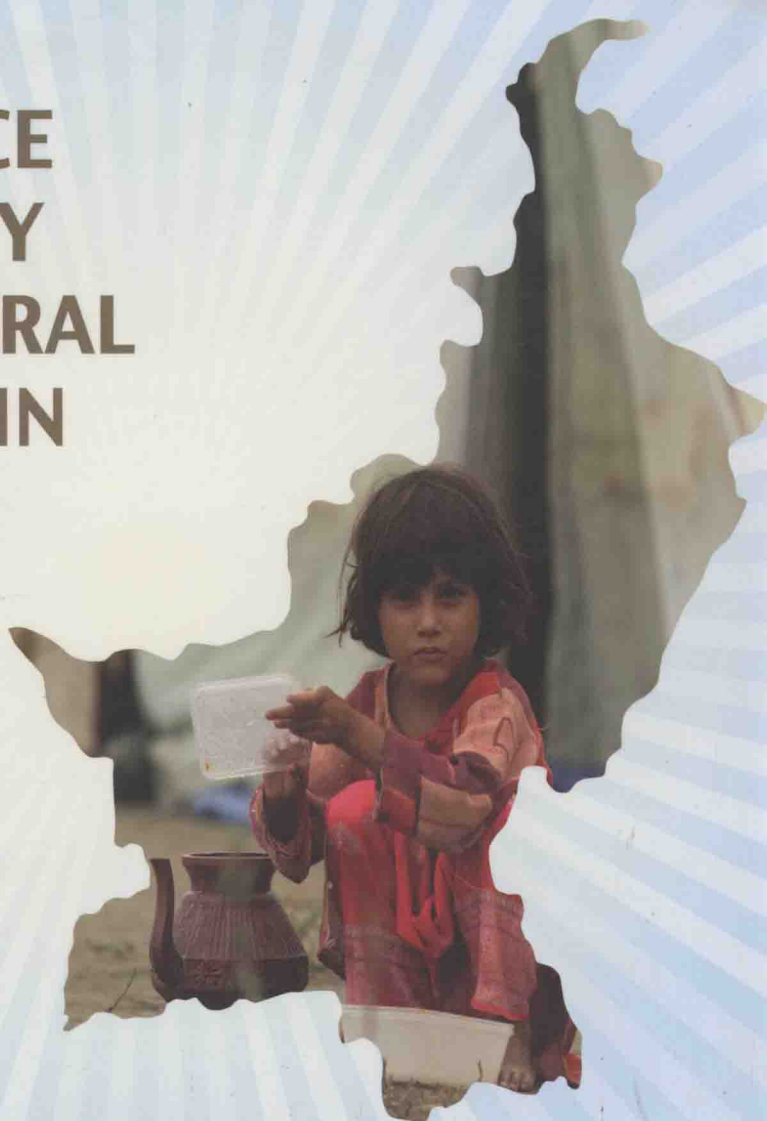


FOOD PRICE VOLATILITY AND NATURAL HAZARDS IN PAKISTAN

Measuring the
impacts on
hunger and
food assistance



World Food
Programme

SISMod -
Shock Impact Simulation Model



Contents

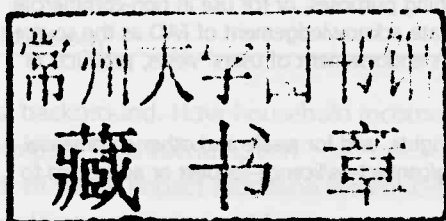
Food price volatility and natural hazards in Pakistan

Measuring the impacts on hunger and food assistance

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Foreword

In recent years, there has been much concern over the increased volatility of global food commodity prices, climate change leading to a higher frequency of severe natural disasters, and political crises, all of which have adverse effects on food security. Both food producing/exporting countries and Low Income Food Deficit Countries (LIFDCs) are affected by recurring crises, which often send shockwaves through national economies and households, leading to a heightened situation of food insecurity.

