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**FOOD AID DISTRIBUTION IN BANGLADESH:
LEAKAGE AND OPERATIONAL PERFORMANCE**

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Abstract

Donors support a number of targeted food-based programs in Bangladesh that are widely credited with providing poor people access to food and improving their food security. However, inefficiency in the food distribution system may be hindering the realization of the full benefits of these programs. The International Food Policy Research Institute (IFPRI) conducted a comprehensive study of the efficiency of food distribution in food aid-supported programs in Bangladesh.

The study has three components: (1) food discharge at harbors, (2) the public food distribution system, and (3) food distribution to program beneficiaries. The capacity and efficiency of the food distribution system was assessed from entry ports to targeted beneficiaries. The study identified problems in the whole food distribution system, determined the level of losses, leakages, and other lapses at various stages, and recommended solutions.

Key words: food aid, food distribution, leakage, Bangladesh

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Abbreviations and Acronyms

AC	<i>Atta Chakki</i>
ADP	Annual Development Program
ADS	Arrival Draft Survey
AO	Allotment Order
AUSAID	Australian Agency for International Development
BBB	Before Breaking Bulk
BBS	Bangladesh Bureau of Statistics
BCSIR	Bangladesh Council of Scientific and Industrial Research
BIDS	Bangladesh Institute of Development Studies
BIWTC	Bangladesh Inland Water Transport Corporation
B/L	Bill of Lading
BRAC	Bangladesh Rural Advancement Committee
BSC	Bangladesh Shipping Corporation
CARE	Cooperative for American Relief Everywhere
CBO	Community based organization
CIDA	Canadian International Development Agency
CMS	Controller of Movement and Storage
CNI	Community Nutrition Initiative
CP	Charter Party
CSD	Central Storage Depot
DAE	Directorate of Agricultural Extension
DATA	Data Analysis and Technical Assistance
DCF	District Controller of Food
DGF	Directorate General of Food
DLMB	Dock Labor Management Board
DMSS	Directorate of Movement, Storage and Silo
DO	Delivery Order
DRR	Directorate of Relief and Rehabilitation
DSDM	Directorate of Supply, Distribution and Marketing
DWA	Department of Women Affairs
EC	European Commission
ECD	Early Childhood Development
EP	Essential Priorities
ERD	Economic Relations Division
FAO	Food and Agriculture Organization
FDR	Final Discharge Report
FFA	Food for Asset
FFE	Food-for-Education
FFW	Food-for-Work
FIFO	Free in Free Out
FILO	Free in Liner Out
FM	Flour Mills
FO	Free Out
FOB	Free on Board
FPC	Fair Price Campaign
FPMC	Food Planning and Monitoring Committee
FPMU	Food Planning and Monitoring Unit
FS	Free Sale
GIS	Geographic Information System
GLEW	Group Leader Extension Workers
GOB	Government of Bangladesh
GR	Gratuitous Relief
HIES	Household Income and Expenditure Survey
HRW	Hard Red Winter
IFPRI	International Food Policy Research Institute
IFS	Integrated Food Security

IFST	Institute of Food Science and Technology
IGM	Import General Manifest
INFS	Institute of Nutrition and Food Science
ITSH	Internal Transportation, Storage and Handling
JC	<i>Jagorani Chakra</i>
LE	Large Employers
LGED	Local Government Engineering Department
LMD	Licensed Measuring Department
LSD	Local Supply Depot
LT	Liner Term
LV	Lighter Vessel
MDMR	Ministry of Disaster Management and Relief
MIS	Management Information System
MLGRDC	Ministry of Local Government, Rural Development, and Cooperatives
MO	Marketing Operation
MOF	Ministry of Food
MP	Movement Plan
MPME	Ministry of Primary and Mass Education
MSS	Movement, Storage and Silo
MT	Metric ton
MUAC	Mid Upper Arm Circumference
MV	Mother Vessel
MWCA	Ministry of Women and Children Affairs
NGO	Non-Government Organization
NNP	National Nutrition Program
NOR	Notice of Readiness
OC	Officer-in-Charge
OMS	Open Market Sales
OP	Other Priorities
PFDS	Public Food Distribution System
PIO	Project Implementation Officer
PPS	Probability proportional to size
PR	<i>Palli</i> Rationing
RCF	Regional Controller of Food
RD	Rural Development
RMP	Rural Maintenance Program
SF	School Feeding
SR	Statutory Rationing
TNC	Training and Nutrition Centers
TOR	Terms of Reference
TR	Test Relief
UNICEF	United Nations International Children Emergency Fund
UP	Union <i>Parishad</i>
USAID	United States Agency for International Development
VAM	Vulnerability Analysis and Mapping
VGD	Vulnerable Group Development
VGf	Vulnerable Group Feeding
VNPS	Village Nutrition Promoters
WFP	World Food Programme
WTC	Women Training Center

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Executive Summary

Food aid donors support a number of targeted food-based programs in Bangladesh, which are implemented by the Government of the People's Republic of Bangladesh (GOB). These programs are widely credited with providing poor people access to food and improving their food security status. However, there are concerns about inefficiency in the Public Food Distribution System (PFDS) that may be hindering the realization of the full benefits of these targeted programs.

The International Food Policy Research Institute (IFPRI) was commissioned to conduct a comprehensive study of the efficiency of food distribution in food aid supported programs in Bangladesh. The capacity and efficiency of the food distribution system was assessed from entry ports to the targeted beneficiaries of the food aid programs. The study identifies problems in the whole food distribution system, determines the level of losses, leakages, and other lapses at various stages, and recommends solutions. Data collection included structured surveys of program beneficiaries and numerous agents in the food distribution channels, the collection of a large volume of secondary data, formal interviews with various stakeholders, and a review of relevant documents. The study has three components: (1) Food discharge at harbors, (2) the Public Food Distribution System (PFDS), and (3) Food distribution to program beneficiaries.

Food Discharge at Harbors

Other than a few instances of imports from India by road and railway, all externally procured foodgrain enters Bangladesh through the two harbors—Chittagong, in the southeast, and Mongla, in the southwest. Foodgrain is discharged at harbors from mother vessels in several ways: bulk wheat is lightered by vaccuators at outer anchorage to lighter vessels; or to silos with suction pumps and carried over on conveyer belts. Frequently, foodgrain is bagged and stitched on board and unloaded in slings by cranes onto trucks and barges at the Chittagong berthing jetty; or to barges in midstream Mongla. Inefficiency in these operations at harbors lowers discharge rates, leading to financial losses. This and the shortfalls reported in the final discharge reports are cause

for concern among both the GOB and the donors. This substudy reviews shipping arrangements and factors influencing discharge rates and losses, estimates losses, analyzes their causes, and recommends ways to improve discharge rates and reduce losses at harbors. Understanding and assessing the system was achieved through (1) physical observation at all discharge spots; (2) interviews with stakeholders, and focus group discussions; (3) compilation of information from office files and computerized data sources; and (4) examination of selected issues by a process of iterative cross-checking.

Findings

- WFP food aid is under the Free-Out system, of which the Directorate General of Food (DGF) of the GOB is responsible for all discharge operations. In contrast, the Liner-Out system, under which the carrier's agent is responsible for all discharge operations, is followed by the Canadian and Australian food aid programs, as well as for food arrivals from the U.S.A. under CARE and World Vision. The evidence indicates that neither of the two systems is more efficient than the other.
- There is a general lack of systematic record-keeping and interagency coordination to use information for timely actions.
- The overall discharge rate for all arrivals since 1996 averaged 2,400 metric tons of wheat per weather working day (wwd). The discharge rate is low at Mongla and Chittagong berthing jetties, averaging around 1,000 metric tons per wwd. Appropriate incentives could double the discharge rate for bagged foodgrain at Mongla. However, such an increase at the Chittagong berthing jetty would require the introduction of new technology. Potentially, discharge rates as high as 4,000 metric tons per wwd at Chittagong Silo, and more than 5,000 metric tons per wwd at the outer anchorage, could be achieved.
- The arrival draft survey is systematically biased; surveyors tend to report more than the quantity recorded in the Bill of Lading (B/L). Furthermore, surveys done by different parties on the same vessel are not carried out independently. Undertaking independent surveys, however, would require more time and raise the total cost, with no assurance of increased benefits.

- Foodgrain losses at harbors, defined as the difference between the B/L quantity and the final discharge report of the stevedores, is estimated to be 1.55 percent of the B/L quantity for all arrivals. Operational loss due to handling and spillage is estimated to be 0.05 percent. The loss due to pilferage is therefore estimated at 1.50 percent.
- Losses due to pilferage appear to be associated with the involvement of numerous agencies, the absence of appropriate legal mechanisms to transfer incentives to the right group, and the presence of unhealthy unions and collusion. Introducing new technology will not necessarily reduce such losses. Incentives for pilferage also tend to lower discharge rates, thereby increasing the overall cost.

A proposal to relocate the Mongla port is under serious consideration within the GOB.

Recommendations

1. The quantity recorded in a Bill of Lading should be considered the reference quantity for agreements between the GOB and donors on the amount of foodgrain delivered.
2. Institutionalizing multiple independent arrival draft surveys would be costly; therefore, the number of agents engaged in such surveys should be reduced.
3. The World Food Programme (WFP) could consider stipulating variable discharge rates in its contracts with the GOB, which would be made specific to points of discharge.
4. A temporary switch to a single port discharge—at the Chittagong outer anchorage and silo jetty—would enable the GOB to reshape the institutional arrangements at Mongla port once it is relocated or a silo is established at a suitable place.
5. A collaborative database should be developed with WFP, DGF, shipping agents, and lightering agents. A common set of information, available to all parties without time lags, will reduce the likelihood of pilferage.
6. A mechanism within the GOB should be formulated to transfer funds from dispatch money to provide incentives to workers, DGF staff, and other parties engaged in discharge. The WFP could revise its calculation of lay time relating to Fridays and holidays.

7. To make the DGF more accountable, appropriate institutional arrangements should be made within the GOB to enhance its role in food-related negotiations with donors.

The Public Food Distribution System

This substudy analyzed the operational performance of the PFDS, paying close attention to institutional structure, stock management, losses, and economic and social costs of its operation. In addition to conducting surveys and holding discussions with key stakeholders, the study team examined secondary data and public documents.

Findings

- Losses in the PFDS have declined substantially in the 1990s. Transit loss of foodgrains, which was as high as 3.50 percent of total distribution in the 1980s, declined to 0.30 percent between 1998-2002. Storage losses have declined from 1.50 percent to 0.72 percent. The value of these losses, however, is still large: the average value of losses in wheat and rice comes to Tk 23.6 crores¹ (\$4.15 million).
- Despite underutilization of storage facilities, the movement of PFDS foodgrain from one local supply depot (LSD) to another LSD within a district is high—17 to 48 percent of the total PFDS foodgrain off-take. The rationale for such intra-district movement is to increase the efficiency of storage in the domestic foodgrain procurement zones, where local storage capacity can be quickly exhausted during the procurement season. However, such movement has also been common in the nonprocurement regions, such as Chittagong and Barisal. The total cost of this LSD-to-LSD movement in 2001/02 is estimated at Tk 1.9 crore (\$330,330).
- Analysis of stock rotation suggests that 35 percent of the foodgrain distributed to beneficiaries is more than nine months old. Assuming a 15 percent discounted value of older stock (rice older than 7 months and wheat older than 8 months), the

¹ In April 2003, the official exchange rate was 57.90 taka (Tk) per US\$1.00. A “crore” is equivalent to 10 million.

implicit cost of stock deterioration in 2001/02 is estimated at Tk 105 crore (\$19 million). This is not surprising, as the Directorate of Movement, Storage, and Silo (DMSS) relies on stock reports received from the district level offices that do not specify the age of stock at the storage level.

- Timeliness of food aid arrival is an important determinant in the PFDS stock management. Food aid arrivals frequently coincide with the GOB's domestic procurement seasons, leading to higher losses due to more movements and higher stock rotation time.
- Contributions to DGF's internal transportation, storage, and handling (ITSH) costs vary widely across donors. The donors' contributions to ITSH also vary, depending on whether food aid is valued at the PFDS cost price, GOB ration price, or open market price. When total costs are broken down, donors' contributions to ITSH are 11 percent, whereas food aid constitutes about one-third of the total PFDS operation.
- Given recent changes in the national food policy, such as the closure of the Food-for-Education (FFE) and downsizing of the Food-for-Work (FFW) programs, the current national food security stock level of 800 thousand metric tons appears to be high. A stock of 600 thousand metric tons of wheat and rice (300 thousand metric tons each) would be cost-effective. Stock levels greater than this increase total PFDS costs because of quality deterioration, higher transit costs and storage losses, and suboptimal use of its administrative structure. Two specific points about this finding need further clarification. First, the recommended 600 thousand tons represent the fiscal year opening stock, which changes every month, depending on off-take and procurement. In other words, the optimal stock is a dynamic concept, not a fixed number for the entire year. Second, in order to be able to manage unanticipated food security threats, such as floods and other natural calamities, the calculation accounted for a security reserve of 300 thousand tons at all points in time.
- The difference between the prices of local variety and food aid wheat ranges from 27 percent for Australian varieties to about 44 percent for hard red varieties from North America. This differential serves as an incentive for private traders to procure food aid wheat, either from the PFDS or from the beneficiaries who often

sell their ration to buy other necessary consumption goods. As the third substudy shows, beneficiaries prefer white wheat to red wheat.

Recommendations

1. Both local movement (LSD-to-LSD) and stock rotation have significant cost implications for the PFDS operations. Successful planning and control requires up-to-date information regarding stock and flow of foodgrain at the storage level. Therefore, an information system that would provide current information to the key decisionmakers should be developed.
2. The PFDS transit loss can be further reduced. First, private flour millers do not incur any transit loss in transporting their grain, as they operate under an arrangement where transporters assume sole responsibility for delivery of full invoice quantity. If the storage facilities are well connected, the GOB can adopt the same strategy for transportation by road. Second, by introducing hundred percent weighing in water transportation (except unavoidable cases at Mongla port), higher permissible limits of losses (currently 0.4 percent) can be revised downward.
3. With the current level of PFDS operations (that is, an annual distribution of about 1.35 million metric tons), the national security stock level can be revised downward from 800 thousand metric tons to 600 thousand metric tons. These levels will not jeopardize the GOB's ability to manage any unanticipated food security threat, such as flood and other natural calamities. There are two additional justifications for this change. First, after liberalization of the regional trade of foodgrain, the private market now plays a more important role in price stabilization. Second, the country has been able to cope with a major natural disaster—the devastating floods of 1998—with only about 500 thousand metric tons of public stock.
4. Although the flow of food aid to Bangladesh has been declining, it still constitutes about one-third of the total PFDS operation. Since foodgrain distribution under various programs is stable, and since domestic procurement is sizeable, arrival of food aid during the procurement season can adversely affect PFDS stock

management. Therefore, food aid arrivals should be scheduled so that they do not coincide with the GOB's procurement season.

5. The GOB and the donors should formulate a single cost sharing arrangement to cover ITSH costs, eliminating unnecessary complications in PFDS accounting.
6. The PFDS revenue budget can be significantly improved by auctioning out hard red wheat varieties, which fetch a higher price in the market. There are four reasons to pursue this policy. First, the poor prefer white varieties to red. Second, given the current movement patterns, food aid wheat rarely goes to the northern part of the country, where the majority of the poor live. Third, formalizing an otherwise illegal trading practice will improve transparency and reduce transaction costs. Finally, conservative estimates for the period 1998/99 to 2001/02 suggest that the revenue gains from tendering out food aid wheat could have been substantial—ranging from Tk 30.31 crore (\$5.32 million) to Tk 176.16 crore (\$30.9 million).

Food Distribution to Program Beneficiaries

The third part of the study investigated food distribution at the beneficiary level, focusing on the performance of the Vulnerable Group Development (VGD) program and the Integrated Food Security (IFS) program. VGD is a nationwide program covering about 500,000 extremely poor rural women. Participants of the VGD program receive a monthly ration of 30 kilograms of wheat over a period of 24 months, combined with a package of development activities. In 2002, VGD used about 74 percent of the WFP Country Program resources. The IFS is a new component under the 2001-2005 Country Program, which focuses on improving food security and the nutritional well-being of participants in the most food-insecure parts of the country. The program is currently implemented in three districts of northern Bangladesh. It used 3 percent of the WFP Country Program resources in 2002. The IFS program includes three components: the Community Nutrition Initiative (CNI), Training and Nutrition Centers (TNC), and Food-for-Asset Creation (FFA) activities. Based on data collected through surveys of beneficiaries and other stakeholders, the study analyzed various factors that influence food distribution to VGD and IFS beneficiaries.

