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**AVERTING A FOOD CRISIS:
PRIVATE IMPORTS AND PUBLIC
TARGETED DISTRIBUTION IN
BANGLADESH AFTER THE 1998 FLOOD**

**CARLO DEL NINNO
PAUL A. DOROSH**

JANUARY 2001

FMRSP Working Paper No. 18

FMRSP Bangladesh
Food Management & Research Support Project
Ministry of Food, Government of the People's Republic of Bangladesh

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This work was funded by the United States Agency for International Development (USAID)

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EXECUTIVE SUMMARY

The 1998 flood in Bangladesh caused a 2.2 million MT shortfall in rice production and threatened the food security of tens of millions of households. Despite the best efforts of donors and government, public distribution of rice and wheat was only 188 thousand MTs more than originally planned for July 1998 through April 1999.

A major food crisis was averted, however, as private imports, made possible by trade liberalization in the early 1990s, stabilized market prices and supplies. Government direct distribution programs, though small compared to private imports, nonetheless increased access to food by poor households. Household survey data indicate that immediate relief efforts were well targeted to flood-affected households, as were transfers from NGO's. Vulnerable Group Feeding, a medium-term program, was not targeted well to households directly exposed to the flood, though the program was relatively well targeted to poor households.

More broadly, the Bangladesh experience with the 1998 flood shows that in a liberalized trade regime where private imports respond to price signals, food aid's contribution to total availability of food may be minimal. Yet, foreign assistance in-kind or as cash, can provide resources for subsidized, targeted distribution to food-insecure households -- assistance not otherwise possible under tight government budget constraints.

1. INTRODUCTION

The 1998 flood, dubbed “the flood of the century” in Bangladesh, covered 51 percent of the country at its peak, caused a 2.2 million MT shortfall in rice production and threatened the food security of tens of millions of households. Government appeals for assistance in August 1998 brought forth pledges of 1.083 million MTs of food aid for flood relief and rehabilitation from donors, providing the food grain for an expansion of targeted public distribution. Yet despite the best efforts of donors and government, public distribution of rice and wheat was only 188 thousand MTs more than originally planned for July 1998 through April 1999. Nonetheless, a major food crisis was averted. This paper explores how.

Food scarcity and famines, unfortunately, are not new to Bangladesh. The Great Bengal famine of 1943 killed an estimated three million people in what is now Bangladesh and eastern India (Dreze and Sen, 1989). Drought-related crop failures and a shortage of foreign exchange for imports resulted in high rice prices and food shortages that contributed to a sharp increase in mortality in 1974 (Ravallion, 1990). Major floods in 1987 and 1988, though not leading to a famine, contributed to crop shortages and sharp increases in rice prices, mitigated by a large increase in public food grain distribution.

Supply (or availability) of food is not the sole determinant of food security, however. Food entitlements of households (their legal means and resources to acquire food: own production, other income, public and private transfers, and borrowing) determine their access to food (Sen, 1982).¹ As is described below, availability of food grains in Bangladesh following the floods of 1998 was maintained mainly through private

¹ In fact, the Great Bengal famine was not caused by a crop failure, but was largely due to an increase in urban demand for food during a wartime economic boom that raised food prices for the rural poor (Dreze and Sen, 1989).

sector imports, made possible by trade liberalization in the early 1990s. Government and NGO programs contributed mainly through increasing access to food by the poor.