In order to take timely action to avert a food crisis, countries need to be able to rapidly assess the impact of such shocks. As disasters are unpredictable by nature, often little time is available for assessment, planning and response. Developing countries may not have the capacity to do such rapid assessments. Furthermore, these countries may be concurrently experiencing other types of economic or political crises, making assessment even more difficult.

Addressing the multi-dimensional factors that underpin food insecurity and poverty requires livelihoods-based analytical tools to better understand food security at global, national and household levels. The global food and financial crises have demonstrated that priority should be given to supporting national and global capacities for timely and forward-looking impact assessments.

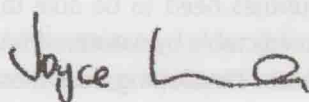
Both the Global Information and Early Warning System (GIEWS) of FAO and the Food Security Analysis Service (ODXF/VAM) of WFP monitor the food security situation in all developing countries, and jointly conduct the FAO/WFP Crop and Food Security Assessment Missions (CFSAM) in countries with current or potential food emergencies. Estimating food availability, access and food assistance needs, and analyzing and targeting vulnerable groups for such rapid assessment missions have proven very difficult because of the lack of analytical tools and baseline information for vulnerable groups.

In light of the above, a Shock Impact Simulation Modeling System (SISMOD) was developed jointly by FAO and WFP to simulate the impacts of shocks on household food consumption. The SISMOD builds on existing nationally representative household survey data. This model is regarded as a strong alternative to nationwide assessments, as it can be used as a cost-effective, time-efficient tool prior to in-depth assessments conducted on the ground in the most affected areas and populations. The results of the simulation can also support early warning and contingency planning for potential shocks and a more rapid response to shocks as they occur. The SISMOD provides estimates of the proportion of undernourished people by livelihood and income group, as well as

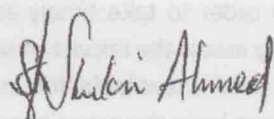


by geographical area. It thus contributes to geographic and community targeting in selected LIFDCs that are highly vulnerable to reoccurring crises.

This book presents the case study for Pakistan, which is the first of five case studies carried out in LIFDCs. The methodological and analytical approach of the SISMOD are presented here, together with extensive baseline information on the vulnerability situation of Pakistan by livelihood and income groups and geographical areas. The results of the simulation of the combined impacts of high food price crisis and climate shocks (floods) provide guidance to policymakers on the most affected areas and population groups. The methodology and the tools used for Pakistan have now been refined in order to ensure effective replication in other countries subject to large-scale shocks.



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FAO	Food and Agriculture Organization
ICPS	International Classification of Primary Sectors
IOYs	Internationally Declared Years
INC	United Nations International Standard Industrial Classification of All Economic Activities
ISU	International System of Units
FATA	Federally Administered Tribal Areas
kcal	Kilo Calorie
kg	Kilogram
km ²	Square Kilometre
KPC	Kinyua Pamburukhwa
LAIDS	Linear Approximate Almost Ideal Demand System
LES	United Nations Expenditure System
LIFDC	Low Income Food Deficit Countries
MDGs	Millennium Development Goals
MAFA	Ministry of Food and Agriculture
MFN	Most Favourable Nations



Acronyms

AHM	Agriculture Household Models
AJK	Azad Jammu Kashmir
APC	Average Propensity to Consume
APS	Average Propensity to Save
CPI	Consumer Price Index
CRED	Centre for Research on the Epidemiology of Disasters
CV	Coefficient of Variation
DEC	Dietary Energy Consumption
DECR	Dietary Energy Consumption Requirement (or threshold)
ECM	Error Correction Model
FAO	Food and Agriculture Organization
FATA	Federally Administrated Tribal Area
FG	Food Gap
FR	Frontier Regions
FSRI	Food Security Risk Index
FY	Fiscal Year
GB	Gilgit- Baltistan
GDP	Gross Domestic Product
GIEWS	Global Information and Early Warning System of the Food and Agriculture Organization (FAO)
GOP	Government of Pakistan
H	Hectare
HIES	Household Integrated Economic Survey
IDPs	Internally Displaced Persons
ISIC	United Nations International Standards Industrial Classification of All Economic Activities
ISU	International System of Units
FATA	Federally Administered Tribal Areas
Kcal	Kilo Calories
KG	Kilogram
KM²	Square Kilometers
KPK	Khyber Pakhtunkhwa
LAIDS	Linear Approximate Almost Ideal Demand System
LES	Linear Expenditure System
LIFDC	Low Income Food Deficit Countries
MDGS	Millennium Development Goals
MINFA	Ministry of Food and Agriculture
MFN	Most Favorable Nations