Findings

- VGD is a well-established and widely known program, while the IFS is a relatively newer program. In both programs, however, survey results suggest that beneficiaries have clear knowledge of their entitlements and responsibilities. This widespread knowledge is essential in ensuring some minimum levels of social accountability in both programs.
- Selection into the VGD program is primarily demand-driven, in the sense that there exists a very large pool of eligible candidates expressing strong demand to participate. In contrast, the IFS program, perhaps because it is new, is more supply driven, with the program administrators seeking and selecting beneficiaries.
- The study found no major anomalies in the selection process in VGD and IFS programs. Ninety-four percent of the VGD cardholders met at least one of the five official selection criteria of the program. In the IFS program, all participants of the TNC component and 96.7 percent of all FFA participants met at least one of the seven selection criteria.
- There are problems regarding transportation and handling of grains for distribution at the beneficiary level. The VGD program has provision to pay food distribution operators the transport and handling costs from LSDs to distribution sites. However, Union *Parishad* (UP) chairpersons and members who distribute foodgrain to beneficiaries report lengthy delays or nonreceipt of transport and handling commissions. Further, the commission is not sufficient to cover the costs.
- The survey of UP officials indicates that, on average, they received 3.5 percent less wheat from LSDs than their allotted quantity. The weight of the gunny bags accounts for almost a third of this shortfall.
- Another weakness in the VGD and IFS programs is the ration-weighing system at distribution sites. An absence of standardized weighing techniques and equipment makes monitoring and verification of program performance difficult.
- One of the operating rules of the VGD program requires that VGD beneficiaries must possess their VGD cards. However, 77 percent of the VGD women did not

- possess their cards at the time of the interview. The majority of them reported that the UP officials kept their cards.
- In the VGD program, a third of the beneficiaries expressed concern about the quality of wheat. Insect infestation was the most common problem. IFS program beneficiaries were generally satisfied with the quality of wheat received. To assess the physical quality and nutrient contents of wheat, laboratory tests were carried out on wheat samples collected from beneficiaries during the surveys. The test results do not indicate any significant deviation from standards in terms of the physical quality and nutrient content of the wheat.
 - Most beneficiaries of the VGD and IFS programs prefer the white wheat variety to the red variety. The majority of wheat distributed by the VGD program is red, while the IFS tends to distribute more white than red wheat.
 - A large number of beneficiaries—47 percent of VGD and 52 percent of FFA beneficiaries—reported selling part of the received wheat ration. They used a sizable portion of the proceeds to buy rice, which is the preferred staple food for Bangladeshis. VGD beneficiaries used about 22 percent of the sales proceeds to make the monthly savings deposit required by the program.
 - Estimating leakage due to short ration (beneficiaries receive less than their full entitlement) is problematic, since quantities of wheat reported by beneficiaries are likely to be riddled with errors arising from inaccuracies in weighing. This is a serious concern as sole reliance on beneficiaries' assessments could result in erroneous conclusions. For this reason, field surveyors of this study physically weighed ration amounts received by the beneficiaries. These findings estimated the average leakage in the VGD program due to short ration to be 7.53 percent, or 2.25 kilograms per month per beneficiary. Leakage due to undercoverage (when the actual number of beneficiaries is less than the officially determined number for whom food was allocated) was 0.48 percent. Hence, the overall leakage in the VGD program is 8.01 percent of the total wheat allotment. This leakage estimate corresponds to food distribution from the LSDs to the program beneficiaries.
 - About 10 percent of the VGD cardholders reported that UP members made them “share” their VGD card with a non-cardholder woman, and consequently, they received only one-half of their ration entitlement. Given the practice of sharing of food rations and ad hoc distribution to the needy at distribution centers, what

constitutes “leakage” becomes somewhat ambiguous. At one level, under a stricter interpretation of leakage, the practice of card sharing clearly violates program rules and therefore constitutes a leakage. Such practice goes against the basic tenets of rule-based community governance, and opens the door for perverse discretion and corruption. At another level, however, card sharing is most often used to address the otherwise irreconcilable gap between the current size of the VGD program and the very large number of eligible candidates. Indeed, 86 percent of the VGD cardholders who had to share their cards considered the non-cardholder recipients of the shared rations to be either poorer or as poor as the cardholders themselves.

- Overall, the practice of ration sharing reduces the average receipt per VGD cardholder beneficiary by 1.7 kilograms of wheat per month per beneficiary, or 5.56 percent of the full entitlement. Therefore, if leakage is defined to include short rationing due to sharing as well, then total leakage in the VGD program becomes 13.57 percent of total wheat allotment.
- Leakage within the IFS programs is worrisome in the case of TNC where beneficiaries received 18.64 percent less than their full entitlement. It should be noted, however, that this estimate of leakage is based on data from surveys carried out in two randomly selected TNC locations. The analysis reveals that the relatively high leakage in TNC was mainly due to malpractice by a Community-Based Organization (CBO) assigned to support TNC user committees in one of these two locations. Moreover, TNC accounts for less than one percent of the GOB-WFP country program resources.
- Leakage was found to be significantly lower in FFA, another IFS component. Physical weighing of wheat rations received by FFA participants indicated an average shortfall of 5.88 percent from their full entitlement. The problems of undercoverage and ration sharing do not exist in the FFA and TNC components of the IFS program.
- All shortfalls from the entitlements cannot automatically be interpreted as leakage. Some of the food received by distribution operators is used to cover legitimate expenses related to transport and handling of foodgrain from the LSDs to the distribution sites.

Recommendations

1. Transportation and handling costs from the LSD to distribution centers should be assessed for each Union. Based on this information, transportation and handling allowances should be allocated in advance to each Union.
2. Care should be taken in selecting and monitoring the CBOs that support the TNC and FFA user committees.
3. Weighing of rations at distribution sites should be replaced by standard volume measures when distributing wheat rations. The use of clearly calibrated and tamper-proof metal buckets that indicate the amount of grain appears to be the most cost-effective and accurate option in the Bangladesh context.
4. Actions should be taken to ensure that the weight of the total amount of wheat delivered from LSDs to the ration distributors is net of the weight of the gunny bags.
5. As involuntary sharing of food rations violates program rules, steps should be taken to eliminate this practice.
6. The operating rule regarding the possession of VGD cards should be strictly enforced to ensure that the official VGD beneficiaries possess their cards.
7. The GOB (particularly, the Ministry of Women and Children Affairs) and WFP should monitor program activities regularly to observe whether unauthorized activities persist in food distribution at the beneficiary level. Representatives of program beneficiaries should be involved in monitoring. Strict disciplinary actions should be taken whenever any malpractice is detected.
8. A monitoring system should be designed and implemented to ensure that the beneficiaries receive good quality of wheat ration.

1. Introduction

Background

Bangladesh has made commendable progress in economic growth and food production since independence in 1971. Foodgrain (rice and wheat) production has increased by 84 percent over the 20-year period from fiscal year 1981/82 (FY82) to 2001/02 (FY02).² This achievement, however, has been largely eroded by a continued high (though declining) rate of population growth. Total population has increased by 45 percent over the past two decades. Consequently, the country has not been able to overcome the chronic shortage in domestic food production to meet basic nutritional needs. Bangladesh continues to depend on food imports (food aid and commercial imports) to help meet food deficits.

Despite Bangladesh's progress in economic growth and food production, pervasive poverty and undernutrition persist. According to the latest poverty estimates, about half of the country's 133 million people cannot afford an adequate diet. About a quarter of the population—the hard-core poor—are too poor to capture the gains of the economic growth and increased food production. They remain seriously underfed due to their inadequate purchasing power. Market-based policies and interventions alone are unlikely to make any noticeable change in the nutritional status of these hard-core poor.

Bangladesh is highly prone to natural disasters, such as floods, cyclones, and occasional droughts. Crop failures from such disasters cause acute shortages, requiring a substantial amount of emergency food aid assistance and commercial imports. Such a crop failure caused a devastating famine in 1974. Sudden food shortages divert much of the government's efforts and resources away from long-run development priorities and into short-term crisis management.

Bangladesh has been one of the world's largest recipients of food aid since the 1974 famine. The food aid donors support a number of targeted food-based programs in Bangladesh, which are implemented by the Government of the People's Republic of Bangladesh (GOB). Most of these programs are widely credited with providing the poor

² Fiscal year in Bangladesh starts on the first of July and ends on the 30th of June (next calendar year).

with access to food and improving their overall food security status. However, food aid donors and the GOB are concerned that inefficiency in the handling of food aid from harbors to the beneficiaries may be hindering the realization of full benefits from these targeted programs. Therefore, food aid donors and the GOB commissioned this in-depth and comprehensive study on efficiency in food distribution, particularly with regard to leakage of food, in the food aid-supported programs in Bangladesh. This study is a step towards the GOB's commitment for increased efficiency in the food-aided program management in Bangladesh. The International Food Policy Research Institute (IFPRI) has carried out the study.

Concept of Losses and Leakage

The aggregate disappearance of food resources from a public food distribution system (from discharge in port of entry to point of distribution) includes losses (transit and storage losses, and losses due to deterioration in the quality of food) and leakage. Losses occur largely due to inefficient management, obsolete or inappropriate technology, adverse weather conditions, and natural or man-made calamities. Even though some losses of food in the system are inevitable, they can be minimized if appropriate measures are taken.

Besides losses, in any public food distribution system, there are incentives and opportunities for the unauthorized diversion of food; for sale in the open market, and other redirections and use. To the extent that such leakage occurs, the government and the food aid donors incur the cost while the benefits accrue, not to the intended or targeted consumers, but to those who gain access to and misappropriate resources. Depending on the rules and operation of a particular public food distribution system, leakage may occur at several points in the distribution system.

It is the task of the government to identify and minimize leakage where it occurs, making sure, however, that the monitoring and enforcement costs do not exceed the benefits of reducing the leakage. Where leakage, monitoring, and enforcement costs are prohibitive, the rules and operation of the system may need to be modified or consideration given to eliminating the food intervention program that has a high rate of leakage. One of the first steps in the process of evaluating the performance of any public

food distribution system is to identify the magnitude of system leakage; that is, how much of the food resources is being diverted before it reaches the intended consumers.

An Overview of Food Aid Flow

Bangladesh's dependence on food aid and its external procurement of foodgrain have changed substantially over the past decade. During the early 1990s, the crop sector had experienced satisfactory growth that raised optimism about the potential for surplus rice production. The growth rates, however, have faltered since then. In FY02, total foodgrain production in Bangladesh was 26.8 million metric tons, of which rice constituted about 94 percent and wheat, 6 percent. Between FY90 and FY92, food aid relative to domestic foodgrain production averaged around 8 percent. This ratio dropped to about 2 percent in FY02. However, the ratio of food aid wheat to domestic wheat production was about 31 percent in FY02.

Over the past three years (FY00 to FY02), annual foodgrain imports in Bangladesh averaged 1.81 million metric tons, of which food aid accounted for 34.5 percent, with the private sector importing the remainder. There were no GOB commercial imports of foodgrains in the past three years. Wheat constituted 97.5 percent of total food aid during this period. The major donors of food aid to Bangladesh are Australia, Canada, the European Community, France, the United States, and the World Food Programme (WFP). WFP handles multilateral donations by individual donors. Between FY00 and FY02, these major donors accounted for about 91 percent of all food aid to Bangladesh. During this period, the United States provided 44.2 percent of all wheat, and all of it came under the PL480 – Title II program. WFP handled 30.1 percent of all wheat aid, followed by Canada (8.7 percent) and Australia (8.0 percent).

The volume of food aid to Bangladesh has fluctuated substantially over the past 10 years, ranging from a low of 492 thousand tons in FY01, to a high of 1,229 thousand tons in FY99, following the floods in 1998. Overall food aid shipments show a declining trend since 1992. Annual cereal shipments have averaged only 732 thousand tons from FY93 to FY02 compared to 1,343 thousand tons during the previous 10 years, FY83-92. Per capita cereal aid was down from 14.0 kilograms in FY91 to 3.9 kilograms in FY02. The downward trends are evident from data of wheat food aid by major donors between FY90 and FY02 (Table 1).

Table 1—Food aid wheat shipments to Bangladesh, by major donors, FY95-FY02

	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02
	('000 metric tons)							
Australia	50	46	54	50	54	50	50	50
Canada	45	78	161	91	90	88	0	75
EU Member States	0	27	20	22	28	3	0	6
European Union Community Action	185	225	106	81	90	50	50	30
Japan	35	31	31	0	54	0	30	0
United States	305	170	164	120	483	417	233	178
World Food Programme	295	167	82	185	409	263	129	171
Others	0	0	0	0	21	0	0	0
Total	915	744	618	549	1,229	871	492	510

Source: Food Planning and Monitoring Unit (FPMU), Ministry of Food.

Objectives and Scope of the Study

The Terms of Reference (TOR) of the study, provided in Appendix 2, identify four main objectives:

1. Assess the capacity and efficiency of the food distribution system under the targeted food aid interventions in Bangladesh;
2. Identify problems in the whole food distribution system from the entry port to the house of the project participants;
3. Determine the level of leakage, both in quantity and quality, and other lapses at various stages; and
4. Recommend means and ways to solve the problems and minimize the food leakage.

According to the TOR, the study includes three substudies on food aid leakage in the following areas:

1. Discharge in Harbors;
2. Public Food Distribution System (PFDS); and
3. Distribution at Beneficiary Level.

The Study Team

A six-member study team (the Team) conducted the study. The Team included Dr. Akhter Ahmed (Team Leader, and Senior Research Fellow at IFPRI), Dr. Shahidur Rashid (Research Fellow at IFPRI), Dr. Manohar Sharma (Research Fellow at IFPRI),

Dr. Sajjad Zohir (Senior Research Fellow at the Bangladesh Institute of Development Studies), Captain Mohammed Khaliqzaman (Master Mariner and General Manager, Mohammadi Sea Transport Private Limited), and Dr. Sayedur Rahman (Associate Professor at the Rajshahi University).

Data Analysis and Technical Assistance Limited (DATA), a Bangladeshi consulting firm with expertise in conducting household and market surveys, carried out the surveys and collected other primary and secondary data for the study. DATA also provided all support services to the Team in Bangladesh.

Organization of the Report

The remaining four chapters of the report are organized as follows. Chapters 2 through 4 present the research methodology and findings for each of the three substudies. Chapter 2 reviews shipping arrangements at both Chittagong and Mongla ports for all food aid imports, and assesses the operational efficiency of the food discharge operation at harbors. Chapter 3 describes the structure and operation of the PFDS, provides estimates of losses and costs, and analyzes the GOB's foodgrain stock management. Chapter 4 presents the analysis of food distribution at the beneficiary level. The chapter reviews the research results on beneficiary selection, beneficiaries' perceptions of the programs, and the degree of leakage. Finally, Chapter 5 provides conclusions for policy and recommends ways for improving the food distribution system. An Action Plan for implementing the recommendations is provided in Appendix 4.

2. Foodgrain Discharge at Harbor

Food Aid Flows Through Harbors: An Overview

Importance of Harbors

Much of the externally procured foodgrain is brought into Bangladesh through the two harbors. The first is located in the southeast on the estuary of the river *Karnafuli* in Chittagong. It has a draft in the range of 7.5 meters to 9.15 meters, varying across high and low tides and across monsoon and dry seasons. The main jetty can accommodate vessels with a maximum length of 186 meters (maximum freshwater draft of 8.55

meters). There is a grain silo in the port area, and vessels with a maximum length of 186 meters (at a maximum draft of 9.15 meters) can berth in its jetty. The outer anchorage in Chittagong can accommodate a draft of 10.5 meters at all times during the year, with a maximum of an 11-meter draft during the monsoon. Vessels with sizes/cargoes exceeding this limit are lightered at outer anchorage near Kutubdia, an island to the southwest of Chittagong.

Bangladesh's second port is located at Mongla in the southwest of the country. Mongla port, on the river *Pussur*, has a limited berthing facility, perennially threatened by the pace of sedimentation.³ Unloading of foodgrains as well as most other cargo is done at midstream onto barges, which then carry the cargo to various inland destinations. The absence of a bridge on the river *Rupsha* and inadequate infrastructure connecting it to major commercial and industrial centers in the country are alleged to have discouraged investment in expanding port facilities in the southwest region.⁴ Current draft restrictions for vessels unloading midstream at Mongla are in the range of 7 meters to 8.2 meters, with a maximum length of 220 meters.