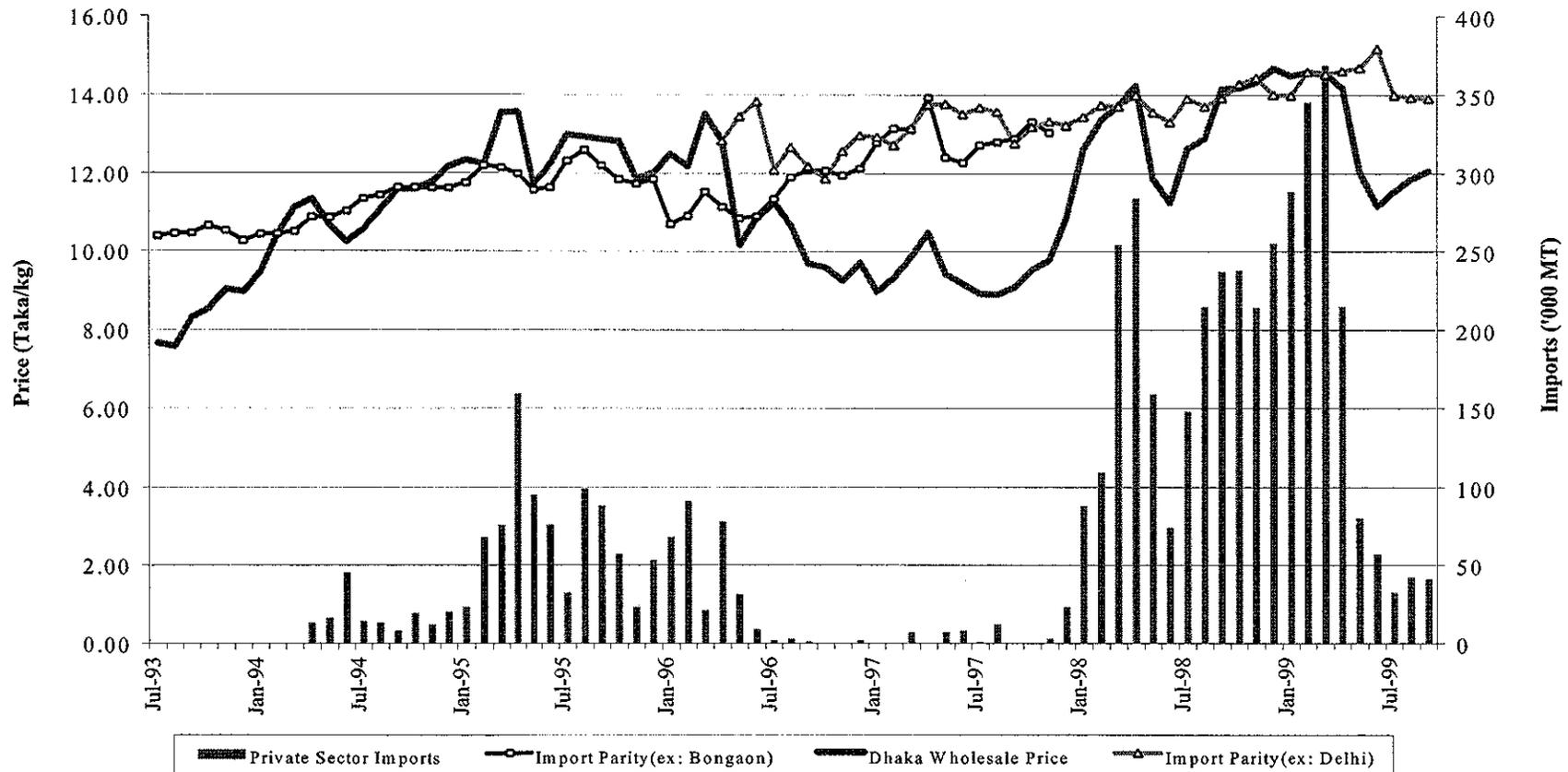
Section Two begins with a review of the foodgrain economy of Bangladesh and major changes in government food policy in the 1990s. The effects of the 1998 flood on domestic production and the role of public and private sector imports in augmenting supply and stabilizing prices are then discussed. Section Three focuses on household access to food, presenting data from a survey of rural households in flood-affected areas. The analysis focuses on the efficiency of targeting of government programs and the relative contribution of public, NGO and private transfers in increasing household access to food. Section Four concludes.

