Towards Comprehensive Food Security in Bangladesh : New Research of Availability, Access and Nutrition

Proceedings of the Third Annual FMRSP Workshop

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FMRSP
Bangladesh Food Management & Research Support Project

TOWARDS COMPREHENSIVE FOOD SECURITY IN BANGLADESH : NEW RESEARCH ON AVAILABILITY, ACCESS AND NUTRITION

Proceedings of the
Third Annual FMRSP Workshop

Editors

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ABBREVIATIONS

Bangladesh Bureau of Statistics ..... BBS
Bangladesh Institute of Development Studies..... BIDS
Bangladesh Rice Research Institute..... BRRI
Central Food Technology Research Institut ..... CFTRI
Central Supply Depot ..... CSD
Computable General Equilibrium..... CGE
Conusmer Price Index..... CPI
Department of Agricultural Marketing ..... DAM
Domestic Resource Cost ..... DRC
Direct Distribution Indicator (DISDI) ..... DSD
East Pakistan Agricultural Development Corporation ..... EPADC
Food and Agriculture Organization ..... FAO
Food for Education ..... FFE
Food Management and Research Support Project..... FMRSP
Food Planning and Monitoring Unit..... FPMU
Government of Bangladesh ..... GOB
Gratuitous Relief..... GR
Gross Domestic Product..... GDP
High Yielding Variety..... HYV
Household Expenditure Survey ..... HES
Household..... HH
International Food Policy Research Institute ..... IFPRI
Local Government Engineering Department ..... LGED
Linear Expenditure System ..... LES
Local Storage Depot ..... LSD
Marginal Propensity To Consume ..... MPC
Metric Tons ..... MT
Ministry of Food ..... MoF
National Nutrition Program..... NNP
Non-Government Organizations..... NGO

Normal Rate of Return ..... NRR
Per Capita ..... PC
Procurement Grades Of Rice ..... DGF
Public Foodgrain Distribution System ..... PFDS
Ready-Made Garments ..... RMG
South Asian Association of Regional Cooperation ..... SAARC
Social Accounting Matrix ..... SAM
Standard Deviation ..... SD
Thousand-Grain Mass ..... TGM
United States Agency for International Development ..... USAID
Vulnerable Group Development ..... VGD
Vulnerable Group Feeding ..... VGF
World Food Programme ..... WFP
World Trade Organization ..... WTO

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ACKNOWLEGEMENTS

A large number of people contributed to the research, the discussions and the logistical arrangements for the Third Annual FMRSP workshop. Many of these people are acknowledged in the individual papers presented. Nonetheless, we feel it is important to thank those who made additional contributions to the workshop itself.

First, we wish to thank the Honourable Minister of Food, Alhajj Amir Hossain, for presenting the keynote address at the opening of the workshop, and the Secretary of Food, Mr. Ayub Quadri, for being chairman of the inaugural session. Special thanks are also due to the Secretary of Planning, Dr. Tawfiq-e-Elahi Chowdhury (B.B.) for acting as chairman of the first working session and participating as a panelist in the final session.

Mr. Abu Abdullah, Director of the Bangladesh Institute of Development Studies (BIDS) took on multiple roles, as well, speaking in the opening session and chairing the final panel discussion. We are also grateful to Mr. Gordon West, Director, USAID, for speaking in the opening session.

We wish to thank the other session chairmen -- Dr. Z. Karim, Secretary, Ministry of Fisheries and Livestock; Mr. Shakir Uddin Ahmad, Director General, Food Planning and Monitoring Unit; and Dr. Raisuddin Ahmed, IFPRI; and Mr. Joan Fleuren, Deputy Director of the World Food Programme in Bangladesh, who served as a panelist in the final session.

The designated discussants of the sessions likewise contributed much to the sessions with thoughtful comments on the papers: Dr. Hossain Zillur Rahman, Senior Research Fellow, BIDS; Professor K.M. Rahman, Jahangirnagar University; Dr. M.A.K. Mia, Senior Agricultural Engineer, Bangladesh Rice Research Institute; Professor Ismail Hossain, Jahangirnagar University; and Dr. Bazlul Haque Khondaker, University of Dhaka.

We will not separately acknowledge the individual researchers who wrote papers for the workshop, except for Dr. Carlo del Ninno, FMRSP, who played a major role in planning and logistics, in addition to co-authoring four of the papers presented. Thanks are also due to the

staff of FMRSP-IFPRI who handled the logistical arrangements for the workshop, especially Hashim Uddin Ahammad, Md. Aminul Islam Khandaker, Nishat Afroz Mirza, Md. Saifur Rahman, Golam Robbani and Syed Rashed Al-Zayed. We also thank Abdulla-Al-Amin for excellent secretarial support and to Thomas Kress for editorial assistance. Wajid Hasan Shah deserves special recognition for his work in editing many of the executive summaries and writing a summary of the panel discussion.

Finally, we gratefully acknowledge the contributions of Mr. Abdul Aziz, the FMRSP Project Director, in the administration of the project and we thank USAID for their financial support.

FORWARD

Despite significant achievements in foodgrain production, food insecurity remains a matter of great concern in Bangladesh. In fact, few countries approach the problem of food security with as much sense of urgency. This is not surprising since Bangladesh faces the daunting challenge of feeding its 130 million people, about half of whom live below the "food-based" poverty line (consuming less than 2122 kcal/capita/day) and about one quarter of whom subsist in extreme poverty (consuming less than 1800 kcal/capita/day). Apart from the prevailing deficit in total calorie intake, the normal diet of Bangladeshi people is seriously imbalanced, with inadequate shares of fat, oil and protein. Women and children are especially vulnerable due to their greater nutritional requirements. Moreover, a large number of the population periodically suffers the distress of transitory food insecurity caused by floods, droughts, cyclones and other natural disasters. Thus, food insecurity and malnutrition are basic problems of the lives of the poor in Bangladesh.

At the 1996 World Food Summit, the Government of Bangladesh set as its goal to reduce the number of undernourished people to half by the year 2015. Achieving the goal will require focusing attention on all three aspects of food security – availability, access and nutrition - in a coordinated effort involving several ministries, the private sector, NGOs and other concerned agencies. The Third Annual FMRSP Workshop, therefore, chose "Towards Comprehensive Food Security in Bangladesh – Availability, Access and Nutrition" as the central theme and included papers analyzing issues involved in these three aspects of food security.

The first session of the workshop, "Household Food Security and Targeted Food Programs", included three papers. The first paper, "Recovering from the Shock of the 1998 Flood: Household Food Security and Nutritional Status One Year Later" by Dr. Carlo del Ninno and Dr. Dilip K. Roy, compared household level data on income, consumption and nutrition across three time periods, just after the flood (November, 1998), approximately five months after the flood (April, 1998), and a year after the flood (November, 1999). This study highlighted the importance of credit, particularly informal sector credit, for households in coping with the effects

of the flood, but noted that debts remained high more than one year later. The paper on "Using Household and District Level Data for Geographic Targeting: A Methodological Exercise with Bangladesh Data" by Dr. Carlo del Ninno and Dr. Binayak Sen dealt with targeting of food assistance. The paper suggested methodologies for generating maps as a guide for allocating resources to vulnerable areas in the country. The third paper in this session, by Dr. Akhter Ahmed, Dr. Carlo del Ninno and Dr. Omar Haider Chowdhury on "Evaluating the Food for Education Program in Bangladesh", examined the effects of the FFE program on school enrollment, attendance and drop-out rates, quality of education and nutrition. It also assessed the targeting efficiency, cost-effectiveness of income transfers, and the efficiency of the foodgrain distribution.

The second session of the Workshop, "Foodgrain Supply and Demand", was devoted to the availability aspect of comprehensive food security. The first paper, on "Recent Developments in Mechanized Cultivation: Emerging Issues in Agriculture of Bangladesh" by Dr. Raisuddin Ahmed, examined various issues associated with mechanization, focusing on the implications of increased use of power tillers on cropping intensity and seasonal labour demand. The second paper, "Poultry Farms and Poultry Feeds in Bangladesh: Survey Results" by Dr. A. Quasem, discussed survey results showing the principal characteristics of poultry farms and the efficiency of their feeding practices at both the household as well as commercial levels. Dr. K.M. Nabiul Islam's paper, "Demand for Poultry Feeds: Implications for Wheat and Maize Markets in Bangladesh", presented alternative projections of demand for poultry feed over the next 20 years, with a special focus on demand for wheat and maize. The fourth paper, by Dr. Quazi Shahabuddin and Dr. Paul Dorosh, "Comparative Advantage in Bangladesh Agriculture", assessed the comparative advantage of the production of both rice and non-rice crops either for import substitution or for export. The final paper, "Medium Term Outlook for Rice Production and Demand: Projections to 2020", presented econometric estimates of the price elasticity of rice acreage and projections of rice supply and demand under both exogenous and endogenously determined prices.

The two papers presented in the third session, "Foodgrain Markets and Storage" discussed

aspects of the quality of foodgrains in Bangladesh. "Chemical Change of Foodgrains in Storage" by Dr. Mohammad Kabirullah and Mr. Mahfoozur Rahman analyzed the nature of chemical changes in foodgrains in government storage using sample survey data. The second paper, "Grades, Standards and Inspection Procedures of Rice in Bangladesh" by Dr. A.K.M. Nurul Afsar, Dr. Mohammad A. Baqui, Mr. Mahfoozur Rahman and Mr. Abdur Rouf, reviewed the existing Director General of Food procurement grades of rice, and recommended procedures to develop appropriate grades and standards of rice for the domestic and international markets.

Three papers were presented in the fourth session of the workshop, "Rural Incomes, Employment and Food Prices". Dr. K.A.S. Murshid in his paper, "A Market in Transition? The Case of the Bangladesh Rice Market" explored developments in Bangladesh rice markets, highlighting the transition towards a more developed (impersonal) market structure. The second paper, "Determinants of Labor Market Participation in Rural Bangladesh" presented by Dr. Carlo del Ninno and Dr. Dilip K. Roy, analyzed labor participation in rural Bangladesh using household level data. The third paper of the session, "The Debate over Dynamics of Agricultural Wage and Rice Price in Bangladesh: A Re-examination" presented by Dr. Shahidur Rashid explored various issues related to the dynamics of agricultural wage and rice markets using co-integration techniques.

Three papers were presented in the fifth session of the workshop, "Macro-Economic Policies and the Foodgrain Sector". Dr. M.K. Mujeri in his paper on "Poverty Trends and Agricultural Growth Linkages" reviewed recent trends in poverty and explored the channels through which agricultural growth benefits the poor. The second paper, "Macro Policies and the Food Sector in Bangladesh: A General Equilibrium Analysis" by Dr. Marzia Fontana, Dr. Peter Wobst and Dr. Paul Dorosh presented a computable general equilibrium (CGE) model of the Bangladesh economy. Model simulations of lower rice productivity, changes in food aid and increased foreign exchange earnings demonstrated the impacts of these economic shocks on both men's and women's labor and welfare of various household groups. The third paper in the session, "Food Aid and Producer Price Incentives" by Dr. Paul Dorosh, Dr. Quazi Shahabuddin, Mr. Abdul Aziz and Mr. Naser Farid examined the potential adverse effects of food aid for wheat

production in Bangladesh. After reviewing global food aid flows and food aid policies and programmes in Bangladesh, the paper presented estimates of "safe levels" of food aid to avoid disincentive effects on wheat production in the country, concluding that if good rice harvests continue, then net public wheat distribution may need to be cut to levels below the current amount of food aid received (650 thousand MTs in 2000/2001) to avoid reducing domestic prices below import parity.

In the sixth session on "Comprehensive Food Security Policy", Mr. Ruhul Amin presented the major issues and recommendations of the Comprehensive Food Security Report, prepared by the Task Force earlier. This was followed by a panel discussion on the central theme of the workshop. Dr. Tawfiq-e-Elahi Chowdhury (Secretary, Ministry of Planning), Dr. Raisuddin Ahmed (IFPRI) and Mr. Joan Fleuren (WFP) took part in the panel discussion, which was chaired by Mr. Abu Abdullah (BIDS). The discussion highlighted various aspects of comprehensive food security including the role of markets in the allocation and distribution process, the need for sustained, broad-based and labor-intensive growth to make a significant dent in poverty, and the importance of increased attention on nutrition and utilization aspects of food security.

It is hoped that the research papers presented and the deliberations that took place in different sessions of the workshop will contribute towards improved decision making of the government, donors, NGOs and others, both in the formulation of policies and implementation of programs to enhance the food security of the poor in Bangladesh.

Dr. Paul A. Dorosh, Chief of the Party, FMRSP-IFPRI
Dr. Quazi Shahabuddin, Research Director, BIDS

Co-editors

X-A

WORKSHOP SCHEDULE

Third Annual FMRSP Workshop

Towards Comprehensive Food Security in Bangladesh: Availability, Access and Nutrition

Venue : Conference Room, IDB Bhaban
Sher-e-Bangla Nagar, Dhaka
Date : February 6 and 12, 2001

Day One 06 February, 2001

OPENING SESSION

9:00 AM	:	**Registration**
9:30 AM	:	**Inaugural Session**
11:00 AM	:	**Refreshment**

SESSION – I **Household Food Security and Targeted Food Programs**

Chairperson: Dr. Tawfiq-E- Elahi Chowdhury (B. B), Secretary, Planning Ministry
Discussant: Dr. Hossain Zillur Rahman, Senior Research Fellow, BIDS

Presentations

11:30AM	Recovering from the Shock of the 1998 Flood: Household Food Security and Nutritional Status One Year Later	Dr. Carlo del Ninno, Consumption Economist, FMRSP-IFPRI
12:00AM	Using Household and District Level Data for Geographic Targeting: A Methodological Exercise with Bangladesh Data	Dr. Carlo del Ninno, FMRSP-IFPRI Dr. Binayak Sen, Senior Research Fellow, BIDS
12:20 PM	Evaluating the Food for Education Program in Bangladesh (Preliminary Results)	Dr. Akhter Ahmed, Research Fellow, IFPRI Dr.Omar Haider Chowdhury, Research Director, BIDS and Dr. Carlo del Ninno, FMRSP-IFPRI
12:50 PM	Discussant's Comments	
1:00 PM	Open Floor Discussion	
1:30 PM	**Lunch Break**	

SESSION – II **Foodgrain Supply and Demand**

Chairperson: Dr. Z. Karim, Secretary, Ministry of Fisheries and Livestock
Discussant: Prof. K.M. Rahman, Jahangirnagar University

Presentations

2:30 PM	Recent Developments in Mechanized Cultivation: Emerging Issues in Agriculture of Bangladesh	Dr. Raisuddin Ahmed, Emeritus Research Fellow, IFPRI
3:00 PM	Poultry Farms and Poultry Feeds in Bangladesh: Survey Results	Dr. M. A. Quasem, Senior Research Fellow, BIDS
	Demand for Poultry Feeds: Implications for Wheat and Maize Markets in Bangladesh	Dr. Nabiul Islam, Research Fellow, BIDS
3:30 PM	Comparative Advantage in Bangladesh Agriculture	Dr. Quazi Shahabuddin, Research Director, BIDS Dr. Paul Dorosh, Chief of Party, FMRSP-IFPRI
	Medium Term Outlook for Rice Production and Demand: Projections to 2020*	Dr. Paul Dorosh, Chief of Party, FMRSP-IFPRI Dr. Quazi Shahabuddin, Research Director, BIDS Mr. Saifur Rahman, Research Analyst, FMRSP-IFPRI
4:00 PM	**Tea Break**	
4:15 PM	Discussant's comments	
4:30 PM	Open Floor Discussion	
5:00 PM	Closing of the session	

* Due to the unavoidable postponement of the second day of the workshop and binding travel schedules, the paper, "Linkages Between Macro- Policy and the Food Sector" by Ms. Marzia Fontana, Dr. Peter Wobst and Dr. Paul Dorosh was presented on February 6. The presentation of the paper, "Medium Term Prospects for Rice Production and Demand: Projections to 2020" by Dr. Paul Dorosh, Quazi Shahabuddin and Saifur Rahman, was postponed to February 12.

Day Two 12 February, 2001

SESSION – III **Foodgrain Markets and Storage**

Chairperson: Mr. Shakir Uddin Ahmad, Director General, FPMU
Discussant: Dr. M.A.K. Mia, Senior Agricultural Engineer, BRRI

Presentations

9:00 AM	Chemical Change of Foodgrains in Storage	Dr. Mohammad Kabirullah, Director (Retired), BCSIR Mr. Mahfoozur Rahman, Researcher, FMRSP
9:30 AM	Grades, Standards and Inspection Procedures of Rice in Bangladesh	Dr. M. A. Baqui, Chief Agricultural Engineer, BRRI Mr. A. K. M. Nurul Afsar, Director General, MoF, Mr. M. A. Rauf, Director Training, MoF Mr. Mahfoozur Rahman, FMRSP
10:00AM	Discussant's Comments	
10:10AM	Open Floor Discussion	
10:30AM	**Tea Break**	

SESSION – IV **Rural Incomes, Employment and Food Prices**

Chairperson: Dr. Paul Dorosh, IFPRI-FMRSP
Discussant: Prof. Ismail Hossain, Jahangirnagar University

Presentations

10:50AM	A Market in Transition? The Case of the Bangladesh Rice Market	Dr. K.A.S. Murshid, Research Director, BIDS
11:20 AM	Determinants of Labor Market Participation in Rural Bangladesh After the 1998 Flood	Dr. Carlo del Ninno, FMRSP-IFPRI Dr. Dilip Roy, Research Fellow, BIDS
11:40AM	The Debate over Dynamics of Agricultural Wage and Rice Price in Bangladesh: A Re-examination	Dr. Shahidur Rashid, Post Doctoral Fellow, IFPRI
12:00AM	Discussant's Comments	
12:10 PM	Open Floor Discussion	
12:30 PM	**Lunch Break**	

SESSION – V: **Macro- Economic Policies and the Foodgrain Sector**

Chairperson: Dr. Raisuddin Ahmed, IFPRI
Discussant: Dr. Bazlul Haque Khondaker, University of Dhaka

Presentations

1:30 PM	Poverty Trends and Agricultural Growth Linkages	Dr. M. K. Mujeri, Visiting Research Fellow, BIDS
1:50 PM	Linkages Between Macro- Policy and the Food Sector*	Ms. Marzia Fontana, IFPRI Dr. Peter Wobst, Research Fellow, IFPRI Dr. Paul Dorosh, Chief of Party, FMRSP-IFPRI
2:10 PM	Food Aid and Producer Price Incentives	Dr. Paul Dorosh, FMRSP-IFPRI Dr. Quazi Shahabuddin, BIDS Mr. Abdul Aziz, Project Director, FMRSP Mr. Naser Farid, Additional Director, FPMU
2:40 PM	Discussant's Comments	
2:50 PM	Open Floor Discussion	
3:15 PM	**Tea Break**	

SESSION – VI : Comprehensive Food Security Policy
Presentation

3:30 PM	Comprehensive Food Security Policy for Bangladesh	Presented by: Mr. Ruhul Amin, Research Director, Food Planning and Monitoring Unit, Ministry of Food
3:50 PM	**Panel Discussion**	
	Chairperson :	Mr. Abu Abdullah, Director General, BIDS
	Panelists :	1. Dr. Tawfiq-e-Elahi Chowdhury, Planning Secretary 2. Dr. Raisuddin Ahmed, Emeritus Research Fellow, IFPRI 3. Mr. Joan Fleuren, Deputy Representative, WFP

5:00 PM **CLOSING OF THE SESSION AND THE WORKSHOP**

OPENING SESSION

FOOD MINISTER'S SPEECH

THIRD ANNUAL FMRSP WORKSHOP

Bismillahir Rahmanur Rahim.

Honorable Chairman, Secretaries of various Ministries and Divisions, representatives of various donor organizations, researchers of FMRSP, ladies and gentlemen, As-salamu alaikum. I am pleased to be present at today's workshop.

As you are aware, for a long time, ever since the Pakistan period, Bangladesh has been a food deficit country. When we assumed power in 1996, we encountered a drought. In 1997, we faced a flood, and in 1998, we experienced the Flood of the Century, which submerged two-thirds of the country. Some sections of the local and foreign media predicted that up to twenty million people would die of hunger as a result. With the blessings of the Almighty and through the prayers and concerted efforts of all the people, we were able to overcome the situation. Along with this, the clear vision and proper direction of the government helped to avoid any loss of life from hunger due to the flood. In the aftermath, we have tried to overcome the food deficit and attain self-sufficiency in foodgrain production. In the two years since then, we have successfully attained that goal of self-sufficiency. Actually, we currently have a surplus.

As you are aware, during these difficult times, we adopted a policy of tax-free private foodgrain imports apart from our own efforts of countering the devastation of the floods. This open import policy significantly helped us to avoid a foodgrain crisis.

Since we were able to overcome the foodgrain deficit and turn it into a surplus situation, the Food and Agricultural Organization of the United Nations has bestowed the prestigious Ceres Award upon the Prime Minister and has honored her for her pioneering role in Bangladesh's achieving food security. We are very proud of this achievement.

Just because we have achieved self-sufficiency in foodgrain does not mean that the poor people of the country have the means of purchasing the food or will have a stake in the surplus.

We need to ensure that the farmers who produce the foodgrain also have profitable operations and have the ability to procure other food items. We are conducting foodgrain purchases in order to help ensure that farmers receive a fair price and to maintain incentives for production.

We have also started old age allowances for old farmers who are no longer able to productively participate in the farming process. We also have programs for desolate and needy women. All these programs aim to put access to foodgrain within their means.

As you are aware, we introduced VGF and cards in the aftermath of the floods so that no one would die from hunger or starvation. Over 25 million people benefited as a result. We are still continuing free foodgrain distribution to alleviate the suffering of the poor and to continue to ensure that no one dies of hunger.

Many think that since we are self-sufficient in foodgrain production and have a slight surplus, we no longer require food aid. There is no basis for such an assumption. All of you know and realize that foodgrain is not only used for consumption, but is also used for various productive purposes through Food for Work programmes. Food aid is used for improving rural infrastructure and the communications system, for building bridges and culverts through LGED, for building embankments to save crops from salinity, and for digging canals for improving irrigation facilities. For the sake of continuing these development efforts, we need continued inflows of foreign aid in increasing not decreasing amounts. We even use food aid for helping improve access to education and increasing literacy. The need for food aid is increasing and not diminishing.