Historically, Bangladesh's receipt of foodgrain was largely under aid programs and the grains were procured from outside the region. The foodgrains thus procured are brought into the country by sea vessels and are unloaded at harbors. Procurement of both wheat and rice from India came into prominence during the 1990s. This also opened the use of land routes for external procurement. While such procurement in the private sector is quite large, its share in food aid inflow has been insignificant. Other than in 1996 and 1997, WFP wheat, even when procured from India, came in via sea route (Table 2). The same, however, does not apply for rice procurement under WFP (see Table 3). For this reason, the study confines itself to wheat arrivals and discharges in the two seaports in examining food aid discharges at harbors.

³ Mongla port was designed to act as an anchorage port handling 34 ships at a time in its mooring and five jetties (each with 182-meters length). Navigability of the channel and berths is maintained by continuous dredging. The choice for unloading foodgrain vessels is now restricted to mooring only.

⁴ Khulna, the third largest city in Bangladesh, is only 20 kilometers away from the Mongla port. The city, however, lies on the west of the river *Rupsha*, while the road link to Mongla is on the west side of the road.

Table 2—Share of WFP wheat arrival, by routes

Fiscal year	Sea (Chittagong)	Sea (Mongla)	Railway	Road	Total
		(percent of total)			(metric ton)
1988	100.00	0.00	0.00	0.00	167,055
1989	99.02	0.98	0.00	0.00	28,1237
1990	100.00	0.00	0.00	0.00	178,913
1991	86.88	13.12	0.00	0.00	394,410
1992	57.04	42.96	0.00	0.00	410,307
1993	54.84	45.16	0.00	0.00	191,597
1994	67.30	32.70	0.00	0.00	93,385
1995	61.01	38.99	0.00	0.00	267,624
1996	67.64	28.76	3.60	0.00	166,638
1997	58.52	23.57	17.91	0.00	93,277
1998	79.78	20.22	0.00	0.00	186,456
1999	76.43	23.57	0.00	0.00	372,770
2000	91.23	8.77	0.00	0.00	262,342
2001	78.61	21.39	0.00	0.00	129,678
2002	92.28	6.66	0.00	1.06	169,595

Source: Compiled from WFP data.

Table 3—Share of WFP rice arrival, by routes

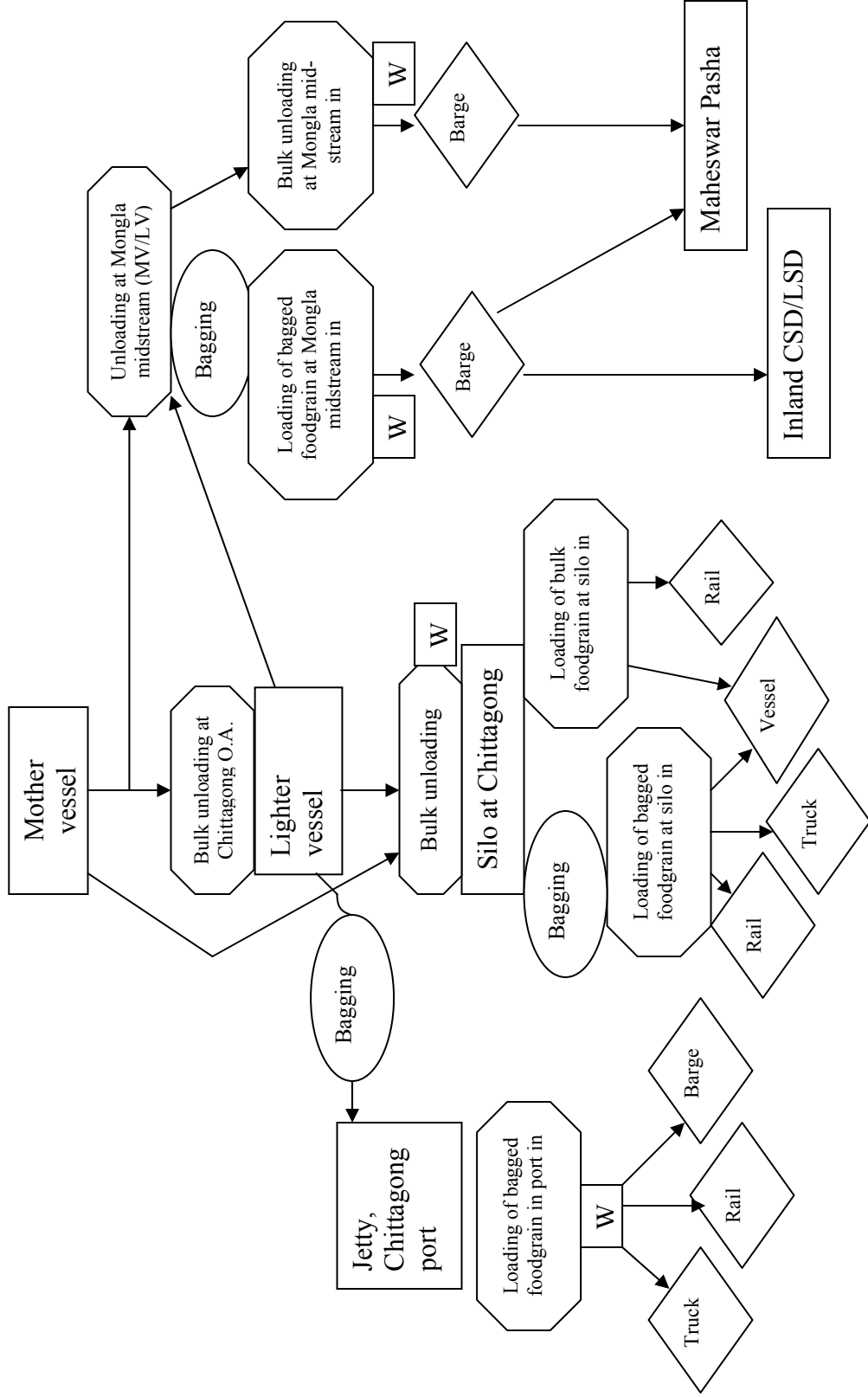
Year	Sea (Chittagong)	Railway	Road	Total
		(percent of total)		(metric ton)
1993	100.0	0.0	0.0	18,000
1999	100.0	0.0	0.0	33,324
2000	0.0	100.0	0.0	1,471
2001	0.0	71.1	28.9	2,767
2002	0.0	100.0	0.0	3,319

Source: Compiled from WFP data.

Overview of Discharge Routes and Their Relative Importance

While all foodgrains brought in ships are discharged at one or both of the ports, draft restrictions at points of final discharge require the adoption of various combinations of unloading, which the Team refers to as “discharge routes.” A description of various discharge routes is provided in Figure 1. Some of the more frequently observed routes for discharging wheat at harbors in Bangladesh include (1) mother vessel discharges to lighter vessels in Chittagong or Kutubdia outer anchorage, and the lighter vessels discharge the foodgrain in silo; (2) mother vessel discharges to lighter vessel in Chittagong/Kutubdia outer anchorage, where these are bagged before discharging on the jetty at Chittagong; (3) mother vessel lighters a part of its cargo at Chittagong/Kutubdia outer anchorage and proceeds to Mongla, where the remaining part is discharged to barges in bulk or after bagging; (4) mother vessel lighters up to harbor permissible draft

Figure 1—Discharge routes of imported foodgrain



at Chittagong/Kutubdia outer anchorage and discharges the remaining directly to Chittagong silo in bulk; (5) mother vessel lighters up to Chittagong harbor permissible draft at Chittagong outer anchorage and lighter vessel(s) proceeds to Mongla for discharging her cargo.⁵

Data compiled in Table 4 suggest that about half of all wheat was lightered from mother vessels until FY99. This has increased in the recent past. Over the years, the importance of Chittagong port jetty had declined for unloading foodgrain. This was largely due to an increased volume of non-foodgrain cargo using the port facility, and increased silo efficiency. While the relative share of mother vessel discharges midstream at Mongla has been on the decline, this has been substituted by increases in the unloading of lighter vessels at this second port. Unloading at Mongla is done at midstream on the river *Pussur*. All foodgrains over at least the last two years have been unloaded to barges in bags.

Table 4—Percentage of different discharge routes in total wheat arrival, by ships

Description of unloading	1990	1997-1998	1998-1999	1999-2000
Lightered at outer anchorage	<i>53.4</i>	<i>48.41</i>	<i>53.29</i>	<i>66.18</i>
- Chittagong Silo	16.9	12.28	21.79	36.71
- Chittagong Port Jetty	24.2	21.93	8.32	1.12
- Mongla midstream	12.3	14.19	23.18	28.34
Retained by Mother Vessel	<i>46.6</i>	<i>51.59</i>	<i>46.71</i>	<i>33.82</i>
- Chittagong Silo	23.1	16.09	30.09	21.59
- Chittagong Port Jetty	2.1	15.78	6.22	2.27
- Mongla midstream	21.4	19.73	10.40	9.96

Source: The figures in the last three columns are compiled from vessel-specific data obtained from the MIS, DGF.

Note: The figures are in percentages. Those in italics are aggregates for the two broad heads mentioned in the table.

⁵ In the distant past, there were also instances of mother vessels berthing at Chittagong jetty for onboard bagging and discharge before proceeding to the silo.

Issues, Concepts, and Data Source

With a view to improving efficiency in the foodgrain discharge operations at ports, this component of the study has the following broad objectives⁶:

1. Estimate the current discharge rates and the extent of losses during foodgrain discharges at harbors;
2. Review the factors underlying the observed losses and discharge rates; and
3. Recommend ways to improve discharge rates and reduce losses.

In light of the above objectives, the study discusses various issues in this chapter and spells out the method and types of data used to analyze the issues. The rest of the chapter provides the broad framework within which the discussion in the subsequent sections is presented.

Concepts and Issues. There are three important terms or concepts that recur throughout this chapter. These are “discharge rate” (actual and potential), “loss,” and “arrangements” between various parties. Discharge rate is a flow, expressed per unit of time—normally 24 hours of discharge day. In the context of this study, it is the amount of cargo discharged or unloaded from the mother vessel per working day. It is, however, difficult to define the unit of time at an operational level. Where records on discharge hours (time) are available, one may easily calculate the discharge rate. While this is quite transparent in singular activity, such as lightering to Lighter Vessels (LV) at outer anchorage, it is not so in instances where mother vessels have to discharge at two or more locations. An example of the latter arises when a mother vessel discharges at outer anchorage, proceeds to Chittagong berthing jetty while onboard bagging is done, discharges at the jetty, and proceeds to Mongla for final discharges. In such situations, two other proxies for time are “lay time” and the “period of stay at ports by the mother

⁶ The TOR for Substudy 1 identify five objectives: (1) undertake a detailed review of shipping arrangements at both Chittagong and Mongla ports for all food aid donors and the relevant consequences; (2) determine the optimum discharge capacity of the two ports and the current performance; (3) review other factors influencing the discharge rates and causing commodity/financial losses, e.g., management-labor relations; (4) determine any losses and causes of such loss between mother and lighter vessels and in discharge at port warehouses; and (5) examine and recommend ways for (a) improving vessel discharge rate at the port systems to avoid vessel demurrage for (mother) vessels; and (b) how to develop a uniform arrangement for all food aid donors for minimizing/compensating losses at harbors.

vessel.”⁷ In the absence of detailed information on the actual discharge time, the Team has used the data on proxy variables to calculate discharge rates.

One important focus of the study is to estimate foodgrain losses and explain their presence. Total receipt by the Directorate General of Food (DGF) from a particular shipment is the sum of all receipts at the exit from the port; receipts recorded at the weighing bridge in Chittagong port, receipts by the silo, and receipts by the barges at Mongla midstream. The difference in this receipt from that mentioned in the bill of lading (B/L) is one estimate of physical loss. B/L quantities are not always infallible and it is a common practice to verify arrival quantity by draft surveys. However, draft surveys themselves are not free of errors,⁸ which provides grounds for opposing views with respect to the acceptability of B/L figures as reference quantities. For numerical estimates and analysis, available records on B/L quantities, manifest quantities based on draft surveys, and final discharge reports (FDR) of stevedores have been consulted. While the difference between B/L quantity and the FDR is considered physical “loss” (or surplus), other perspectives on qualified assessments of such figures are also discussed in this chapter.

The recorded loss during handling and discharge operations at harbors may arise for a number of reasons. The state of technology may impose high spillage. It is, however, the general contention that pilferage accounts for most of the physical loss. There is also a belief that poor technology in weighing at points of unloading facilitates such pilferage. A number of weighing methods are currently in place at different discharge points, marked as “W” in Figure 1. The weighing methods include (1) for bulk transfers, load and light draft surveys are undertaken and the difference in displacement is considered a proxy for the amount discharged from the mother vessel to the lighter vessel; (2) there is a gravitational weighing scale supported by a computerized reading to measure the grain received by the silo in bulk; (3) the railway department has its own weighing bridge for measuring bulk transfers through the railway system; (4) a separate weighing bridge is in place to record the amount taken out of the Chittagong port

⁷ An illustration of the problem of estimating discharge rate is provided in Box 1, which summarizes the lay time sheet of MV Zeno.

⁸ The well-known method of assessing the weight of a matter by the volume of fluid it displaces, upon taking into account the fluid density and other external factors, is applied in draft surveys. Instability of the vessel, especially in turbulent water, often induces an element of error in the measurement of submersion level and therefore in the calculation of displaced water.

Box 1. Lay time sheet on MV Zenoa

1. Charter Party (CP) date	London 19/07/2000*
2. Date of Arrival at Chittagong O/A	At 0625 hours on 01/09/2002
5. Quantity as per nonnegotiable cargo receipt certificate	26,000 MT wheat
6. Discharging/lightering commenced	1800 hours on 01/09/2002
7. Discharging/lightering completed	0315 hours on 03/09/2002
8. Quantity discharged/lightered	4457.124 MT
9. Time and date of berthing at Chittagong Silo Jetty	At 0850 hours on 03/09/2002
10. Discharging commenced at Chittagong Silo Jetty	At 1150 hours on 03/09/2002
11. Discharging completed at Chittagong Silo Jetty	At 2035 hours on 09/09/2002
12. Lay time commenced	At 0700 hours on 02/09/2002
13. Rate of discharge as per Charter Party	2,400 MT per weather working day Free Out
14. Lay time allowed	10 days 20 hours 00 minutes
15. Lay time used	05 days 06 hours 50 minutes
16. Lay time saved	05 days 13 hours 10 minutes
17. Rate of demurrage/dispatch as per CP	US\$5,000 / US\$2,500 per day
18. Amount of dispatch money earned	US\$13,871.53

Table: Lay time statement (consolidated from the original)

Date	Day	Stay period D-H-M	Lay time counted	Remark (reasons of no work and time lost hour – minute)
02.09.02	Monday	00-17-00	00-17-00	
03.09.02	Tuesday	00-24-00	00-18-25	Shifting = 02-50 Rain and bad weather = 02-45
04.09.02	Wednesday	00-24-00	00-20-20	Rain and bad weather = 03-40
05.09.02	Thursday	00-24-00	00-15-43	Half-time count as per CP after noon=03-42 Rain and bad weather = 02-50 Electricity fault = 01-45
06.09.02	Friday	00-24-00	00-07-07	Electricity fault = 01-00 Rain and bad weather = 07-15 Half-time count as per CP = 07-08 Juma prayer = 01-30
07.09.02	Saturday	00-24-00	00-15-00	Half-time count as per CP = 03-30 Rain and bad weather = 05-00
08.09.02	Sunday	00-24-00	00-16-30	Rain and bad weather = 07-30
09.09.02	Monday	00-20-35	00-15-45	Rain and bad weather = 04-50
Total		07-03-35	05-06-50	

Note: Lay time calculation included 02.09.02 as the first day even though discharging commenced from 01.09.02.

Alternative Estimates of Discharge Rates (MT/ day)

At outer anchorage, 33,217 MT based on stay period (after discharge commenced).

At the Chittagong silo, 3,319 MT based on stay period (until completion).

Aggregate discharge rate

based on total stay period = 3,066 MT

based on lay time used = 4,921 MT

in trucks; and (5) unloading into barges, normally in bags, which are then weighed only partially by the traditional gravitational weighing scales operated manually.⁹ Many believe that the system of discharge could be improved by introducing better methods of weighing and building the infrastructure they require. The study looks into some aspects of this as well.

In the course of the study, it was evident that losses are officially recorded even at discharge points where the best possible weighing technologies are in place. It is therefore no surprise that observed losses are largely perceived as rooted in the existing contractual arrangements between different parties involved in realizing discharges and receipts of foodgrains in harbors. There are multifarious dimensions in these “arrangements.” They may be formally stipulated in a legal document between two or more parties, or alternatively, may be informally negotiated and adhered to. Given the nature of the activities and the parties engaged, the arrangements may often reflect the relative strength of the parties, rather than the fair interplay of market forces. While arrangements at various tiers have been touched upon, the primary focus of the study is on shipping arrangements.

