briefs*, (147291).
- Maddawin, A., P. Morgan, A. Park, D. Suryadarma, L. Q. Trinh, and P. Vandenberg, P. 2024. Learning Disruptions during the COVID-19 Pandemic: Evidence from Household Surveys in Southeast Asia. *International Journal of Educational Development* 107: 103053.
- Mahmood, T., R. Kumar, T. M. Ali, N. Naeem, and S. Pongpanich. 2023. Determinants of the Food Insecurity at Household Level in Pakistan: A Multilevel Model Approach. *Plos one* 18(10): e0291343.
- Matin, I., and D. Hulme. 2003. Programs for the Poorest: Learning from the IGVGD Program in Bangladesh. *World Development* 31(3): 647–665.
- Messer, E., and M. J. Cohen. 2007. Conflict, Food Insecurity and Globalization. *Food, Culture & Society* 10(2): 297–315.
- Morgan, P., and L. Q. Trinh. 2021. Impacts of COVID-19 on Households in ASEAN Countries and their Implications for Human Capital Development (No. 1226). ADBI Working Paper.
- Morgan, P. J., L. Q. Trinh, and K. Kim. 2022. *Impacts of COVID-19 on Households in ASEAN Countries and their Implications for Human Capital Development: Medium-run Impacts and the Role of Government Support* (No. 1312). ADBI Working Paper.
- Mutisya, M., M. W. Ngware, C. W. Kabiru, and N. B. Kandala. 2016. The Effect of Education on Household Food Security in Two Informal Urban Settlements in Kenya: A Longitudinal Analysis. *Food Security* 8: 743–756.

- Petralias, A., E. Papadimitriou, E. Riza, M. R. Karagas, A. B. Zagouras, A. Linos, and DIATROFI Program Research Team. 2016. The Impact of a School Food Aid Program on Household Food Insecurity. *The European Journal of Public Health* 26(2): 290–296.
- Randell, H., C. Gray, and E. H. Shayo. 2022. Climatic Conditions and Household Food Security: Evidence from Tanzania. *Food Policy* 112: 102362.
- Randell, H., C. Jiang, X. Z. Liang, R. Murtugudde, and A. Sapkota. 2021. Food Insecurity and Compound Environmental Shocks in Nepal: Implications for a Changing Climate. *World Development* 145: 105511.
- Rozaki, Z. 2020. COVID-19, Agriculture, and Food Security in Indonesia. *Reviews in Agricultural Science*, 8: 243–260.
- Rudolfson, I., H. Bartusevičius, F. van Leeuwen, and G. Østby. 2024. War and Food Insecurity in Ukraine. *World Development* 180: 106647.
- Samputra, P., and E. Antriandarti. 2024. Food Insecurity among Female Farmers in Rural West Sleman, Indonesia. *Agriculture and Food Security* 13:1. <https://doi.org/10.1186/s40066-023-00453-1>.
- Shemyakina, O. 2022. War, Conflict, and Food Insecurity. *Annual Review of Resource Economics* 14: 313–332.
- Singh, D. R., D. R. Sunuwar, S. K. Shah, L. K. Sah, K. Karki, and R. K. Sah. 2021. Food Insecurity during COVID-19 Pandemic: A Genuine Concern for People from Disadvantaged Community and Low-income Families in Province 2 of Nepal. *Plos one* 16(7): e0254954.
- Sisha, T. A. 2020. Household Level Food Insecurity Assessment: Evidence from Panel Data, Ethiopia. *Scientific African* 7: e00262.
- Swinnen, J., and J. McDermott. 2020. COVID-19 and Global Food Security. *EuroChoices* 19(3): 26–33.
- United States Department of Agriculture. 2012. U.S. Household Food Security Survey Module: Six-Item Short Form. Economic Research Service, USDA. <https://www.ers.usda.gov/media/8282/short2012.pdf>.
- Verpoorten, M., A. Arora, N. Stoop, and J. Swinnen. 2013. Self-reported Food Insecurity in Africa during the Food Price Crisis. *Food Policy* 13: 51–63.
- Wang, Q., X. Yang, and R. Li. 2022. The Impact of the COVID-19 Pandemic on the Energy Market – A Comparative Relationship between Oil and Coal. *Energy Strategy Reviews* 39: 100761.
- World Bank Group. 2024. Food Security Update. *World Bank Response to Rising Food Insecurity*. June 3. <https://www.worldbank.org/en/topic/agriculture/brief/food-security-update> (accessed 28 June 2024).