2. FOOD AVAILABILITY AFTER THE FLOOD

Aggregate food availability in Bangladesh is low, even in years of good harvests. In 1996-97, the most recent year of good harvests, total calorie consumption was only 2085 calories per person per day, 72.8 percent from rice and 9.2 percent from wheat, (FAO Food Balance Sheet, 1997). Three crops of rice are cultivated in Bangladesh: *aman*, typically transplanted during the monsoons in June-July and harvested in November-December, *boro*, transplanted in December-January and harvested in May-June, and *aus*, often directly sown in March-April and harvested in July-August. Prior to the 1998 flood, *aman* and *boro* rice production in the July 1998 – June 1999 fiscal year were expected to be 9.5 and 7.8 million MTs, 49 and 41 percent, respectively, of anticipated total production of 19.2 million MTs. Due to adoption of green revolution technology, (including improved seeds, irrigation of *boro* rice in the dry season, and fertilizer), rice production has increased rapidly, particularly since the late 1980s, and the country is near self-sufficiency in rice. In the 1990s, rice imports averaged only 686 thousand MTs per year, 4.0 percent of net rice availability and 3.5 percent of net food grain availability. Wheat imports (about 64.3 percent from food aid) averaged 52.9 and 7.7 percent of net wheat and food grain availability, respectively.

Prior to the April 1994 liberalization of private sector rice imports (and the 1992 liberalization of private sector wheat imports), shortfalls in food grain production were met through food aid, government commercial imports, and drawdown of public stocks. Since 1994, however, private sector imports of rice, mainly from India (which liberalized its private sector rice exports in late 1994), have added to domestic supplies in years of

Figure 1 — Rice Prices and Quantity of Private Rice Imports in Bangladesh, 1993-99



Note : Beginning November 1998, the marketing margin between Delhi and Dhaka was increased by 1.1 Tk/kg to 4.1
 Source : Dorosh (1999), calculated using data from FPMU, CMIE (1998,1999) and Baulch, Das et. al, (1998).

below-average harvests in Bangladesh. Thus, the import parity price of rice from Indian markets has provided a ceiling on rice prices in Bangladesh (Figure 1).²

Market prices of rice had been high in the first half of 1998, even before the flood, because of a poor 1997/98 *aman* rice harvest in November / December 1997. As domestic prices rose beginning in December 1997, it became profitable for the private sector to import rice from India (mainly by truck and rail across land borders). Government policy encouraged private sector imports of rice through removal of tariffs on imports, limitations on open market sales, instructions to expedite clearance of rice imports through customs and abstaining from re-imposition of anti-hoarding laws. An excellent *boro* rice harvest in mid-1998 brought a temporary respite from high rice prices in Bangladesh, but prices soon rose again to import parity levels as flood waters gradually spread across the country from mid-July to early September, 1998. Initial flood damage to the standing *aus* crop was small, (only 280 thousand MTs), but the flood also destroyed seedlings for the following November's *aman* rice crop, ultimately leading to a 1.76 million MT *aman* crop loss (Table 1). However, private sector imports exceeded 200 thousand MTs of rice per month from August 1998 through April 1999, totalling 2.377 million MTs over this period, more than offsetting the estimated total rice production shortfall of 2.2 million MTs.³

In comparison with private sector rice and wheat imports, public distribution of foodgrain was relatively small, due to relatively low wheat stock levels at the time of the flood, uncertainties regarding food aid arrivals, problems with government procurement of

² See Dorosh (2001) for a more in-depth discussion of the rice trade between India and Bangladesh in recent years.

³ Comparisons of estimated rice demand with total rice availability and comparisons of Bangladesh and India data on the volume of rice trade between the two countries suggest that the volume of private imports for the April 1998 – March 1999 period may have been overstated by as much as 1.0 million MTs (out of an official Government of Bangladesh [GOB] total of 3.2 million MTs). See Dorosh (2001) and Del Ninno, Dorosh, Smith and Roy, (forthcoming).