Two aspects of current arrangements on food shipments may be identified. First, foodgrain arrives in Bangladesh under different variations of two broad types of contracts: Free-In-Free-Out (FIFO) and Free-In-Liner-Out (FILO, commonly referred to as Liner Term - LT). Under FIFO, the carrier has no responsibility while loading or unloading. Thus, the receiver (the GOB) is responsible for discharging food from the mother vessel; and the Bangladesh Shipping Corporation (BSC) has traditionally been assigned the lightering operation. The contract between the respective donor agency and the receiver has a provision for donor contribution to cover the discharge expenses. Under the Liner Term, the shipping agent, on behalf of the carrier, bears all responsibility of lightering and discharging. In such instance, local private shipping agencies are contracted to accomplish the task of lightering and overseeing stevedoring.¹⁰

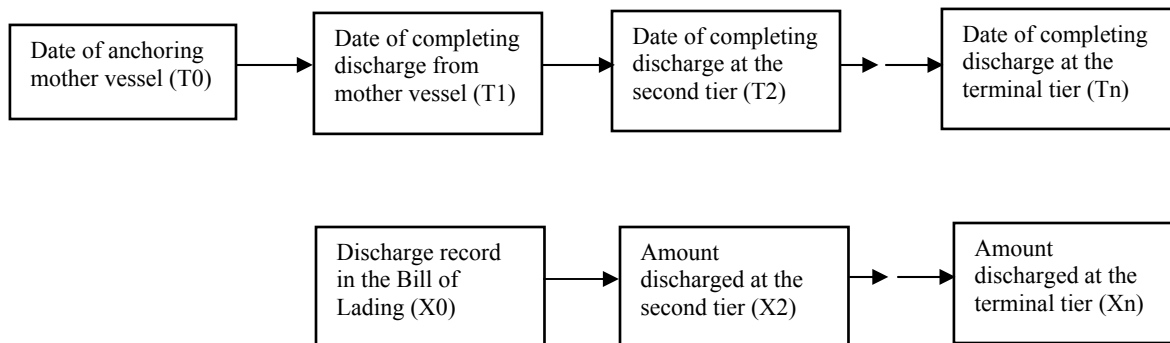
⁹ Weighing bridge for railway wagons is in Chittagong only. It was not in operation during the time this study was administered. In case of weighing bridges, difference between an empty and a loaded vessel (say, truck) is considered as a proxy measure of the amount.

¹⁰ The private shipping agencies include the Bengal Shipping, S. S. Shipping and Trading Limited, and the Lams Cleaford Co. (Pvt.) Limited. Normally, the BSC is not engaged in lightering operations under the LT. Occasionally, when they are engaged by the shipping agent, the latter uses its own lightering equipment, such as vacuum grain discharging pumps commonly known as Vacuators.

Over the recent past (since 2001), use of the Liner Term by CARE and other institutional importers has increased. However, WFP continues to employ the FIFO system. The study intends to throw light on the relative merits of the two arrangements in reducing system loss. In addition, the potential merit of replacing the practice of two port discharges with a single port discharge in the interest of efficiency will be examined.

Analytical Approach and Sources of Data. The outcome variables under study involve one or more of the following three: discharge rates, financial loss involved in the forms of demurrage, and physical loss of foodgrain. While these are distinctly separate operational categories (see Figure 2), they are affected by the same set of factors. These factors may be grouped broadly into two sets: technological factors and those factors involving the incentives of agents engaged in the operations. The technologies of transfer from one holding unit¹¹ to another, movements within the same holding unit, and the technology of storage set the minimum discharge time (for a given size of discharge), a technologically determined minimum physical loss of foodgrain, and subsequently, a minimum financial cost. The losses rooted in technology may arise due to the

Figure 2—Estimation of discharge time and pilferage



Note: Discharge time = $Dt = (Tn - T0)$; Discharge amount, first variant = $Da1 = X0$; Discharge amount, second variant = $Da2 = (X0 + Xn) / 2$; Discharge Rate = Da / Dt ; Total physical loss = $Lt = (Xn - X0)$.

¹¹ The carrier or spot, which holds the foodgrain at any particular time, is referred to here as a “holding unit.”

inappropriate/inefficient choice of technology, or due to the inefficient use of the technology.¹² The causal linkages are described in Figure 3.

The second set of factors arises, allegedly, due to distorted incentive structures and moral hazards. The crew of mother vessels may sell part of the foodgrain at the outer anchorage or during transit; crews of lighter vessels may also do the same, and pilferage is expected during bagging inside lighter vessels where a large number of laborers is involved.¹³ Similarly, at each and every step, individual agents, either singularly or in collusion, may contribute towards increasing the size of the loss. The act of pilferage (if any) may be facilitated by delays in discharge at each stage and these discharge rates are affected by the incentives of the agents involved. The two, in turn, affect system loss in financial terms: low discharge rates result in high demurrage costs; and higher loss (including pilferage) at the harbor. The liability for this is passed on to the carrier agency, therefore affecting freight prices on deliveries of similar cargo in the future.¹⁴

There is no scientific basis for suggesting any unique figure on a technologically required maximum discharge rate and/or minimum cost or loss. Recorded data, however, provided ranges, the upper (lower) limit of which may be considered the maximum (minimum) discharge capacity (loss). In some instances, opinions from experts and practitioners were also sought on this maxima/minima. It was hypothesized that the extent of loss as well as discharge rates depends on the nature of the contract between the supplier and the receiver of the foodgrain (i.e., across free-out and liner-out systems), discharge routes and ports used, discharge methods applied, and contracts among various other parties involved in the whole discharge process.

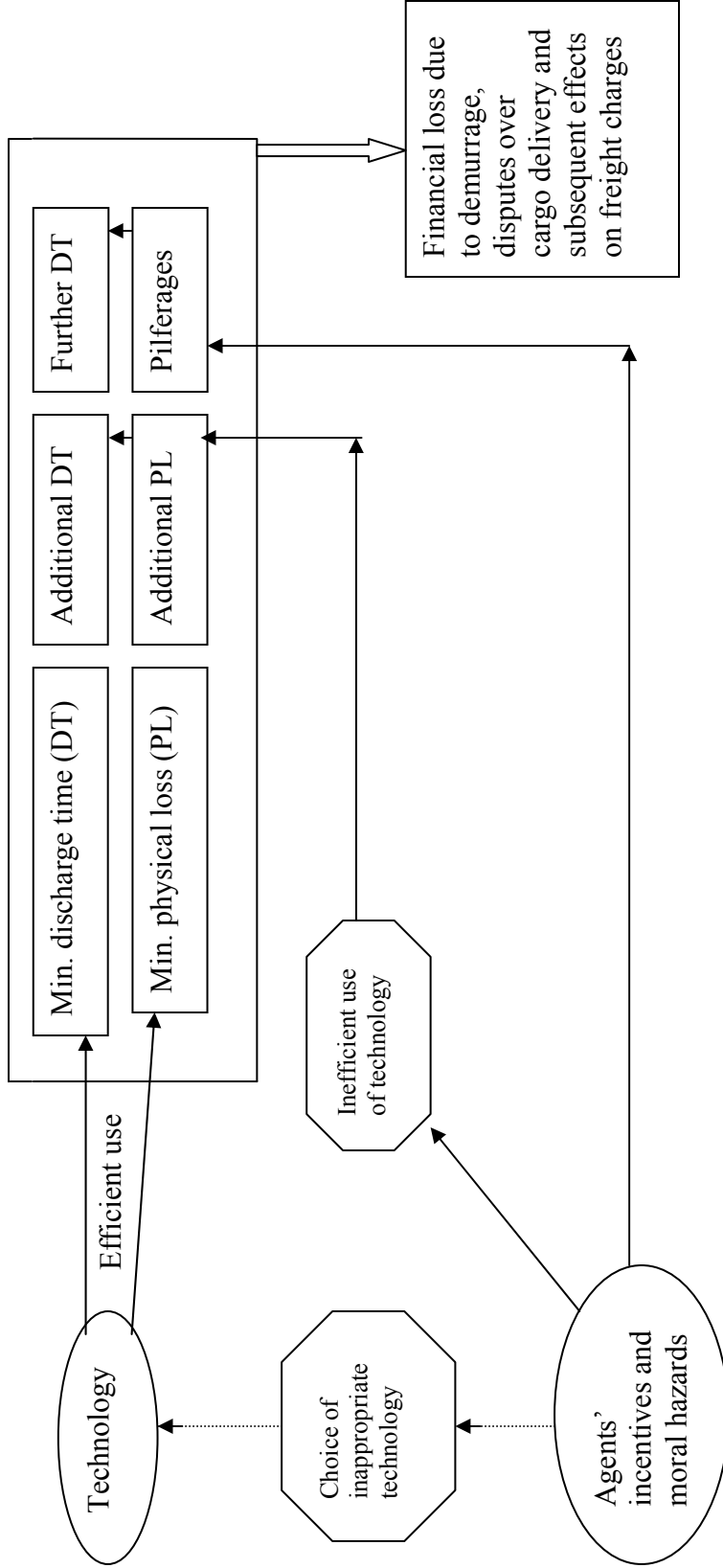
A number of methods were employed to collect and process information to address the above issues. Secondary data from vessel-specific records and modes of storage were obtained from the office of the DGF, offices of Controller of Movement and

¹² Note that inappropriate choice of technology and/or inefficient use of technology may reflect rent-sharing practices, and thus, links them with the second set of factors.

¹³ The Team was cautioned about alleged practices in barter trade by crews of mother vessels in certain transit ports and by crews of lighter vessels en route to Mongla from Chottagong/Kutubdia outer anchorage.

¹⁴ Figure 3 describes the conceptual linkages. It was beyond the scope of the study to assess the last aspect on freight charges.

Figure 3—Flow chart on cause and effects



Storage (CMS), WFP, European Commission, office of shipping agents,¹⁵ and the port authority. Interviews and focus group discussion with numerous agents in the two port cities and at the ports provided valuable insights, which were followed up by administering short, structured questionnaires to some of the agents. Reports and copies of contracts between different parties also provided the basis for the assessment made on discharges in harbors.

Discharge Rates and Operational Losses

It is important to distinguish between the actual discharge rate and that stipulated in a Charter Party (CP).¹⁶ The discharge rate in a CP is normally calculated by observing actual discharge rates. In instances where the food-donors provide for the shipping cost and negotiate the CP, the donors prefer to agree on a higher discharge rate, since it reduces the allowable lay time and thereby incurs a lower freight charge. In contrast, the receiver of the foodgrain (i.e., the GOB) prefers to stipulate a higher discharge rate, since the likelihood of paying demurrage is reduced, or equivalently, the likelihood of getting dispatch money upon completing the work before the allowable lay time increases. For obvious reasons, the present study considers discharge rates of mother vessels only.

Until the end of 1997, a standard WFP charter party required a discharge rate of 2,000 metric tons per day (mt/day). This was revised upward temporarily to 3,000 mt/day, and was imposed till reverting to 2,400 mt/day in response to objections from the DGF office. However, as noted in the previous section, it is very difficult to get transparent figures on discharge rates and greater difficulties arise in comparing two or more figures.¹⁷ In spite of the difficulty, several estimates on discharge rates are compiled in this chapter. Furthermore, findings from multivariate regression analysis are provided to explain the factors underlying current performances on discharge rates. The last part of the chapter deals with operational losses—physical as well as financial.

¹⁵ Ancient Steamship Ltd. had set up a new database, which had been extensively used in analyses, that is presented in the later part of this chapter.

¹⁶ “Charter party” refers to the contract between the service provider and the service receiver.

¹⁷ For example, a report prepared for the WFP by Capt. Bjoern Palmgren (Palmgren 2001) compares private lightening with BSC lightening, without making appropriate adjustments for wide variations in the volume of cargo lightened between the two sets.

Estimates on Discharge Rates and Discharge Capacity

Current discharge rates for a limited number of vessels have been estimated from lay time information obtained from the files at the DGF office. Since such information appears to be systematically present (absent) in cases of dispatch claims (in cases of demurrage), these estimates are likely to be biased upward.¹⁸ They do, however, present examples of achievable discharge rates. These estimates, presented in Table 5, along with potential discharge rates perceived by those actively engaged in the operations (Table 6), suggest of poor discharge performance.

Table 5—Estimates on discharge rates from a biased sample^a

Lightering by Mother Vessel at	WFP	Non-WFP
	(metric tons/day)	
Outer anchorage only	3,961	4,236
Outer anchorage and silo	4,920	8,644
Outer anchorage and Chittagong jetty		4,194
Outer anchorage and Mongla ^b	4,884	3,636
Outer anchorage, silo and jetty	5,655	
Outer anchorage, silo and Mongla		2,269
Outer anchorage, jetty and Mongla	3,143	
Outer anchorage, silo, jetty, and Mongla	2,914	
Silo only		6,365
Silo and Mongla		4,497
Jetty and Mongla	2,909	

^a The sample is biased, generating high figures on discharge rates, since information on lay time was available only when there was dispatch money to be earned. Such high figures were achievable partly due to availing holidays.

^b Lighter/Mongla for WFP is on a single vessel, which carried USAID wheat as well.

Table 6—Perceived potential discharge rates

Place of discharge	Maximum	Dry/winter average	Wet/monsoon average
Lightering at outer anchorage	5,000	4,500	4,000
Unloading bulk at Chittagong silo	4,500	4,000	3,500
Unloading bags at Chittagong berthing jetty	2,500	1,500	1,300
Unloading bags to barges at Mongla midstream	3,000	2,100	1,500

Source: Survey of stevedores, carrying contractors, shipping agents, and other officials.

¹⁸ The same applies to the data provided by the donors, who happen to highlight on the dispatch money and remain silent on lay time information for vessels, which had possibly incurred demurrage. One such example includes information on *Akadan Bulk*, *Kea*, and *Prospathia*, which were not adequately provided.

Discharge rates are expected to be the lowest at Chittagong berthing jetty, since the unloading of bags normally would be done at one side, which restricts the number of cranes put into operation. Of the four different operations, the maximum discharge rate attainable is in lightering of the mother vessel. In the real world, instances of full discharge at outer anchorage are rather limited. Current records on them have systematic bias, and therefore, may not provide the true ordering of various discharge mixes (as shown in Table 5) in terms of attainable discharge rates. One may, however, note that overall discharge rates are adversely affected due to mother vessels touching base at Mongla.¹⁹

All discharge rates assume total discharge to be equivalent to the quantity mentioned in the B/L. A separate set of estimates, reflecting the lower end of current discharge rates, is provided in Table 7. Lay time information obtained from files in the DGF office provided the basis for an aggregate calculation, while the total stay period of a vessel provided another. Stay at individual ports by the mother vessel and discharges made at respective ports, as reported by the Shipping Agent, provided the basis for calculating the port-specific discharge rates. These are estimates for a sample of 21 WFP vessels, and are likely to reflect the lower end of the possible range of discharge rates.²⁰

Table 7—Estimated discharge rates

Type of discharge rate	Minimum	Maximum	Average
	(metric tons per 24 hours)		
Discharge rate based on actual lay time	1,090.6	4,517.8	2,370.1
Discharge rates based on stay period of MV			
- At Chittagong	422.7	2,277.9	1,290.7
- At Mongla	217.0	1,590.8	771.7
- Aggregate, adjusted for holidays	367.2	1,900.0	1,007.1

Note: The estimates are based on a matched sample of 21 observations.

There are numerous factors that may be identified as the cause of the lower discharge rates. Quite often, the technological constraints are identified as the root problem. Thus, one would cite manual handling of bagging and stitching, unloading of

¹⁹ The lower discharge rate in Mongla is not necessarily attributable to the mode of unloading in that port. During the time of this study, *Betnavis* had unloaded 12,759 metric tons of bagged wheat in only six days, with an average discharge rate of 2,126.5 mt/day.

²⁰ The sample does not suffer from any systematic bias. The method of calculation, which considers the vessel's stay period (date of sailing minus the date of arrival), defines the minimum discharge rate. See the illustration in Box 1.

bags in slings, and the traditional method of weighing at Mongla to be hindering faster discharges. Similarly, the number of hatches in a vessel, load distribution, total size of cargo, etc., also influence the possible pace of discharge. All these, however, set limits that are still much higher than those achieved currently.