MT	Metric tonnes
MMT	Million metric tonnes
MY	Market year
NDVI	Normalized Difference Vegetation Index
NFSS	National Food Security Strategy
ODXF	Food Security Analysis Service of World Food Programme
PAK	Pakistan Administered Kashmir
PARC	Pakistan Agriculture Research Council
PE	Partial Equilibrium
PSLM	Pakistan Social and Living Standards Measurement Survey
Rs	Rupees
SISMOD	Shock Impact Simulation Model
TTRI	Tariff Trade Restrictiveness Index
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction
USD	United States Dollar
WFP	World Food Programme
WHO	World Health Organization
WTO	World Trade Organization



Glossary

Average propensity to consume (Apc)

APC is defined as the ratio of a household's spending or consumption to its disposable income. In turn, the 'average propensity to save' or APS is the ratio of the family's savings to its disposable income. The resulting sum of APC and APS is one; that is, one hundred percent of disposable income.

Crop income

The estimation of crop income accounts for the sale of crop production, crop by-product production, sharecropping, the consumption of household crop production, net of all expenditures incurred in realizing these activities, such as agricultural inputs (seeds, pesticides and fertilizers) and the hiring of farm labour.

Depth of hunger (kcal/person/day)

Refers to the difference between the average dietary energy intake of an undernourished population and its average minimum dietary energy consumption requirement (DEC). (Average gap between Minimum DEC and DEC for the undernourishment population).

Dietary energy consumption (DEC) (kcal)

Food consumption expressed in energy terms. At sub-national levels it is estimated using food consumption data, with quantities collected from in national household surveys; these estimates refer to private food consumption. Average DEC is the average per capita daily total food calorie intake.

Dietary energy consumption requirement (DEC)

The threshold amount of dietary energy per person adequate to meet the energy needs for minimum acceptable limit of the range of body-weight for attained-height and the light physical activity norm. For a population, the overall daily dietary energy requirement per person is derived by aggregating the sex-age requirements weighted by the proportion of each sex and age group in the total population.



Disaster

A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.

Household income

Household income is disaggregated into crop income, livestock income, wage income and remittance income.

Livestock income

The livestock income category includes income from the sale and barter of livestock, livestock by-product production (i.e. milk, eggs, honey etc.), net of expenses related to livestock production (e.g. fodder, medicines) and livestock purchases, plus the value of household consumption of own livestock and livestock by-product production.

Percentage of people consuming less than the threshold of

DECAR (<2 350 kcal/person in adult eq./day)

Percentage of people with daily kilocalorie (kcal) intake <2 350 kcal in adult equivalent.

Percentage of people consuming less than the threshold of

DECAR (<2 100 kcal/person/day)

Percentage of people with daily kilocalorie (kcal) intake <2 100 kcal.

Percentage of people consuming less than the threshold of

DECAR (<1 730 kcal/person/day)

Percentage of people with daily kilocalorie (kcal) intake <1 730 kcal.

Remittance income

Remittance income is separated from other income. Remittance income can be sourced by domestic transfer income and overseas transfer income.

Total cereal gap in wheat equivalent (tonnes) (or food gap in quantity of wheat equivalent)

Total gap for all undernourished people in a year (converted from kcal to wheat equivalent).