## APPENDIX

**Table A1: First Stage IV Regression Result**

Variables	(1) SEA	(2) CAC
<b>Income quartile</b>		
2nd quartile	−0.01 (0.01)	−0.03*** (0.01)
3rd quartile	−0.03* (0.01)	−0.04*** (0.01)
4th quartile	−0.03** (0.01)	−0.07*** (0.01)
<b>General inflation</b>		
Price gone up significantly	0.01 (0.02)	0.10*** (0.01)
Price gone up slightly	−0.01 (0.02)	0.10*** (0.01)
<b>Income change</b>		
Income decreased	0.01 (0.01)	0.03** (0.01)
Income unchanged	0.03** (0.01)	−0.01 (0.01)
<b>Financial circumstance</b>		
Financial circumstance worse off	−0.03** (0.01)	0.05*** (0.01)
Financial circumstance unchanged	−0.03** (0.01)	0.02*** (0.01)
<b>Coping strategies</b>		
Aid	0.95*** (0.06)	0.95*** (0.06)
Savings	0.09*** (0.01)	0.03*** (0.01)
Selling	0.13*** (0.01)	0.03*** (0.01)
Gender (1=Female)	−0.01 (0.01)	0.02** (0.01)
<b>Education</b>		
Secondary or high school	0.01 (0.01)	0.01 (0.02)
Vocational	0.03 (0.03)	−0.00 (0.02)
University/college	−0.02 (0.02)	−0.00 (0.02)
Graduate	−0.04** (0.02)	−0.02 (0.02)
Don't know	−0.03 (0.03)	−0.03 (0.07)

*continued on next page*

**Table A1** *continued*

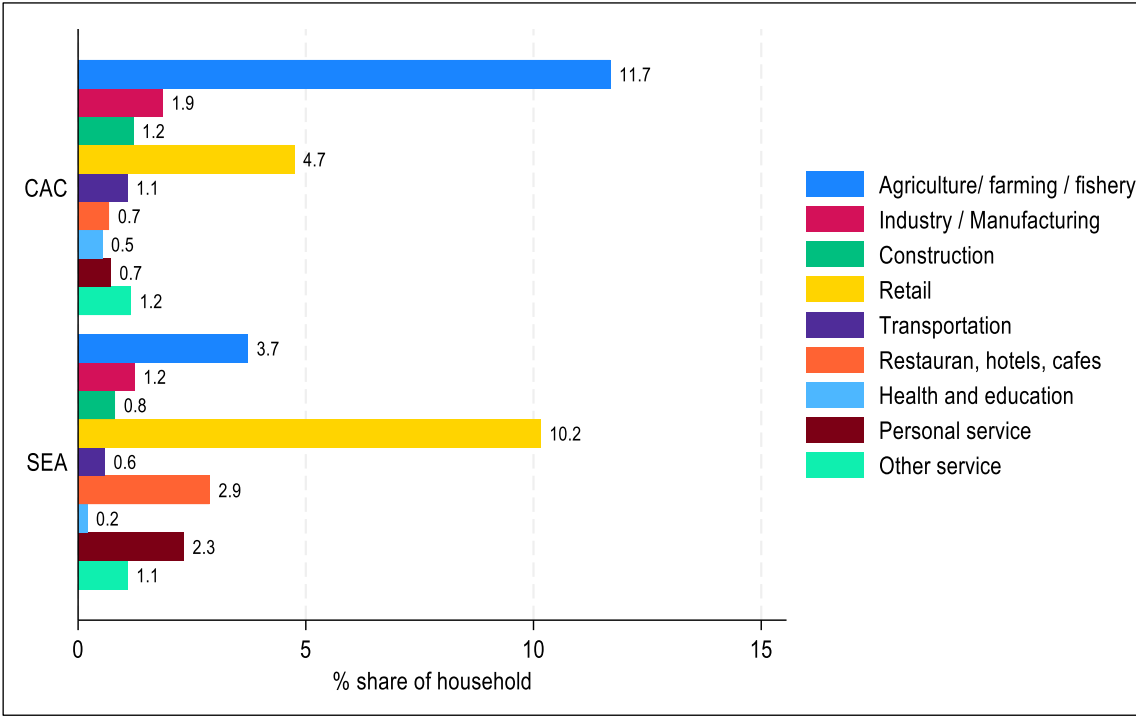
<b>Variables</b>	<b>(1) SEA</b>	<b>(2) CAC</b>
<b>Age group</b>		
30–39	–0.01 (0.02)	0.01 (0.01)
40–49	–0.02 (0.02)	0.01 (0.01)
50–59	0.00 (0.02)	0.01 (0.01)
60+	0.01 (0.02)	–0.02 (0.01)
Location (1=Rural)	–0.01 (0.01)	0.01 (0.01)
Household Size	–0.00 (0.00)	0.01*** (0.00)
<b>Work status</b>		
Self-employment	–0.03** (0.01)	–0.02*** (0.01)
Retired	–0.02 (0.02)	–0.01 (0.01)
No work	0.01 (0.02)	0.02* (0.01)
Mean regional inflation in SEA	–0.00 (0.00)	
Mean district inflation in CAC		–0.00*** (0.00)
Constant	–0.02 (0.05)	–0.08*** (0.02)
Observations	5,792	7,416
F-statistics	233.4	217.8

Standard errors in parentheses are robust.

\*p&lt;.01; \*\*p&lt;.05; \*\*\*p&lt;.001.

Source: Authors' estimates.

Figure A1: Business Sectors



Source: Authors' estimates from survey data.