Some of the institutional issues, including those on incentives, have been addressed in the last section of this chapter. Findings from a limited exercise are provided to identify some of the measurable variables. Lay time-based discharge rates, reported in Table 7, have been regressed on several factors and the findings are reported in Table 8. The findings conform to the view that higher discharge rates are achievable when the size of the cargo is large,²¹ a larger proportion of the cargo is lightered, and a larger percentage of total cargo is discharged in Chittagong. The last variable may be interpreted to suggest that a higher percentage of the cargo discharged in Mongla will reduce the overall discharge rate and this is not surprising. However, controlling for this, the regression analysis suggests a negative relationship between observed discharge rates and the extent of pilferage. The negative relationship between pilferage and discharge rates is statistically significant when only Chittagong is considered. That is, a higher (recorded) shortfall is associated with a lower discharge rate. The finding is indicative of the role of incentives in determining the discharge rates achieved in reality, and this will be scrutinized further in the next section.

Table 8—Explaining discharge rates: Estimates from regression analysis

Explanatory variable	Discharge rate, Chittagong		Discharge rate, Aggregate	
	Coefficient	t-statistics	Coefficient	t-statistics
Constant	1,165.2316	2.38	-2,195.333	-2.45
Bill of lading quantity (metric tons)	0.05112	3.43	0.05537	4.31
Percent Chittagong discharge lightered	17.33485	2.25	18.73259	2.93
Percent discharged by MV in Chittagong			36.00948	4.10
Number of hatches in MV	1.01548	0.02	-72.57134	-1.31
Shortfall as percent of BL quantity	-750.4778	-3.56	-356.5199	-1.66
Adjusted R square		0.45		0.60
Number of observations		61		61

Operational Losses and Financial Implications

Operational losses during foodgrain discharges in harbors have both physical and financial dimensions. The former is taken up in the following section, while some

²¹ A larger load with many hatches provides more options to discharge and therefore a higher discharge rate can be realized.

aspects of the latter are discussed here. The operational categories, such as discharge rate, allowable lay time, demurrage, and dispatch, are all interlinked, and these constitute important aspects of a contract between the donors and the receiving government. As noted earlier, a higher discharge rate agreed upon by both parties enables the donor to stipulate a lower lay time in the charter party for a given quantity, and thereby, a lower freight cost paid to the carrier. This also increases the likelihood of demurrage, which is borne by the receiver under the Free-Out (FO) agreement.

In contrast, a lower stipulated discharge rate increases the chance of earning dispatch. This, however, distorts the relative allocation of resources from the donor perspective. The issue may also have a bearing on roles played by different agencies at the receiving end. While these aspects were discussed in the last section, this section presents some preliminary information on the financial aspects of the contracts covering transactions in the harbors.

Out of 172 vessels arriving at Bangladeshi ports from October 1996 to October 2002 (on which information could be collected), about half (72) are reported to have earned dispatch money. On average, each of these vessels had brought in 32 thousand metric tons of wheat. Those earning dispatch had an average earning of \$7,012, equivalent to an approximate saving of 4.8 days of lay time per vessel. For all 172 vessels taken together, the corresponding figures are \$8,812 and 2.52 days of lay time.

Earning dispatch has not been the norm, though precise information on this was not available. Since lay time used will rarely coincide exactly with the lay time allowed, vessels on which dispatch was not earned are more likely to have incurred demurrage; and this group is half the number of all vessels. It is worth noting that, though the discharge rates had been raised from 2,000 mt/day to 2,400 mt/day, the half-and-half ratio was maintained over the two equal periods of the sample of observations.²² Recently, WFP is reported to have realized its claim of about Tk 120 million due to demurrage incurred during late 1998 and early 1999. Officials of the DGF claim that such demurrage arose due to severe congestion in the ports during the period after the severe 1998 flood. Quite interestingly, information in Table 9 on arrival of EC Food aid suggests dispatch earning. While congestion is a factor, incentives or lack of it may have been the overriding component explaining demurrage. This was also shown to be true in

²² Out of 96 vessels arriving since October 1998 till October 2002, 47 had earned dispatch money.

the previous discussion, which argued that discharge rates are affected by distorted incentives, which subsequently raise the chance of demurrage.

Table 9—Selected information on shipment of EC food aid

Name of Mother Vessel	B/L quantity (mt)	Lay time allowed (day)	Implied discharge rate (per day)	Lay time used (day)	Actual discharge rate (per day)	Reported shortfall (percent)	Period of stay at ports
Arti	30,000	12.50	2,400	8.70	3,448	0.66	May-June '99
Fivi	30,000	12.50	2,400	11.00	2,726	0.63	May-June '99
Ovruch	30,000	12.50	2,400	10.00	2,999	3.84	June-July '99
Wavelet	25,000	10.42	2,400	9.36	2,671	2.86	November-December '99
Seri Ibondi	24,526	10.22	2,400	9.14	2,685	2.79	December '99-January '00
Boron Explorer	30,000	8.35	3,593	2.92	10,261	1.34	December '01
Maria-M	25,000	7.60	3,289	4.25	5,882	1.84	April-May '01
Agia Kyriaki	25,000	7.52	3,323	4.49	5,573	1.95	March '01

Source: Compiled from information obtained from the Food Security Office, EC, Dhaka.

Summary—A Numerical Example

Everyone agrees that on technical grounds there is no barrier to raising the current discharge rates, which are at dismal levels. Such low discharge rates sustain higher freight to the carriers, on which information could not be sought. In contrast, any attempt to raise the stipulated discharge rate, with subsequent lowering of allowable lay time, may help in reducing the freight to be paid to carriers, but raises the risk of demurrage. These aspects are illustrated with a numerical example, presented in Table 10. Under scenario 1, there is 50 percent chance of saving on lay time (by 2.5 days in the example)

Table 10—A hypothetical comparison of financial implications of alternative discharge rates

Items	Scenario 1	Scenario 2
B/L quantity (metric tons)	30,000	30,000
Stipulated discharge rate (metric tons per day)	2,400	3,000
Allowable lay time, days	12.5	10
Lay time saved if higher discharge attained	2.5	
Lay time exceeded if lower discharge realized		2.5
Applicable dispatch / demurrage rates (\$/day)	4,000 / 8,000	4,000 / 8,000
Total dispatch (demurrage) money, US\$	10,000	(20,000)
Gains (losses) to the GOB	10,000	(20,000)
Gains (losses) to Carrier	10,000	0
Minimum WFP savings under Scenario 1, US\$		20,000

and earning dispatch money of \$10,000. The carrier, paid \$8,000 per day, can cash in on only half of it, but may have incentive to do so (and facilitate faster discharge) if an additional \$8,000 can be earned in a tight market. In the event, the allowable lay time is reduced to 10 days and the actual discharge requires 12.5 days, and the cost to the receiver (the GOB) is very significant.

The illustration alludes to a number of pertinent issues in the context of setting a discharge rate to which all parties agree. First, given the technology and an incentive structure, there is an average discharge rate around which the actual discharge rate varies. Since current rates of demurrage payment are double the rate of dispatch to be earned, stipulating an average discharge rate will be an unfair offer to the receiver of foodgrain (the GOB). Thus, a fair distribution of risk may only be ensured if the stipulated rate is less than the average discharge rate. The second observation follows from the first. Any attempt to increase the stipulated discharge rate will result in savings for the donor (WFP) at the cost of the receiving country as well as reduced revenue for carriers.

Review of Shipping Arrangements at Ports

Transportation and handling of foodgrain through harbors involve numerous agents/parties, who together evolve into an intricate network of conflicts and cooperation. Parties maneuver to make themselves indispensable, often forcibly. The bilateral and multilateral arrangements that these parties negotiate among themselves, either formally or informally, are integral aspects of the system, which sustains (as well as jeopardizes) the operation of food discharges at harbors. This section looks into some of these arrangements, with emphasis on the shipping arrangements. A brief overview on various operations/activities precedes the discussion.

Agents and Activities Associated with Discharge of Foodgrain at Ports

Once allocations are made and required agreements are reached, a vessel is arranged by the supplier (say, WFP, Rome), who then nominates the vessel to DGF and specifies the quantity of grain the vessel will carry and the load port. Depending on the insurance terms and terms of carriage, loading advice is sent to the concerned parties. Upon completion of loading and after the issue of documents, WFP hands this paperwork over to the Ministry of Food (MOF). The following documents are normally required:

1. Bill of lading,
2. Certificate of quality,
3. Certificate of quantity,
4. Load port survey report,
5. Certificate of country of origin, and
6. Sanitary certificate.

Upon receiving these documents, not always in the same order and not always with adequate lead time, the DGF then

1. Obtains a necessary waiver on import duty (Ministry of Disaster Management and Relief and Ministry of children and Women's Affairs) and files for custom's clearance,
2. Assigns/contacts lighterage contractors,
3. Appoints stevedores (from those enlisted),
4. Appoints carrying contractor (enlisted),
5. Allocates port, silo, Central Storage Depot (CSD), and Local Supply Depot (LSD), and
6. Appoints surveyor (where applicable).

The shipping agent (say, Ancient Steamship Ltd.), the other very important actor in the system, performs several tasks, both before and after the arrival of the vessel. Prior to arrival, the agent performs the following tasks:

1. Submits inward declaration to port authority;
2. Submits import general manifest (IGM) to customs;
3. Obtains lighterage permission from customs and port authority;
4. Completes other formalities with customs and port authority;
5. Serves advance notice of arrival to concerned parties;
6. Coordinates with the foreign partner, DGF (CMS), stevedores, lighterage contractors, superintendents, customs, and port authority;
7. Appoints draft surveyor for quantity survey.

The post-arrival tasks include:

1. Serving a notice of readiness (NOR);
2. Submitting a inward entry to customs;
3. Clearing a vessel inward;
4. Organizing a draft survey;
5. Receiving a vessel at anchorage;
6. Arranging sanitary and port health clearance;
7. Obtaining immigration clearance for crews;
8. Obtaining permission from customs boarding (Preventive) officer to commence lighterage operation;
9. Booking pilot upon completion of lighterage and arranging for berthing at Chittagong Silo/Jetty or at Mongla midstream as per the instruction of DGF (CMS);
10. Obtaining port clearance from customs (outward clearance) upon completion of discharge, and arranging for sailing.

The lighterage contractor does the following:

1. Obtains necessary permission from customs, port authority, and the Department of Shipping;
2. Prepares lighter vessels and keeps them on standby for lighterage operation upon arrival of the mother vessel;
3. Arranges Vacuators for lighterage;
4. Appoints draft surveyor for quantity survey;
5. Berth and discharge lighter vessel as per the instruction of the DGF.

The stevedore, appointed by the DGF (CMS), obtains the program and coordinates with the CMS, shipping agent, and with the lighterage contractor before arrival. Upon arrival of the vessel, a stevedore normally performs the following tasks:

1. Sends stevedoring gang onboard mother vessel;
2. Sends stevedoring gang onboard lighter vessel;
3. Discharges at anchorage;
4. Prepares boat note;
5. Prepares daily discharge report;

6. Circulates daily discharge report to CMS, Customs, Port Authority, lighter contractor, shipping agent and superintendent.

After completion of lighterage operation and upon berthing at Chittagong Grain Silo/Jetty or at Port Jetty, a stevedore has to repeat the same operations as above, and upon completion of discharge, prepare and circulate an FDR.

The donor (say, WFP) appoints Superintendents to look after their interests. In the case of WFP food arrivals, James Finlay acts as the cargo superintendent, who is expected to perform the following tasks:

1. Nominates draft surveyor, who boards the mother vessel at anchorage to conduct draft survey to determine cargo quantity;
2. Coordinates subsequent draft surveys when necessary and also a final light draft survey to determine the “constant” used in calculating the cargo quantity;
3. Inspects cargo condition before breaking bulk (BBB), collects sample and reattains;
4. Witnesses the entire discharging from commencement to completion and submits report to WFP;
5. Prepares time sheet (statement of fact).

There are enlisted carrying contractors, who are reportedly assigned with a given vessel (to carry a part of the cargo) following a serial. Even though they are engaged by the CMS, in all modes of transport (i.e., barge, trucks, and railway), it is the stevedores who coordinate with them in discharging the cargo. There are also independent measuring agencies with licenses issued by the Chambers of Commerce in the two port cities, which are assigned the task of overseeing measurements during final discharge of the cargo. While the Licensed Measuring Departments (LMD) and the workers undertaking the weighing are engaged by the DGF, the stevedores coordinate their deployment. The instruments for weighing are also provided by the Food Department.

The last group of actors is the laborers, spearheaded by the Dock Labor Management Board (DLMB), often identified as an influential component in the case of discharge of foodgrain in bags. Since operations with bagging, stitching, slinging, unloading, and loading are done by laborers, their role is important in determining the rate of discharge and the extent of pilferage. The level of efficiency in port operations is

further impaired due to the presence of a strong union (under the control of DLMB).²³ Thus, terms of hire are often imposed on other parties; and the historically evolved symbiotic relations between various parties are alleged to be a major hindrance to smooth functioning of the ports.

Crowding of representatives from different agencies is well captured in the written comments of the Chairman of Mongla Port Authority on an earlier draft of this report. It notes that about 8 to 10 DGF staff, along with several security guards (*Ansars*), take charge of unloading foodgrain. The stevedores, appointed by either the DGF or the shipping agent, requisition dock-laborers numbering 20 to 25 to work in each hatch and an additional handling gang of 10 to work in the barges. In addition, the stevedore has about 8 general staff, 9 tally clerks/foremen, 1 ladder man, and 1 boatman. There are about 10 LMD persons per hook/hatch, and another 20 doing odd jobs (Cleaning Markers and *Chatpat Pharader*). The Chairman further notes that there are surveyors representing the cargo superintendent and occasional representatives from other agencies involved. The Team physically inspected the scene of unloading in both the ports. A slide presentation with photographs capturing various activities that clearly supported the above description was submitted to WFP and other stakeholders.

Shipping Contracts: A Brief Overview

It is often claimed that changing the nature of charter party contracts may pave the way for more efficient discharges of foodgrain at Bangladesh ports. Some of the salient features of the current shipping arrangements adhered to by different donors are summarized in Table 11. With the primary focus on WFP, one may note several aspects in the current arrangement, which require closer scrutiny. First, the discussion on discharge rates, dispatch and demurrage in Section 2 may be related to the following terms: (1) 2,400 mt per weather working day (wwd); (2) lay time calculation includes half of Fridays and holidays used; and (3) a demurrage rate of \$5,000 per hatch per day. Relatively these conditions are more onerous for the receiving party, which tends to increase the risk that they face. The terms offered to the carrier by WFP appear to be more favorable than those observed in other cases. It is quite possible that the receiving

²³ The DLMB was formed to protect the rights of port laborers. Even though the Chairman of the respective port authority is officially the Chairman of the Board, the effective control is alleged to lie with the Vice Chairman, who is an appointee of the Ministry.

party is forced to concede to demands from other parties in order to fulfill the restrictions imposed. The study could not, however, look into such linkages.

Table 11—Review of shipping contracts

Item	WFP	Canada	AusAid	European Commission	CARE/USAID PI-480 Title-II
Discharging term	Free out Charter Party, worldfood	Free-In MOF/BSC Charter Party	Free-In MOF/BSC Charter Party	Free out/Liner term/ Free-In	Free out/Liner term
Discharge rate (mt/wwd)	2,400	BSC/MOF Charter Party	BSC/MOF Charter Party	4,500 at Silo Jetty (> = 4 hold/hatch) else, 2,400	
Discharge ports	1 or 2	2	2	1 or 2	2
Lay time	<i>Fhe</i> , ½ if used	MOF/BSC	MOF/BSC	<i>Fheiu</i>	
Demurrage rate	Demurrage US\$5,000 /hatch/day	BSC/MOF Charter Party	BSC/MOF Charter Party	Maximum of Euro 8,000/vessel/day	Demurrage Paid by MOF
Dispatch rate	One-half the demurrage			One-half the demurrage	
Lighterage arrangement	MOF	MOF/BSC	MOF/BSC	MOF	MOF/BSC under Free out
Charter hire	WFP	MOF/BSC Charter Party	MOF/BSC Charter Party	EC	USAID
Superintendence	WFP	MOF	MOF	Has the option to appoint one	
Inland transport cost	One-half the ITSH cost reimbursed by WFP	\$20/mt by donor and rest MOF	MOF	\$ 10/mt by EC and rest MOF	MOF
Quality requirements		CIDA	Australian Wheat Board	EC	PL-480
Reference quantity	Arrival draft survey	B/L quantity	B/L quantity	As per taking over certificate	Arrival Draft Survey
Liability of shortage/ damage	Pre-arrival WFP Post-arrival MOF	BSC/MOF Charter Party	BSC/MOF Charter Party	Supplier takes insurance cover, MOF ensuring compliance	Marine shortage Damage underwritten by CARE

Source: Various contract documents.