Table 1 — Forecast and Actual Bangladesh Food Grain Production and Trade, 1998-99

	1998-99 Forecast	1998-99 Actual	1998-99 Difference
	(million MTs)		
Rice Production			
Aus	1.900	1.620	-0.280
Aman	9.500	7.740	-1.760
Boro	7.800	10.050	2.250
Total	19.200	19.410	0.210
Wheat Production	1.800	1.910	0.110
Total Food Grain Production	21.000	21.320	0.320
Public Food Grain Distribution			
Rice (July 1998 - April 1999)	0.732	0.400	-0.332
Wheat (July 1998 - April 1999)	0.557	1.185	0.628
Total (July 1998 - April 1999)	1.289	1.585	0.296
Rice (July 1998 - June 1999)	0.813	0.530	-0.283
Wheat (July 1998 - June 1999)	0.905	1.603	0.698
Total (July 1998 - June 1999)	1.718	2.133	0.415
Private Rice Imports	0.600	2.663	2.063
Private Wheat Imports	0.200	0.805	0.605

Source: Ministry of Food, Government of Bangladesh.

rice in international markets, and a perceived need to maintain sufficient stocks to help stabilize markets in case of possible severe short-term shortages.⁴ Although rice distribution was greater than originally planned in the months immediately following the flood (July through September), rice distribution was cut back once food aid wheat was available, partly because international procurement through open tenders failed to acquire the desired quantities. Ultimately, only 399 thousand MTs of rice were distributed from July 1998 through April 1999, 333 thousand MTs less than originally programmed in the pre-flood distribution plan. Private sector rice imports, equal to 2.42 mn MTs in this period (using official GOB figures), were thus 6.1 times larger than government rice distribution.⁵

⁴ Dorosh (1999a) and Del Ninno, Dorosh, Smith and Roy (forthcoming) give further details of government food policy following the flood.

⁵ Using a lower estimate of 1.42 million MTs (1.0 million MTs less than the Government of Bangladesh official figures), private sector rice imports were still 3.5 times larger than government rice distribution.

Increased inflows of food aid did enable a large increase in public distribution of wheat from 905 thousand MTs to an eventual 1.603 million MTs for the entire July 1998 through June 1999 fiscal year, but through November, 1998 wheat distribution was limited by slow arrival of food aid and low government stocks. The major role of public distribution of food grain during and after the flood was not increasing total supplies, however, but targeting relief to those in need.

3. HOUSEHOLD ACCESS TO FOOD: PUBLIC DISTRIBUTION AND OTHER TRANSFERS

Two major channels dominated government food relief efforts following the flood: Gratuitous Relief (GR), designed to provide emergency relief to disaster victims, and Vulnerable Group Feeding (VGF), aimed at assisting households over a longer period (ultimately, from September 1998 through April 1999).⁶ Immediate short-term relief through GR was targeted by location. In contrast, the VGF program included all areas of the country (both flooded and non-flood affected areas), and was administratively targeted to poor households through selection by local committees (Del Ninno and Roy, 1999a). The size of these programs was limited, however, both by available wheat stocks (up through early November when government commercial imports and food aid arrivals added to government stocks) and the financial cost of the programs (covered to a large extent by food aid).

Major flood relief efforts began in August 1998 through provision of 20,400 MTs of rice through Gratuitous Relief (GR) in flood-affected *thanas* and an additional 30,800 MTs of rice in September. In addition, the Vulnerable Group Feeding (VGF) program began on a large scale in August with an initial distribution of 1.3 million cards entitling the holder to 8 kgs of rice per month. During August and September, a total of 27,500 MTs of rice were distributed through this program. At 8 kgs/card, an estimated 1.35 and 2.13 million households received VGF rations in August and September, respectively. Almost no wheat was distributed through relief channels in the initial months of the flood. At the urging of the World Food Programme (WFP), the Government of Bangladesh expanded the VGF program

⁶ Food For Work (FFW) programs began on a large scale only in December 1998, following the *aman* rice harvest, when soils were dry enough to permit manual earthwork in building of roads and culverts.