Honorable Chairman and distinguished guests, one-third of our population is suffering from chronic malnutrition. The majority of those suffering are women and children. Many women and children are suffering from anemia. The child/infant/female mortality rate in Bangladesh is the highest among the SAARC countries. Foodgrain currently dominates the food basket of the population. Other foods, in addition to food grains, are also needed for adequate nutrition. We must improve the situation. There is a lot to do in this regard. The honorable Prime Minister has started the National Nutrition Program for attaining the goal of a more healthy population.

I would like to inform you all that Bangladesh has already prepared a Comprehensive Food Security Plan. We are in the process of designing a new National Food Policy. Our goal is a strong and healthy population. Foreign donors play a vital role in this process.

The food situation in Bangladesh will be covered in this workshop, as well as other relevant food policy issues. I wish the workshop all success, and formally announce the inauguration of the Third FMRSP Annual Workshop.

ABSTRACTS OF THE PAPERS PRESENTED

SESSION I

HOUSEHOLD FOOD SECURITY AND TARGETED FOOD PROGRAMS

RECOVERING FROM THE SHOCK OF THE 1998 FLOOD: HOUSEHOLD FOOD SECURITY AND NUTRITIONAL STATUS ONE YEAR LATER

- Dr. Carlo del Ninno
- Dr. Dilip K. Roy

The 1998 flood caused major disruptions in the Bangladesh economy and adversely affected household food security in two major ways. First, it hampered the ability of households to acquire food because of a loss of income (lack of jobs and/or loss of output). Second, food production loss and disruptions in transports and markets reduced access of households to food through increased prices of grain and other essentials. To maintain the same level of consumption, people had to sell their assets and borrow money. The poor were hit especially hard by the flood because they had less cash reserves and less access to credit and assets to enable them to offset sharp declines in income.

In this report, we examine the immediate and medium-term consequences of the flood on household food security using data from an in-depth household survey of 757 households in seven flood-affected *thanas*. The survey covers three time periods: immediately after the flood (November, 1998), approximately five months after the flood (April, 1999), and a year after the flood (November, 1999). Using the survey results, we show how the level of consumption and welfare changed over time, and how various types of households coped with the direct and indirect effects of the flood.

DEFINITION OF FLOOD EXPOSURE CATEGORIES AND WELFARE CATEGORIES

In this study, households have been classified according to their level of direct exposure to the flood. A flood exposure index has been calculated using the depth of water in the homestead and in the house, and also the duration (number of days) of water in the house.

Households were also ranked according to their level of welfare, measured by their level of total per capita expenditure at the time of the first round (November 1998). They were classified into three main categories: those in the bottom 40 percentile (the poorest), the next 40 percentile

and the top 20 percentile (the richest).

HOUSEHOLD COMPOSITION AND SCHOOL ATTENDANCE

We found only a slight decline in household size across rounds, but this may be due more to the definition of the membership criteria than to anything else. It does not appear that there were any dramatic changes to the household size and composition, indicating that there was not any major increase or decrease in migration after the flood. Likewise, there are no apparent differences between school attendance and education attainment by flood exposure and rounds. Nonetheless, there is a sharp difference in attendance and education level for males and females and across welfare categories.

HOUSEHOLD INCOME AND REVENUE

In rural Bangladesh, households derive income from many sources, including farm activities, participation in the labor market (collecting wages from casual or dependent employment), self-employment in business and cottage activities, transfers, remittances. Compared to round one, income was 45 percent higher in round two and about 50 percent higher in round three. The *relative* position of poor flood-exposed households with respect to other households deteriorated in round two and round three, however, even though their incomes increased.

Because the flood decreased the chances of planting and harvesting the *aman* crop and slowed the general level of economic activity, other activities such as fishing were more pronounced in round one. In contrast, some business and livestock activities were more prominent in round three. About 50 percent of household income originated from agricultural activities except in round one and 10.5 percent from livestock and fishing. The contribution of agricultural income increased from round one to round two and then remained at the same level in round three.

The large increase in income from agriculture was mostly due to the increase in the production of *boro* rice in the winter following the flood and to some extent due to the increase

in the production of vegetables. About one-third of all households produced vegetables in round one, with an average income from vegetables of Taka 181 per month. The number increased to 63 percent of households with Taka 506 in round two, and to 83.3 percent households with Taka 320 in round three.

Wage earnings of daily laborers in the flood period (July-October 1998) were 60 percent of those in July-October, 1997, and did not return to the same level even one year after the flood in July-October, 1999. Only in the April-May, 1999 period, did the earnings of daily labor exceed those in the July-October, 1997 period. In general, we found that the main determinants of rural household income were farmland and household size, indicating the number of workers in the family.

HOUSEHOLD EXPENDITURE PATTERNS

The mean level of total household expenditure decreased from Taka 4,001 in the first round to Taka 3,663 in the second round and remained relatively stable at Taka 3,508 in the third round. The main reason for this drop is the change in the level of non food expenditure that decreased from Taka 1,293 in the first round to Taka 842 in the second round and remained relatively stable at Taka 855 in the third round. In fact, on average, households spent 71 percent of their budget on food in the first round, compared to 78 percent in the second and third rounds.

As a consequence, the resulting consumption of calories per capita per day increased across the three rounds from 2,249 to 2,518 and 2,526 respectively. This increase has been more evident for poorer households, especially for those exposed to the flood. In fact, the caloric consumption of poorer households went from 1,638 calories per capita per day in round one to 2,208 in round two and 2,200 in round three. The main reason why this was possible was the decrease in the price of rice, which declined from Taka 16.1 per kg in the first round to Taka 13.1 per kg in the second and to Taka 11.9 per kg in the third round. On the other hand, the price of wheat and *atta* decreased only slightly in the year after the flood.

Households that were more exposed to the flood spent less on rice, more on wheat and

more on prepared food in the first round. In the following rounds, they reduced the budget share for rice expenditure and increased the budget shares for milk and fruits. This is partly due to the changes in the relative price of rice and wheat, and partly because the consumption of wheat was also affected by increased distribution of wheat through transfer programs in early 1999. As a result, poor households were able to increase their level of per capita daily consumption from the period immediately following the flood in round one.

The flood prompted larger expenses on housing, heath and fuel. This appears to have been counterbalanced by reduced expenses on food, clothing, travel, personal and other cheaper and unnecessary expenses, and more importantly by an increase of purchases of food on credit. After the flood, households were able to spend less on non-food items and on rice and return to their long run pattern of expenditure.

The impact of the flood on food security in round one was quite dramatic. More than half of flood-exposed households in the bottom 40 percentile in round one were food insecure (50.4 percent), compared to 40.1 percent of non flood-exposed households in the same category. Overall, the percentage of flood-exposed households who were food insecure is 24 percent, compared to 15 percent of non flood-exposed households. The reverse is true for food secure households. The percentage of food secure people is much higher for richer households that were not exposed to the flood.

The data on households in the bottom 40 percentile shows that their level of food insecurity had decreased in the year after the flood. In fact, only 28.7 percent and 26.7 percent of flood-exposed and non flood-exposed households, respectively, were food insecure. Thus, poor households that were exposed to the flood were able to improve their level of food security with respect to non flood-exposed and non-poor households.

INCIDENCE OF DISEASE AND NUTRITIONAL STATUS

It is evident that the overall incidence of disease was higher in the period immediately after the flood than a year later. The deterioration of household food security and caloric consumption

and the increase in the incidence of disease just after the flood had a particularly large negative impact on the nutritional status of women and children. We found a small improvement in the percentage of wasting of children across the three rounds of the survey, however.

The percentage of children stunted continued to increase from 53.4 percent in the period after the flood, to 60.9 percent six months later and went down to 56.2 percent a year after the first measurement. This means that the effect of the flood was still felt by children several months after the flood itself. For poor, flood-exposed families in the bottom 40 percentile, the situation was even worse. At least 68 percent of children in this category were stunted at the time of the second round of data collection and a year after the flood, 64.4 percent of them were still stunted.

There was a large improvement in the percentage of energy deficient young women between the first and last rounds (from 66.3 percent to 56.4 percent). This improvement was not the same across expenditure categories. Even a year after the flood, 70.1 percent of poor women in the bottom 40 percentile were still energy deficient, compared to less than 50 percent of rich women in the top 20 percentile. The nutritional status of older women between the age of 19 and 49 years of age showed a less marked difference between rounds

ASSET OWNERSHIP AND DISPOSAL

The damage caused by the flood to houses and trees was quite extensive for flood-exposed households. Between the period before and after the flood, the value of the houses went down from Taka 26,476 to Taka 21,902 and the number of trees owned by the households went down from 43.0 to 24.4. The losses suffered in terms of livestock were also significant, particularly for goats, sheep and chicken. The average number of cattle owned by all the households in the seven flood-affected *thanas* surveyed went down only slightly after the flood, however, and one year after the flood, it was almost the same as before the flood. The percentage of households selling cattle increased after the end of the first round of the survey, perhaps an indication of a distress sale aimed at recuperating cash to pay off debts contracted in the period of the flood.

Though households in periods of stress may have tried to sell their assets to get enough cash to maintain the same level of expenditure, the loss of assets due to the flood constrained the households both in their consumption and sales of assets. Poor people seemed to be more severely affected by the flood than non-poor households because they owned fewer assets before the flood, yet nonetheless had a more difficult time to recover the same level of assets they had before the flood.

BORROWING STRATEGY

Borrowing to purchase food and to fund other expenses (such as education and health, farming, business, repayment of loans, marriage and dowry, purchases and mortgage of land/agricultural equipment purchases, etc.) was the most important coping strategy employed by households in Bangladesh after the flood.

During the flood period, 51.3 percent of households borrowed money, and 34.7 percent of those households borrowed money for food. While the initial increase in the borrowing was due to the flood, even though the economic conditions improved, households still had to borrow money in the period following the flood in order to cover their needs, especially for food. After the flood, there was an increase in the percentage of households who borrowed for farming and business purposes.

Households borrowed mostly from non-institutional sources such as friends and neighbors, rather than from NGOs and banks. In particular they borrowed for food, education and health from their neighbors. NGOs and banks seemed to be lending primarily for farming and business investments. The interest rate for institutional loans was 21 percent before December 1997, but in the following periods, the average interest rate went up to 42 percent. The interest rate for non-institutional loans, on the other hand, was much higher for the same period.

The percentage of households with outstanding debt one year after the flood decreased progressively, irrespective of flood exposure. Nevertheless, 64 percent of the households still had outstanding debts more than one year after the flood.

GOVERNMENT TRANSFERS

In the period during and after the flood, the government used several programs to help poor and flood-exposed households. The Gratuitous Relief (GR) and Vulnerable Group Feeding (VGF) programs were the largest programs in terms of coverage (particularly for bottom 40 percent of the households) in the sample areas.

The number and percentage of households exposed to the flood that received some kind of transfers declined over the three periods. The VGF program achieved larger coverage for flood-exposed households, with larger transfers per household in round two relative to rounds one and three. Among the various programs, the GR program was the most effectively targeted towards flood-exposed households at the time of the flood. Only 10 percent of GR recipients, compared to 19.3 percent of VGF recipients were not directly exposed to flood in round one.

Average total consumption expenditures of households not receiving transfers were higher than that of receiving households in all the periods. Households receiving transfers had higher budget shares of rice, wheat, pulses, oil and vegetables than households not receiving transfers in the third period, however. Per capita calorie consumption of households receiving transfers increased from 2,088 Kcal in round one to 2,286 Kcal in round two and decreased slightly to 2,121 Kcal in round three.

CONCLUSIONS

Many households suffered severely during the flood of 1998 through loss of income earning opportunities and assets, higher food prices, and a worsened health environment, yet they were able to survive by modifying their consumption patterns and by using a variety of coping strategies. Nonetheless, a year after the flood, many households were still repaying debts that had been contracted to maintain their levels of expenditure despite severe losses to assets and income just after the flood. Poor households exposed to the flood had to borrow more than other households, and the level of outstanding debts of many households was very high – equal to roughly half of their average monthly household expenditures.

USING HOUSEHOLD AND DISTRICT LEVEL DATA FOR GEOGRAPHIC TARGETING: A METHODOLOGICAL EXERCISE WITH BANGLADESH DATA

- Dr. Carlo del Ninno
- Dr. Binayak Sen

OBJECTIVES OF THE STUDY

Previous studies on Bangladesh indicated persistent geographic effects on poverty (Ravallion and Wodon 1999; Sen 2000) and pointed out to the need for geographic targeting for reducing the severity of poverty (Task Force Report 1991; Sen 1997). The policy problem then turns out to be a problem of identifying the poor and the poorest areas. Once validated such a mapping can serve as the guide for allocating resources to the poor areas. Within the poor areas, conventional household based targeting can be used for reaching out to the poorest and the most vulnerable. The accurate poverty-mapping exercise based on geographic information, however, requires a range of socio-economic information at suitable levels of regional disaggregation, which are typically absent in the census and district level data. District level data, for instance, contain some broad information on land availability and cropping pattern, physical infrastructure such as road, irrigation and electricity, social infrastructure such as schools and health centers, rainfall and flooding. Household level data—as typified by the HES data—contains detailed information on household and community level resource endowments as well as information on income, consumption, and employment. To generate the same range of information at the district level would have been prohibitively costly. The question is whether the two sets of data can be combined in a way to generate regional poverty maps on a more defensible basis. The present paper attempts to address this question.

METHODOLOGY

In this paper we suggests a parametric approach, such as the one used by Nick Minot (2000) for Vietnam. John Hoddinott and Saul Morris (1999) used a similar method for Cote d'Ivoire. For other attempts, see the paper by Hentschel et al et al (2000) on Ecuador.

Specifically we adopt the following steps:

1. We estimate a typical household income determination model with household and community level variables (see, expanded model based estimates, as presented in Table 1);

2. We re-run the same model but with only limited household level variables for which exact mapping at district level is possible (see, model based on smaller set of variables, as presented in Table 2);

3. We predict the district level per capita consumption expenditure (used for poverty ranking) by using the coefficients obtained from Table 2 but by replacing the household level variables (as far as possible) by district level variables (see, Table 3).

4. We produce the output in the form of regional poverty maps (Map1 for actual per capita expenditure data, Map 2 for Table 1, Map 3 for Table 2 and Map 4 for Table 3).

5. We also produce maps indicating the regional distribution of VGD cards and FFE food allocation (Map 5 and 6 respectively) for checking their poor area sensitivity based on our model. The results are encouraging and suggestive of the importance of the approach combining household survey and district level data.

ISSUES FOR FURTHER RESEARCH

1. Expand the list of matched indicators between household and district data sets

2. Given the importance of vulnerability of poor areas to natural disaster, include flood related variables in the estimation of the above models

3. Test the model at administrative disaggregations at sub-district level and below

4. Use the census data tape for finer disaggregations at sub-district levels

5. Test the same methodology to predict and map other relevant poverty outcomes (like malnutrition, food security, caloric deficiency and so on).

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Table 1 — Determinants of Per Capita Consumption Expenditure: Results for Expanded Model

Dependent Variable: Log of per capita annual consumption

Independent Variables	Coefficient	t
Log of land owned	0.107	26.600
Share of land rented-in	0.034	3.611
No. of family members	-0.073	-23.544
Log of total workers	0.130	8.368
Share of non-agricultural workers	0.070	5.077
Share of female workers	-0.098	-3.454
Electricity access (0, 1)	0.141	6.506
Remittance (0, 1)	0.149	7.735
Level of Education of the Household head	0.022	10.070
Level of Education of wife	0.011	3.687
Religion (0, 1)	0.030	1.577
Sanitation (0, 1)	0.201	12.015
Percent of tribal households in district	0.001	0.552
Electricity access district	0.003	4.031
Literacy both sex 7+ in district	0.004	3.124
Barisal Division	0.051	1.717
Chittagong Division	0.226	11.219
Dhaka Division	0.144	8.871
Khulna Division	0.068	3.169
Sylhet Division	0.292	11.381
Constant	8.792	211.581

No of Observations: ---------- 4378

R-squared: ----------0.4042

Table 2 — Determinants of Per Capita Consumption Expenditure: Results for Small Model

Dependent Variable: Log of per capita annual consumption

Dependent Variables	Coefficient	T
Log of land owned	0.086	22.590
Sanitation (0, 1)	0.247	14.190
Percent of tribal households in district	0.001	0.361
Literacy	0.136	9.774
Electricity access(0, 1)	0.209	9.563
Barisal Division	0.085	3.753
Chittagong Division	0.260	13.700
Dhaka Division	0.166	9.808
Khulna Division	0.110	5.134
Sylhet Division	0.265	9.960
Constant	8.699	618.068

No of Observations: ----------4693

R-squared: ----------0.2945

Table 3 — Actual and Predicted Values of Per Capita Consumption Expenditure Based on Different Models

District Name	Actual PC exp	Expanded model HH data	Small model HH data	Small model Dist. data
Bagerhat	9,534	9,377	8,663	8,380
Barguna	10,620	8,201	7,734	8,160
Barisal	10,140	8,896	8,699	8,128
Bhola	9,972	7,497	7,734	7,510
Bogra	9,085	7,208	6,886	7,254
Brahmanbaria	8,644	7,200	7,778	8,746
Chandpur	8,491	8,197	8,230	9,289
Chittagong	12,934	9,453	9,161	9,612
Chuadanga	6,910	7,117	7,179	8,103
Comilla	8,601	8,699	8,601	9,703
Cox's Bazar	10,526	7,149	8,316	8,752
Dhaka	21,555	11,389	9,529	10,248
Dinajpur	7,793	6,356	6,255	7,104
Faridpur	8,193	7,700	7,976	8,305
Feni	11,811	10,079	9,633	9,860
Gaibandha	8,001	6,195	5,935	6,715
Gazipur	14,297	9,060	8,716	8,344
Gopalganj	7,493	7,283	7,488	8,646
Habiganj	9,261	9,105	8,799	9,682
Joypurhat	8,699	6,424	6,385	6,900
Jamalpur	7,942	6,915	7,357	8,112
Jessore	9,662	7,834	7,584	8,454
Jhalokat	7,863	7,418	7,115	7,818
Jhenaida	10,571	8,120	8,123	7,826
Khagrachari	8,468	9,223	9,201	9,396
Khulna	10,526	8,825	8,500	8,854
Kishoreganj	7,604	6,739	7,099	8,104
Kurigram	4,681	5,295	5,755	6,582
Kushtia	8,356	6,492	6,696	7,643
Laksmipur	9,440	8,675	8,648	8,937
Lalmonir	7,670	6,076	5,868	6,902
Madaripur	7,036	6,968	6,871	8,337
Magura	6,978	7,017	7,646	7,943
Manikganj	7,681	6,827	6,910	8,057
Meherpur	6,052	6,406	6,835	7,924
Maulvibazar	12,245	9,751	9,498	9,285
Munshiganj	10,505	7,963	7,712	8,526
Mymensingh	8,435	7,583	7,517	8,125
Naogaon	9,000	6,562	6,169	7,213
Narail	12,456	8,415	8,377	8,091
Narayanganj	13,667.			
Narsingdi	10,148	7,682	7,804	8,267

Table 3 — Actual and Predicted Values of Per Capita Consumption Expenditure Based on Different Models (Continued)

District Name	Actual PC exp	Expanded model HH data	Small model HH data	Small model Dist. data
Natore	7,183	6,495	6,267	7,157
Nawabganj	7,636	5,307	6,064	6,716
Netrokona	8,371	7,274	7,521	8,233
Nilphamari	7,388	5,839	6,268	6,813
Noakhali	9,162	7,643	7,954	9,242
Pabna	6,396	6,334	6,644	7,151
Panchagar	5,954	5,912	6,081	7,103
Patuakhali	8,453	8,598	8,259	8,114
Pirojpur	9,923	8,597	7,985	8,341
Rajbari	9,808	6,230	6,202	7,023
Rajshahi	8,458	8,010	8,614	8,154
Rangamati	16,692	11,886	10,891	10,000
Rangpur	7,011	5,862	5,997	6,683
Satkhira	6,690	5,997	6,881	7,960
Shariatpur	9,446	7,665	7,778	8,013
Sirajganj	7,404	6,804	6,996	6,770
Sherpur	7,058	6,645	7,033	7,817
Sunamganj	7,344	7,434	7,982	9,350
Sylhet	9,959	8,106	8,320	9,487
Tangail	8,774	8,185	7,845	8,358
Thakurgaon	7,739	6,092	6,173	6,983

Table 4 — Comparisons between Household Level Survey and District Level Data for Four Predictors