Notes: *fhe* = Friday and holidays excepted (if not used); half is considered if used.

fheiu = Friday and holidays excepted, even if used.

wwd = weather working day.

FI = Under the Free-In system, it is the responsibility of the MOF to arrange and place vessel at load port; grain will be provided free on board. Discharging and transportation at discharge port is also the responsibility of the MOF. The BSC is assigned to implement it.

The EC contract reveals two important elements—spelling out discharge rates specific to points of unloading; and having the receiver (the GOB) appoint an independent agent (SGS or Bureau Veritas) to assess the “take over quantity.” The first provides a wider choice in arriving at a cost-effective rate, while the latter is more relevant in the context of addressing pilferage during discharge at ports. Finally, the reference quantity, an issue of significance from donors’ perspectives, is identified as the “arrival draft survey” quantity under WFP and CARE/USAID agreements. Since the survey quantities are generally higher than those in the B/L (see Section below on Estimates on Shortfalls), the clause has important financial implications, especially for the food aid under the CARE program.

Highlights on Some Formal Contracts

A large number of groups were identified above, who are involved in the operation of foodgrain discharges at harbors. There are many others, and many subgroups within each of the earlier-mentioned groups, complicating an already intricate network of agents. It is understood that there are equal numbers of unions/associations—reportedly more than 20 in each of the port areas. Within labor groups, where dock and shore labor have been amalgamated into one category of “dock” labor, there are at least 13 different categories, recognized legally in formal wage contracts. The list of contracts, even the formal ones, is predictably quite large.

The DGF has formal contracts with donors, lighterage party, stevedores, carrying contractors, labor and transport contractors at CSD/LSDs (final discharge points), and even with the paramilitary forces it employs for security purpose. On a regular basis, it also has to deal with the port authority, shipping agent, customs, surveyors, and many other groups. In terms of their relative importance, the shipping agent, stevedores, carrying contractors and labor groups come next. Since price and wages dominate the terms of these contracts, several important aspects of contracts are summarized below.

There are prescribed schedules for stevedoring, and prices are quoted for each of the narrowly defined activities, for weather working days as well as for Fridays and holidays. They are also quoted for three broad categories of potential weighing—100 percent, 10 percent, and none. There is apparently no difference in the rates for stevedoring at outer anchorage between government and private (under LT) contracts.

However, LT normally offers a higher (by about 30 to 40 percent) stevedoring rate for bagging and unloading.

Contracts with stevedores for discharges at Mongla differ from those negotiated in Chittagong. A recent contract, negotiated in January 2002 and valid till June 2003, stipulates a minimum discharge of cargo after bagging, stitching, stenciling direct into the lighters/coaster/barge/cargo at the port of Mongla at the rate of at least “2,000 M/tons per day of 24 hours, Friday and holidays inclusive” from each ship or “300 metric tons per hook prorata basis per day and night in time of good weather.” There is, however, no clear mention of who will be responsible for demurrage and how the payment for it will be made, other than a clause suggesting the first party’s right to deduct 50 percent of the stevedoring bill amount.

The lightering contract between the DGF and the BSC has not been revised for many years. A copy of the old contract suggests that the cost of possible demurrage is passed on to the lighterage contractor (BSC). Different parties engage surveyors who undertake draft surveys—often several for a single arrival, depending on the frequency of discharges made. In many instances, these contracts quote prices per metric ton of surveyed quantity.²⁴ Such pricing practice is likely to influence the outcome, which will be discussed in the following section.

For discharges at ports, carrying contractors are relevant only in the context of Mongla. As per contracts during 1999-01, each cargo vessel (barge) was expected to load at least 250 mt per wwd. This has reportedly been increased to 300 mt during recent years, which is the same as the minimum stevedoring requirement per hook. The contract also allows a maximum loss of 0.4 percent from the manifest quantity in cases of less than 100 percent weighing. In such cases, there is also a provision for “block balancing,” which enables a carrying contractor to settle accounts once at the end of each of the three four-month periods (January-April, May-August, and September-December).

Tripartite contracts between the labor union, stevedores, and labor contractors are negotiated on a regular basis (every two years), and generally favor the labor union. Interestingly, the general trend in Mongla port has been towards ensuring greater employment per vessel and enhanced rates for wage payments.

²⁴ See, for example, a contract between CARE and M/S Bureau Veritas Bangladesh Ltd., negotiated in 2001 and stipulating a payment of Tk 1.99 per metric ton of wheat grain surveyed.

Shipping agents under LT are allowed a maximum of 1 percent loss in handling. This provides them a great deal of leverage in realizing faster discharge rates.

WFP has formal contracts with a cargo superintendent. Other than getting duplicate information, which is easily available from the shipping agent as well, no additional service is allegedly provided. Nor is there a clear mechanism to hold the party accountable in the case of failure to provide independent information or in the event of foodgrain loss reported by the stevedores in the FDR.

Insights into Informal Contracts

A survey of a sample of stevedores, carrying contractors, shipping agents, and relevant officials revealed a number of interesting insights into the various informal arrangements/contracts prevalent among various parties engaged in foodgrain discharge at ports. These are highlighted below.

1. Most respondents suggest well-defined arrangements between three to four parties. In the case of Chittagong, these are stevedores, carrying contractors, and officials of the DGF. Respondents on Mongla had also included the surveyor, shipping agent, and laborers under the DLMB in this core group.²⁵
2. Other than a single case, none of the respondents in the sample had identified the shipping agent as having informal contracts with any of the other parties. There are, however, two different views of the shipping agent's involvement. Independent sources have revealed that an employee of one of the shipping agents, responsible for discharging foodgrain arriving under LT, had informal agreements with some officials at the Chittagong Silo. That person was later dismissed from his position. Estimates on year-specific shortfalls under LT (presented below) support the story. A second view, reflecting the current practices, suggests additional payments must be made by the shipping agent to different parties engaged in the network in order to facilitate and quicken the discharge process. In the case of Mongla, this happens under LT, especially when there is a shortage of barges.

²⁵ The Team contends that the general laborers are on the receiving end.

3. None of the respondents reported surveyors or ship crew receiving extra payments of any sort. Most had, however, identified the stevedores and the carrying contractors to be at the center, sustaining the informal network supported by financial payments. In Mongla, standard practices in such informal pricing are alleged to have emerged. There are reports of variations in Chittagong, where the bulk of the cargo is discharged at the Silo.

Estimates on Shortfalls and Their Explanations

Physical loss of foodgrain for the discharge operations is essentially an accounting concept, which represents the difference between the recorded stocks loaded in the ships and that received by the DGF as officially acknowledged in the FDR. In order to arrive at a common set of estimates, it is therefore necessary to probe into the various data sources containing such records, as well as the different accounting practices one may use in estimating losses. This is done in the first section. As noted in the discussion on analytical approach earlier, the subsequent section presents estimates on physical losses for different routes, programs, and discharge modes. The remainder of this section discusses possible factors underlying the loss—in terms of the statistical analysis based on secondary data, as well as the incentives and institutional issues drawing upon findings from field visits and surveys.

In Search of a Consistent Set of Numbers

During the course of this study, repeated attempts were made to compile a consistent set of vessel-specific data from alternative sources. This was realized with limited success. The WFP-Dhaka provided an initial set of limited computerized data, which did not include information on demurrage and dispatch. Nor did it distinguish between discharges at Silo and Chittagong berthing jetty. It did, however, provide an initial set of references capturing arrivals of only WFP foodgrain since 1988. Offices of individual donors maintained information on vessels, which carried their food aid—and these were mostly maintained in files, not readily available for sharing.

The office of the Director of Movement, Storage, and Silo (DMSS) maintains the vessel-specific files, dating back to late 1996. Although tedious to compile, these

provided a rare and informative glimpse into the raw data. The office of the WFP superintendent could only provide some incomplete information in an obscure format and failed to provide the Team with the information requested. The office of the shipping agent, dealing with WFP wheat arrival by sea, made an extra effort to develop a database, following suggestions made by the members of the Team.²⁶ While it needs to be developed further to incorporate additional information already lying on various print-forms, this later data set, along with those collected from the DGF's office, provided the basis for much of the quantitative analysis undertaken in this section. The MIS department in the DGF's office was also encouraged to compile vessel-specific data from FY96, and this was made available to the Team toward the end of the study period. This set enabled further cleaning of the data and the analysis. Some of the other information included draft surveys of lighter vessels under BSC, limited information provided by the Mongla port authority,²⁷ and the responses to the questionnaire survey administered under the study.

The concept of a reference quantity was alluded to in a previous discussion about the calculation of loss. The quantity mentioned in the B/L is one important reference figure, whose record is consistently maintained by all agents, and consequently, there is no reason to expect discrepancies on it across different sources. Upon arrival of a vessel at outer anchorage (or Kutubdia), there is an arrival draft survey, whose figures are finalized only after the final (light) draft survey. WFP and CARE require that this survey figure be the reference quantity. The justification for this is examined in this section.

Since mother vessels, in most cases, lighter part of the cargo at outer anchorage before proceeding to unload at port/silo jetty or at Mongla midstream, there is always scope for confusion in assessing the amount carried to end points and therefore in establishing actual final discharges. Such confusion arises from possible errors in the lightered amount arrived at from reports of MV or LV displacement draft surveys, as well as due to the lack of coordinated record-keeping by the relevant parties. The discussion below also highlights some aspects of these accounting problems.

²⁶ The Team benefited immensely from the assistance provided by the staff of the Ancient Steamship Ltd. office in Chittagong.

²⁷ The Mongla Dock Labor Management Board (DLMB) maintains vessel-specific information. Since the information was separately obtained from the common database developed, no attempt was made to analyze the data received from DLMB, Mongla.

Information on 80 vessels carrying WFP wheat was available from the Ancient Steamship, of which 77 records had information on arrival draft survey. In only a single incident (out of these 77), the draft survey quantity was identical to the B/L quantity. In all other cases, the arrival draft survey quantity had been higher—on an average, by 2.62 percent (Table 12). In contrast, the amount assessed on the basis of LV displacement is only 0.10 percent higher than the B/L quantity, and this is almost identical to the aggregate based on light draft surveys. The FDR as per the Stevedore’s report is, in most instances, lower than the B/L quantity. Given all the discrepancies, measures on shortfalls would vary with the choice of the reference quantity (denominator).

Table 12—Estimated shortfalls, based on aggregates of mother vessels

Description of items	Chittagong	Mongla	Aggregate
BL quantity (metric tons)			25,693
Arrival Draft Survey (ADS) (metric tons)			26,385
Excess of ADS over B/L quantity (percent)			2.62
Draft surveys 1, at lightering point (metric tons)	19,532	6,187	25,719
Draft survey 1 as percent of B/L quantity (percent)			0.10
Draft surveys 2, light for Mongla (metric tons)	19,532	6,184	25,716
Stevedore’s report on receipt (metric tons)	19,436	5,984	25,420
Shortfall as percent of draft survey 2	0.49	3.23	1.15
Shortfall as percent of bill of lading quantity			1.06

Source: Database of Ancient Steamship.

Note: Averages of 75 out of 80 mother vessels, on which information was provided.

There is also a discrepancy in reporting by various agencies on the amount lightered at outer anchorage and the amount delivered by the lighter vessels at end points. The last three columns in Table 13 capture the differences. At the aggregate level, shown in the last row, the BSC report on receipts at the outer anchorage is lower than that reported in the files of DGF by 0.6 percent. BSC claims to deliver amounts higher than that received since the light draft quantity (column 6 in Table 13) is higher than the LV displacement survey. Since the FDR is lower than all the figures, shortfalls due to BSC are exaggerated by the DGF. Such assertions do not imply that the BSC figures are correct.

Discrepancies may also arise in reporting of the FDR. For example, shortfalls calculated by deducting the FDR figure from the same B/L quantity are found to differ across sources (Table 14). The Team was informed that the initial figures are retained

with the shipping agents; and for various reasons (some legitimate), these figures may undergo changes. The recorded figures on shortfalls are similar between the two DGF sources, and the WFP's Superintendent is alleged to pass the information to WFP, which they obtain from others.

Table 13—Discrepancy in reporting, by the BSC and the DGF

Port unloaded (1)	Program (2)	Lighter vessel displacement quantity, as per DGF (3)	Loaded at outer anchorage, as per BSC (4)	Final discharge, as per DGF (5)	Discharges, as per BSC (6)	BSC report on loading (col. 4) (7)	FDR of DGF (col. 5) (8)	BSC discharge (col. 6) (9)
			(wheat in metric tons)			(as percent of column (3))		
Chittagong Silo	WFP [18]	7,486.2	7,472.2	7,451.6	7,523.7	99.81	99.54	100.50
	Non-WFP	8,803.5	8,804.8	8,738.3	8,803.0	100.01	99.26	99.99
	Total [20]	7,617.9	7,605.5	7,580.2	7,651.6	99.84	99.51	100.44
Chittagong Jetty	WFP [1]	5,826.7	5,895.5	5,831.6	5,919.6	101.18	100.08	101.60
	Non-WFP	10,185.8	10,011.9	9,924.5	10,122.8	98.29	97.43	99.38
	Total [2]	8,006.2	7,953.7	7,878.0	8,021.2	99.34	98.40	100.19
Mongla midstream	WFP [3]	5,749.0	5,743.3	5,536.2	5,757.9	99.90	96.30	100.15
	Non-WFP	9,097.7	8,936.2	8,635.7	8,944.3	98.22	94.92	98.31
	Total [14]	8,380.1	8,252.0	7,971.5	8,261.5	98.47	95.12	98.58
Total	WFP [24]	7,116.4	7,105.9	7,054.6	7,151.6	99.85	99.13	100.49
	Non-WFP	9,274.4	9,166.8	8,912.4	9,176.6	98.84	96.10	98.95
	Total [39]	7,946.4	7,898.6	7,769.1	7,930.5	99.40	97.77	99.80

Source: Information compiled from the DGF's office.

Note: Figures in brackets are the number of observations during 1997-2001. Total includes two other combinations, not separately reported here.

Estimates on Shortfalls

A number of alternative estimates on shortfalls, calculated by deducting the FDR quantity from that noted in the B/L, are presented in Tables 15 to 18. The observed findings are summarized below.

1. For all arrivals since FY96, the average shortfall has been 1.55 percent. Other than sudden increases in shortfalls during FY00 and FY01, there has been a generally declining trend in the percentage of shortfall (Table 15).
2. Shortfall under the FO system is 1.65 percent, which is marginally higher than that under the LT (1.39 percent, see Table 15).

Table 14—Differences in shortfalls arising due to different records on FDR, by sources

Name of MV	Date of arrival in Chittagong	WFP database	Ancient steamship		
			DGF files	MIS-DGF	(metric tons)
MV Ocean Prize	12/03/97	735.6	316.4	735.6	735.6
MV Alam Talang	28/03/97	374.3	455.0	374.3	374.3
MV Overseas Valdez	07/06/97		0.0	0.0	258.5
MV Helios-2	23/06/97	297.4	275.9	297.3	297.4
MV Almi	15/07/97	359.3	359.3	359.3	359.3
MV Joalmi	03/08/97	689.5	546.9	689.5	689.5
MV Great Prize	23/09/97	112.9	86.8	86.8	86.8
MV Sea Harmony	01/10/97	501.3	203.5	501.3	503.3
MV Alam Selarus	22/10/97	567.4	491.5	573.0	573.0
MV Lady Of Lorne	03/12/97	145.7	145.7	145.7	145.7
MV Treasure Island	27/12/97	630.2	149.9	631.2	631.2
MV Liberty Wave	13/05/98	313.7	0.0	313.6	313.6
MV Handy Lily	07/07/98	121.5	121.5	121.5	122.0
MV Golden Sun	18/09/98	94.1	94.1	95.1	94.1
MV Sea Daniel	03/10/98	146.0	265.4	265.4	265.4
MV Overseas Arctic	18/10/98	190.4	0.0	0.0	190.4
Liberty Star	23/11/98	292.5	8.0	292.5	292.5
MV Shanking	05/12/98	46.1	46.1	46.1	46.1
MV Yick Hua	19/12/98	339.8	528.2	339.2	339.2
MV Golden Rose	26/12/98	515.0	511.9	461.8	461.8
MV Filok Titis	11/01/99	675.9	539.6	675.9	675.9
MV Nadel Horn	12/01/99	538.3	601.0	538.1	538.1
MV Meloi	14/01/99	330.5	134.5	330.5	330.5
MV Sailor-1	03/02/99	509.8	509.8	509.8	109.8
MV Marie Flood	30/03/99		0.0		536.4
MV Chios Charm	03/04/99	89.5	89.5	89.5	89.5
MV Kyvernites	19/04/99	72.6	72.7	72.7	72.7
MV Anniva-I	29/08/99	72.9	73.0	73.0	73.0
MV Tecam Sea	16/09/99	45.4	45.4	45.4	45.4
MV Spar Opal	18/09/99	581.2	586.1	581.2	581.2
MV Millenium Hawk	23/09/99	478.4	434.0	487.3	487.3
MV Santa Rosa	03/09/99	663.0	673.1	663.0	663.0
MV Unity	11/10/99	281.8	121.9	281.8	281.8
Uljanik	20/11/98	1,024.5	811.0	1,024.5	1,024.5
MV Mihalis-F	22/11/99	954.4	763.5	954.4	954.4
MV Evrimedon	03/12/99	699.6	558.9	699.6	699.6
Juthasarun Pak	05/12/99	145.8	111.9	111.9	111.9
MV Fair Banks	02/01/00	286.4	0.0	286.4	286.3
Olympic Mentor	26/11/00	43.7	-196.8	43.7	44.0
Paragon	24/12/00	-125.4	-5.6	-125.4	-126.0
MV Nena-F	02/01/01	845.0	843.0	1,054.0	1,054.0
MV Mirande	30/01/01	350.1	350.1	388.0	386.9
MV Golden Gate	24/09/01	903.1	0.0	903.1	895.0
MV Zeno	01/09/02	9.7	9.7	-50.9	-51.0
MV Wuchang Hai	07/09/02	10.0	91.0	52.8	53.0
Average of all observations 45		354.6	262.7	356.0	368.8
Average of valid observations 43		371.1	275.0	372.5	367.5

3. In terms of the sources, shortfalls are low for wheat arrivals under programs of AusAid and Canada/CIDA (0.79 percent to 0.91 percent), while those originating from Europe and the United States (under USAID-supported programs) recorded higher shortfalls (1.9 percent). Average shortfalls under WFP lie between the two limits (Table 16).
4. Disaggregated estimates specific to various mixes of discharge ports show that the shortfalls are significantly high for discharges at Mongla (Table 17).
5. Shortfalls specific to lighter vessels only are generally lower than the aggregate (at MV level) shortfall (Table 18).