Table 2 — Transfers Received by Expenditure Quintiles

	Quintile 1	Quintile 2	Quintile 3	Quintile 4	Quintile 5	All
Per Capita Expenditures (Taka/month)	319.4	471.5	600.7	778.0	1603.9	755.2
Total Household Expenditures (Tk/nth)	1812.3	2672.2	3384.0	4160.3	8315.8	4071.5
Household Food Expenditures (Tk/mth)	1331.3	1898.9	2410.1	2793.9	5301.3	2748.6
Flood Exposed Households (percent)	69.7	70.2	76.2	67.6	71.7	71.1
% of Households Owning <0.5 Acres	85.5	76.8	67.6	60.9	49.3	68.0
Percentage of Households Receiving Transfers						
Total Government Transfers	67.1	43.7	49.0	41.1	34.9	47.2
Gratuitous Relief (GR)	31.6	23.8	27.8	21.2	17.8	24.4
Vulnerable Group Feeding (VGF)	38.8	22.5	19.2	17.2	11.2	21.8
Other Government Transfers	13.2	7.9	14.6	8.6	13.2	11.5
NGO Transfers	11.2	11.9	10.6	9.3	11.2	10.8
Private Transfers	7.9	9.9	7.9	8.6	11.2	9.1
Total Transfers	69.1	53.6	57.6	49.7	46.7	55.4
Average Transfer Received / Household (Taka/month) ^a						
Total Government Transfers	59.9	31.2	44.1	32.3	25.8	38.7
Gratuitous Relief (GR)	11.9	9.6	11.5	8.3	8.5	9.9
Vulnerable Group Feeding (VGF)	32.4	16.0	15.0	14.2	6.9	16.9
Other Government Transfers	14.0	5.7	15.1	8.7	10.4	10.8
NGO Transfers	8.1	9.6	8.5	6.7	13.2	9.2
Private Transfers	23.8	73.5	111.6	232.9	165.9	121.5
Total Transfers	93.0	114.8	165.9	271.9	205.1	170.1
Number	152	151	151	151	152	757

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998.

Note: ^a Average transfer received over four month period, July 15 - November 15, 1998.

to 4 million cards with an allotment of 16 kgs of grain/card, half rice and half wheat in October, and all wheat thereafter.

Data from a survey of 757 households conducted in November-December, 1998 (about 2 and ½ months after the floodwaters had receded) in seven flood-affect *thanas* were

used to provide evidence of the extent to which these programs were well targeted.⁷ As shown in Table 2, average per capita monthly expenditures during the July 15 – November 14, 1998 period were only 755.2 Taka (\$15.64 at the November 1998 exchange rate of 48.3 Tk/\$). 68.0 percent of all households, and 85.5 percent of households in the lowest per capita expenditure quintile, owned less than 0.5 acres (0.20 hectares) of land.

67.1 percent of the households in the first quintile received some type of government transfer; 38.8 percent of these households received VGF grain (mainly wheat) and 31.6 percent received GR grain (mainly rice). VGF was fairly well-targeted by expenditure; nonetheless, 17.2 percent and 11.2 percent of the households in the top two quintiles, respectively were participants. The size of these transfers was relatively small, though. The average value of VGF grain received by participating households in October and November 1998 was 202.0 Tk/household/month, equal to only 5.0 percent of total household expenditures. For VGF participants in the lowest quintile, these transfers were more significant, equal to 10.5 percent of total household expenditures.

Table 3 presents data on household expenditures and transfers according to an index of household exposure to the flood. This index measures the direct exposure to the flood at the household level, taking into account four factors: 1) the depth of water in the homestead; 2) the depth of water in the house; 3) the duration (number of days) of water in the house; and 4) the number of days away from home due to the flood.⁸ For each of these four components, we created an index ranging from 0 to 5. The total flood exposure index, equal to the sum of component indices, ranges in value from 0 to 18. Finally, a categorical variable was defined

⁷ The seven flood affected *thanas*, representing five out of six divisions of the country, were selected according to two major criteria: the severity of flood as determined by the Water Board and the percentage of poor people in the district in which the *thana* is located. Given these two major criteria, some *thanas* that were in the samples of earlier studies were purposively selected. Households were randomly selected using a multiple stage probability sampling technique (with the exception of households in one *thana* that were in the sample of an earlier study). In all, approximately six households were selected per village, 36 per *union*, and 108 per *thana*, for a final sample size of 757 households in 126 villages (see Del Ninno and Roy, 1999b for a more detailed description of the sampling frame).