	Ave. Land Owned per Household		Proportion of HHs with Sanitation		Adult Literacy		Proportion of HHs with Electricity	
District Code	HH Survey	District	HH Survey	District	HH Survey	District	HH Survey	District
1	1.52	1.32	0.54	0.35	0.53	0.54	0.14	0.20
4	1.67	1.60	0.39	0.33	0.47	0.48	0.11	0.16
6	1.09	1.05	0.53	0.45	0.50	0.54	0.36	0.14
9	1.42	1.01	0.36	0.25	0.50	0.41	0.23	0.10
10	1.57	0.98	0.36	0.33	0.36	0.41	0.24	0.26
12	0.71	0.99	0.19	0.18	0.29	0.35	0.16	0.13
13	0.62	0.71	0.32	0.39	0.42	0.43	0.20	0.24
15	0.51	0.76	0.46	0.34	0.50	0.46	0.52	0.42
18	1.02	1.34	0.24	0.21	0.41	0.42	0.11	0.27
19	0.87	0.87	0.30	0.37	0.43	0.52	0.25	0.35
22	0.93	0.73	0.19	0.25	0.31	0.35	0.11	0.16
26	0.39	0.92	0.75	0.63	0.67	0.57	0.89	0.69
27	1.18	1.37	0.14	0.17	0.49	0.40	0.07	0.22
29	1.27	1.31	0.26	0.20	0.41	0.44	0.15	0.13
30	0.93	0.85	0.47	0.47	0.55	0.51	0.36	0.31
32	0.66	0.92	0.16	0.16	0.36	0.37	0.06	0.14
33	0.98	1.16	0.45	0.28	0.56	0.44	0.42	0.11
35	1.19	1.52	0.22	0.27	0.38	0.54	0.00	0.12
36	1.08	1.35	0.20	0.27	0.40	0.40	0.25	0.32
38	1.53	1.15	0.17	0.13	0.30	0.37	0.00	0.21
39	0.83	0.97	0.19	0.30	0.20	0.29	0.16	0.12
41	1.77	1.24	0.25	0.34	0.44	0.48	0.17	0.31
42	0.85	1.24	0.23	0.24	0.60	0.63	0.01	0.08
44	1.33	1.49	0.40	0.14	0.38	0.42	0.30	0.14
46	3.09	1.94	0.15	0.14	0.40	0.35	0.00	0.12
47	0.86	1.40	0.64	0.45	0.62	0.55	0.60	0.31
48	0.66	1.09	0.24	0.17	0.26	0.41	0.21	0.15
49	0.92	1.10	0.01	0.14	0.30	0.30	0.00	0.04
50	0.96	0.98	0.18	0.18	0.28	0.35	0.11	0.21
51	0.78	0.89	0.29	0.18	0.45	0.47	0.15	0.20
52	1.24	1.13	0.10	0.25	0.20	0.41	0.00	0.07
54	0.92	1.20	0.05	0.22	0.15	0.38	0.00	0.20
55	1.46	1.52	0.43	0.21	0.38	0.39	0.08	0.14
56	0.84	1.07	0.07	0.17	0.17	0.39	0.00	0.14
57	2.20	1.22	0.05	0.21	0.15	0.35	0.10	0.25
58	1.59	1.11	0.34	0.23	0.45	0.43	0.24	0.22
59	0.81	0.76	0.05	0.24	0.38	0.51	0.38	0.39
61	0.95	1.10	0.25	0.15	0.39	0.42	0.18	0.17
64	1.20	1.36	0.17	0.23	0.38	0.42	0.15	0.21
65	1.66	1.62	0.40	0.24	0.55	0.48	0.35	0.11
67	0.41	0.66	0.42	0.41	0.53	0.50	0.67	0.62
68	0.76	0.78	0.32	0.30	0.40	0.40	0.33	0.24
69	1.62	1.22	0.03	0.21	0.40	0.40	0.02	0.26
70	0.94	1.33	0.35	0.11	0.28	0.28	0.13	0.11
72	1.66	1.44	0.18	0.13	0.31	0.40	0.14	0.16
73	0.89	1.15	0.19	0.19	0.25	0.31	0.18	0.13
75	0.45	0.97	0.25	0.25	0.27	0.47	0.25	0.24
76	0.97	1.18	0.27	0.30	0.38	0.35	0.25	0.19
77	1.93	1.66	0.00	0.24	0.22	0.39	0.00	0.07
78	2.37	1.53	0.35	0.34	0.60	0.50	0.18	0.14
79	1.08	1.21	0.50	0.46	0.60	0.65	0.21	0.13
81	0.80	1.08	0.26	0.20	0.38	0.42	0.23	0.21
82	1.26	1.23	0.45	0.21	0.43	0.35	0.27	0.12
84	1.35	2.39	0.40	0.20	0.62	0.42	0.68	0.20
85	0.72	1.00	0.16	0.11	0.29	0.33	0.16	0.17
86	1.25	1.12	0.08	0.17	0.17	0.37	0.00	0.07
87	1.30	1.25	0.23	0.25	0.50	0.47	0.32	0.16
88	1.99	1.07	0.18	0.20	0.48	0.31	0.20	0.12
89	1.42	1.03	0.02	0.13	0.23	0.32	0.00	0.10
90	1.63	1.76	0.16	0.22	0.26	0.32	0.09	0.16
91	1.45	1.40	0.16	0.27	0.24	0.38	0.11	0.22
93	1.04	1.07	0.21	0.25	0.33	0.40	0.19	0.22
94	1.32	1.62	0.02	0.15	0.43	0.36	0.03	0.12
Total	**1.02**	**1.11**	**0.33**	**0.29**	**0.43**	**0.44**	**0.29**	**0.25**

Source: HES 95/96 and District level

EVALUATING THE FOOD FOR EDUCATION PROGRAM IN BANGLADESH (PRELIMINARY RESULTS)

- Dr. Akhter U. Ahmed
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- Dr. Omar Haider Chowdhury

The Government of the People's Republic of Bangladesh launched the Food for Education (FFE) program in 1993 on a large-scale pilot basis. The FFE program is designed to supplement vulnerable group income by linking it to primary school enrollment of children, and thus achieve the objective of increasing primary school attendance of children from low-income households. Many children from poor families in Bangladesh do not attend school because they cannot afford to, or because they cannot be spared from contributing to their family livelihoods. The FFE program provides monthly free rations of foodgrain to poor families if their children attend primary school. Thus, the FFE food ration becomes the income entitlement that would enable a poor family to release children from household obligations so they can go to school. The FFE program has four objectives: (a) to increase school enrollment; (b) to promote school attendance; (c) to prevent drop-out; and (d) to improve the quality of education.

Food for Education has the potential to improve household food security of the poor in the short run. FFE also holds considerable promise in the long run. In a generation, education would equip children from poor households to improve their productivity, thereby expanding their income-earning potential.

The Food Management and Research Support Project (FMRSP) has recently conducted a study on the FFE program in Bangladesh. The objectives of the study are to assess the program in terms of:

(1) macro-level effects

(2) effects on school enrollment, attendance, and drop-out rates

(3) effects on the quality of education

(4) targeting efficiency

(5) cost-effectiveness of income transfers

(6) efficiency of foodgrain distribution

(7) food security and nutritional impact

National level secondary information is used to assess the macro-level effects, which are summarized as follows:

- The FFE program started in 1993 at a cost of Tk. 68.93 crore, involving distribution of 79,661 metric tons (MT) of foodgrain. By 1998, the cost increased to Tk. 374.98 crore, and the distribution of foodgrain to 340,663 MT. The program started in 460 rural unions in 1993, covering 4,918 primary schools, and 7.07 lakh beneficiary students from 5.50 lakh families. By 1998, the program coverage expanded to 1,243 unions, and 22.96 lakh beneficiary students from 21.82 lakh families.
- The share of the FFE program in total expenditure for primary education in the country increased from less than 5 percent in 1994 to around 20 percent by 1998. However, the share of primary education in total expenditure for education has declined from 53 percent in 1994 to 45 percent in 1998.
- At the national level, the trend rate of growth of non-government primary schools was 6.2 percent per year in the pre-FFE era between 1978 and 1992. The number of non-government primary schools increased significantly in the year the FFE program was launched. However, the trend rate of growth of non-government primary schools became negative in the post-FFE period. There was little impact from the FFE program on the expansion of the number of government primary schools.
- Employment of primary school teachers increased significantly in the year the FFE program was introduced. However, there was no noticeable change in the trend rate of growth of employment of primary school teachers in the post-FFE era.
- The trend growth rate of primary school enrollment of students in the pre-FFE period were 4.0 percent and 6.7 percent per year, respectively, in government and non-government schools. During the post-FFE period, the growth rate increased to 6.9 percent for non-government schools. Enrollment in government schools increased initially with the introduction of FFE, but then declined during the post-FFE period.

The assessment of objectives two through seven is based on data collected by FMRSP from the village census and the school, household, community, dealer and implementation official surveys conducted in September-October, 2000. The analysis of survey data is currently in progress. Preliminary results from the partial analysis are summarized below.

- The village census results show that on the aggregate level enrollment and literacy rates are higher in FFE unions compared to non-FFE unions. There are several instances, though, in which enrollment is higher in non-FFE unions. There are several other factors aside from FFE that affect enrollment rates. These factors include distance and access to schools, the socioeconomic characteristics of the households, etc.
- The census results also indicate a large difference between thanas in terms of literacy (between 42 and 92 percent) and enrollment (from 57 to 98 percent). Within each thana, there is a strong correlation between literacy and enrollment. This means that increasing enrollment would have a large impact on literacy and that more efforts should be directed towards understanding the reasons why enrollment is very low in some areas in order to direct efforts towards improving it.
- The school survey results show a large increase in enrollment in FFE schools from the period before the start of the program to immediately after the introduction of the program in the schools. Non-government schools had a higher increase in enrollment than government schools in the initial year of the introduction of the FFE program. The findings indicate a remarkable increase in the proportion of girls to total enrolled students after the introduction of the FFE program. While the rate of increase in enrollment declined significantly in the years following the initial year, the rate of the decline has been somewhat higher in FFE schools than in non-FFE schools.
- The rate of school attendance is higher in FFE schools than in non-FFE schools.
- Within FFE schools, the drop-out rate is much lower for FFE beneficiary students. However, there is no significant difference in drop-out rates between FFE and non-FFE schools.
- There are more students per teacher in FFE schools than in non-FFE schools.
- Teachers' education levels are about the same between FFE and non-FFE schools.

- FFE school classrooms are more crowded than non-FFE school classrooms. The number of students in FFE non-government school classrooms exceeds the classroom seating capacity.
- Student achievement test scores are slightly lower in FFE schools than non-FFE schools.
- Primary school scholarships are obtained at a slightly higher rate in non-FFE schools. Girls are receiving more scholarships in both FFE and non-FFE schools.
- The household survey was designed to permit an assessment of the targeting effectiveness of the FFE program. The results suggest that the FFE program effectively targets the low-income households. FFE beneficiary households are poorer than non-beneficiary households whose children are attending FFE schools.
- However, there are still some eligible households living in FFE unions who are not on the program. These households have primary school-age children, but they are not attending any school. These non-beneficiaries (12.6 percent of all households in FFE unions) are poorer than FFE beneficiary households. This finding indicates that the income benefits offered by FFE may not be enough to entice the children from the poorest households to attend schools.
- The results also suggest that 21.7 percent of the FFE beneficiaries do not meet any of the official targeting criteria.[1]
- The geographic targeting of unions for the FFE program appears to be good. The average income of households living in FFE unions is lower than the average income of households who live in non-FFE unions.

[1] The targeting criteria for selecting FFE beneficiary households are:

1. A landless or near-landless household that owns less than 0.5 acre of land
2. The principal occupation of the household head is day labor
3. Female-headed household (widowed, separated, divorced or having a disabled husband)
4. Low income professions (such as fishing, pottery, weaving, etc).

SESSION II

FOODGRAIN SUPPLY AND DEMAND

RECENT DEVELOPMENTS IN MECHANIZED CULTIVATION: EMERGING ISSUES IN AGRICULTURE OF BANGLADESH

- Dr. Raisuddin Ahmed

The agriculture that we witness in the contemporary developed world has reached this stage of high modernity over decades of development in mechanical, biological and chemical technology. Asian developing countries including Bangladesh have experienced only limited progress in advancing their agriculture in the technological path, mainly through the bio-chemical innovations involving seeds and fertilizers. However, irrigation development that provides a basic foundation for seed fertilizer technology portends a substantial degree of mechanization. Mechanization of cultivation for clearing, plowing and leveling of cropland has spread rather thinly in Asia, perhaps because of a factor endowment dominated by abundance of labor and scarcity of land. But careful analysis of countries like Taiwan, Korea, Thailand and Malaysia demonstrate that highly productive agriculture cannot be attained without application of modern mechanical technology to complement seed-fertilizer technology. Even, the success of both Indian and Pakistan Punjab, in development of a progressive agriculture tells us this fact of the re-enforcing role of mechanized cultivation.

Deepening of seed-fertilizer technology and expansion of commercialization have begun to bear upon the spread of mechanized cultivation in Bangladesh as in many other developing countries of Asia. The production process in crop agriculture entails a number of strenuous field operations. The effectiveness of these operations determines the extent of production through changes in both yield and cropping intensity. This paper focuses on mechanized cultivation, in particular, power tillers and tractor cultivation.

It is apparent that labor requirements for rice cultivation are highest in the land preparation and planting phase of the production cycle. This phase spreads over about a month. The second phase of inter-culture operation spreads over about two months and in this phase labor

requirement is relatively thin. In the final phase of the production cycle the harvesting season of rice that extends over a period of about a month - the labor requirement is again relatively high.

The objective of this paper is to provoke fellow researchers and invite them to undertake new studies on various issues of mechanization in crop production of Bangladesh. As we will see later, mechanization has assumed a heightened trend in recent years and is still an unexplored area in policy research. The paper therefore, sheds little light on empirical findings, but possibly generates enough heat to induce colleagues in new studies on mechanization.

HISTORICAL PERSPECTIVE AND THE CURRENT STATE OF MECHANIZATION

Unlike irrigation-based seed-fertilizer technology, progression of mechanized cultivation has occurred with little public intervention and promotion of technology. The first public initiative was undertaken through a scheme of mechanized cultivation in the mid-sixties, mostly for Haor areas of Bangladesh. In those days most of the land used to remain fallow during the dry season because of thicket of sturdy weeds that could not easily be broken by plough. Tractors were instrumental in enabling this land to be cultivated with boro rice, of course, under irrigation by means of low-lift pump (East Pakistan, EPADC, the mechanized cultivation and power pump irrigation scheme, 1966). However, this scheme could not make a significant and sustainable impact on mechanized cultivation. The second public initiative in mechanized cultivation was launched in 1965 through a project called Pak-Japan Cooperative Scheme for introduction of tractors and power tillers in the then East Pakistan. This program was able to make small but significant steps in getting the technology known among a small proportion of the farm population, particularly in the potato growing areas. However, according to the Agricultural Censuses of 1977 and 1983-84, only about two-tenths of a percent of cropped land in Bangladesh was cultivated by tractors and power tillers in each of these years.

The current state of mechanization is best reflected in the report of the 1996 Agricultural Census, which demonstrates a dramatic progress in the use of power tillers and small tractors in Bangladesh. On average, about 28 percent of cultivated land was plowed with power tillers and tractors in 1996. It seems that progress in the application of power tillers/tractors in Bangladesh

was rapid in the 1990s, after the liberalization of agricultural input markets, particularly the liberalization of inputs of agricultural machinery in 1988. However, the spread of mechanization is quite uneven among various districts. Fifteen districts use power tillers on less than 10 percent of cultivated lands and another 10 districts use power tillers to cover only 10 to 20 percent of cultivated land, while 26 of the 54 districts extensively use power tillers on more than 30 percent of their land. The use of power tillers is common among all size-groups of farmers. However, large and medium farms are found to use power tillers to a proportionately greater extent than small farmers.

Regression analysis of district-level data from the 1996 agricultural Census indicates that labor supply, propensity of irrigation, availability of work animals and cropping intensity are all correlated with the rate of adoption of power tillers. Similarly, a regression using cropping intensity as the left-hand-side variable indicates that a 10 percent increase in power tiller cultivation results in a 1.3 percent increase in cropping intensity.

ORGANIZATIONS FOR POWER TILLERS

Perhaps, there are few farmers who can own and operate power tillers for cultivating only their own land. The holding size of most farmers would dictate that a farmer would own a power tiller and sell its services to other farmers, as is commonly the case with shallow tubewells. Who takes initiative, how is the purchase of a power tiller financed and what is the pricing mechanism involved in selling the services to other farmers? This information is currently not known precisely. It is also not known whether monopolistic or competitive market mechanisms are involved in provision of services. This information is necessary not only to find efficient methods of organizing services but also for monitoring whether the new technology is influencing changes in the traditional land rental market or polarizing the distribution of farm sizes in rural Bangladesh.

IMPACTS ON PRODUCTION

The production impact of power tillers is expected to occur through a) increased cropping

intensity, b) increased yields and c) cost-savings in plowing. Analysis tends to indicate that increased cropping intensity is perhaps the most significant source of a positive impact. But this conclusion is based on cross-sectional data that might not be a true reflection of the impact under a dynamic situation. To capture the dynamic effects, further fieldwork is needed, involving asking farmers about their changes in farming practices in response to mechanization.

Experiments conducted at the Rice Research Institute indicate that the impact of better tillage on rice yield varies by nature of soil structure. Areas with hard soils get a better impact from tillage than in sandy or loamy soils. In general, the yield impact is small. However, power tiller cultivation might allow farmers to incorporate field stubbles and other vegetation into the soil mass, thus improving the organic matter content of the soil. Bangladesh soils being generally very deficient in organic matter may derive a substantial benefit in this regard from mechanized cultivation.

The cost-saving effect of replacing bullock power with power tillers could, however, be very substantial. On the basis of some rudimentary information on prices of power tillers and bullocks, maintenance costs, operation costs and life, an estimate of comparative costs of land preparation between bullock plowing and power tiller plowing has been made. Non-farm uses of power tillers have been ignored, but could be substantial.

Even though the estimates are crude, it seems that power tillers cost about 50 percent less than bullock cultivation. Moreover, the implicit cost of risk involved in maintaining bullocks (e.g. sudden death), if included, would increase further the cost of plowing by bullocks. This cost savings could therefore be a powerful driving force in switching from bullock power to power tiller. It also has implications for competitive advantage and total factor productivity of crops.

IMPACTS ON EMPLOYMENT

The employment impact of mechanized cultivation has always been a fashionable subject arousing debates and controversies. It is probably not questionable that substitution effect of

mechanization generates a negative impact on employment. But the output impact that gets generated through, for example, increased cropping intensity, is positive and may surpass the substitution effect. This theoretical proposition should be analyzed with careful consideration of seasonal and spatial segmentation of input markets. Disaggregated analysis is needed because the nature of labor requirements varies across stages of a crop-cycle.

So, analysis of seasonal wage rates and seasonal labor requirements for all crops combined is important. When labor requirement exceeds labor supply, as in the land preparation and harvesting phases, the wage rate ought to go up to equilibrate the supply of and demand for labor during that season. Such a model would then be able to predict what impact a labor substituting mechanical technology would bear upon the employment situation in agriculture. It is hoped that the research agenda in the follow-on project of IFPRI will include this aspect.

CONCLUDING OBSERVATIONS

The evolution of the agriculture of Bangladesh into a modern sector comparable to the agricultures of east Asian developed countries cannot be conceived without a thriving role of mechanical technology. The emerging picture of adoption of power tillers and tractors seems to be a beginning of modernity. How the process can be accelerated without any serious negative impact on employment and poverty should attract professional attention. The progress that has been achieved so far is not the result of any significant public intervention. Market forces seem to have driven the process. Therefore, it may logically be argued that studies on mechanization are not necessary. Such a conclusion would be wrong and counterproductive. Policy makers of Bangladesh ought to know what social implications are involved in the market-driven process of mechanization. The government would then be in a position to adopt right policies as well as explain the rationales to donors. The reduction of cattle population for draft purposes may bear a far-reaching implication for the crop-sector, particularly in respect to total factor productivity and competitive advantage. Therefore, these aspects of mechanization warrant a serious investigation.

POULTRY FARMS AND POULTRY FEEDS IN BANGLADESH: SURVEY RESULTS

Dr. Abul Quasem

The number of poultry farms in the country has been growing at an annual rate of six percent in the 1990s. At present there are over sixty thousand farms, of which about three-fourths are layer farms. In recent years broiler farms are growing fast. Household farms are small and their housing conditions are usually poor.

The poultry farms use mixed feedgrains, maize and wheat, and also manufactured feeds commonly known as ready feeds. Mixed feeds are prepared by individual owners generally by following the prescriptions given in the booklets, distributed by the Department of Livestock Services and the feed mills. In making of feeds household or small-scale farms seem to be at disadvantage due to lack of proper technical knowledge and price information. The present study, based on small field survey covering 71 farms spread over in three districts (Gazipur, Manikganj and Cox's Bazar) examines existing feeding practices and their efficiencies at both household and commercial levels and also analyses maize and wheat markets keeping in view the prospects of poultry industry in the country.

The majority of surveyed poultry farms were established after 1995 particularly in broilers. The average cost of establishment of a farm was Tk. 3,30,571 (Table 1). Commercial Layer farms cost as high as Tk. 1060 thousand. Broiler farms have however, lower investment cost (Tk. 42,000), the least costly establishment being the household broiler farms. This suggests that the NGOs can support establishment of broiler farms in their poverty alleviation program.

Table 1 — General Characteristics of Surveyed Poultry Farms

	Layer farms		Broiler farms		All
	Household	Commercial	Household	Commercial	Farms
No. of Farms Surveyed	33	20	9	9	71
Age of Farms (Years)	3.9	6.1	4.3	6.6	5.1
Percent of Farms Established after 1995	73	25	67	67	61
Initial Cost of Investment (000Tk.)	47.8	1059.9	20.0	70.11	330.6
Stock of Birds (No.)	607	4870	622	1544	1872
No. of workers	1.66	5.90	1.74	2.89	-

Source: Quasem (2001).

The present stock of birds in a farm is 1083 broilers and 2139 layers. Commercial layer farms raise as many as 4870 birds. All farms at present are using three-fourths of their existing capacity, the highest utilization being at Gazipur (82%)

Poultry farms consume both maize and wheat, while among non-grain feed ingredients rice polish, soybean meal, and vitamins are important. Of the selected farms half are exclusively maize users, 24% consume ready feeds and the remaining consume both maize and wheat. The exclusive use of maize is predominant by layer farms at Gazipur, while ready feeds are predominant at Manikganj and also by the broiler farms at Cox's Bazar.

In the individually prepared feed mixture, grains constitute over half of feed weight and the share of maize in feedgrains is very high (85%). Feed mills use negligible proportion of wheat in their manufactured feeds.

A household broiler during its growing period of six weeks consumes mixed feeds of 3.64 kgs and it is marginally lower in commercial farms. Similarly a household layer in the growing period of 20 weeks takes 6.9 kgs as shown in Table 2. It may be noted that commercial layers are fed with lower amount of feeds. An adult layer consumes 105 gms per day amounting to

total annual consumptions of 30 kgs of feeds inclusive of the quantity used during its growing period of 20 weeks. An average size broiler and a layer farm annually consume 23 and 64 tons of feeds respectively where maize has a share of about 45 percent (Table 2).

Table 2 — Feeding Practices, Weight Gained and Mortality

		Layer farms		Broiler farms	
		Household	**Commercial**	**Household**	**Commercial**
i.	Amount of Feeds consumed by a bird during the Growing Period (kgs)*	6.86	6.45	3.64	3.17
ii.	Proportion of Maize to Total Feed Weight (%)	45.1	45.3	44.7	40.8
	Proportion of wheat to Total Feeds Weight (%)	6.3	4.9	15.8	17.8
	Proportion of Non-grains to Total Feed Weight (%)	48.6	49.8	39.5	41.4
iii.	Weight Gained during the Growing Period (kg)	1.5 (Average)		1.84 (Average)	
iv.	Mortality of Birds (%)	10	10	9	10

Source: Quasem (2001).

Note: * The growing period for a broiler is considered to be six weeks and that for a layer is 20 weeks.