Table 15—Shortfalls, by shipping arrangements and year

Fiscal year	Free-out	Liner term	Average	Minimum	Maximum
			(percent)		
1996-97	1.74	1.01	1.60	0.09	2.55
1997-98	1.97	1.00	1.44	0.00	3.86
1998-99	1.27	1.25	1.26	0.00	5.75
1999-2000	1.91	2.80	2.05	0.01	5.47
2000-01	2.37	3.28	2.67	0.00	7.79
2001-02	1.33	1.48	1.43	0.56	3.95
2002-03	0.11	0.00	0.06	0.00	0.23
All years	1.65	1.39	1.55	0.00	7.79

Source: MIS data, based on Port Operations Report, DGF.

Note: Averages of percentages.

Table 16—Shortfalls, by programs

Source	Average	Minimum	Maximum
		(percent)	
WFP	1.51	0.00	3.86
Cash	1.31	0.00	5.75
USA	1.93	0.01	5.57
AusAid	0.79	0.00	2.14
Canada	0.91	0.09	2.19
EC + France + Japan	1.91	0.63	7.79
Total	1.55	0.00	7.79

Source: MIS data based on Port Operations Report, DGF.

Note: Averages of percentages.

Table 17—Frequency distribution of arrivals and shortfalls, by discharge mixes

Route of discharge	1997	1998	1999	2000	2001	2002	2003	All years	Shortfall (percent)
MV Chittagong only		4	5	3		1	1	14 (10.37)	0.61
MV+LV Chittagong only	2	4	10	3	2			21 (15.56)	1.04
LV Chittagong only		1		3		1		5 (3.70)	1.31
MV and/or LV Mongla only		1	2	1		1		5 (3.70)	3.12
LV Chittagong + LV Mongla only	2	3	7	6	2	4		24 (17.78)	1.90
MV Chittagong + LV Mongla only	5		10	3	2	1	2	23 (17.04)	2.05
LV Chittagong + MV Mongla only		3	3	1				7 (5.19)	1.29
MVChittagong + MV Mongla only		1				1	1	3 (2.22)	0.80
MVChit + MVMong + LVChit	2	2	7	4	1			16 (11.85)	1.81
LV in both ports and MV (rest)	5	5	3	1	2	1		17 (12.59)	2.24
All routes	16	24	47	25	9	10	4	135 (100.0)	1.65

Note: Figures, except those in the last column, are observed frequencies. The last column is shortfall reported by stevedores in FDR, expressed as a percentage of the quantity recorded in the bill of lading. MV = mother vessel, LV = lighter vessel.

Table 18—Shortfalls in foodgrain carried, by lighter vessels

Lighter vessel unloading at	Lightered as per boat notes (metric tons)	Shortfall (metric tons)	Shortfall as percent of alleged amount lightered
Chittagong only	10,207	103	1.00
Both	42,342	600	1.42
Mongla only	11,897	195	1.64

Source: Database of Ancient Steamship.

Explaining Shortfalls

The database compiled from the MIS, DGF, and Ancient Steamship Company files enabled a limited exercise with multivariate analysis, the findings of which are presented in Table 19. The findings may be summarized as follows: (1) shortfall as a percentage does not increase proportionately with cargo size (B/L quantity); (2) the size of the shortfall tends to increase significantly with the increase in the percentage of total discharge handled by lighter vessels; (3) shortfall is positively affected by an increase in the share of discharge in Mongla (i.e., negative coefficient with discharge in Chittagong); (4) increased moisture content reduces (not significantly, though) the size of shortfall; (5) texture does not appear to influence the shortfall significantly; (6) overstay at the ports leads to a significant increase in shortfall; and (7) contrary to the evidence on average-level findings, the multivariate analysis suggests, if anything, that shortfalls are higher under the liner term than under the free-out term.

Table 19—Explaining shortfall, regression estimates

Explanatory variable	Model 1		Model 2	
	Coefficient	t-statistics	Coefficient	t-statistics
Constant	1.021	1.37	3.876	2.43
Bill of lading quantity (mt.)			-0.000317	-2.68
Percent lightered in Chittagong ^a	0.00668	1.84	0.015468	3.08
Percent discharged by MV in Ctg/Silo ^b	0.005295	1.39	-0.02104	-3.37
Percent discharged in Mongla	0.01811	4.29		
Over-stay (total stay/lay time)			0.347743	2.05
Moisture (percent)	-0.06551	-1.11	-0.103308	-1.15
Dummy on ship contract, Liner = 1	0.431014	2.03		
Dummy for color, 1 = white			0.022306	0.08
Adjusted R square		0.20		0.60
Number of observations		108		33

^a Model 1 considers percentages of total quantity, while Model 2 considers lightering as percentages of total discharges in Chittagong.

^b Model 1 considers percentage of total quantity discharged by MV at Chittagong Silo, while Model 2 considers percentage of discharges in Chittagong handled by MV directly.

The above findings indicate what is observed, without verifying if the cause is rooted in operation technologies, or due to some other factors discussed earlier. Extensive discussion at the two ports in Bangladesh as well as in Kolkata and Haldia (in India) ports suggest that spillage due to handling during discharge may at most be 0.05 percent of the total cargo.²⁸ None of the respondents had registered substantive discrepancies with the B/L quantity, and all had ruled out the possibility of the ship crew or the surveyors getting involved in pilferage of foodgrain.

Information on all arrivals of wheat to Chittagong port during 2002, imported by the private sector, was also compiled. Of the five such arrivals, none reported any loss. However, the researchers had the opportunity to inspect the unloading of rice imported by the private sector and to interview relevant persons. The figure for allowable loss due to spillage was estimated to be no more than 0.05 percent of the B/L quantity.

Given an average recorded loss of 1.55 percent, the above findings suggest the extent of pilferage to be 1.50 percent of the B/L quantity. If one considers an extreme example with provision under charter party to allow for a maximum of 1 percent loss, and the DGF allowing a 0.4 percent loss for carrying on barges with less than 100 percent weighing, the estimate of a 1.50 percent loss may not appear to be too high. This does not, however, dispute the fact that there is a substantial amount lost from the public

²⁸ The wiser guess on the variable is placed at 0.02 percent. However, there are possibly psychological barriers to reporting any value below 0.1percent, which had raised the average figure quoted in the text.

control. This “lost” foodgrain is then distributed throughout the economy and society in various ways and through various routes. Some of these are discussed below.

One may list numerous factors to explain the lack of governance and presence of pilferage in the system. The description of the operations involved and contractual arrangements among various agents undertaking these operations suggest that the act of pilferage cannot remain a secret guarded by one or two parties. On the contrary, the system requires collusion between several parties, as well as an elaborate effort to maintain consistent records. Some of these aspects are further elaborated in the concluding section of this chapter as well as in the concluding chapter of the report.

Summary

The discussion in this chapter essentially laid out the basis for addressing more specific operational issues that confront donors, receiving GOB agencies, and others who strive for greater efficiency in foodgrain discharge at the two harbors in Bangladesh. This section summarizes the major findings and highlights broad policy areas that deserve attention. The details on policy recommendations are left for the concluding chapter.

The study finds the average shortfall during discharges at harbors to be 1.55 percent of the quantity quoted in the B/L. The main reason for shortfall is not the inadequacy in weighing equipment, since the loss due to spillage does not exceed 0.05 percent of the B/L quantity. However, traditional weighing methods involve numerous agencies and the physical presence of many persons during the unloading operations, thereby facilitating pilferage. The study also finds the arrival draft survey quantity is higher than the B/L quantity. While several agencies engage in draft surveys, these surveys are not independent. Given these findings, the Team proposes that all parties agree to rely on the B/L quantity and establish coordination to engage fewer survey agencies with a view to reducing cost.

The study compiled vessel-specific data from various sources. Currently, an agreed discharge rate of 2,400 mt per wwd is found to reflect the historical average, which is 2,370 mt per day. Actual discharge rates as well as potential discharge rates, however, vary across places of discharge. Moreover, controlling for the location of unloading, higher pilferage is found to be associated with lower discharge rates. The

Team further notes that the discharge rate stipulated in a contract has implications for the distribution of risk between the donor and the GOB as well as for the freight cost that will be incurred. It is suggested that the *ex ante* risk for both parties would be reduced if they agreed on a variable discharge rate based on a simple formula that accounts for different ports/places.

The study noted specific concerns with regards to discharge at Mongla port. The average shortfall for discharges at Mongla was found to be higher than average. Part of it may be due to record keeping, and one cannot rule out the possibility of such shortfalls being residually determined for the last port of unloading. In this regard, the study takes note of the recent records of zero shortfalls and of discharge rates as high as 2,000 mt or more in Mongla. While introducing mechanized weighing will reduce the number of agents during unloading, it cannot eliminate pilferage. The study also observes that there are too many “unionized” people with too little remunerative work, which raises the share of “speed money.”²⁹ Wherever such money goes, it ought to originate from the recorded shortfall, and the practice of block adjustment facilitates pilferage by allowing consistent temporal records.

There was not any significant variation in losses incurred under the FO and the LT arrangements. The distribution of incentives to the field-level operators is better achieved under the LT arrangement. The study also notes that excessive manpower within the DGF increases extra claims on limited resources; and inadequate monitoring of weighing instruments in silos enables losses to continue even under mechanized discharge.

The study argued that most of the foodgrain loss is actually pilferage and if it is recorded in the books, the most obvious method of reducing pilferage is to make the records more transparent. It is recognized, however, that currently, considerable effort is expended on record keeping and the creation of consistent records. A common set of information, available to all parties without time lags, will reduce the scope for pilferage.

Finally, the study notes a number of institutional failures. In order to address them adequately, it is important that institutional responsibilities at the national level be defined with greater clarity. In this respect, the Team recognizes the need to enhance the role of the MOF and the DGF in negotiating contracts related to food aid and calls for the

²⁹ Extra money paid to individuals to expedite the work.

active involvement of an independent monitor from the Economic Relations Division (ERD).

3. The Public Food Distribution System

Introduction

With a current annual distribution of about 1.5 million metric tons and an average stock level of about 1.0 million metric tons of foodgrains, the Public Food Distribution System (PFDS) plays an important role in the food and agricultural sectors of Bangladesh. The main objectives of the PFDS are to (1) make foodgrains available to poor households that would not otherwise have access to adequate food, (2) distribute food during emergency situations, such as natural disasters, (3) provide incentive prices to foodgrain producers to encourage domestic production, and (4) stabilize market prices to prevent excessive price rises.

Ensuring efficient delivery of food to citizens is a dynamic process, which depends on both technologically and institutionally determined factors. Improving the cost-effectiveness of the PFDS would require the reduction of transaction costs through investment in technology and improvement in the institutional structure. Following the recommendations of a series of earlier studies, notably by the FAO and IFPRI, the GOB has undertaken several measures in this respect, including rehabilitation of storage facilities, substantial revision of record-keeping systems, and better information systems for planning and monitoring.³⁰ However, as the TOR of this study point out, there are still concerns about the efficiency of the PFDS, particularly with respect to the high losses that it incurs at ports, at storage facilities, and during internal transportation.

To address the above issues, the Team has adopted a two-pronged analytical approach. First, through consultation with related stakeholders and a review of documents and data, the Team analyzed the costs and institutional structure within which PFDS operates. Second, using a primary survey and a large amount of secondary data,

³⁰ See, for example, the FAO logistic study (1986) and a series of studies under the Bangladesh Food Policy Project, jointly implemented by the Ministry of Food and IFPRI, funded by the United States Agency for International Development (USAID).

the Team estimated losses and analyzed the factors contributing to them. The method of data/document collection to implement this analytical framework is discussed below.

Data Collection and Methodology

Primary Data Collection. In order to assess the operational efficiency of the PFDS, primary data were collected by administering four types of surveys: (1) a survey of silo, CSD, and LSD officials; (2) a survey of enlisted carrying contractors of the GOB; (3) a survey of private wheat millers and traders; and (4) a survey of private transporters of wheat. The methods of sampling and survey design were carried out as follows: since all silos and CSDs were to be included, the selection of a sample for the first survey required only the selection of LSDs. The sample selection method was tied with the selection of household survey sites under Substudy 3. In particular, the following sampling procedure was followed:

1. Select all LSDs that serve the 12 sampled unions in 11 districts, where household surveys were to be conducted.
2. Randomly select the remainder, approximately 45-50 LSDs, from the household-survey districts, using the probability proportional to size (PPS) based on the upazila-level total number of VGD cardholders.

Selection of samples for the other three surveys was largely based on the list of carrying contractors obtained from the MOF. Ideally, determination of these samples should be guided by the quantity of wheat transacted by each of the contractors/transporters/millers. However, such disaggregated data are not available, and so to some extent, true randomness had to be compromised for practical reasons. The following method was employed:

1. National-, regional-, and district-level MOF carrying contractors were selected within the vicinities of silos, CSDs, and LSDs that most frequently serve the household survey sites.
2. Based on interviews with the enlisted contractors, the most frequently used routes for PFDS wheat transportation were determined.

3. A sample of private transporters was then selected from the same locations to collect information on costs of shipping wheat by various modes of transport.
4. Finally, a sample of wheat millers was interviewed to estimate their transportation and handling costs, storage and handling losses, and stock rotation time.

Secondary Data Collection. Implementation of Substudy 2 required a large set of time series data and procedural documentation that set out the guidelines for public foodgrain stock management. Substantial portions of these data, particularly at the upazila level, are not available in Dhaka. However, with the assistance and cooperation of the DGF, the Team was able to collect and analyze much of these data. Under the guidance of the key researchers, an associate worked full-time on collecting and computerizing these data.

Organization

Including the introduction, this chapter has six sections. The next section provides an overview of the PFDS operation in Bangladesh, focusing mainly on the historical changes that have taken place to adjust its emphasis in the context of emerging food policy challenges. The institutional structure within which the current PFDS operates, including key decisionmaking processes and their implications, are discussed in the third section. The key results from the survey, as well as secondary data analyses, are presented in the next sections, respectively. The analytical results of stock management—including stock movement, stock rotation, and losses—are reported, which is then followed by an analysis of PFDS costs and benefits. In addition to providing estimates of various costs and subsidies, this section also provides analysis on the implicit costs of alternative stock and offers a policy option to improve the PFDS revenue budget.