⁸ The last two factors are expressed as categorical variables.

according to the value of the flood exposure index: 0 = not exposed to the flood, 1 – 5 = moderately exposed to the flood, 6 – 10 = severely exposed to the flood and 11+ = very severely exposed to the flood (for further details see Del Ninno and Roy, 1999b)⁹.

Table 3 — Transfers Received by Index of Household Exposure to Flood

	Not Exposed	Moderate	Severe	Very Severe	All
Per Capita Expenditures (Taka/month)	699.2	1019.1	689.6	790.0	755.2
Total Household Expenditures (Tk/mth)	3645.9	4485.9	4114.8	4345.8	4071.5
Household Food Expenditures (Tk/mh)	2388.1	2960.6	2708.0	3247.7	2748.6
% of Households Owning <0.5 Acres	67.1	64.7	65.3	77.7	68.0
Percentage of Households Receiving Transfers					
Total Government Transfers	33.3	44.1	50.5	64.0	47.2
Gratuitous Relief (GR)	9.6	21.6	30.6	36.7	24.4
Vulnerable Group Feeding (VGF)	18.7	24.5	21.9	24.5	21.8
Other Government Transfers	7.8	9.8	11.4	18.7	11.5
NGO Transfers	2.7	5.9	12.1	24.5	10.8
Private Transfers	8.7	9.8	11.4	4.3	9.1
Total Transfers	41.1	48.0	60.9	71.2	55.4
Average Transfer Received / Household (Taka/month)					
Total Government Transfers	26.3	36.5	40.7	55.4	38.7
Gratuitous Relief (GR)	3.0	6.2	13.2	16.7	9.9
Vulnerable Group Feeding (VGF)	13.9	19.8	16.2	20.9	16.9
Other Government Transfers	9.4	8.8	10.2	15.6	10.8
NGO Transfers	2.1	3.1	11.2	20.5	9.2
Private Transfers	111.1	218.2	134.3	39.4	121.5
Total Transfers	139.7	257.8	186.5	118.5	170.1
Number	219	102	297	139	757

Source: FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998.

Note: ^a Average transfer received over four month period, July 15 - November 15, 1998.

⁹ The findings of the analysis obtained using the flood exposure index presented here appear to be quite robust. Similar results were obtained using a different flood exposure index that uses only three variables and a different cut off point (Del Ninno, Dorosh, Smith and Roy (forthcoming)).

All together 57.6 percent of the households in the sample were severely exposed to the flood, while 28.9 percent were not exposed to the flood. The flood affected both rich and poor: there is essentially no correlation between severity of flood-exposure and expenditures as indicated by flood exposure by per capita expenditure quintile (Table 2) or per capita expenditure by degree of flood exposure (Table 3).

The VGF program was not effectively targeted according to flood exposure, even in the flood-affected *thanas* studied. 18.7 percent of households not directly exposed to the flood received cards, only slightly below the percentage of households very severely exposed to the flood (24.5 percent). In contrast, only 9.6 percent of households not directly exposed to the flood received assistance through the shortterm GR relief program, compared to 36.7 percent of very severely exposed households.

In terms of leakages, GR was better targeted towards flood-exposed households than was VGF. Only 11.4 percent of GR recipients, as compared with 24.7 percent of VGF recipients were not directly exposed to the flood. Neither program achieved large coverage, though: 69.3 percent of flood-exposed households did not receive GR; 76.6 percent did not receive VGF. Though VGF was better targeted to the poor than was GR, 50.9 percent of VGF recipients were relatively non-poor households, in the top 60 percent of the per capita expenditure distribution or owning 0.5 acres or more of land.