The feeding efficiency in broiler farms is 52% with a range of 46-62 percent for household and commercial farms. Commercial farms are found to be more efficient. Feeding efficiency is far less in layers (22%) with little difference between household and commercial layers. The live weight growth of a broiler during the growing period is 43 gms per day and it is higher by 17% in commercial farms. Such growth is only 11 gms in case of layers. The use of mixed feeds appears to be more useful to both broiler and layers.

It seems that feeding efficiency in broilers can be raised substantially particularly in household farms. The farm owners may be properly trained in feeding principles and farm management.

Employment opportunities created through establishment of poultry farms at household

level are largely limited to self-employment. A layer farm, on average, employs three persons, while a broiler farm only two persons. Household farms engage less than two persons; commercial layer farms employ six people on average. Self-employment in household farm comprises about three-fourths but in a commercial farm this is much lower (27%). Number of birds supervised by a worker is estimated to be about 300 layers and 365 broilers at household level. This is however high in case of commercial farms as expected. It may be reported that an investment of Tk. 10,000 is required for about 375 broilers but in layers it is just over 100.

A rough estimate on costs and returns of a poultry farm indicates that it is a profitable enterprise. Commercial farms are more efficient with higher returns in both broiler and layers. At household level broilers are more profitable than layers.

Prices of feedgrains (both maize and wheat) have been fairly stable across regions and over time. Feedgrain market in the country is, thus, performing reasonably well. In 1998 and 1999 retail prices of maize in the samples were lower (Tk. 0.45 per kg) than wheat. The monthly price range is observed to be within Tk. 1.00 per kg, which appears to be normal in the Bangladesh context. Commercial layers paid a bit lower price for feedgrains than those paid by household farms. This seems to be due to large-scale grain purchase by them and perhaps also due to easier access to markets. The price trend in maize and wheat during the period of 1995-1999 indicates that it is reasonably stable. Their market prices if adjusted against the country's inflation rates, prices of grains appear to have declined over time. Along with the feedgrains, prices of other non-grain ingredients including one-day chicks are also found to be stable. The existing degree of stability in prices of all principal feed ingredients suggests that the input markets are favorable to development of poultry farms in the country. About the prices of poultry products (eggs and meat) during the period, no definite comment can be made as no such price analyses have been carried out in this paper. The DAM (Department of Agricultural Marketing) collected market price for 1998-2000 shows almost the same annual price for eggs (Tk. 308 for 100 eggs), but broilers record marginally rising price trend at that time. Monthly price fluctuations are also small suggesting that product markets are somewhat stable.

However, poultry farming in Bangladesh is largely import dependent with respect to feed ingredients and the chicks. There are unfortunately no clear rules and regulations regarding their imports and quality testing. Quality inspection for imported feed ingredients and the chicks is an urgent need. Appropriate steps should also be taken to produce all the chicks domestically thereby reducing foreign dependency for their supplies. It is however, not known why the parent chick production farms are not growing in the country; the area needs to be carefully researched. Adequate measures are also needed for increased production of maize and soybean, which have large potentials in the country.

Poultry farms in the country are now utilizing three-fourths of their production capacity. It is much lower in household farms (below 65%), reportedly due to cash constraint. For efficient capacity utilization, formal credit supports are required. Mortality of birds is also high (10%) which can be reduced through adequate supplies of disease free chicks and quality vaccines and feeds.

Towards long-term development of poultry industry in the country environment friendly technologies should be applied in the disposals of poultry litters and industrial wastes containing toxic elements to avoid health hazards in the locality. It is reported that institutional credit supports to the establishment of bio-gas plants using litters by farm owners can greatly help in this regard.

The present study has not examined the degree of price competition in poultry, eggs, meat and other production inputs between Bangladesh and its neighboring countries. Such study is essential to identify the factors causing differential levels of performance, as is evident in their price differentials. Moreover, for creation of export markets in poultry products, some special market study may also be initiated.

DEMAND FOR POULTRY FEEDS: IMPLICATIONS FOR WHEAT AND MAIZE MARKETS IN BANGLADESH

Dr. K.M. Nabiul Islam

Wheat and maize are important components of poultry feeds. The demand for wheat and maize, therefore, is expected to increase with the growth of poultry farms in the country. The *major objective* of this study is to carry out projections of demand for poultry feeds and its implications for wheat and maize production in Bangladesh over the next 20 years.

ESTIMATION PROCEDURES

Two approaches have been employed to estimate demand for use of grain (wheat and maize) as poultry feeds: (1) Demand Analysis Approach and (2) Trend Analysis Approach. The study employs both the approaches in order to obtain a range of demand estimates for the use of grain as poultry feeds, for the year 2005, 2010, 2015 and 2020. The year 2000 is considered as the base year.

The Demand Analysis Approach involves projecting demand derived from the consumption of poultry products (meat and eggs) through incorporation of factors such as population, urbanisation and income growth and income elasticities of demand.

Beginning with base year estimates, per capita consumption of poultry products (separately for meat and eggs) are projected for various years. Projected quantities of poultry products are then translated into feed requirements and finally into projected use of grain for poultry feeds. The projections are carried out, disaggregated by village (scavenging) and commercial poultry birds (layers and broilers), using appropriate feed coefficients since the feeding practices vary significantly among these three types of birds.

Future feed requirements can also be considered based on the growth in the poultry population. The Trend Analysis Approach, thus, involves assessing future feed requirements through estimating historical trends of growth in the poultry population. The projected poultry

populations have been used to project future feed requirements, particularly for wheat and maize.

DATA SOURCES

A basic problem in any analysis of the poultry sector relates to lack of reliable and adequate data on use by type of feed and by category of poultry output, and on poultry population, disaggregated by scavenging and commercial birds.

This study is largely based on information from secondary sources such as Agricultural Censuses and FAO Yearbook. Such information is supplemented by primary data generated from field surveys. In particular, the data on current poultry production system, generated by the field surveys, have been used. Also, some data are collected from a rapid market survey including a few key-informant interviews.

NATIONAL CONSUMPTION OF POULTRY PRODUCTS FOR THE BASE YEAR 2000

The per capita consumption multiplied by population (urban and rural) gives estimates of rural and urban consumption for poultry products. The total rural consumption of poultry meat for the base year 2000, based on FMRSP data, is estimated to be 104 thousand metric tons. The estimate based on HES data, is quite close, 106 thousand metric tons. The rural consumption of poultry eggs for the year 2000 is estimated to be 1831 millions, based on FMRSP data. The HES, however, estimates the total number of eggs to be as high as 2711 millions. Since the FMRSP consumption data for rural households are the most recent and the data for urban households are not available from this source, the analysis uses combination of the two sources in estimating total national consumption. In other words, the analysis uses FMRSP data for rural households and HES data for urban households in estimating the total national consumption. Thus, the national consumption of meat for the year 2000 is estimated to be 172 thousand metric tons while the consumption of eggs for the year 2000 is estimated to be 3007 millions. These estimates have been used as the base year figures in the projection exercise.

PROJECTIONS OF CONSUMPTION OF POULTRY PRODUCTS (DEMAND ANALYSIS APPROACH)

Besides population and income growth, the Demand Analysis Approach requires that the responsiveness of demand for poultry products to income growth be incorporated in the exercise. The estimated income elasticities are adopted from Alam (1997).

Following this approach, the national consumptions of eggs are projected to be 4347 millions, 4878 millions, 5397 millions and 5866 millions for the years 2005, 2010, 2015 and 2020 respectively. Thus, the national consumption for eggs is estimated to increase by 62 percent by the year 2010 and by 95 percent by the year 2020. The corresponding national consumption for meat is projected to be 227, 255, 283 and 307 thousand metric tons for the four selected years respectively. Thus, the national consumption for meat is expected to increase by 48 percent by the year 2010 and by 78 percent by the year 2020.

PROJECTIONS OF POULTRY POPULATION (TREND ANALYSIS APPROACH)

Two estimates of poultry population are carried out, based on two methods: poultry population trend method and per capita (of poultry) trend method. One can use either of the two, or the mean of the two estimates. In this analysis, mean of the two estimates is calculated, which have subsequently been used in the projection of grain use as poultry feeds. Starting from the base year figure of 172 million poultry population, the Trend Analysis Approach estimates the projected poultry population to be 218, 279, 356 and 451 million for the four selected years respectively. Thus, the Trend Analysis Approach suggests that the poultry population is expected to increase by 64 percent by the year 2010 and by 165 percent by the year 2020. The data derived from these projections have subsequently been used in the projection of grain use as poultry feeds.

PROJECTION OF GRAIN (WHEAT AND MAIZE) USE AS POULTRY FEEDS

The analysis presents projected use of grain (wheat and maize) for poultry feeds, by poultry type, for the four selected years. The projected use of grain for poultry feeds is estimated

through adopting both the approaches and also, by use of feed ingredients as well as feed coefficients obtained from the field surveys.

Based on information collected from our field survey, an average rate of 10 percent mortality has been assumed. For both layers and broilers, feed consumptions are adjusted to for annual level. For layers, feed consumption (per week) applies for the life cycle of 78 weeks, from which that for 52 weeks is estimated and used in the projection exercise. For broilers, average feed consumption (per week) applies for the life cycle of 6 weeks. Six batches of broilers in a year are considered. Thus, for broilers, feed demand for 36 weeks is considered in a year. The wheat consumption by scavenging birds is estimated to be 20 percent of average quantify consumed by layers and broilers. No maize consumption is considered for scavenging birds. Half of the scavenging birds are assumed to lay eggs in the whole year.

The use of grain for poultry feeds for the base year 2000 is estimated to be 631 thousand metric tons. Of this, wheat accounts for 141 thousand metric tons (22 percent) and maize accounts for 491 thousand metric tons (78 percent). Current production levels for wheat and maize in Bangladesh are in the range of 1800 thousand and 65 thousand metric tons, respectively. Thus, total poultry feed requirement is approximately one-third of the total wheat and maize production in Bangladesh. The requirement of wheat as poultry feed is nearly 8 percent of the total domestic production and the requirement of maize as poultry feed is about 7.6 times its domestic production.

Adopting the Demand Analysis Approach, the use of total grain as poultry feeds is projected to be 665, 746, 826 and 898 thousand metric tons, for the years 2005, 2010, 2015 and 2020 respectively (Table 1). Thus, starting from the base-year requirements of 631 thousand tons, the projected use of grain for poultry feeds is expected to increase by 18 percent by the year 2010 and by 42 percent by the year 2020.

According to the Trend Analysis Approach, the projected total grains as poultry feeds are 794, 1022, 1346 and 1817 thousand metric tons, for the years 2005, 2010, 2015 and 2020 respectively (Table 1). Therefore, in this approach the projected use of grain for poultry feeds is

expected to increase by 62 percent by the year 2010 and by 188 percent by the year 2020.

The two alternative projections appear to be within a reasonable range. Further refinements in the Demand Analysis approach projections could be made if more data becomes available, however. Ideally, separate income elasticities for village and commercial poultry products, and separate income growths for rural and urban areas could be used. Impacts of changes in prices could also be modeled. Nonetheless, both feed demand projections indicate substantial growth in the next two decades.

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Table 1 — Projected Use of Grain (Wheat and Maize) for Poultry Feeds (by Poultry Type) in Bangladesh

Grain by poultry type	Base year 2000	Projected use of grain for poultry feeds (000 Tons)			
		2005	2010	2015	2020
	Demand Analysis Approach				
Scavenging					
Wheat	-	100.99	113.36	125.47	136.42
Maize	-	-	-	-	-
Layer					
Wheat	-	38.09	42.75	47.31	51.44
Maize	-	500.59	561.87	621.85	676.11
Broiler					
Wheat	-	8.63	9.69	10.72	11.66
Maize	-	16.56	18.59	20.58	22.38
Wheat	**140.56**	**147.71**	**165.80**	**183.50**	**199.52**
Maize	**490.51**	**517.15**	**580.46**	**642.43**	**698.49**
Total grain	**631.07**	**664.86**	**746.26**	**825.93**	**898.01**
	Trend Analysis Approach				
Scavenging					
Wheat	79.70	102.86	131.53	165.63	203.97
Maize	-	-	-	-	-
Layer					
Wheat	34.02	42.66	54.95	72.85	99.54
Maize	438.98	550.55	709.10	940.05	1284.50
Broiler					
Wheat	26.85	33.67	43.37	57.49	78.55
Maize	51.53	64.63	83.25	110.36	150.80
Wheat	**140.56**	**179.19**	**229.85**	**295.96**	**382.06**
Maize	**490.51**	**615.18**	**792.35**	**1050.41**	**1435.29**
Total grain	**631.07**	**794.37**	**1022.20**	**1346.37**	**1817.35**

COMPARATIVE ADVANTAGE IN BANGLADESH AGRICULTURE

- Dr. Quazi Shahabuddin
- Dr. Paul Dorosh

Agricultural price and trade policies, such as import tariffs, export taxes, input subsidies and other price policies; can have a major impact on the private profitability of domestic agriculture. Broader macro-economic policy and overall trade policy, affect the profitability of agriculture as well, through influencing the exchange rate, overall level of inflation, interest rates and other determinants of prices and costs in the economy. Because of these intentional or even inadvertent distortions in prices, the total social costs and profitability of production may differ from private costs and profitability.

This study examines the relative efficiency of production of crops in Bangladesh and their comparative advantage in international trade. Relative efficiency in production depends on three factors – technology, resource endowments and international prices. While farmers would decide what to grow based on their perceptions of potential and constraints, public policies concerning irrigation, water control, technology and prices can influence farmers' choice of crop-growing decisions. A comparative evaluation of producing rice vis-à-vis other crops sheds light on the issue of foodgrain self-sufficiency in the country under both medium and long-term perspectives. The analysis also has important implications for the scope and incentives for crop diversification.

METHODOLOGY AND SOURCES OF DATA

Comparative advantage of producing different crops in Bangladesh agriculture has been analyzed using two measures: (a) Net Economic Profitability (the profitability using economic, rather than financial costs and prices), and (b) Domestic Resource Cost Ratio, (the amount of cost of non-tradable domestic resources used in production divided by the value of tradable products). To calculate these efficiency indicators requires data related to (a) production coefficients, (b) financial prices of crops and production inputs (c) economic (shadow) prices of

crops and production inputs, and (d) shadow (equilibrium) price of foreign exchange. The empirical exercise has been carried out using data for the 1996/97-1998/99 period.

COMPARATIVE ADVANTAGE IN CROP PRODUCTION

When compared with financial returns, economic returns at import parity prices are considerably higher for all varieties of rice produced using different irrigation techniques (Table 1). Thus the economic profitability analysis demonstrates that Bangladesh has a comparative advantage in domestic production of rice for import substitution. However, at the export parity price the picture becomes completely different and the economic returns are now less than the financial returns for almost all varieties of rice. Moving to an export price regime implies a substantial decline in economic profitability for all rice crops. Moreover, when compared with economic profitability of many non-rice crops, it would appear that the country has more profitable options other than production for rice export. The estimated domestic resource cost (DRC) ratios for rice are generally consistent with the results of the economic profitability analysis discussed above.

The estimated domestic resource costs (DRC) of wheat are observed to be lower than unity under different irrigation conditions thereby demonstrating its efficiency of domestic production (Table 2). However, as compared to high yielding variations of rice, the ratios are observed to be higher implying that resources can be used more efficiently in the cultivation of modern varieties of rice under irrigated conditions. The DRC ratios for jute (0.80-0.92), though less than unity is quite high relative to most other crops indicating its comparative advantage for export but at the same time, there may be some competing demand on resources for production of other crops from efficiency point of view. The estimated DRC ratio for cotton (0.55) indicates its relative efficiency in domestic production for import substitution, especially during the aman season when it is produced. The relative efficiency of production for export of tobacco is quite pronounced, as reflected in its very low DRC ratio estimates (0.20-0.21).

Sugarcane, on the other hand, hardly displays any comparative advantage in terms of efficiency in domestic production for import substitution, with estimated DRC ratios exceeding

unity in almost all cases. This is largely attributed to the excessive milling costs incurred by inefficient sugar refineries under public ownership. The situation is even worse in case of production of oilseeds for import substitution, considered either in terms of import of oil or of seeds. The estimated DRC ratios are observed to exceed unity by a large margin in most cases. This again can, at least, partly be attributed to the inefficiency of the local oil-milling industry.

The estimated DRC ratios of different types of pulses are observed to be less than one in all cases thereby demonstrating their efficiency in domestic production not only for import substitution but export as well. Of the two types of spices considered in this exercise, the production of dry chili does not appear to be efficient under either modern irrigation or traditional/non-irrigated conditions, with DRC exceeding unity in both cases. Onion, on the other hand, is observed to be highly efficient in production for import substitution, as reflected in its low estimate of DRC ratio (0.25).

The production of potato, under both modern and traditional irrigation, seems to be highly efficient for both import substitution and export. The production of different types of vegetables considered in this exercise also would appear to be highly efficient, especially for exports as reflected in the extremely low estimates of DRC ratio of these crops (0.05-0.12). In fact, vegetables appear to be highly competitive in terms of both financial and economic returns as well.

SENSITIVITY ANALYSIS

Sensitivity analysis has been carried out to examine the degree to which the efficiency measures estimated under the baseline assumptions are likely to be affected by possible changes in the values of basic parameters such as yield, prices and major components of costs of production. This exercise would demonstrate the robustness of the conclusions derived in this study. The condition for sensitivity analysis considered in the exercise included: (a) effect on financial profitability (b) effect of changes in output prices (economic) on efficiency in domestic production (c) effect of changes in shadow wage rate on efficiency in domestic production (d) effect of changes in shadow exchange rate and (e) effect of future changes in production

technology. The results of sensitivity analysis indicate that the relative production efficiency is more sensitive to changes in yields and prices (both financial and economic prices) than to changes in components of production cost such as (shadow) wage rate and cost of irrigation. Production efficiency was observed to be fairly sensitive to changes in shadow exchange rate. However, since there was hardly any variation across five crops considered in the exercise, their relative efficiency rankings remained unchanged.

COMPARATIVE ADVANTAGE OF ALTERNATIVE CROP SEQUENCES

The estimates of net economic returns per unit of cropland is one way of analyzing comparative advantage in terms of efficiency of resource use and land allocation for production of different crops and crop mixes. However, in order to meaningfully interpret these estimates as an indicator of comparative advantage, it may be worthwhile to estimate the net returns of alternative cropping pattern and/or crop sequence in order to highlight the nature and scope of competition or complementarity in the choice of crops.

There are large variations in the cropping pattern observed among various regions of the country, and many of these variations can be related to agroclimatic factors. The cropping pattern in the country can be broadly classified into rain-fed and irrigated patterns, which again vary according to the degree of seasonal flooding and land types. Based on data from a fairly representative nationwide survey carried out in 1987, the study estimated the net financial and economic returns associated with the cropping pattern across different land types and irrigated conditions.

The nature of competition and/or complementarity in the choice of crops in different land types, however, is not fully reflected in the above analysis. Although most non-rice crops compete for land in the dry boro season, the substitution among dry-season crops may entail changes in other seasons as well. The study, therefore, analyzed the crop-sequences in three different seasons – Rabi, Kharif I and Kharif II – based on information from 10 selected thanas in 4 (new) districts in the Northwest Region of Bangladesh.

It was observed that although crop-sequences vary widely in the region, the most prevalent one is Boro-Fallow-T. Aman. Not only 9 out of 10 selected thanas adopt this crop-sequence, the proportion of total land devoted to such pattern is also quite high (50.2%) – in fact, much higher than any other crop-sequence observed in the region. Most of the crop sequences include T. Aman and this remains the single-most important crop in the region. Wheat fits well into a number of crop-sequences (Wheat - T. Aus – T. Aman, Wheat – Fallow – T. Aman and Wheat – Jute – T. Aman), and is cultivated widely in the region. Nonetheless, the percentage of land sown with wheat is still much lower (ranging from 5.0% to 13.2% of total cultivated land), that the percentage of land sown with irrigated boro.

Potato is one of the most important cash-cum-vegetable crops in the Region and fits well in the existing cropping pattern either as a lone crop or intercrop. The resulting net returns are also relatively high. However, there are a number of constraints that impede large-scale expansion of potato cultivation in the region. Storage, preservation and marketing are major problems from farmers' point of view. Vegetable combines either with cultivation of spices or with potato, with land remaining fallow in the Kharif II season. The amount of land devoted to such cropping pattern, however, is small despite their high financial and economic returns. That this is so has been alluded to above while discussing the crop-sequences associated with potato, another high-value non-cereal crop. One can attribute this to a combination of technical and economic factors. The study identifies these constraints and also makes specific policy recommendations to promote diversification of crops while at the same time maintaining sustained growth of foodgrain production in the country.

CONCLUSIONS

The analysis of comparative advantage carried out in this exercise seems to suggest that the menu of crops that Bangladesh can produce efficiently either for import substitution or for export is quite large. In fact, the profitability estimates and estimated domestic cost ratio indicate that except for a few import-competing crops such as sugarcane, oilseeds and chili, Bangladeshi has a comparative advantage in the production of most agricultural crops. The economic profitability

analysis also demonstrates that Bangladesh has a comparative advantage in domestic production of rice for import substitution but not for export. In fact, moving to an export price regime implies a substantial decline in economic profitability for all rice crops. Moreover, when compared with economic profitability of many non-rice crops, it would appear that the country has more profitable options other than production for rice export.

There are a number of crops, namely vegetables, potato and onion whose financial and economic returns are either as high as or higher that that of HYV rice. The fact that they have performed so poorly despite their higher returns can largely be attributed to high price risks associated with the marketing of such crops. Development of agroprocessing industries and marketing networks provide effective means for reducing variability in prices. Development of rural infrastructure including roads and inland water transport, rural electrification and communication facilities is an essential prerequisite for integrating localized rural markets with each other and with urban markets. At the same time, market links need to be established abroad and appropriate grading and processing facilities developed to promote exports of these products. The economic profitability of vegetable production for export has been observed to be fabulously high as compared with most other crops. However, their exports are presently constrained by lack of experience with these crops in Bangladesh, as well as a variety of marketing problems including product quality, acceptable packaging, high transport costs and market access. These problems need to be addressed to exploit the potential and scope of crop diversification in the country. The real prospects for diversification, however, would still depend on how far technological innovation could make non-cereal crops competitive under conditions of modern irrigation.