Undernourishment

Refers to the condition of people whose dietary energy consumption is continuously below a minimum dietary energy requirement (MDER) for maintaining a healthy life and carrying out light physical activity. The number of undernourished people refers to those in this condition.

Number of people undernourished

Total number of people who are undernourished.

Wage income

Wage income consists of all income received in the form of employee compensation either in cash or in kind. Wage employment income is first disaggregated by industry in the survey. The classification is based on the United Nations International Standards Industrial Classification of all Economic Activities (ISIC). As the classification of industries changes over time, the most appropriate revision of the ISIC classification standards is chosen based on the year the survey was undertaken. In the survey, industries are grouped into ten principal categories: agriculture; forestry and fishing; mining; manufacturing; utilities; construction; commerce; transportation, communications and storage; finance and real estate; services; and miscellaneous. Using this industrial classification, total wage employment income is separated into three aggregate categories: agricultural wages, non-agricultural private wages, and non-agricultural public wages.



Preface

This book forms part of the output from the joint FAO/WFP Project (JP) created to develop a Shock Impact Simulation Model (SISMod) for Food Security Monitoring and Needs Assessment for selected vulnerable countries. The initial phase of the current project focused on shock-prone food-deficit countries representing different levels of exposure to shocks: Bangladesh, Nepal, Pakistan, Tajikistan, Niger, Tanzania and Uganda.

Pakistan is the first of five case studies. In recent years, Pakistan has faced the combined impacts of the global food price, fuel and financial crises and a series of climate shocks, which have increased undernourishment significantly. These events have also sent shockwaves through the national economy. To analyse the impact of these shocks on food security, the JP team processed household survey data, conducted a household food demand analysis, developed profiles on vulnerability to food insecurity at national, subnational and household levels, and carried out studies on market integration. The model developed for Pakistan was applied during the 2010 multi-agency Damage and Needs Assessment in Pakistan, which was led by the Asian Development Bank/World Bank and the UN Mission on Floods Impact on MDG Analysis in Pakistan led by UNDP. Furthermore, the model has been applied by the WFP for programme formulation activities in Pakistan for 2012.

Synopsis

- Recent increases in global food prices, high frequency of natural disasters and political tensions have had adverse effects on household food security. Many countries are affected by recurring crises. In the first case study, the impact of market and climate-related shocks on household food consumption are quantified in Pakistan, using a series of modules that derive food consumption information from household income levels.
- The study first analyses the baseline vulnerability context at different geographic areas for a range of household livelihood groups through three profiles: market integration of staple food commodities, nationwide vulnerability to natural disasters, and household vulnerability.



Executive summary



Synopsis

- Recent increases in global food prices, high frequency of natural disasters and political crises have had adverse effects on household food security. Many countries are affected by reoccurring crises. In this first case study, the impact of market and climate-related shocks on household food consumption are quantified in Pakistan, using a series of modules that derive food consumption information from household income levels.
- The study first assesses the baseline vulnerability context in different geographic areas for a range of household livelihood groups through three profiles: market integration of staple food commodities, nationwide vulnerability to natural disasters, and household vulnerability.



- The results of the simulation model indicate that the number of undernourished people (as per the Government of Pakistan's calorie consumption threshold of 2 350 kcal/adult/day) increased from 77.6 million in 2005/06 to 95.7 million by the end of 2010. The increase can be attributed to price inflation (about 13 million people) and to the massive flood disaster in August 2010 (an additional five million people). The consumption shortfall for the undernourished population equals 6.2 million tonnes of wheat per annum to combat the impacts of the recent shocks.
- If a lower minimum per capita consumption standard of 2 100 kcal/person/day is applied, the number of undernourished people reaches 99.2 million (an additional 11.5 million owing to price inflation and five million because of floods, from a baseline value of 82.7 million). The national food gap becomes some 6 million tonnes of wheat per annum. If the minimum daily energy requirement of 1 730 kcal/person/day is used, the number of undernourished people becomes 65 million (an additional 14 million because of price inflation and 7 million because of floods, from a baseline value of 44 million), and the national food gap becomes 2.7 million tonnes per annum.
- Pakistan's per capita wheat consumption has been declining in recent years in response to high prices and the reduction in incomes, leading to a rise in wheat stocks. In terms of the national balance sheet, Pakistan is expected to be balanced in wheat while continuing to be a net exporter in rice, albeit with a reduction in volume by over one million tonne.