In contrast to VGF, transfers from NGO's were particularly well targeted to households exposed to the flood. 24.5 percent of very severely flood-exposed households received transfers from NGO's, compared to only 2.7 percent of non-flood exposed households. The value of transfers per household was also nearly ten times larger for very severely flood-exposed households, 20.5 Tk/month compared with 2.1 Tk/month. The excellent targeting of NGO transfers to flood-exposed households may be largely explained by the types of programs undertaken by NGO's at this time: relief programs to flood victims, mainly in the areas that had been more severely affected by the flood. There were no major

Table 4 — Determinants of Participation in GR and VGF Programs, Probit Regression Results

Dependent Variable	GR Participants				VGF Participants			
	Coef.	Std. Err	z	P> z	Coef.	Std. Err	z	P> z
Age Households head	-0.001	0.009	-0.106	0.916	0.007	0.010	0.672	0.502
Female head	-0.589	0.352	-1.674	0.094	0.430	0.312	1.375	0.169
Dependency ratio	0.005	0.004	1.052	0.293	-0.002	0.005	-0.461	0.645
No. males 0_4 yrs.	-0.247	0.149	-1.662	0.097	0.330	0.164	2.012	0.044
No. male 5_14 yrs.	0.065	0.076	0.858	0.391	0.042	0.086	0.495	0.621
No. male 15_19 yrs.	-0.318	0.133	-2.385	0.017	0.245	0.130	1.881	0.060
No. male 20_34 yrs.	-0.163	0.111	-1.468	0.142	-0.083	0.124	-0.673	0.501
No. male 35_54 yrs.	0.110	0.164	0.667	0.505	-0.104	0.197	-0.527	0.598
No. male 55+ yrs.	-0.110	0.234	-0.472	0.637	-0.053	0.274	-0.193	0.847
No. female 0_4 yrs.	-0.436	0.152	-2.860	0.004	-0.197	0.164	-1.201	0.230
No. female 5_14 yrs.	-0.217	0.079	-2.749	0.006	0.000	0.083	0.004	0.997
No. female 15_19 yrs.	-0.152	0.131	-1.161	0.246	0.029	0.138	0.208	0.835
No. female 20_34 yrs.	-0.128	0.155	-0.829	0.407	-0.065	0.164	-0.400	0.689
No. female 35_54 yrs.	0.085	0.195	0.435	0.664	-0.145	0.210	-0.694	0.488
No. female 55+ yrs.	0.131	0.270	0.485	0.628	-0.455	0.305	-1.491	0.136
No. Males no education	0.062	0.076	0.816	0.414	-0.161	0.083	-1.934	0.053
No. Females no education	0.190	0.084	2.262	0.024	0.170	0.087	1.958	0.050
No. Dependent workers	-0.186	0.126	-1.479	0.139	-0.050	0.131	-0.384	0.701
No. Daily laborers	-0.016	0.097	-0.167	0.867	0.128	0.105	1.213	0.225
No. Own farm labor	-0.136	0.123	-1.103	0.270	-0.039	0.140	-0.277	0.782
Landless	0.067	0.149	0.445	0.656	0.311	0.167	1.861	0.063
Owns cattle	-0.141	0.127	-1.114	0.265	-0.075	0.137	-0.549	0.583
Tin roof	-0.560	0.175	-3.201	0.001	-0.322	0.194	-1.661	0.097
No. house buildings	0.068	0.077	0.888	0.375	-0.159	0.085	-1.872	0.061
Flood Exposed-Moderate	0.528	0.215	2.457	0.014	-0.002	0.208	-0.009	0.993
Flood Exposed-Severe	0.901	0.177	5.089	0.000	-0.125	0.176	-0.708	0.479
Flood Exposed-Very Severe	0.947	0.203	4.673	0.000	-0.163	0.210	-0.776	0.438
Thana 2	0.314	0.235	1.334	0.182	0.547	0.270	2.027	0.043
Thana 3	0.171	0.257	0.667	0.505	0.365	0.260	1.404	0.160
Thana 4	0.430	0.234	1.840	0.066	0.199	0.270	0.736	0.462
Thana 5	0.977	0.255	3.829	0.000	0.702	0.267	2.629	0.009
Thana 6	0.339	0.241	1.410	0.159	0.673	0.246	2.736	0.006
Thana 7	0.848	0.236	3.600	0.000	0.795	0.267	2.974	0.003
Constant	-1.708	0.483	-3.539	0.000	-1.577	0.516	-3.059	0.002
Observations	737				737			
Chi-squared (33)	145.06				61.91			
Prob > Chi-squared	0				0.0017			
Pseudo R-squared	0.177				0.099			