The results of sensitivity analysis indicate that the relative production efficiency is more sensitive to changes in yields and prices than to change in components of production costs such as wage rate and irrigation costs. Production efficiency was observed to be fairly sensitive to changes in shadow exchange rate. However, since there was hardly any variation across different crops considered in this exercise, their relative efficiency rankings remained unchanged.

Table 1 — Financial and Economic Profitability, and Domestic Resource Cost of Rice Crops in Bangladesh: 1996/97 - 1998/99 Period

Rice Crops	Irrigation Technique	Net Financial Return (Tk./hectare)	Net Economic Return ((Tk./hectare)		Domestic Resource Cost	
			Import Parity	Export Parity	Import Parity	Export Parity
Boro						
HYV	Modern	7299	18172	7254	0.70	1.12
Local	All	3953	9245	3758	0.93	1.40
Aman						
HYV	Modern	9782	19682	9090	0.62	0.96
HYV	Rainfed	11216	20490	10069	0.59	0.91
HYV	All	10459	19970	9644	0.61	0.93
Pajam	All	8528	17413	7863	0.67	1.03
Local T.	Rainfed	4250	10105	4003	1.04	1.57
Local B.	Rainfed	2735	7374	2583	1.55	1.40
Aus						
HYV	Rainfed	3831	10638	3710	0.81	1.27
HYV	Modern	5494	13918	5308	0.73	1.13
HYV	All	3410	10763	3428	0.82	1.30
Local B.	Rainfed/ Traditional	-2371	1757	-1834	1.25	1.91

Source: Authors' calculations.

Note: The estimates are averages for 1996/97, 1997/98 and 1998/99, expressed at 1997/98 prices.

Table 2 — Financial and Economic Profitability, and Domestic Resource Cost of Non-Rice Crops in Bangladesh: 1996/97 - 1998/99 Period

Non-Rice Crops	Irrigation Technique	Net Financial Return (Tk./hectare)	Net Economic Return (Tk./hectare)		Domestic Resource Cost	
			Import Parity	Export Parity	Import Parity	Export Parity
Wheat	Modern	2819	6466	-	0.90	-
Wheat	Non-irrigated	3254	6101	-	0.91	-
Wheat	All	3165	6540	-	0.89	-
Jute (White)	Rainfed	751	-	8189	-	0.92
Jute (Tossa)	All	2804	-	11140	-	0.80
Cotton	Rainfed	18665	16886	-	0.55	-
Tobacco	All	9993	-	91212	-	0.21
Sugarcane (Sugar)	Modern	44081	33323	-	0.81	-
Sugarcane (Sugar)	Non-irrigated	25726	18575	-	1.11	-
Mustard (oil)	Traditional/ Non-irrigated	4235	-2747	-	3.20	-
Mustard (seed)	Traditional/ Non-irrigated	4235	3576	-	1.25	-
Masur (Lentil)	Traditional/ Non-irrigated	8521	14543(H) 10358(L)	9715 -	0.43(H) 0.54(L)	0.56 -
Gram	Traditional/ Non-irrigated	6621	12184(H) 8407(L)	7826 -	0.44(H) 0.55(L)	0.57 -
Khesari	Traditional/Non-irrigated	4538	8551(H) 5867(L)	5454 -	0.62(H) 0.78(L)	0.81 -
Chilli (dry)	Modern	16429	6549	-	1.11	-
Chilli (dry)	Traditional/ Non-irrigated	3118	-3318	-	1.64	-
Onion	All	97482	86322	-	0.25	-
HYV Potato (fresh)	All	49140	184665	26788	0.18	0.63
HYV Potato (chilled)	All	49140	120926	-	0.31	-

Source: Authors' calculations.

Note: The estimates are averages for 1996/97, 1997/98 and 1998/99, expressed at 1997/98 prices.

MEDIUM TERM OUTLOOK FOR RICE PRODUCTION AND DEMAND: PROJECTIONS TO 2020

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Bangladesh has made substantial progress in rice production, more than doubling production since the mid-1970s. In recent years of normal rice harvests, supply from domestic production has essentially met domestic demand so that imports have been very small. Future supply-demand balances will be determined in part by the price-responsiveness of supply and demand, along with technical change, income growth and other factors. This paper provides estimates of the price-responsiveness of rice production (in particular, area planted to rice), and then simulates supply and demand balance for rice under alternative scenarios.

ECONOMETRIC ESTIMATES OF SUPPLY PARAMETERS

Rice supply projections are based on estimated coefficients from regressions on area and yield by rice crop (aus, aman and boro). The area regression equations follow a basic Nerlovian model where area is expressed as a function of expected prices (proxied as lagged prices), lagged area and other factors. The yield regressions are simple estimates of logarithmic growth rates.

For the aman regressions, the sample data is from 1972/73 to 1999/2000. The real rice price[2] at planting time (the average price from October-December of the previous year) is used as a proxy for the expected rice price. Dummy variables for various years were added after examination of the outliers of plots of fitted versus historical values of the dependent variable (aman area). The best fit was obtained with dummy variables with a value of one for 1975, 1976, 1987, 1988, 1989 and 1999. The estimated short-run price elasticity with this model is 0.051, with a long-run elasticity of 0.067. Long-run elasticities computed from alternative regressions range from 0.041 to 0.110 (Table 1).

Table 1 — Determinants of Area Planted to Foodgrains: Regression Results

	1	2	3	4
Years	1973-2000	1979-2000	1973-2000	1979-2000
Dependent Variable	*Aus Area*	*Boro Area*	*Aman Area*	*Wheat Area*
Constant	0.426	-0.410	-4.192	0.057
	(1.961)	(-1.123)	(-7.013)	(1.065)
Lagged Real Price	3.620	5.222	4.031	0.101
	(2.426)	(1.806)	(2.385)	(1.415)
Lagged Area	0.762	0.497	0.233	0.787
	(11.134)	(4.057)	(2.193)	(11.298)
Lagged Yield Rate		0.319		
		(3.379)		
Adj R^2	0.978	0.989	0.777	0.934
D-W	2.298	1.896	1.996	2.134
SR Elasticity	0.106	0.164	0.051	0.120
LR Elasticity	0.443	0.326	0.067	0.563

Note: *t-statistics are shown in parenthesis. Elasticities are computed at the arithmetic means* values of the respective price and area variables.

The regression for boro area includes lagged boro yields as well as lagged area, planting time price (October-December of the same fiscal year as the boro harvest), and dummy variables. The best regression includes a dummy variable with a value of 1 for 1988 and two other dummy variables equal to 1 for all years after 1988 and all years after 1998. These latter two dummy variables capture the large and apparently permanent increases in boro area after the 1988 and 1998 floods. Using the full sample from 1972/73 to 1999/2000, the estimated short-run price elasticity with this model is 0.089 with a long-run elasticity of 0.168. Using only a 1978/79 to 1999/2000 sample, the short-run elasticity is 0.164, with a long-run elasticity of 0.326. In the projections, the parameters from this latter regression are used. A similar methodology was also used for aus area, resulting in an estimated short-run elasticity of 0.106 and a long-run elasticity of 0.443.

For the yield regressions, a shorter sample from 1989/90 to 1999/2000 was used. Trend yield growth rates for aman, boro and aus are 0.00073, 0.1935 and 0.0915, respectively. Since the coefficient for aman was not significantly different from zero, however, a zero growth in

[2] Real prices are calculated using the non-food CPI as a deflator.

aman yields is assumed in the base projection.

SUPPLY PROJECTIONS

The parameters above were used to project annual rice production from 2001 through 2020 using alternative.assumptions regarding real prices and yield growth. In the base run, with no change in the real price of rice over time, total rice area increases by 11.0 percent, as the increase in boro area more than offsets the declines in aus and aman area. Boro and aus yields increase by 46.7 and 20.0 percent, respectively, over the twenty-year period. As a result boro production increases by 77.3 percent, aman production is nearly constant, and aus production falls by 14.6 percent. Total rice production in 2020 in the base run is 31.1 million MTs, 35.1 percent higher than in 2000.

If real rice prices gradually increase by 20 percent over the period, (assuming a constant growth rate of real rice prices), total production rises to 31.8 million MTs. A 20 percent decline in real rice prices results in production of 30.4 million MTs. Thus, with only area assumed to be responsive to price changes, total production varies by only 1.37 million MTs in these three scenarios. Increasing aman yields by 1 percent per year along with a 20 percent increase in real rice prices over time raises 2020 production to 34.0 million MTs. Cutting boro yield growth in half, together with a 20 percent reduction in real prices over time, lowers 2020 production to only 25.6 million MTs.

SUPPLY AND DEMAND PROJECTIONS WITH ENDOGENOUS PRICES

Table 2 presents projections of supply and demand where prices are determined endogenously. Prices are generally set equal to the autarky market-clearing price where domestic supply (production less 10 percent for seed, feed and losses) equals domestic demand. However, in simulations where the autarky price exceeds the import parity price (or falls below the export parity price), the import (export) parity price is used to recalculate supply, demand and imports (exports). The import parity price is calculated as the average 1995/96 to 1999/2000 import parity price of rice from India, expressed in dollars ($293/MT) multiplied by the

2000/2001 exchange rate of Tk 54/$, or 15.8 Tk/kg). An export parity price of $240/MT (12.3 Tk/kg) is used, slightly above the average export parity price of $229/MT (11.7 Tk/kg) from 1995/96 to 1999/2000, and 10 percent higher than the actual price in 1999/2000. (This export parity price implies that if marketing channels had been established, the Bangladesh private sector could have profitably exported rice to India, or competed with Indian exports to third-country markets in 1999/2000.)

In the base run, demand is modeled using an income elasticity of demand of zero, an own-price elasticity of demand of –0.4 and population growth of 2 percent per year. Under these assumptions, real prices rise by 19.6 percent by 2020 as domestic demand increases faster than supply. Assuming per capita income growth of 5 percent per year and an income elasticity of demand of 0.2, domestic demand grows even faster. Prices rise to import parity by 2013 (an increase of 35 percent in real terms) and by 2020, imports reach 1.52 million MTs per year, equal to 5.0 percent of total consumption of 32.5 million MTs. Similarly, with base run demand parameters, but with slower growth in boro yields, prices rise to import parity by 2011, and by 2020 imports reach 2.67 million MTs per year.

If aman yields are assumed to increase by 1 percent per year, then in the absence of exports, real prices are almost constant over the twenty-year period, rising by only 4.9 percent by 2020. If export parity holds as a price floor, however, then exports reach 720 thousand MTs per year in 2020, equal to 2.4 percent of net production.

Table 2 — Rice Supply and Demand Projections with Endogenous Prices

	Production				2020	2020
	Aman	Aus	Boro	Total	Price	Trade[a]
	(% Change from 2000 Base Simulation Shown in Parentheses)					
2000 (base)	10.30	1.73	11.00	23.03	0.050	0.00
Base Simulation 2020	10.22	1.70	19.95	31.86	0.060	0.00
	(-0.8%)	(-2.1%)	(81.3%)	(38.3%)	(19.6%)	(0.0%)
Increased Aman Yields	12.39	1.55	19.63	33.58	0.052	0.00
	(20.3%)	(-10.3%)	(78.5%)	(45.8%)	(4.9%)	(0.0%)
Increased Aman Yields With Rice Exports	12.42	1.60	19.73	33.74	0.055	0.72
	(20.6%)	(-7.9%)	(79.4%)	(46.5%)	(10.0%)	(2.4%)
High Rice Demand	10.30	1.87	20.30	32.47	0.068	-1.52
	(0.0%)	(8.0%)	(84.6%)	(41.0%)	(35.0%)	(-5.0%)
Slow Boro Yield Growth	10.30	1.88	15.22	27.39	0.068	-2.669
	(0.0%)	(8.2%)	(38.4%)	(18.9%)	(35.0%)	(-9.8%)

Source: Authors' calculations.

Notes: [a] Share of imports or exports in net production is shown instead of the percentage change.
Base run: per capita income growth 3%; population growth 2%; income elasticity 0.0; Price elasticity of demand -0.4.
Increased aman yields: 1 percent increase in average yields per year.
High rice demand: per capita income growth 5%; income elasticity 0.2

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SESSION III

FOODGRAIN MARKETS AND STORAGE

CHEMICAL CHANGE OF FOODGRAINS IN STORAGE

- Dr. M. Kabirullah
- Mr. Mahfoozur Rhaman

BACKGROUND

The history of storing foodgrains is as old as human civilization. Seasonal variations in harvest need storage of stocks in excess of immediate requirements to adjust the mismatch between supply and demand. Grain quality can only be maintained over any period of time by proper storage. In Bangladesh, the main objective of government storage of foodgrains is to ensure a safe buffer stock of foodgrains as an instrument of food security at the national levels. Foodgrains are also stocked by the government to service the need of the Public Food Distribution System, and for programs of social security and disaster management.

Farmers store foodgrains for their own consumption and seeds, or for selling through the commercial channels. At the farm level, storage is normally in the form of paddy, because paddy is less susceptible to deterioration in storage. The receptacles in use for storage vary in size and in the material used for construction. They may be temporary, or semi-permanent, but always built of cheap materials. Cylindrical bins made of unbaked clay are very common. A larger receptacle (5000-7000kg capacity) may consist of a rectangular elevated structure of plaited bamboo build on piles and with a sloping thatched roof *(Gola)*. Farmers also store rice in earthen bins *(Motka)* for short periods. In some cases, the mouth of the bin is sealed with mud and straw and rice is stored for extended periods.

Majority of the rice mills store the paddy in *Kothas*, a battery of rooms built of brick and mud or mortar and provided with doors and windows. Paddy is stored over a 15cm layer of paddy husk sprayed on the ground. In commercial storage, paddy is normally stored in jute bags, particularly when they are to be milled in the immediate future. Rice for commercial use is invariably stored in gunny bags in Bangladesh.

GOVERNMENT STORAGE

Cereals are stored in the government LSD, CSD and Silos for a period normally covering two cropping seasons. At present, there are 607 LSDs, 13 CSDs and 4 silos in the country, having total installed capacity of 1,566,850 MT. Such godowns are constructed in almost every upazilla of the country. In CSDs and LSDs, cereals are packed in gunny bags and stored on wooden dunnage. There is no facility to control humidity and temperature in the godowns. In silos, normally wheat is stored in bulk condition. In some of these godowns, there are facilities to measure moisture levels of the stored grains. Arrangements are also available to spray insecticides and fumigate the stored grains to prevent the growth of microbes and to prevent and destroy insects.

STORAGE MANAGEMENT AND QUALITY DETERIORATION

The government godown management procedures determine safe storage life of the grains by numbering. These numbers indicate period of safe storage of the grains so classified, and they must be disposed of within this time period. The grains are thus classified as DSD-1, DSD-2 and DSD-3, and so on. These numbers indicate months within which the grains must be disposed of before deterioration makes the grain unfit for human consumption, or total stock loss may occur.

Relevant literature based upon long accumulated experience indicate that chemical changes in foodgrains is a natural process and occurs continuously resulting in the loss/gain of weight, changing of physical appearance, loss of nutritional/food value, loss of culinary properties, and ultimately, total destruction of the grain will result. Stock deterioration is influenced mainly by post harvest processing and storage conditions. Conditions in storage, such as humidity, temperature, presence and attack of insects, rodents, fungus etc determine to a large extent safe storage life of foodgrains. Of all the parameters of chemical changes, moisture is the most important factor. The process of breakdown of triglycerides, resulting in the production of free fatty acid value and breakdown of starch into smaller fraction resulting in the increase of reducing sugar add to the process of deterioration. Auto-oxidation of unsaturated fatty acids,

producing peroxide and growth of fungus has been recognized as the major parameters in changing the chemical composition of foodgrains. It may be noted that any change in protein occurs very slowly and thus may be ignored in any scientific study to find the determinants of chemical changes in grains.

CHEMICAL CHANGES IN FOODGRAINS

In Bangladesh, storing of cereal grains especially rice has a long history, though very few studies have been conducted on the chemical changes in the stored foodgrains. Understanding of the chemical changes in foodgrains in storage is vital for developing a viable storage strategy and procedures. While a literature exists generally describing such changes in foodgrains in storage, no data or formula is available to storage managers for ascertaining and/or predicting foodgrains conditions in storage over long period of storage. Ministry of Food, Government of Bangladesh has, therefore, decided to conduct a study for ascertaining the chemical changes in foodgrains in government storage. The study will help the store managers to ascertain the quality of the stored foodgrains and act accordingly. The study has been designed to continue for a period of 5 months. This paper reports on the sampling techniques, physical conditions of the godowns and depots, and the chemical changes of grains sample drawn in the first round with some preliminary observations.

Storage Units

Individual storage capacity of the sampled depots varies between 500 and above 5000MT each unit. These units were selected under a sound statistical sampling scheme aimed to draw a representative sample of the entire government stock of foodgrains. Stock of foodgrains in these godowns, as on 30th June, 2000, ranged between 25% to above 100% of installed capacities, where 24 godowns have the installed storage capacity of 500MT, 1 has 750 MT and 5 have 1000MT. All the depots store rice and wheat. Only 3 depots had oil and 9 had stored paddy. Twelve godowns stored foodgrains more than their installed capacity. Nine godowns stored 75-99%, 7 godowns stored 50-75% and 2 godowns stored 25-50% of their installed capacity, All the grains were harvested in the summer of 2000 in the *boro* season. The samples were taken within

a period between 7 days to 6 months of the date of stock entry. But almost half the samples were taken within 3-5 months. Such time gap between harvesting and stock entry into the food godowns is natural, given the cropping pattern and government procurement and subsequent movement of stocks.

Physical Condition of the Godowns

All these storage units were constructed in a period starting early 1950s. Some of them were renovated and structurally modified during the intervening period that stretched to 1990s. Most of the depots in the northwestern part of the country are located on flood free grounds. The high flood levels of 1988 did not affect any godown, though some of them were only marginally saved. On physical inspection, six godowns were found with damp walls. The floors of 9 godowns were in fair condition, and those of 5 were poor. The ceilings of 7 godowns were leaky. In short, the physical condition of 5 godowns was in a bad condition. The doors and ventilation systems of all the godowns were found to be satisfactory.

Parameters of Change

Parameters of chemical changes of the grain samples collected during the 1st round have been determined. The results were correlated with the elapsed period between the stock entry and the dates of sample drawn. The age of the sample varies between 7 to 180 days with an average of 101.90 days, having standard deviation (SD) of 43.06. It may be noted that all the samples of grains were harvested during the summer season of 2000. So the net age of the sample appears to be almost identical. In order to track the changes in the chemical parameters of the grain in the stores, the date of stock entry was considered as the starting date and the results were correlated accordingly. The moisture level of the grain samples ranged between 11.01- 14.66 % with the average of 13.72% having SD of 0.74. Peroxide value ranged between 10.1 to 18.1 with an average of 14.5 and a SD of 2.26, and shows co-relation with elapsed similar to that of acid value. It appears from the correlation coefficient (r) that the moisture level of the grains indicated a decreasing trend with age. It may also be noted that the moisture content of the grains naturally decrease with age but the rate of decline depends on a number of

variables, such as initial moisture level, degree of milling, physical conditions of storage, container, temperature, humidity etc. In Bangladesh government stores, there is no system to control these variables other than by natural ventilation. Temperature and humidity at the geographical locations of the storage also decrease after the summer, and reach the lowest during the winter. These changes influence the moisture level in the grains stored in the government stores. The fat content of the grains normally depends on the degree of milling. Parboiled and mill-polished rice contains almost similar amount of fat, which decreases, with the age of the grains. The acid value of the grain samples ranged between 10.1-17.39. The acid value of the samples is positively correlated with the age of the samples. The peroxide value ranged between 10.1 to 18.8, with an average of 14.15, and a standard deviation of 2.26. Acid values were also correlated with age. The change in the reducing sugar was negligible. The fungal load of the grains varied widely, which may be due to variability of handling between the stores, where any unhygienic handling of the grains during processing, milling and packaging would have enhanced the fungal infestations. Only one sample of imported wheat was collected from a silo. The origin and age of the sample could not be ascertained. Results obtained with wheat also vary with those of rice samples but no attempt was made to correlate the results with those of rice samples, as they are totally different species of grains.

PRELIMINARY OBSERVATIONS AND CONCLUSIONS

The preliminary results of analysis conducted on the sampled grains indicate decreasing percentage of moisture and increasing acid and peroxide values with increased age (time period between stock entry and sampling date). The fungal load of the sampled grains varied widely. This variation is most probably attributable to the extent of contamination imparted to the grains during post harvest handling, processing, and storage.

The preliminary results reported here are only indicative of the chemical changes in foodgrains stored in government godowns by the first round of samples and analysis thereof. Conclusions may be drawn and appropriate recommendations may be made after completion of the 4th round of analysis covering 6 months of storage life.

GRADE, STANDARDS AND INSPECTION PROCEDURES OF RICE IN BANGLADESH

- Mr. A. K. M. Nurul Afsar
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OBJECTIVES

The major objectives of this study are:

- To review existing DGF procurement grades of rice.
- To review the existing grades of the Asian region, particularly of Thailand, Pakistan, India and the USA.
- To device modern standard grades.
- To recommend ways and means to implement procedures to ensure standards and grades of rice in the domestic as well as for international markets.

GRADES AND STANDARDS IN SELECTED COUNTRIES

The existing DGF procurement grade was reviewed. The study was carried out by literature reviews, field surveys, personal interviews with concerned persons, and analysis of collected samples. A comparative study on the grades and quality of rice was carried out using the data from the survey, the existing grades of DGF, and information regarding other neighboring rice producing countries, and of the USA.

In all, grade and standards of 13 countries including Bangladesh were reviewed and major findings were noted and described in the paper.

Countries under review more or less followed similar grading parameters for rice grading. These are: moisture content, head rice, broken (big and small), damaged kernel, discolored/yellow kernel, chalky, immature grain, foreign matter, red kernel, admixture of other varieties and degree of milling. Among them, moisture content, brokens and impurities in the grain are the major factors influencing grading specifications as regards quality of the product.

Moisture content of milled rice was 14% for all the countries except Nepal. The percentage of big broken in non-parboiled (white-milled) rice of the comparable grades of the Philippines, Gr. 1 & Gr. 2, Thailand 15% broken & 25% broken, Vietnam 15% broken & 25% broken, Pakistan Gr. 3 & Gr. 4, India Gr. A & Gr. common, and Nepal Grade 3 & Gr. 4 were 19.75% & 34.50%, 17% & 28%, 16% & 27%, 15-20% & 20-25%, 24% & 30%, 25-30% & 15% & 25%, respectively.