Background and approach

Recently there has been a marked increase in the number of countries facing food crises. Some of the underlying causes have included higher global food commodity price and increased volatility, higher frequency of severe natural disasters and political crises. National and global methods for prompt assessments are weak in supporting timely responses to food crises in many developing countries. While many sudden-onset natural disasters leave little time for assessment and response, man-made disasters present even more challenges to conducting increasingly complex and in-depth analyses. Therefore, there has been an urgent need to develop an effective Early Warning System that signals potential shocks and allows a quick response to crises.

This report presents such a system: a shock impact modeling system (SISMOD) that was developed jointly by WFP and FAO, to simulate the impacts of shocks on household food consumption. The SISMOD builds on existing nationally representative household survey data. This model reduces the need for in-depth nationwide assessments, which can then be limited to the most affected areas and populations. Geographic and community targeting



is made possible as the SISMOD provides estimates of the proportion of undernourished people by livelihood, income group and geographical area. It is being piloted in selected Low- Income Food- Deficit Countries (LIFDCs) that are highly vulnerable to reoccurring crises.¹

The results of the Pakistan case study are presented here. In recent years, Pakistan has faced several crises, including the 2008 global food, fuel and financial crises, and a series of major natural disasters, which have increased undernourishment significantly and sent shockwaves through the national economy. In 2008, a UN Interagency mission was conducted in Pakistan in order to assess the impact of food price hikes in the country. This mission was supported by the Government of Pakistan and other stakeholders.² As the analytical method developed for this assessment was recognized to be very useful, the methodology was further refined, in order to enable effective replication in other countries vulnerable to large-scale shocks.

The project consisted of two parts. In part 1, the vulnerability context of Pakistan was assessed using baseline data (i.e. without shocks), and the areas and livelihood groups most vulnerable to potential shocks were identified. Three profiles were used to assess the vulnerability context. The first provides a market integration analysis of staple food commodities, and determines the markets that are most receptive or vulnerable to international and domestic food price shocks. The second profile reviews the historical records of nationwide vulnerability to natural disasters and highlights the areas that are most vulnerable to climate shocks. An understanding of the relationship between weather patterns and staple crop production, and the implications for household food security are provided. The third profile estimates the baseline caloric intake of households and analyses the vulnerability of livelihood groups to shocks by combining households' main income sources with the shock factors. These three baseline vulnerability profiles provided contextual information for the modeling by highlighting factors that make households sensitive to market and climate shocks.

The second part was the simulation of the impact of shocks on household food consumption (measured by caloric intake) through a series of modules following three steps: estimation of incomes, allocation of incomes through a two-stage budget allocation demand system by income group, and estimation of equivalent caloric intake. The simulation results show the population groups that were most affected by previous shocks and the groups that are most likely to be affected by future shocks.

Therefore, it can contribute to geographic and community targeting. It is being piloted in selected LIFDCs that are highly vulnerable to reoccurring crises.

Pakistan is the first of the five case studies. In recent years, Pakistan has been faced with the combined impacts of the 2008 global food price, fuel and financial crises and a series of climate shocks, which have increased undernourishment significantly.

¹ These countries include: Bangladesh, Tajikistan, Tanzania, Nepal and Pakistan.

² The UN Inter Agency (FAO/UNDP/UNICEF/WFP/WHO) Assessment Mission. High Food Prices in Pakistan: Impact Assessment and the Way Forward
http://www.un.org.pk/wfp/Pakistan_High%20Food%20Prices%20_11%20Aug%202008_.pdf



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