Source: Authors' calculations, using the FMRSP-IFPRI Bangladesh Flood Impact Survey, 1998.

non-flood relief NGO programs involving transfers in-kind or as cash in operation in the thanas surveyed in late 1998. Private transfers were not highly correlated with flood exposure, but it is notable that the poorest twenty percent of households received only about one fifth as much transfers per household as did the average household in the sample.

The analyses of the determinants of participation in GR and VGF programs, conducted using probit regressions, provide further evidence of the degree to which these programs were targeted towards the poor and flood exposed households (Table 4). The regressions clearly show that the criteria used for targeting the households with respect to the level of exposure to the flood were very different. In the GR model, the dummy variables for flood exposure, and particularly the dummy variables for severe and very severe flood exposure, are highly significant explanatory variables for participation in GR. In contrast, for VGF participation, flood exposure variables are not statistically significant explanatory variables, even in this sample of households from flood-affected *thanas*.

The coefficients of the variables describing the indication of the level of household wealth confirm that the VGF program was better targeted towards poorer households. Landlessness and housing characteristics (tin roof and the number of buildings in the household compound) are statistically significant explanatory variables for participation in VGF. In the GR regression, however, among the household wealth variables, only residing in a house with a tin roof reduces the probability of participation.

Household characteristics and household size variables are not strong determinants of the probability of receiving either GR or VGF transfers. In the case of GR, this is to be expected, since the flood is likely to have affected all households in a village, irrespective of household size. Nonetheless, there appears to be a bias towards smaller families that have fewer younger children in GR distribution, perhaps because these households were more mobile and had less difficulty reaching distribution centers. In the case of VGF transfers, targeting towards larger families with more children might be expected. However, few

household composition variables are significant, apart from coefficients for the number of young boys, thus indicating that overall level of wealth (as reflected in the housing variables discussed above) was the main determinant of participation in the program. Somewhat surprisingly, there is only weak evidence of targeting towards female-headed households. The coefficient on the dummy variable for female household head is positive, but it is significantly different from zero only at a 17 percent confidence level.

4. CONCLUDING OBSERVATIONS

Food security at the household level depends on both availability of food in markets as well as access to food.¹⁰ Liberalization of private sector imports of rice and wheat in the early 1990s and ensuing government policies supporting trade in 1998 enabled private imports to stabilize market prices and supplies. Government direct distribution programs, though small compared to private imports, nonetheless increased access to food by poor households. Given the tight resource constraints that limit the size of distribution programs, effective targeting is crucial. Immediate relief efforts were well-targeted to flood-exposed households, as were transfers from NGO's. VGF, a medium-term program, covered non-flood affected regions and, even in flood-affected *thanas*, was not targeted well to households directly exposed to the flood. Nonetheless, according to survey data from seven flood-affected *thanas*, the program was relatively well-targeted to poor households, with households in the three lowest expenditure quintiles receiving an estimated 75 percent of the foodgrain distributed through this program.

More broadly, the Bangladesh experience with the 1998 flood illustrates the dual role of food aid in increasing availability and providing food resources for enhancing access of food insecure households. In a liberalized trade regime where private imports respond to price signals, food aid's contribution to total availability of food may be minimal. Nonetheless, foreign assistance in-kind or as cash, can provide resources for subsidized, targeted distribution to food-insecure households -- assistance not otherwise possible under tight government budget constraints.

¹⁰ Utilization, another aspect of food security, is not covered in this paper.

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