The percentage of brokens in parboiled rice of comparable grades of India, Nepal, Pakistan and Bangladesh are 15% & 17%, 16-20%, 12.5-15% and 10-12%, respectively. Major impurities in percentage, including discolored grain and chalky kernels, for the Philippines, Thailand, Vietnam, Pakistan, India, Nepal and Bangladesh were (2-4, 5-10), (1, 7), (1, 7-8), (nil, 8-10), (8 & 6), (4-8, 7-8), and (1-1.5, nil) respectively.

Comparable criteria of rice grading of most rice-producing countries in Asia including Bangladesh are quite similar. However, in the USA, quite a different set of parameters of grading is utilized.

Quality standards for milled rice depend on a number of factors. Some of those are variety, season of production, physical impurities present, milling methods, and cooking methods.

GRADES OF RICE

Rice has been classified by the FAO based on its size and shape, namely, **slender, medium, bold (coarse) and round,** according to the milled kernels' length/breadth ratio. The length-breadth ratio of **slender, medium, bold** (coarse) and **round grain** are **more than 3, 2.4 to 3.0, 2.0-2.39 and less than 2.0** respectively.

Rice processing is the largest food industry in Bangladesh, with about 100,400 large and small rice mills. Two marketing and milling systems are found in the country. The small huller type mills at rural areas process about 16 metric tons of paddy per week. Large huller and rubber roll mills process about 30 metric tons of paddy per week per unit. Fully automatic rice mills with modern parboiling (CFTRI, India) units process about 200 metric tons per week. Over 90%

of rice in Bangladesh is parboiled before milling. In terms of milling capacity, this is adequate for the country, but the quality of milling needs to be improved through introducing two stage milling system and ancillary processing equipment. This improvement in milling technology will reduce milling losses to a great extent, and will provide the nation additional milled rice out-turns compared to the same quantities of paddy currently being processed by inefficient mills. In addition, by improving the quality of rice to conform to international standards, it will create opportunities of exporting quality rice in the international market.

FIELD SURVEY ON RICE GRADE AND QUALITY

A Field Survey was conducted at 7 LSDs of 4 districts and 8 rice mills of 8 districts to collect information relevant to rice quality, grading, storage and marketing. Rice samples were collected from the government storage units and from private rice mills. These samples were analyzed in the laboratory using standard methodology. Quality parameters including moisture content, brokens, and other impurities were determined. Moisture contents of both LSD and rice mill samples were below 14% on average. The big broken percentage for coarse (Boro and Aman), fine and aromatic rice on an average were 2.55% and 2.44%, 3.88% and 7.77%, respectively. These analyses indicate that broken percentage is higher in fine and aromatic varieties than in coarse varieties of milled rice in Bangladesh. Therefore, a maximum of 5% big broken may be suggested for coarse rice grading. Although, results from DGF samples indicate higher percentage of small broken (5.79%) compared to the existing limit of 3%; however, percent of small broken from the mills was about 3%. It is thus suggested that allowable limit of small broken may remain the same as before (3%). Total brokens in Boro rice was higher (8.03%) than in Aman rice (6.1%). Total brokens in aromatic milled rice is higher in Bangladesh (15.9%) compared to those of Pakistan (12.5%). Other quality parameters including chalky and immature grain, damaged and dead grain, admixture of other varieties, paddy, foreign matters and red kernels were found to be at levels below the present DGF standard.

SUGGESTED GRADES

Considering literature reviews, personal interviews, and survey results of rice sampled from government procured stocks and from rice mills, the milled rice of Bangladesh are suggested to be classified into **three grades: coarse, fine, and aromatic** for consideration and eventual adoption. While classifying the collected rice samples into coarse, fine, and aromatic grades, the study group found difficulties in placing some medium and fine varieties into appropriate grades. This difficulty arose because FAO classification of milled rice based on size and length/breadth ratio does not fit some of the medium and fine rice varieties produced in Bangladesh (e.g. BR22, BRRI Dhan28 and Pajam). In order to classify those varieties distinctly and properly, the thousand-grain mass (TGM) method was applied. TGM value of aromatic grade milled rice is suggested to be up to 10 points. TGM value of fine grade milled rice will fall between more than 10, and up to 14 points. TGM value of coarse grade milled rice will be above 14 points.

The existing single grade for procurement by the DGF may be continued with some improvement in the quality parameters. This single DGF grade, after some modifications, is proposed for the interim period, until such time multiple grades are adopted.

IMPLEMENTATION

In addition to existing DGF inspection procedures, the following procedures are suggested for improvement in grades and standards of government procurement:

- Before procurement, concerned technical personnel of DGF should visit and inspect rice lots tendered by the authorized dealers/millers.
- Upon inspection of the commodity, the inspector should record date of inspection, grade and other necessary information on the lot.
- In sampling, standard method must be followed.
- Scientific analysis should be carried out for all samples.
- TGM method should be used to determine weight loss of stored commodity at a definite interval. It is suggested that the first such test be carried out first after 6 months of storage, and subsequently, every 2 months.
- To find an alternative to the existing storage and disposal indicators, the following techniques and procedures may be used after testing at a properly equipped laboratory. These procedures, in short, are:

- Determination of percentage of insect damage grains
- Determination of percentage weight loss using TGM method

Suggested grade standard for DGF procurement may be implemented in phases.

These suggested steps should be:

- Undertake a pilot program to develop new grade testing methods and applying this technique in LSDs and procurement centers to test its efficiency.
- A working group of experts should identify and record practical problems and suggest solutions.
- DGF procurement staff should be trained on the application of new grading techniques for procurement after its development.
- After the pilot program phase, these procedures may gradually be introduced nation wide.

TRAINING, LABORATORY AND LIBRARY

Training needs on procurement and storage management of DGF personnel were clearly reflected in the survey. Training related to overall management of LSD, laboratory techniques, procurement, grading, inspection, storage and quality control might be arranged for the DGF personnel at different levels to update knowledge and skill. Such training is a continuous process and may be conducted on a regular basis.

Existing laboratory equipment at the DGF is not adequate to perform all the tests. Therefore, modern equipment should be procured and installed. A list of such equipment is included in this report.

At present, there is no librarian for the DGF library, which is mostly stocked with local books. To upgrade the library to the standard level, relevant books and journals on food grain inspection, storage and management should be procured. A list of such books is also included in this report.

CONCLUSIONS

Grades and standards of rice are of vital interest to the nation. It is imperative to introduce

modern grades and standards for a multiple of reasons. They are important to the consumers, as cereal grains supply large percentage of dietary calories for the people of Bangladesh. The Government also procures large quantities of food grains from the domestic market. Thus, it is a prerequisite that appropriate grades of food grains are procured so that they are fit for long storage, as well a wholesome and nutritious product is supplied to the people. Grades and standards need continued revision and up-gradation as well as enforcement. This report may be seen as a preliminary effort towards the end, when efficient and modern grades and standards of rice will be effectively introduced for the Ministry of Food, and the country.

SESSION IV

NATIONAL FOOD SECURITY POLICY OPTIONS

A MARKET IN TRANSITION? THE CASE OF THE BANGLADESH RICE MARKET

- Dr. K.A.S. Murshid

INTRODUCTION

There have been major forces at work in the rural economy over the past decade and a half, with quite striking implications, in particular, for the rural food economy. On the production front, large increases in foodgrain productivity have taken place ushering in an era of near self-sufficiency in rice. The incentive regime facing agriculture has undergone a major transformation, resulting in rapid technological change (widespread adoption of the Green Revolution technology and modern irrigation practices). Significant improvements have taken place in physical infrastructure (rural roads, telecommunications and rural electrification) and in the delivery system of rural services, including financial and extension services. The rice market has also had to contend with withdrawal/reduction of food subsidies, reforms of the Public Food Distribution System, trade (import) liberalization of rice and expanded production and marketed quantities.

The purpose of this paper is to explore rice market dynamics in the Bangladesh context for signs of a transition towards a more developed (impersonal) market structure.

METHODOLOGY

The data generated for this study has been obtained from a selective re-survey of the original Crow and Murshid (1994) study areas in late 2000 in order to have comparative evidence between two points in time separated by over a decade. This has provided us with a rare opportunity to take a close look at various aspects of the rice market: structure, trade finance and forms of transactions. It is an opportunity to examine whether the charges of stagnation and lack of dynamism that is often levied on the countryside is an apt description of current realities, in the context of a specific market, namely the domestic rice market in Bangladesh.

The study areas relate to three distinct sets of markets. An agriculturally progressive or "advanced" Green Revolution area in Bogra in the North-west, an agriculturally "backward", mono-cropped *char* area in Noakhali in the South and the major urban market configurations in the Dhaka - Narayanganj belt, consisting of Badamtoli, Madanganj and Kamlaghat.

BACKWARD AND ADVANCED AREAS: CHANGING CONTRASTS IN THE EXCHANGE REGIME

A Backward Area: Chars of Noakhali, 1988

When the area was first visited in 1988 it was found to be predominantly single-cropped with *Aman* paddy cultivation (from August to November) constituting the main agricultural activity. Land productivity was low, with a high incidence of tenancy and sharecropping, a predominance of absentee landlords and relative lack of alternative employment opportunities. The area was poorly served by infrastructure, services and institutions. Communications were difficult, very few development agencies or programs were seen to operate here and access to schools, clinics and hospitals remained very limited.

Trade Circuits, Credit Hierarchy and Types of Credit Relations

The large *char* grain collection market stood at the apex of a hierarchy of financial relationships that served to channel cheap paddy from its hinterland to money-lending traders and absentee landlords. The hierarchy was found to operate through a network of trading-financial arrangements that extended up to the grower's level and sustained by its dominance over the local power structures (including the police and *lathials*), as well as control over transport from within and from the area. Its principal functions were to secure paddy supply for the traders at the apex (at a low rate) in exchange for financing cultivation costs and consumption during the growing stages of the crop.

There were two principal forms of trade or merchant capital operating in the backward area that could be viewed as the basic economic links binding the hierarchy - designated here by *dhaner upore* and *dadon*. The first is a pre-harvest price-fixing loan to cultivators to be repaid in

kind at harvest. The second is a trade-tying working capital loan to a subordinate trader by a money-lending trader.

A Green Revolution (Advanced) Area: Bogra, 1988

An advanced area of Bogra district that was studied stands out in sharp contrast with the Noakhali *chars* discussed above. The area is situated in the very old alluvium of the Barind Tract, unlike the still active *chars*, and is much more densely populated. The area is characterized by intensive irrigation development and adoption of the Green Revolution technology, in the 1980s. Multiple cropping is universal, communications are good and electrification was expanding quickly. Sharecropping was found to be rare with the predominant form of tenancy being in terms of fixed cash rents. The area posts a healthy surplus in both the *aman* and *boro* seasons.

In terms of credit related to the grain trade, very few cases of *dhaner upore* were found. There is some lending from rich to poor peasants but the most prominent form of loans was those from rich growers to traders and millers. Short-term supplier's credit (*paikari baki*) is used widely to increase turnover and is given by millers to Trader-brokers (*aratdars*). The main condition of these loans is that the *aratdar* may not buy from any other miller in the same market.

The main trading circuits identified show two distinct flows: a relatively small, local flow meant for the local market and a much larger flow catering to the deficit markets to the South and in Dhaka.

Previously three main contrasts in the exchange regime were identified:

- in the proportion of free and tied transactions in rice,
- in the number and types of intermediaries in the main trade circuits, and
- in the form and direction of credit.

Nature of Transactions

The most striking contrast was found in the extent of tied and non-tied transactions in the

advanced and backward areas and markets. Transactions of growers with traders in the former were largely untied while those in the latter exhibited considerable tying, mainly through sharecropping and *dhaner upore* loans. Thus over 92 percent of sales by growers in the advanced area were non-tied while this was only 30 percent in the backward area. A form of credit popular amongst surplus growers in the advanced areas (mostly to processors and traders) was the higher-than-market price loan in which the debtor pays back the creditor at the end of the season at the highest price of the season. In other words the origin of capital in advanced areas is "free" agriculture while that in backward areas is primarily mercantile (big traders) or semi-feudal (large sharecropping landlords).

These contrasts remain even today but have diminished greatly in a number of ways. Sub-ordinate traders tied to urban trader-financier-brokers who were central in channeling *dhaner upore* loans to poor cultivators in backward areas have all but ceased their lending functions. The incidence of *dhaner upore* remains significant but the role of the trader-financier-brokers who used these as a well-structured mechanism to procure paddy supplies cheaply, no longer exists. The number of traders has sharply declined (by 60 percent) and those that have survived now transact principally in cash to procure supplies. One possible factor may be the lower returns to *dhaner upore* today compared to the situation in the late 1980s, making it unattractive to traders (but not to absentee landlords).

Market Structure and Trade Circuits

A second contrast between the two areas was in the market structure and in the circuits of trade. A decade ago the circuit in the backward areas was longer compared to that of advanced areas because of the need to engage additional intermediaries to finance and channel the *dhaner upore* loans originating from the trader-financier-brokers (namely the paddy collecting subordinate trader). An interesting reversal has occurred a decade later. The *cycle bepari* (paddy collecting agent or faria) and the paddy *aratdar* have emerged as important players in the advanced area markets (thereby elongating the circuit). Previously, the role of the *cycle bepari* was essentially that of a small or microprocessor cum trader using family labor to process the

paddy (soaked, sun-dried and parboiled before husking in a mill) for ultimate sale to the rice *aratdar* or outside buyer. By contrast, in backward areas, the near demise of trader-financier-brokers and their tied, subordinate agents have shortened the circuit.

Form and Direction of Credit

The realignments in the structure of trade has meant that the downward flowing trade finance (to growers) in backward areas no longer exists as has been the fate of the upward flowing higher-than-market price credit from growers to millers or traders in advanced areas. Thus, the *dhaner upore*-led trade finance to growers has lost its significance in backward areas. In advanced areas, surplus growers are no longer able to transfer their price and storage risks on to medium processors or mills through higher-than-market price credit. The bulk of trade credit now available in both backward area and advanced area markets are short-term sales on credit (typically rolled over every 7-15 days and settled at the end of each trading season) provided by paddy *aratdar*s, millers and wholesalers to their customers. Transactions at both ends of the trading circuit, i.e. with growers on the one hand and retailers on the other are strictly in cash.

TRADE TYING IN LONG DISTANCE TRADE

Trade tying loans generally known by the generic name of *dadon* has been reported from many major markets in Bangladesh, e.g. Badamtoli, which used to be one of the largest wholesale markets of the country. Similarly large markets in Narayanganj (e.g. Kamlaghat and Madanganj, just outside Dhaka) also reported widespread use of *dadon* as well as *dhaner upore* loans given by large traders to subordinate traders as a key business strategy to segment the market.

Revisiting these areas in 2000 we were surprised to find that both *dadon* and long distance *dhaner upore* had almost completely disappeared from Badamtoli and Narayanganj. Other changes have also been reported from the long-distance trade. Direct cash payment has declined sharply as most payments by e.g. rice *aratdar*s to distant wholesalers, are made largely through telegraphic transfer from bank to bank. However, transactions were generally partly settled at

the time of initiation - typically 40 percent was paid immediately and the remaining 60 percent was settled usually within 7-15 days. Although the speed and security of transactions appear to have increased the problem of debt recovery (from buyers making credit purchases) remains a serious cause for worry. The relative abundance of grain supplies tends to accelerate credit-led sales, and unless mechanisms for recovery are adequate, can lead to large number of bankruptcies. Such a situation however, has not yet emerged.

CONCLUSION

In the markets investigated, we found that significant changes have taken place in the nature of transactions. In advanced areas, transactions have been speeded up through a number of ways: (a) greater reliance on bank to bank transfers to settle payment for larger consignments in the (long-distance) inter-district, rice trade, replacing dependence on direct cash transactions, (b) greater availability of telephone connections (the number of connections increased from around 50 to around 250 in one advanced area market) and better roads, and (c) credit sales by paddy and rice *aratdar*s as the main mechanism to increase turnover.

In BA, traditional transactions entailing inter-linked exchange such as *dhaner upore* was found to have sharply diminished in importance. Similarly the nature of trade finance changed from seasonal, roll-over credit used to tie-in subordinate, paddy/rice procuring traders, to short-term, credit sales and purchases and cash transactions. There has been a lot of change in the nature of informal credit markets - generally more exploitative forms have declined in importance while those that remain appear to charge lower implicit rates of interest. Further, the power of the trader-landlord-transport cartel (referred to as the backward area hierarchy in the CM study) has been broken and the structure of trade has become "freer" and much more impersonal.

Major changes have been reported from the large, urban rice markets. The dominant role of markets like Badamtoli has withered with time, replaced by a large number of smaller markets that have sprouted up all over the Dhaka-Narayanganj belt (Annex Table 1). The stiff competition has meant that even the remaining aratdars in Badamtoli are finding that their

turnover has reduced sharply (by over 50 percent). The hugely increased competition has also resulted in some major markets being shut down completely - the paddy-rice market in Madanganj is a dramatic example of this.

The nature of transactions too has altered in these markets. The overwhelming dependence on tied, subordinate traders or agents for supplies that was pervasive of Badamtoli and Madanganj markets a decade ago, has been almost totally replaced by "free" trade. Long distance trade financing of paddy production through *dhaner upore* loans also appears to have perished.

There are a number of implications for our findings: (a) more impersonal markets have improved efficiency and competition. This is most evident in the backward area markets marked by the fall of the "hierarchy" as well as thickening of participation (Annex Table 2). The striking changes in market participation in advanced area markets already observed, is also symptomatic of the same phenomenon; (b) These changing market conditions have implications for the return to growers and other participants, and may serve to explain at least in part, the underlying causes leading up to the rapid spurt in rice production noted in the 1990s, and (c) it would appear that market forces are more powerful than traditional hierarchies based on market inter-linkages and domination over the local power structure, at least under conditions similar to that of rural Bangladesh.

DETERMINANTS OF LABOR MARKET PARTICIPATION IN RURAL BANGLADESH AFTER THE 1998 FLOOD

- Dr. Carlo Del Ninno
- Dr. Dilip K. Roy

This paper is one of the few attempts to deal with labor participation issues in rural Bangladesh. These issues are very important because they have a direct impact on the livelihood of the poor. In our sample, we found that 21 to 32 percent of rural household income originates from wage income (dependent workers and daily laborers' work), and 19 to 24 percent from self-employment in business and cottage activities.

After briefly discussing the employment situation in the economy, this paper focuses on the determinants of labor force participation in rural areas using three rounds of collected data. The first round of data was collected in November-December, 1998, immediately after the floods, the second round in April-May, 1999 and the third round in November, 1999, one year after the flood. Then the level of wage earnings and other characteristics of the occupations of those who are working are investigated, comparing the periods before and after the 1998 flood.

An attempt was also made to describe the family labor participation in household non-market activities such as work on house repairs, tending livestock, etc.

LABOR FORCE PARTICIPATION

The labor force participation rate was low (40.8 percent) during the flood and in the immediate post-flood period (round one) in the rural areas of Bangladesh. It declined slightly to 39 percent in April-May, 1999, and to 37 percent in October-November, 1999. The curve of labor participation shows an inverted "U" shaped pattern with respect to age for both males and females.

There is a clear gender difference in labor participation between males and females. Lower female labor participation may be explained in part by the involvement of a large majority of

females in housework and in school (for 10-14 years old). A majority of males in the 10 to 24 year age group go to school and do not participate in the labor market.

The labor participation model used in this paper confirms that age is positively correlated with labor participation at a decreasing rate. As expected, males are more likely to participate in the labor market than females, as well as married people. We also found that while primary education has a positive impact on the participation of males and females, higher levels of education are a deterrent to male participation.

The size of land ownership negatively influences rural labor participation in each of the time periods. This means that poor households want to supply more workers to the labor market to earn at least a subsistence income for their family. The Flood variables, measuring to the severity of village level agriculture-flood exposure show that the flood had an overall negative impact on the labor market.

LABOR STATUS OF WORKERS

In our survey area, dependent workers represent only 15 percent of rural employed persons. More than one-third of rural male workers were found to be daily laborers. The first round of data collection found that about 44 percent of rural male workers were self-employed in their own businesses and owned farm activities. There is an increasing trend in the percentage of individuals engaged in self-employment. The percentage increase in females self-employed in their own businesses is even higher than that of males. The proportion of unpaid family workers was found to be lower than in the labor force survey of 1995-96 and declined between rounds one and two.

Dependent workers have relatively higher levels of education. More than 14 percent have completed 11 or more years of schooling, compared to about 5 percent for those engaged in business and cottage activities. Non-government projects, along with the private sector, employed 73.3 percent of all dependent workers in July-October, 1997. About 60 percent of the dependent workers were employed in the service sector in July-October, 1999 and October-

November, 1999. The rural manufacturing sector absorbed about 16 percent of workers, followed by off-farm work (10.7 percent). The service, trade, transport and rural manufacturing sectors paid higher monthly earnings than other sectors. Monthly average earnings from the agriculture sector were relatively higher in December, 1998, through April, 1999.

Daily laborers were mostly males (90 percent) aged between 25 to 54 years (75 percent), while the females were more concentrated in a 35-54 age group (more than 50 percent). The daily wage rate varied from Tk. 55 to Tk. 60 including meals. They never exceeded US $20 a month and dropped even lower at the time of the peak of the flood in August, 1998. Agriculture was the single largest source of employment for daily laborers. Labor absorption in agriculture varied from month to month, going from 42 percent in the pre-flood and flood period (July-October, 1998) to a high of 61 percent in October-November, 1999. The second most important source of use of daily laborers was the rural manufacturing sector, which absorbed 20-24 percent of all daily laborers in July-December of 1998 and 1999, followed by the construction sector in the months of January-May, 1999.

Business and cottage activities (self-employed non-farm activities) absorbed more than one-third of total employment in October-November, 1999. An average monthly income from rural non-farm activities was much higher than earnings from daily labor; during the July-October, 1999 period the average monthly earnings were reported to be 89 percent higher. The monthly income of self-employed persons in non-farm activities was lower than that for dependent workers, except in the period of November-December, 1998 when self-employed workers earned more than dependent workers by four percent. Trade accounts for about one-fifth to one-fourth of rural employment in the non-farm sector, followed by rural manufacturing (14-17 percent), transport (14-15 percent) and fish sales (12-17 percent). Rural trade was dominated by retail trade and, together with other businesses, accounted for 35-43 percent of non-farm employment. Non-farm activities were performed for more than an average of 180 hours per worker per month in July-October, 1997, November-April, 1999, and July-October, 1999.

Besides participating in the formal labor market, individuals perform a large variety of tasks

at home, ranging from repairs of their homes, working on their own farms, tending livestock, fishing, cleaning the house, etc. During the flood (July-October, 1998), more than one-fifth to one-third of family labor was engaged in fishing. Then the percentage declined. In fact, the percentage of family labor in fishing varied from six to nine percent in 1999. Other important activities performed by a large proportion of family labor were house-repairs and tending livestock. In January-May, 1999 more than one-third of family labor was involved in own farm activities on which an average of 74 to 87 hours was spent per month. Time allocation for livestock activities varies from one period to another, ranging from one-third to half of family labor time.

LABOR DEMAND IN CROP PRODUCTION

There is no doubt that family labor constitutes the highest proportion of total labor used in farm activities. Nevertheless, hired labor was one-third of all labor used and larger farmers (with 150 or more decimals of land) used more hired laborers than smaller farmers (with less than 50 decimals of land).

The comparisons between the use of hired labor between agricultural periods shows that the demand for labor was relatively higher at the time of the production and harvest of the HYV boro rice that took place in the season after the flood. At that time the use of labor per acre also increased from round 1 to round 2. Therefore, it appears that the loss of labor demand suffered during the period of the flood was offset, at least to some extent, by higher demand and higher earnings in the period after the flood.

CONCLUDING OBSERVATIONS

In conclusion, it emerges that labor markets in rural areas of Bangladesh are dominated by male daily laborers, with seasonal variations of demand, and that this demand may be subject to further reduction caused by disasters and other shocks. There is also concern for female workers. Their participation is very small. They sometimes participate in the production process only as unpaid family labor.

The challenge of improving the labor participation of a growing active population can only be met by an increase in opportunities in off-farm and cottage activities, since off-farm activities grow at a faster rate and provide employment in the agricultural sector. These activities can include sericulture, horticulture, reforestation and watershed development for rain-fed areas. This means that infrastructure, training and credit opportunities need to be available and that literacy and education have to be expanded to provide a more efficient labor force.

THE DEBATE OVER DYNAMICS OF AGRICULTURAL WAGE AND RICE PRICE IN BANGLADESH: A RE-EXAMINATION

- Dr. Shahidur Rashid

The significance of an understanding of wage-price adjustment is derived from the following two realities in Bangladesh: i) a large proportion of the country's population relies on labor markets for their livelihood; ii) rice is the country's main crop and accounts for over three quarters of aggregate calorie consumption. Therefore, the responsiveness of wage to rice price is a good indicator of how lives of the poor evolve over time. In particular, the sluggish adjustment of wage to rice price (even in the short run) can have detrimental effects on the poor whose major source of income is presumed to be wages. This background is the point of departure for a large body of empirical literature on the dynamics of wage formation in Bangladesh. Although issues are well conceived, the empirical results are conflicting and the debate over interpretation of empirical findings is ongoing.

Three important results come out of the re-examination of the data used in the past studies. First, within the framework of Johansen's multivariate co-integration method, our analysis suggest that agricultural wages and rice prices maintained a strong co-integrating relationship throughout the period from 1949/50 to 1979/89. This result is in sharp contrast to the findings of Boyce and Ravallion (1991) that argued that real agricultural wage was in an alarming downward trend from the mid-sixties to the early eighties. Second, all of the variables used in previous studies are non-stationary, which invalidate the use of the classical regression method used in past studies. Finally, we demonstrate that the inclusion of the agricultural productivity variable—measured as per acre production—into the long run co-integrating relationship is misleading. This is simply because variables like nominal wages and price are inflationary and can be affected by changes in other sectors, as well as through macroeconomic policy instruments e.g., exchange rate policies. On the other hand, the same is not true for per acre production, which is constrained by a given level of technology. Therefore, an attempt to find a

positive co-integrating relationship between this variable and wages is meaningless.

The results of the analysis on post-famine data are striking. Our analyses suggest that there has been a major shift in the dynamics of wage formation in Bangladesh. Using data from 1976/77 to 1998/99, we demonstrate that the rice price is no longer a significant determinant of the agricultural wage rate. This implies that the concern about declining purchasing power due to a sluggish adjustment of wages to rice price is no longer an issue. Since labor cost is significant proportion of total costs of production, an increase in agricultural wage rate relative to rice price implies a decline in farmers' profitability. These results point to the increasing integration of urban and rural wage markets in Bangladesh, and suggest the importance of maintaining a vibrant economy in rural areas and small urban centers in order to alleviate increased pressure from labor migration to Dhaka and other large cities.

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SESSION V

MACRO-ECONOMIC POLICIES AND THE FOODGRAIN SECTOR

POVERTY TRENDS AND AGRICULTURAL GROWTH LINKAGES

- Dr. Mustafa K. Mujeri

The paper reviews recent trends in poverty and explores the channels through which agricultural growth benefits reach the poor. The objective is to identify emerging challenges and suggest future directions of agricultural growth for promoting an enabling environment for poverty alleviating growth in the country.

Despite date limitations and absence of adequate information to discern long term trends, assessment of the poverty situation since the 1980s highlights several features: (i) the overall poverty incidence in the country has been declining at a slow rate of less than 2 percent a year; (ii) a faster decline of rural poverty is noticed in the late 1990s; and (iii) the absolute number of the poor has started to decline since the mid-1990s. The rural-urban decomposition of past poverty changes indicates that reduction of rural poverty is critical for Bangladesh. The incidence of poverty also reveals wide variation across different regions. The results indicate that there are seven regions (old districts) where the levels of incidence of both rural and urban poverty exceed their national averages. These are: Barisal, Bogra, Faridpur, Jamalpur, Mymensingh, Pabna and Rangpur. The poverty characteristics indicate significant differences in both income and non-income dimensions including physical and human resource endowments, demographic features and occupational groups.

With a low level of per capita income and slow growth in key social indicators, Bangladesh needs to adopt a multi-strategy solution for poverty reduction. Within the strategy, economic growth matters for reducing both income and non-income poverty. In particular, a 'pro-poor' or 'broad-based' growth is necessary so that increasing benefits for the poor are generated. Over the 1984-1999 period, per capita GDP increased at a rate of 2.5 percent per year while per capita agricultural GDP increased at only 0.8 percent. A comparison of the growth rates over different sub-periods with corresponding changes in incidence of poverty reveals some links between

growth and poverty. The evidence suggests that declining poverty, in general, is associated with relatively high GDP growth originating in agriculture. In terms of structure and sectoral composition of economic growth, the poverty-reducing role of agriculture seems to be important. The poor mostly live in rural areas and depend on agricultural activities for their livelihood. A rural resident is also more likely to be poor. The growth of agriculture has several advantages in accelerating overall growth and creating a growth structure that contributes to raising the poor's income. The impact of agricultural growth on rural wages is an important element in the process since, for the poor households, a major share of income originates from wage labor in agricultural and non-agricultural activities. A high agricultural growth also creates synergies for diversification of the rural economy and development of the rural non-farm sector with greater poverty reduction impact. It is, therefore, important for Bangladesh to accelerate growth of agriculture and non-farm sector, improve coverage and quality of social services, ensure well-functioning rural institutions, and expand rural infrastructure.

Past Patterns of Agricultural Growth

Since the 1970s, Bangladesh agriculture experienced a modest growth and a slow transition: with wide fluctuations, agricultural growth averaged around 2.5 percent per year and growth of output barely kept pace with population growth. A significant acceleration of agricultural growth has, however, taken place during the second-half of the 1990s: annual growth exceeded 5 percent during 1997-2000 compared to 2 percent during 1991-1996 (Table 1).

Table 1 — Annual growth in agriculture

	Percent at constant 1995/96 prices	
	1991-1996	1997-2000
Agriculture	1.8	5.1
of which:		
Crops & horticulture	-0.1	4.2
Animal farming	2.4	2.7
Forest & related activities	2.9	4.7
Fishing	7.8	9.0
GDP	4.4	5.3

Source: BBS.

In particular, significant increase in rice and wheat production has been achieved since the 1970s. The production more than doubled since 1971: foodgrain (rice and wheat) production increased from around 10 million tons in early 1970s to exceed 24 million tons by late 1990s.

FOOD CONSUMPTION PATTERN AND FOOD PRICES

Despite low agricultural growth in the past, regions with relatively high level of per capita agricultural and total income and regions that experienced more rapid growth have performed better in reducing poverty. Over the last two decades, reforms in the agricultural sector and dismantling of state interventions have played a crucial role in increasing agricultural production. The post-reform period also witnessed decline in real agricultural prices and rise in agricultural productivity. As a result, relative food price declined in rural areas, which benefited the majority of the households, particularly the poor, who are net purchasers of food.

Since the 1980s, two major changes in consumption pattern in rural and urban areas have taken place: shift in consumption from cereals to non-cereals within food and from food to nonfood in overall consumption (Table 2). The trends are stronger in urban areas. In case of quantity of consumption of cereals, per capita intake increased in both rural and urban areas over the period. Large differences, however, exist in food intake between the poor and the non-poor in both rural and urban areas. Two contrasting trends in rice consumption in rural and urban areas are present. First, per capita rice consumption is higher for the non-poor in rural areas compared to the poor. Hence, rice consumption will increase as people move out of poverty in rural areas – the average rice consumption of the non-poor is nearly 20 percent higher than the poor. Second, food consumption pattern is less rice intensive in urban areas for both the poor and the non-poor compared to that in rural areas. The trend of accelerated pace of urbanization in future will thus have a moderating impact on total rice consumption.

Table 2 — Distribution of monthly per capita consumption expenditure

(Percent)

	Rural			Urban		
	1983/84	1991/92	1995/96	1983/84	1991/92	1995/96
Food	66.7	69.2	62.4	56.7	56.1	46.3
of which:						
Cereals	38.0	35.9	29.8	25.6	21.7	14.4
Non-cereals	28.7	33.3	32.6	31.1	34.4	31.9
Nonfood	33.3	30.8	37.6	43.3	43.9	53.7
Total	100	100	100	100	100	100

Source: BBS, *Household Expenditure Survey*, various years.

IMPLICATIONS ON FUTURE AGRICULTURAL GROWTH

Two dominant factors are likely to shape future structural changes and growth pattern of Bangladesh agriculture: declining rate of population growth and higher growth in per capita income. The annual growth rate of population has declined from around 2.5 percent in the 1980s to 1.6 percent in the late 1990s and the target is to achieve NRR = 1 by the year 2005. The growth rate of per capita GDP has also increased: from less than 2 percent per year in the 1980s to around 4 percent in late 1990s. The past demand for agricultural output was determined by high population growth and slow growth in per capita income so that the consumption pattern did not reflect much the differential growth in demand for agricultural products. In contrast, income – induced pattern of demand for agricultural output is likely to emerge as the major determinant of future food consumption. This would imply a lower growth in demand for cereals and a strong market demand for non-cereal crops and non-crop agriculture. The likely changes in demand for agricultural products imply that significant adjustments and resource re-allocations will be needed to ensure required growth and structural changes in Bangladesh agriculture. A faster expansion of non-cereals and non-crop agriculture will be necessary to maintain stable prices, generate higher farm incomes and achieve food security.

In order to maximize the poverty reducing impact of agricultural growth, emphasis is needed on several dimensions of agriculture: in addition to growth of the rural economy, productivity gains and falling real agricultural prices that accompany agricultural growth would

allow the supply of low cost food to the people, improve their nutritional status, and enhance food security. At the present stage of development of Bangladesh agriculture and, with the resource constraints, the priority is to ensure yield growth of the staple food (rice), which is a key factor for poverty reduction and food security. This is also necessary to release resources for accelerated growth of non-cereal crops and non-crop agriculture. In designing policies for increasing agriculture's ability to reduce poverty, it needs to be recognized that household income of the poor farmers will not increase much through improvements in agricultural technology due to small size of their holdings and unfavorable terms of trade of the major crop (rice). Improvements in crop productivity will contribute more in terms of increasing supplies and reducing unit cost of production. This will enable access to food by the poor at affordable prices. For increasing household income, expansion of non-crop agriculture and non-farm activities needs to be targeted.

To meet the above challenges, the agricultural policy framework needs to emphasize two key elements: exploitation of economies of scale along lines of comparative advantage and acceleration of agricultural investment embodying technological innovations. For the purpose, actions are necessary in three broad areas: intensification of production of existing crops (e.g. rice), diversification to high return crops having comparative advantage, and improvements in non-crop agriculture. In order to better manage the resource base and ensure sustainable exploitation of agronomic potentials, the strategy needs to increase agriculture's competitive edge by combining coherent policies, incentives and programs to pursue efficient production practices, remove supply side constraints, and provide a supportive macro and trade environment. Increasing the rate of investment in agriculture requires action on two fronts: creating an institutional and policy environment that provides incentives for accelerated private investment; and enhanced public investment in key areas to ensure adequate availability of public goods in agriculture. Public investment in priority areas e.g. applied agricultural research and extension, rural infrastructure, and basic education is vital to agricultural development in Bangladesh. Public investment in agricultural research and development is needed to build capacity to accelerate technological progress. The emphasis needs to be placed on site and

season-specific technologies and extension messages in combination with credit and marketing services. Efficient marketing requires public investments in rural infrastructure, electrification, developing regulatory frameworks, and availability of market support services e.g. quality control, grades and standards, and market information. Without investments in these public goods, institutional reforms alone are not likely to produce sustained agricultural growth in Bangladesh.

LINKAGES BETWEEN MACRO-POLICY AND THE FOOD SECTOR

- Ms. Marzia Fontana
- Dr. Peter Wobst
- Dr. Paul Dorosh

Trade liberalization in the early 1990s in Bangladesh has enabled the private sector to respond with market-stabilizing inflows of rice and wheat following major production shortfalls. At the same time, easing of restrictions on foreign investment and a substantial depreciation of the Taka has enabled exports of the labor-intensive ready-made garment industry to expand significantly. Recently discovered natural gas resources might be exploited, creating new revenues for the country. A proper assessment of the impact of all these policies on the poor requires a comprehensive framework to analyze interactions between different sectors, and linkages between macro and micro levels.

The objective of this paper is to provide such framework by constructing a computable general equilibrium (CGE) model for Bangladesh. The model captures important features of the rice and wheat sectors and it is used to analyze the impact of different shocks and policy changes on the food sector. It is based on a 1993/94 social accounting matrix (SAM) which distinguishes two different kind of rice technology in the agricultural sectors and has fairly disaggregated labor market and socio-economic groups, permitting detailed analysis of household welfare and poverty.

The SAM includes 43 production activities: 10 agricultural activities (including a disaggregation of paddy production by aman and boro/aus crops), 19 industrial activities (including a separate ready-made garments sector), and 14 services activities. Eight types of labor are specified according to level of education (none, low, medium and high) and gender. In addition to labor, there are two other factors of production: land (including agricultural capital) and non-agricultural capital.

Twelve household groups are defined: eight rural and four urban. Among the eight rural

household groups, there are four rural agricultural household groups divided according to level of land ownership (landless, less than 0.5 acres, 0.5 – 2.49 acres, and greater than 2.5 acres), and four rural non-agricultural household groups, split according to land ownership and gender of the household head. The four urban households are split according to education level of the head of household.

Income distribution as reflected in the SAM is quite unequal. Urban educated households receive 28 percent of total income but constitute only 7 percent of the total working population, while landless and marginal farmers receive only 5 percent of total income despite accounting for 18 percent of the working population. In the SAM, these latter households derive their income exclusively from labor, (70 percent of this labor income from uneducated labor). By contrast, about 70 percent of the urban educated households' incomes come from capital. Small farmers and large farmers are the only household groups in the SAM receiving income from land.

The CGE model used for the simulations is structured in the tradition of trade-focused CGE models of developing countries (Dervis, de Melo and Robinson, 1982). Given agricultural capital and land, which in the simulations for this paper are assumed fixed in each sector, the model solves for the levels of output, labor use and non-factor inputs in each production activity. Returns to factors of production (wages, land rents and capital incomes) are paid in fixed shares to enterprises and households according to the shares of factor income in the base 1993/94 SAM. Household consumption of each commodity is modeled using linear expenditure system (LES) demand functions. For all commodities except rice and other foodgrains (wheat), domestic and internationally traded commodities are assumed to be imperfect substitutes. In the simulations, foreign savings and total private investment are fixed, and the marginal savings rates of private enterprises and households adjust to achieve a balance between total economy-wide savings and investment.

A special feature of the model is that in some simulations, domestic rice and other foodgrains are modeled as perfect substitutes with internationally traded commodities. In this

case, if domestic demand exceeds domestic supply at the import parity price, the import parity price is used as the domestic market price and imports adjust to equate supply and demand. Similarly, if domestic supply exceeds domestic demand at the export parity price, the export parity price is used as the domestic market price and exports adjust to equate supply and demand. If the market-clearing price in the absence of trade (the autarky price) is between import and export parity levels, then there is no private sector external trade, and this autarky price is used as the market price.

Three sets of model simulations were run. The first set of simulations modeled a ten percent decline in total factor productivity in the rice sector due to floods under two different trade scenarios – with and without private sector rice imports. When rice imports are allowed, (Scenario 2), domestic prices of rice rise only to the import parity level, increasing by 10.5 percent instead of 13.4 percent as in Scenario 1. Given the relatively less favorable price incentives, domestic production of rice declines more than in the first scenario: aman declines by 6.5 percent and boro declines by 3.6 percent. Private sector rice imports equal to 3.6 billion Taka, (2 percent of base year consumption), help to raise the total import bill by 2 percent. In terms of households' welfare, changes are similar to the first scenario, but smaller in magnitude. Medium and large farmers benefit less, while all other households are less negatively affected, resulting in smaller regressive overall effects. Thus the model simulations suggest that most households benefit from a policy of allowing private imports of rice, particularly after rice production shocks.

The second set of simulations models the effects of elimination of wheat food aid, with and without a cut in the total value of foreign aid resources. In the first case, the decline in imports without an offsetting change in foreign savings causes a slight appreciation of the real exchange rate by 0.3 percent so that exports decline marginally in all sectors and total exports decline by 0.4 percent. Food imports other than wheat increase and wheat imports decline only by about 9 percent as most of private imports substitute for food aid. Demand for wheat flour slightly declines, less in rural (0.8 percent) than in urban areas (1.0 percent). Domestic production of wheat increases (by 4.5 percent), while output in all other sectors declines, albeit very slightly.

There is not much change in returns to factors, nor is there much change in households' welfare.

Under the second food aid scenario, with an offsetting decline in foreign savings, the real exchange rate depreciates by 3 percent causing exports to rise by 4 percent. The highest increases, although still moderate, are in exports of agricultural products and light manufacturing. The decline in wheat imports (11.9 percent) is higher than in the first scenario (as devaluation discourages substitution of private imports for food aid). Domestic production of wheat increases more (by 5.4 percent instead of 4.5 percent). Because of the real exchange rate depreciation, the most significant increase in domestic output is recorded in the most export-oriented sectors (garments and other textiles) while non-traded output slightly declines. As a result female/male relative wages do increase with possible positive effects for gender equality, unlike in the first scenario. The decline in households' welfare is slightly more pronounced than in the previous case in all urban households and in rich non-agricultural households, with positive, although mild, effect on inequalities. All in all, though, the elimination of wheat food aid does not cause a large negative shock at the sectoral or macro- level. Private imports substitute for government imports to a certain extent so that there is a decrease in wheat imports of only 9 percent and 12 percent, respectively, and there is also increase in domestic production of grains.

The final simulation models the impacts of possible natural gas exports on the Bangladesh economy. This experiment simulates a rise in foreign savings by 100 percent, equal to about 11.5 percent of total exports in the base case (or about one percent of GDP). This causes an appreciation of the real exchange rate by 7 percent. Exports decline by 11 percent while imports increase by less than one percent. Exports fall especially in leather, jute-textile and ready-made garments, with thus negative effects for the emerging outward oriented textile industries. Imports increase by about 6 percent for agricultural products, processed food and light manufacturing products, while there is a decline in imports of mill clothing and other textiles (which are almost exclusively used as intermediate inputs by the ready-made garments sector whose exports and output fall).

As a result, output declines significantly in the garment industry (9 percent), but increases moderately in agriculture (grains, other crops, poultry), construction and most services because of the rise in domestic demand resulting from the higher capital inflow. Rice production marginally increases and there are no imports, as the domestic price of rice does not rise up to the import parity level. Households and government all increase their consumption, financed through a reduction in domestic savings (which might not be sustainable if increased foreign exchange influx is not permanent). The wages of women relative to men decline, however, as garments output is displaced by the gas sector. Though all socio-economic groups benefit from this shock in terms of their real consumption, the greatest welfare gains are for the relatively well off, especially in urban areas.

Further work is planned to improve both data and model specification. These preliminary results nonetheless point to the important linkages between the food sector and the macro-economy. Moreover, all the simulations suggest that the impacts of economic shocks on women's labor and female-headed poor households can differ significantly from the effects on men's labor and other households, suggesting the importance of further analysis of the differential gender effects of economic policies.

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FOOD AID AND PRODUCER PRICE INCENTIVES

- Dr. Paul A. Dorosh
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Food aid, (aid supplied as food commodities on grant or concessional terms), has played a useful role in Government of Bangladesh efforts to increase food security in the last three decades. At the national level, food aid has added to foodgrain availability, helping to reduce the gap between foodgrain consumption needs and supply from domestic production. And at the household level, food aid increasingly has been targeted to poor households, increasing their access to food. Moreover, resources from food aid have helped successful development projects and programs in Bangladesh. However, sustained increases in domestic production of both rice and wheat have increased the likelihood of disincentive effects arising from continued large inflows of food aid.

Food aid to Bangladesh and total global food aid deliveries (both predominantly in the form of wheat) have varied substantially over time. Total food aid worldwide increased between the 1970s and the 1980s, and peaked in 1992/93 at 15.2 million tons. Subsequently, total food aid flows declined steeply to only 5.6 million MTs in 1996/97 as U.S. contributions fell from 8.5 million MTs in 1992/93 to only 2.3 million MTs in 1996/97. Total food aid again increased in 1998/99 and 1999/2000 to over 10 million MTs each year, with the U.S. contributing about 60 percent of the total, similar to its average over the past two decades. These fluctuations in food aid at the global level to a large extent reflect supply considerations in donor countries.

Food aid to Bangladesh has declined over time, from on average of about 1.2 million tons per year in the 1970s and 1980s to only about 600 thousand tons by the end of the 1990s. Uses of food aid have also changed over time. In the seventies, much of the food aid was sold in PFDS channels, with the counterpart funds used for general public expenditures. In later years, donors introduced conditions for the use of counterpart funds, stipulating that they be used for

jointly agreed projects, and eventually discontinued monetization of food aid through sales channels. Reforms of the PFDS in the late 1980s, including a gradual reduction of the subsidy in sales channels, eventually led to closing of major sales channels in the early 1990s. By the late 1990s, about 85 percent of all PFDS distribution was disbursed through channels targeted to poor households and food aid accounted for about one-third of total PFDS distribution of about 1.8 million MTs per year. In contrast, food aid from 1986/87 through 1991/92 averaged 1.4 million MTs per year, accounting for nearly 60 percent of average distribution of 2.4 million MTs.

DISINCENTIVE EFFECTS OF FOOD AID

Food aid can potentially adversely affect domestic food production and incomes in several ways. First, it can reduce domestic prices and farmers' incentives for domestic production. Second, food aid can enable countries to neglect their domestic agriculture through inadequate lower public investment in rural infrastructure, agricultural research and extension, as well as price and trade policies biased against the agricultural sector. Third, food aid supported projects can potentially distort local labor markets. This report focuses on producer price disincentive effects in the context of Bangladesh.

Since food aid ultimately increases market supply of wheat, it has the potential to lower domestic wheat prices and adversely affect incentives for domestic wheat production and incomes of wheat farmers. Whether food aid actually lowers market prices, however, depends on whether food aid is simply replacing public or private imports, or whether food aid is actually increasing total domestic supply of wheat. In other words, in order to avoid depressing market prices below import parity prices, the total level of food aid must not exceed the amount of wheat that would be imported by the private sector under free trade in the absence of food aid.

From early 1998 through mid-2000, private sector imports were substantial and Bangladesh domestic prices for wheat closely tracked import parity prices. Private sector wheat imports surged in the months immediately after the mid-1998 floods, averaging 111 thousand MTs per month from September through December 1998 and remained high through 1999/2000. In 1999/2000, a total of 1.619 million MTs of wheat was supplied to domestic markets through

private sector imports (806 thousand MTs) of wheat and public net distribution (total distribution less domestic procurement of 813 thousand MTs). Given that domestic prices remained close to estimated import parity prices for most of the year, and perhaps more important, that large amounts of wheat were imported by the private sector, it appears that food aid did not lead to price disincentive effects for Bangladesh wheat farmers in 1999/2000.

After April 2000, however, national average domestic wheat prices fell to an average of 1.1 Tk/kg below estimated import parity levels. Nonetheless, private sector imports remained high. From April through June 2000, this was apparently due to imports of exceptionally low-priced wheat (about $130/MT C&F Chittagong) from the EU and Turkey. Later in 2000, however, private market imports considerably slowed, suggesting that private imports of non-milling wheat (wheat with a lower gluten content, like that produced in Bangladesh) may not have been profitable.

The "safe" level of food aid (the maximum amount of food aid that can be distributed without having an adverse effect on wheat prices) depends on several factors, including international wheat prices, price-responsiveness of wheat consumers and producers (as reflected in elasticities of wheat supply and demand), and domestic rice prices. The higher the import parity price of wheat, the smaller the amount of net public distribution of wheat that can be distributed without depressing domestic wheat market prices below import parity. For example, with a medium-level rice price of 12.24 Tk/kg (the average wholesale price in 1999/2000), raising the import parity price of wheat from 9.2 to 12.2 Tk/kg reduces the "safe level" of food aid from 1.132 to 0.623 million MTs, (assuming inelastic supply and demand for wheat). More elastic supply and demand parameters imply that changes in the import parity price have a larger effect on the total quantity of wheat import demand. Thus, with a more elastic demand and supply, raising the import parity price from 9.2 to 12.2 Tk/kg reduces the "safe level" of food aid from 0.999 to 0.004 million MTs. Finally, rice prices have a major impact on the "safe level" of food aid. With low rice prices, wheat demand falls, by about 200 thousand MTs with inelastic parameters and 350 to 400 thousand MTs with elastic parameters.

Disincentive effects of food aid on wheat prices are plausible in Bangladesh. Net public wheat distribution on the order of 800 thousand MTs (the figure was 813 thousand MTs in 1999/2000) exceeds the "safe level" of food aid under all scenarios with low rice prices except that of low international prices and inelastic demand parameters. Even with inelastic demand parameters, the "safe level" of net wheat public foodgrain distribution is only 838 thousand MTs, only 25 thousand MTs more than actual distribution in 1999/2000, (a year, however, that had lower international wheat prices).

Note that these figures are based on the distribution pattern of wheat in 1999/2000, when 351 thousand MTs of wheat were distributed through Food For Education, Vulnerable Group Development and Vulnerable Group Feeding, programs for which participants have a high marginal propensity to consume (MPC) wheat out of transfers received. Assuming an MPC for wheat of about 0.3 in these programs, then these programs created an additional wheat demand of about 105 thousand MTs. If cuts in wheat distribution take place in these programs, this additional wheat demand will be lost, as well, with a potentially negative effect on domestic prices.

With net PFDS wheat distribution of 900 thousand MTs and medium-level rice prices, wheat prices in Bangladesh would be 10.44 Tk/kg in the absence of non-milling wheat imports by the private sector. This price is 10.6 percent below long-term import parity of 11.67 Tk/kg (calculated using the average dollar price of U.S. Hard Red Winter #2 wheat over the 1995/96 – 1999/2000 period, adjusted for quality, transport and marketing costs). If net PFDS wheat distribution were only 600 thousand MTs, then the market-clearing price would be 12.32 Tk/kg, which would be above the long-term import parity price.

Thus, net PFDS wheat distribution of 900 thousand MTs has small price disincentive effects on wheat production even with medium-level rice prices, and the disincentive effects are quite large (-20.3 percent) when domestic rice prices are low, as in 2000. Reducing net PFDS wheat distribution to 600 thousand MTs completely eliminates the price disincentive effect with medium-level rice prices (and inelastic parameters). If the more elastic parameters are a better

indication of medium-term supply and demand behavior, however, then there are still significant price disincentives, even with average medium-level rice prices and only 600 thousand MTs of net wheat distribution.

Reducing net PFDS wheat distribution from 900 to 600 thousand MTs can be accomplished relatively easily by substituting domestic wheat procurement for commercial imports and stock drawdowns. Cutbacks below 600 thousand MTs, of course, imply a reduction in food aid.

CONCLUSIONS

If good rice harvests continue so that real rice prices remain at their levels of 2000, and if international wheat prices return to their average 1995-99 levels, then net public wheat distribution may need to be cut to levels below the current amount of food aid received (650 thousand MTs in 2000/2001) to avoid reducing domestic prices below import parity.

Cuts in food aid, however, could potentially cost Bangladesh millions of dollars per year in resources that currently provide the resources for programs that increase access to food by poor households. A major loss of resources for food security need not occur in this scenario, though. In place of the food aid imports, donors could provide the equivalent value of resources in the form of cash, either to permit the Government of Bangladesh to procure foodgrain locally for these programs or to use directly in re-designed Cash for Work or other cash programs.

Continued good harvests depend on adequate funding of agricultural research and extension, maintaining appropriate price incentives for production, timely input supplies at reasonable prices, and the weather. If these prerequisites are met, foodgrain availability targets are likely to be achieved. Resources, however, will continue to be required for programs that increase access to food by the poor, contribute to increased utilization of food and result in improved nutritional outcomes. Thus, it is important that resources devoted for food security in Bangladesh not decrease, even if the need for food aid to increase availability of foodgrains diminishes.

SESSION VI

COMPREHENSIVE FOOD SECURITY POLICY

REPORT OF THE TASK FORCE ON "COMPREHENSIVE FOOD SECURITY POLICY FOR BANGLADESH" RECOMMENDATIONS AND CONCLUSIONS

- Mr. Ruhul Amin

Food security has several components and numerous dimensions. In order to address these complex and inter-related issues, a comprehensive food security policy for Bangladesh, including availability, access and utilization aspects is needed.

Food security discussions and planning unfortunately have often had a much narrower focus, over-emphasizing the estimated "food gap", the difference between a target level of availability and domestic production. The food gap, however, measures only availability of foodgrains, thus neglecting availability of other foods. Moreover, focus on the food gap has often diverted attention from the other major aspects of food security: access and utilization.

Yet, availability of foodgrains is not always the constraint on food security in Bangladesh. Rather, because of the widespread poverty, access to adequate diets (i.e. households' insufficient capability to acquire food) and utilization of food (influenced by poor health and other factors) are generally the major constraints on food security.

POLICY RECOMMENDATIONS

This report has identified a number of key areas for increasing food security in Bangladesh including:

1. **Incentives for sustained growth in domestic food production**, which are important not only for adequate availability, but increasing rural incomes and access to food as well. Agricultural research and dissemination (for both foodgrains and other food products), investments in irrigation and marketing infrastructure, and appropriate domestic foodgrain procurement and price stabilization policies are needed, ensuring profitability of efficient

domestic production. Macro-economic policy is important here as well, since appreciation of the real exchange rate (an increase in the real value of the Taka relative to other currencies) could make domestic food production less competitive with imported food.

2. Further development of **private markets** to facilitate efficient distribution and storage of food within the country, timely food imports following domestic production shortfalls, and exports of agricultural and small-scale industrial products to increase incomes of the poor.
3. **Emergency preparedness** to alleviate the transitory food insecurity caused by floods, cyclones and other natural disasters that often occur in Bangladesh. **Public foodgrain stocks** equal to three to four months of emergency distribution requirements and a relief system to distribute food, clean water, medicine and other needs should be maintained. This required level of minimum public foodgrain stocks should be reviewed annually to take into account changing conditions in domestic and international markets.
4. Promoting **income growth of the poor** through a labor-intensive development strategy coupled with skills enhancement and increased access to capital (through micro-credit programs) for poor households. This income growth is a necessary condition for sustainable access to food by poor households.
5. **Targeted food and non-food interventions** to food insecure people, particularly poor women and children, and destitute, old and infirmed individuals. Targeting is important, here, because of the need to conserve scarce resources and in order to limit potential adverse impacts of foodgrain distribution on producer prices.
6. Strengthening **nutrition education**, particularly for poor, food insecure households, so that household resources are efficiently used for nutrition and health of vulnerable individuals, particularly women and children. Promotion of **diversity in diets** through increased availability of non-foodgrains and nutrition education in order to increase consumption of protein, fats and oils, vegetables and micronutrients. Given the weak link between incomes and consumption of micronutrients, increases in household incomes without nutrition education are unlikely to result in a major improvement in nutrition.

7. Increased **investments in rural infrastructure and social services**, especially **clean water, sanitation** and **medical services**, to promote public health, a key component in favorable nutritional outcomes.
8. Further **evaluation of current policies and programs** is needed, along with in-depth analysis to understand the inter-relationships between availability (especially domestic food production), access (sustainable increases in rural incomes), and nutrition.

OPERATIONAL RECOMMENDATIONS

9. **Re-focus the debate** on food security so that aid and investment for food security does not fluctuate according to the size of the harvests in Bangladesh or the level of stocks in food aid donor countries. Instead of concentrating on food aid levels and food gaps, more attention should be given to alleviating food insecurity of the poor by increasing access to food by the poor through food- and cash-financed programs of skills-enhancement, nutrition interventions, etc. One possibility is that the GOB and development partners could **commit a combination of cash and food to programs targeted to food insecure households** in Bangladesh. The goal of these efforts would be to achieve a measurable improvement in nutritional and health outcomes (reductions in infant mortality, stunting and wasting, micro-nutrient deficiencies) in a specified period of time. A useful step in changing the focus of food security policy would be to construct **food security resource budgets,** (involving an inventory of current and recent projects and programs involved in the various aspects of food security), that would be monitored and updated regularly.
10. Improve **coordination across GOB and development partners' projects** and programs so as to assist the Government of Bangladesh in integrating major elements of its food security programs that are separated by Ministerial and development partner boundaries. Among the major programs are the programs in the Rural Development Strategy funded by the World Bank; the food aid programs funded by USAID, WFP and others; and the National Nutrition Project, also funded by the World Bank. Since these are large, multi-year programs, there are likely to be large benefits from co-ordinating their activities. There is also a need for co-

ordination with GOB development efforts financed by its own funds or those of development partners. This co-ordination need not be done exclusively (or even mainly) at the national level. Instead, local governments (at the district or thana level) might be best-placed to decide how to best integrate these activities operationally, given an overall national food security framework. Participation of NGO's and civil society, at both the national and the local level, might also increase the effectiveness of these efforts.

11. The GOB should consider **expanding the mandate of the existing Food Planning and Monitoring Committee** to monitor and plan overall food security efforts, including utilization and nutrition issues, such as the availability and prices of non-foodgrain commodities, the number and the income levels of poor households, the food consumption gap for calories and other nutrients, and the nutritional status of children. Representatives of related Ministries might be included so that progress on all aspects of food security, in addition to availability and prices, could be discussed on at least a quarterly basis.
12. Finally, **specific targets** need to be set, programs and projects designed, resources committed and institutions mobilized and strengthened to ***operationalize*** the general policy framework outlined above.

CONCLUSIONS

Since Independence, Bangladesh has made substantial progress in increasing domestic production of foodgrains, thus to a large extent overcoming the constraint of insufficient foodgrain (and calorie) **availability**. There is no room for complacency, however. Continued efforts are required to maintain these hard-won gains in availability in the face of continued population growth.

Adequate availability, though, is a necessary, but not sufficient condition for food security. Significant improvements in household food security in Bangladesh can be achieved without major increases in **per capita** foodgrain production or food aid, but such improvements do require a major effort at increasing access to food and utilization of food by poor households. Thus, all aspects of food security must be addressed: greater efficiency of domestic agriculture

(and enhanced availability of food, including non- foodgrains); sustained increases in the incomes of the poor (their access to food) and improved food utilization by under-nourished individuals (through education and health care). In this way, it is hoped that all people in Bangladesh will enjoy the food security that they truly deserve.

PANEL DISCUSSION

Chairperson: Mr. Abu Abdullah
Director General, Bangladesh Institute of Development Studies.

Panelists:

1. **Dr. Tawfiq-e-Elahi Chowdhury, BB**
   Secretary, Ministry of Planning

2. **Dr. Raisuddin Ahmed**
   Emeritus Research Fellow, IFPRI

3. **Mr. Joan Fleuren**
   Deputy Country Director, WFP

Mr. Abu Abdullah: Thank you, Mr. Ruhul Amin for your presentation of the "Report on A Comprehensive Food Security Policy for Bangladesh". We now have a set of distinguished panelists who will offer their insights and comments on these issues.

Dr. Tawfiq-e-Elahi Chowdhury, BB: Thank you Mr. Chairman. Congratulations to Mr. Ruhul Amin for presenting the Comprehensive Food Security Plan. The difficulty I see is in implementing the Plan.

The market should be the dominant force in allocation of resources for increasing availability of food, as well as access and utilization. We also need to see how we can integrate the complementary goals outlined in the Comprehensive Food Security Plan that involve various ministries and programs.

Over the last few decades, we focused mainly on rice and other cereals. Now that we have achieved self-sufficiency in foodgrain production, the emphasis is shifting to nutrition. Here, it is important that we also look into the distribution of food within the household.

We have been focusing more towards achieving a surplus; we need to concentrate on the household allocation process. We are going through a period of transition. Due to the recent excellent harvests, our net production exceeds our target for foodgrain availability, and we might

be squeezed out of food aid. But targeted food aid programs are important for household food security and should not be neglected. The government and donors need to understand the situation.

Mr. Abu Abdullah: Thank you, Dr. Tawfiq-e-Elahi Chowdhury. Maybe I misled the panelists. The panel discussion is not restricted to the Comprehensive Food Security Report; other issues can also be discussed.

Dr. Raisuddin Ahmed: I have been associated with research on agriculture, food and the development process for a long time. I have observed that we often concentrate on the short run. As a result, we lose out on the broader concept of food security, as well as the evolution of food security.

When Amartya Sen wrote the Theory of Entitlement, he revolutionized the conventional thinking. He made a significant statement in a television interview after winning the Nobel Prize. He said, "The supply of food is *not* the critical problem... It is the ability of the poor to purchase food that matters most."

I would like to address four main issues for further research.

The first issue concerns the relationship between agriculture, growth and poverty. The economy has witnessed four to five percent annual GDP growth over more than a decade. In spite of a declining population growth rate, though, there has been hardly any dent on poverty. In order to reduce poverty more quickly, the growth needs to be more labor intensive. The development of agriculture is crucial, given the increased population pressure on the land. Today's medium farmers are tomorrow's small farmers. Today's small farmers are tomorrow's landless farmers. Today's landless farmers are tomorrow's rural migrants.

Growth in the livestock and fisheries sector has been very fragile. However, increases in foodgrain production have had quite an impact, but this growth has not occurred in all parts of the country. The green revolution has occurred in the north and western regions of the country,

and in Comilla, but not in the central or coastal regions. Some sluggish districts such as Noakhali and Pabna have witnessed only slow growth in production. Real rice prices have fallen with increases in aggregate production, leading to lower real incomes for farmers who have not adopted the green revolution technology. These linkages between agriculture, poverty and food security deserve further investigation.

The second issue concerns Non-Government Organizations (NGOs). The aggregate data tell us that poverty has stagnated in spite of the efforts of a growing number of NGOs. We need further research on why this is occurring and how the NGO programs can be made more effective in alleviating poverty.

Third, further attention should be given to rural non-farm employment. The share of agriculture in GDP has decreased to 25 percent. Yet the contribution of agriculture in rural employment is still 67 percent. This is not unique to Bangladesh. A similar scenario existed in Korea and Thailand. Substantially increasing food security in the rural areas will require improvement in non-farm rural incomes.

The fourth point concerns governance. Projects face many obstacles in their implementation process. There is the incidence of tolls, extortion, corruption, etc. Transaction costs are more concealing than revealing. If the labor market is fragmented, the producer can shift these transaction costs to his employees. The burden of corruption thus falls on the poor, who are dependent on wages. Making these facts transparent will hopefully lead to further support to efforts to improve governance.

Finally, a greater focus on access to food is needed. If we consider [Amartya] Sen's statement "access to income of the poor is food security," we should change our priority from food security narrowly defined in terms of availability of food to income security of the poor.

Joan Fleuren: Very often we read stories of Bangladesh having eliminated its food gap and achieving food security. This does not mean all have access to food, as most of us realize. There

is also a third component to food security, nutrition, which is rightfully getting more attention now. The National Nutrition Project (NNP), due to begin in 2002, is an important start.

As reflected in the Comprehensive Food Security Policy report, the debate is moving away from food aid to food security. The recommendations of the Comprehensive Food Security Policy are now well accepted. I would like to know, however, what is the current status of this policy statement? Also, what will be the framework to integrate specific programs and actions?

My second observation concerns the fine-tuning of the food security policy. All people are not equally vulnerable and we need to focus our efforts on those most in need. We need to know in which areas of the country are people more vulnerable and why? We also need to know how to make significant improvements in their food security.

The poor of today become the ultra-poor of tomorrow, as mentioned by the previous speaker. Natural disasters are often part of this process as evidenced by the September, 2000 flood that submerged much of the southwest of Bangladesh and made many people there fall below the poverty line.

Mr. Abu Abdullah: We keenly feel the absence of one panelist. However, the floor is now open for discussion.

Dr. Bjorn Carleson: Thank you Mr. Chairman. My perspective is somewhat different. There is no food security policy in Nordic and developed countries. Is it a relevant policy instrument to use? There are various social security policies for health, education, social welfare, etc. Is a food security policy really necessary?

Dr. Akhter Ahmed: Dr. Carleson brings up an important point. The Ministries of Finance and Industries have policies designed to increase overall economic growth. This growth is necessary but not sufficient for reduction of poverty and increased food security, however. Therefore, specific policies are needed to decrease poverty and to increase food security.

Dr. Tawfiq-e-Elahi Chowdhury, B.B.: Most talk out food security deals with food

availability. We don't talk enough about the other issues, such as access to food and income security. There needs to be a greater emphasis on creating non-farm employment opportunities to increase the incomes of the poor. On the availability side, we also need to look into genetically modified seeds and foods.

Dr. M. A. Quasem: People in rural areas are severely deficient in consumption of pulses and oilseeds due to the shifting of land for producing rice. A greater emphasis should be given to these crops.

Mr. Abu Abdullah: We have had an obsession for achieving self-sufficiency in rice. This has had adverse effects on production of other crops.

Dr. Raisuddin Ahmed: I agree with most of the comments. I caution against trying to achieve self-sufficiency in all aspects, however, especially oilseed production. The largest components of edible oils are by-products. Without a market for these products, oilseeds are unlikely to be more profitable for farmers than rice and other alternatives. But I agree that the time has come when non-rice crops need to have technological improvements. Ultimately, rice acreage should decline to permit this crop diversification.

Dr. Akhter Ahmed: There are several new and emerging issues. Dr. Chowdhury mentioned genetically engineered food. Another emerging issue is the effect of globalization on food security. The WTO may affect food and non-food prices, as well as income. It also has effects on labor mobility. Quotas on ready-made garments (RMG) will be abolished; this will have adverse effects on Bangladesh. There are also potential effects on exchange rate and income, such as was the case in Indonesia. Another possible effect is outsourcing of information and communication/commerce from developed to developing countries.

Mr. Abu Abdullah: We seem to have a case of cold feet with regard to international trade and the prospects for ready-made garments and other exports. I never hear us say we will over-run the Chinese market.

Dr. Reazul Karim Talukder: One area not addressed is the people's demand for quality food. There are both subjective and objective components. We need to know how to alter the nutritional component of their diets and the quality elasticity of their demand for food. I urge you to do research on this area.

Dr. Paul Dorosh: Thank you distinguished panel and everyone present today. I thank the Ministry of Food and FPMU for their support and participation in planning and participating in this workshop. Thanks also to Mr. Abdullah for chairing the session and to Quazi Shahabuddin for leading the BIDS research team. I also thank the IFPRI staff who worked very hard to prepare for this workshop. Thank you all, once again.