The Public Food Distribution System: An Overview

The GOB's food policy operations are carried out through the PFDS. Originating in 1943 during the Bengal famine, its initial objective was to guarantee a minimum quantity of cereals at controlled prices to urban consumers. Foodgrain distribution under the system had expanded rapidly since the liberation of Bangladesh in 1971, reaching its

peak in FY89. During the latter part of the 1970s, it distributed almost twice as much foodgrain as during the latter half of the 1960s. Year-to-year off-take varied substantially during the 1980s. The variations in off-take were caused mainly by increased requirements of foodgrain resulting from natural disasters. The highest distribution was 2.94 million metric tons in the aftermath of the 1988/89 floods. In FY02, total foodgrain off-take from the system was 1.46 million metric tons. This was equivalent to 5.7 percent of all foodgrain consumed in the country that year.

Historically, the relatively well-off section of the urban population has been the principal beneficiary of subsidized food distributed through the PFDS. The benefits of subsidized food largely bypassed the rural and urban poor, whose need for subsidized food is greatest, but there have been encouraging changes in the past decade. Improved foodgrain distribution through better targeting to achieve poverty alleviation objectives is receiving increasing attention from the government and donor agencies. Table 20 presents evidence of the gradual increase in programs for the needy.

In recent years, the PFDS has operated through 15 distribution channels that broadly fall into two groups: 8 monetized (sale) and 7 nonmonetized channels. Each channel implicitly represents some target groups. Monetized channels consist of the following: essential priorities (EP) for the armed forces, Bangladesh Rifles, police, Ansars (paramilitary group), and jail staffs; other priorities (OP) for government employees, jail and hospital inmates, students' hostels, and so forth; large employers (LE) for industrial and tea garden workers; approved flour mills (FM) and *Atta Chakki*³¹ (AC) that are allotted wheat usually at a subsidized price; and open market sales (OMS), marketing operation (MO), and free sale (FS) channels that sell foodgrains to the general population at subsidized prices. The nonmonetized channels serving the poor include Food-for-Work (FFW), Vulnerable Group Development (VGD), Vulnerable Group Feeding (VGF), Test Relief (TR), Gratuitous Relief (GR), and Food-for-Education (FFE). While the monetized channels are managed by the Ministry of Food, the nonmonetized channels involve various ministries, including the Ministry of Disaster Management and Relief (MDMR), the Ministry of Women and Children Affairs (MWCA), the Ministry of Primary and Mass Education (MPME), and the Ministry of Local Government, Rural Development, and Cooperatives (MLGRDC).

³¹ *Atta* is whole-wheat flour, and *atta chakki* is a wheat crushing mill that produces *atta*.

Table 20—Off-take of cereals from the public food distribution system and the share directed to the poor: FY79-FY02

Year	Total PFDS	Programs for the poor	Share of off-take for the poor
		('000 metric tons)	(percent)
1978/79	1,825	581	31.8
1979/80	2,446	835	34.1
1980/81	1,546	521	33.7
1981/82	2,067	858	41.5
1982/83	1,937	857	44.2
1983/84	2,052	928	45.2
1984/85	2,580	1,371	53.1
1985/86	1,541	653	42.4
1986/87	2,119	945	44.6
1987/88	2,505	1,411	56.3
1988/89	2,941	1,751	59.5
1989/90	2,165	1,224	56.5
1990/91	2,449	1,331	54.3
1991/92	2,345	1,142	48.7
1992/93	1,074	618	57.5
1993/94	1,376	845	61.4
1994/95	1,573	1,065	67.7
1995/96	1,794	1,147	63.9
1996/97	1,392	1,128	81.0
1997/98	1,621	1,224	75.5
1998/99	2,120	1,874	88.4
1999/00	1,900	1,609	84.7
2000/01	1,774	1,506	84.9
2001/02	1,464	1,209	82.6

Source: Food Planning and Monitoring Unit (FPMU) of the MOF.

Table 21 provides a comparison of the distribution of foodgrain by channels and their shares in total with the PFDS off-take in FY87 and FY02. There have been significant changes in the pattern of the PFDS cereal distribution over the 15 years. The most remarkable changes were the abolition of the *Palli* (rural) Rationing program in 1992 and Statutory Rationing³² program in FY94, the introduction of the Food-for-Education program in 1993, and the termination of the Food-for-Education program in 2002. The share of monetized channel distribution in the total PFDS declined from 67 percent in FY92 to 17 percent in FY02. Consequently, the share of nonmonetized channel distribution in the PFDS increased from 33 percent to 83 percent, and the absolute quantity increased by 75 percent over the period. However, the total quantity of the PFDS distribution declined by 30 percent over the same period.

³² Before its demise, the Statutory Rationing program distributed foodgrain at subsidized prices to government employees in six urban areas (that is, four metropolitan cities—Dhaka, Chittagong, Khulna, and Rajshahi, and two municipal towns—Narayanganj and Rangamati).

Table 21—Distribution of cereals, by channels and their relative shares in the PFDS: A comparison between FY87 and FY02

Channels	1986/87						2001/02					
	Total off-take			Share in total PFDS			Total off-take			Share in total PFDS		
	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total
	('000 metric tons)			(percent)			('000 metric tons)			(percent)		
Statutory rationing (SR)	27	183	210	1.3	8.8	10.1	-	-	-	-	-	-
Modified/Palli rationing (PR)	103	154	257	4.9	7.4	12.3	-	-	-	-	-	-
Essential priorities (EP)	70	48	118	3.4	2.3	5.7	119.6	103.4	223.0	8.2	7.1	15.2
Other priorities (OP)	109	280	389	5.2	13.4	18.7	8.4	8.3	16.7	0.6	0.6	1.1
Large employers (LE)	3	35	38	0.1	1.7	1.8	0.0	10.2	10.2	0.0	0.7	0.7
Open market sales (OMS)	109	108	217	5.2	5.2	10.4	-	-	-	-	-	-
Fair price campaign (FPC)			-	-	-	-	0.0	0.0	0.0	-	0.0	0.0
Marketing operation (MO)	32	5	37	1.5	0.2	1.8	0.2	4.3	4.5	0.0	0.3	0.3
Free sales (FS)	3		3	0.1	-	0.1	-	-	-	-	-	-
Flour mills (FM)		123	123	-	5.9	5.9	-	-	-	-	-	-
Atta Chakki (AC)			-	-	-	-	0.1	0.1	0.1	-	0.0	0.0
Total monetized	456	936	1,392	21.9	44.9	66.8	128.3	126.2	254.5	8.8	8.6	17.4
Food for work (FFW)		467	467	-	22.4	22.4	146.6	368.4	514.9	10.0	25.2	35.2
Variable group feeding (VGF)			-	-	-	-	82.8	1.6	84.4	5.7	0.1	5.8
Vulnerable group development (VGD)		176	176	-	8.4	8.4	4.0	167.2	171.2	0.3	11.4	11.7
Test relief (TR)		33	33	-	1.6	1.6	144.2	1.0	145.2	9.9	0.1	9.9
Gratuitous relief (GR)		16	16	-	0.8	0.8	14.6	7.0	21.6	1.0	0.5	1.5
Food for education (FFE)			-	-	-	-	76.2	125.1	201.4	5.2	8.5	13.8
NGO direct			-	-	-	-	9.0	9.0	9.0	-	0.6	0.6
School feeding (SF)			-	-	-	-	-	-	-	-	-	-
Others			-	-	-	-	51.1	10.6	61.7	3.5	0.7	4.2
Total nonmonetized	-	692	692	-	33.2	33.2	519.5	689.9	1,209.4	35.5	47.1	82.6
Total PFDS	456	1,628	2,084	21.9	78.1	100.0	647.8	816.1	1,463.9	44.3	55.7	100.0

Source: World Food Programme, *Bangladesh Foodgrain Digest*, various issues.

The Institutional Structure of the PFDS Operation

The Annual PFDS Operation Plan

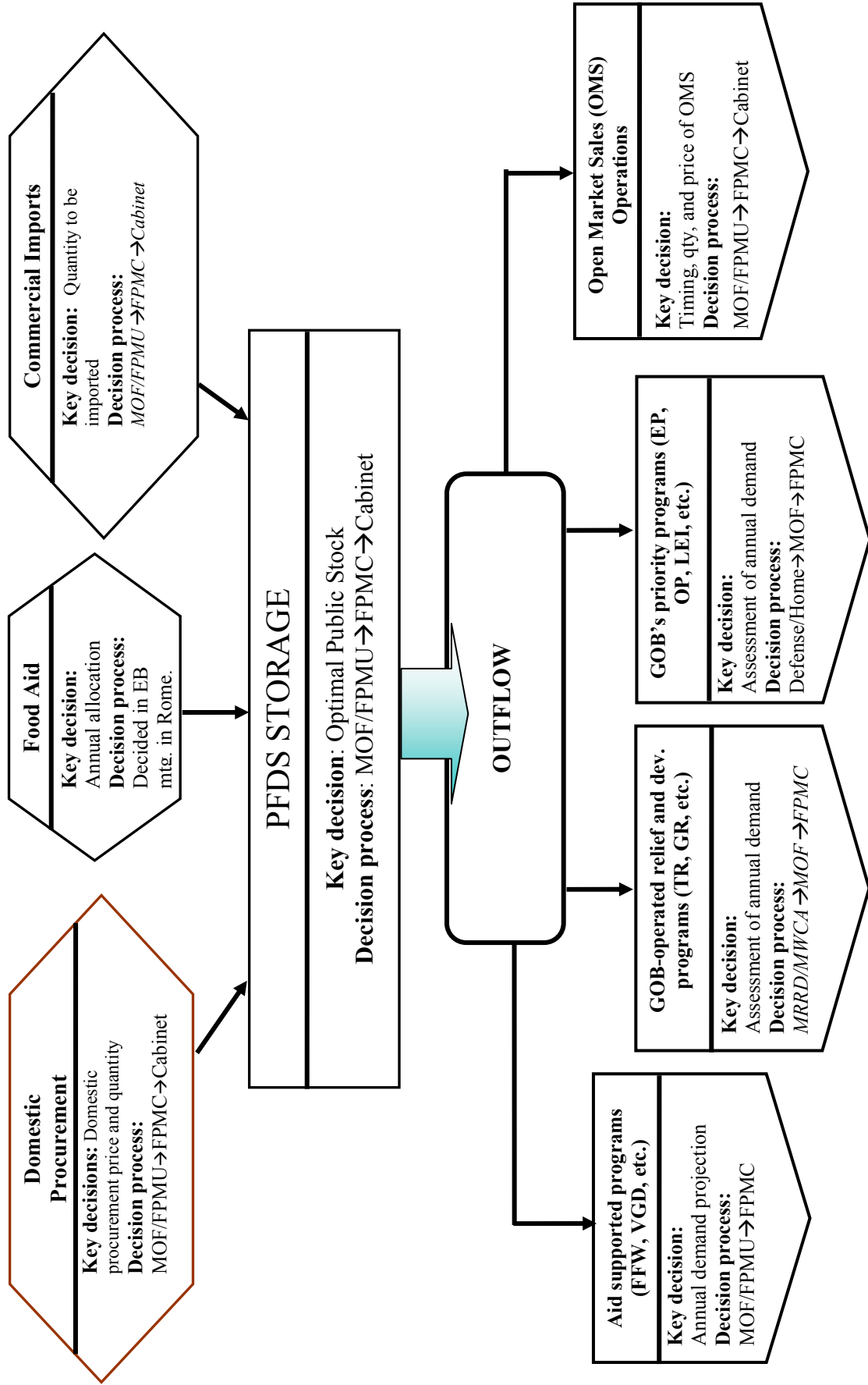
The annual PFDS operation plan, drafted by the Food Planning and Monitoring Unit (FPMU) of the MOF, involves an extensive process of consultation with relevant ministries, donors, and other stakeholders before it is submitted to the Food Planning and Monitoring Committee (FPMC) for approval. This plan provides detailed accounts of annual cereal demand and supply, proposes targets for domestic procurement and commercial imports, and allows provisions for distribution of food during emergency situations, such as natural disasters. Figure 4 summarizes how various ministries/agencies are involved in this planning process. It is clear from Figure 4 that coordination among the institutions involved in the formulation and execution of the plan can critically affect the efficiency of the PFDS operation. Decisions on optimal security stock, scheduling of commercial imports and food aid, as well as procurement price setting can all influence losses, stock quality, and costs of the PFDS.³³ This section describes various steps involved in the planning and decisionmaking process.

Assessment of PFDS Demand and Supply. The annual cereal demand for the PFDS depends on three broad factors: (1) the size of the food aid supported programs, (2) the food-based market intervention and targeted programs of the GOB, and (3) the projected food balance in the country. The demand for food aid supported programs—such as Integrated Food Security (IFS), Vulnerable Group Development (VGD), and humanitarian relief programs—are estimated using the WFP allocation plan, which is normally prepared for a two-year time period. The GOB also contributes to the WFP coordinated programs, which amount to about one-third of the total program requirement.³⁴

³³ For example, due to the failure of procurement programs and delayed arrival of commercial import, total stock dropped down to an alarming level, approximately 205 thousand metric tons of rice and wheat during FY95 (Dorosh and Farid 2003). There were also three periods of high stock build-up that led to high losses and quality deterioration during the 1990s.

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Figure 4—The operation plan and decisionmaking process in PFDS



The GOB-financed food programs can be classified into three major groups. The first group of programs, which includes Food-for-Work (FFW), Test Relief (TR), and Gratuitous Relief (GR), are designed with the dual objectives of development and relief. The Ministry of Disaster Management and Relief (MDMR) is responsible for assessing the requirements of these programs. Depending on domestic foodgrain production and population projections, these estimates are adjusted, with normally no more than a 10-percent escalation annually. In an average year, total distribution through these channels is 1,300 thousand metric tons, which translates to about 85 percent of the total PFDS distribution.

The second group of GOB programs distributes rations to the army, police, and employees of large industries, mainly the workers on tea estates. The Ministry of Defense and the Ministry of Home assess the annual requirements for Essential Priorities (EP) and Other Priorities (OP), respectively. The Bangladesh *Cha Shangsad*, an association of tea garden owners, places the demand for Large Employer Industries (LEI). The final group of GOB-financed programs includes Open Market Sales (OMS), Marketing Operations (MO), Free Sale (FS), and distribution through Flour Mills (FM) and Atta Chakki (AC), which are used as a policy lever for market price stabilization in the case of price rises. The FPMU estimates the requirements for these channels, based on the cereal price forecasts.

The final step in the preparation of the PFDS operation plan involves projections of national demand and supply of foodgrain, the primary assessment of which is again carried out by the FPMU. The national aggregate cereal demand is estimated by multiplying the projected mid-year population by the minimum requirement of 16 ounces of foodgrains per day. The projection of domestic foodgrain supply is determined on the basis of production trend, agro-meteorological factors, and consultation with the Directorate of Agricultural Extension (DAE). Unlike demand projection, this is not a unique number. Several scenarios of possible production levels are presented to the FPMC, which, after consultation with its members, approves one of the production forecasts. Putting all these numbers together, the FPMU prepares the aggregate public food operation plan. After review and comments by the MOF, this plan goes to the FPMC for final approval.

The Decisionmaking Process

Level of Optimal Public Stock. The cabinet takes the final decision on the level of optimum national foodgrain stock. A national stock level in the range of 0.8 to 1.0 million metric tons, which is equivalent to 0.2 to 0.3 million metric tons of security stock and 3-4 months of distribution requirement, appears to have become acceptable to the political and administrative authorities. This stock level, however, changes occasionally. In 1998, with professional inputs from IFPRI and the World Bank, the stock level was increased from 0.8 to 1.0 million metric tons. Again, after the closure of the Food-for-Education Program in 2002, the stock level was revised downward to 0.80 million metric tons.

Domestic Procurement Price and Quantity. Based on available costs of production information, domestic and world market price forecasts, and budgetary allocation, the FPMU, with approval from the Minister and the Secretary of the MOF, proposes a procurement price and a targeted quantity to the FPMC about 2-3 months prior to harvest. The FPMC then forwards these figures to the cabinet for final decision. The current ranges of procurement are 250 to 350 thousand metric tons of rice (or equivalent) and 70 to 150 thousand metric tons wheat per cropping season.

GOB Commercial Import. After examining the stock levels and projected requirements, the Secretary of the MOF, in consultation with the FPMU on timing and quantity, prepares a proposal for the Minister of the MOF. Once the Minister approves the proposal, the procurement wing of the MOF initiates the tendering process. However, while the MOF oversees the procurement process, the final decision rests with the cabinet committee on public procurement, which is chaired by the Minister of Finance.

Channel-Wise Distribution Prices. Based on changes in costs of procurement, the FPMU suggests adjustments in the channel-wise distribution prices, which, with approval from the Secretary of the MOF, go to the FPMC for final approval. The FPMU then forwards the channel-wise distribution prices to the relevant departments in the Ministries of Food and Finance.

The Planning of the PFDS Stock Movement

Except for local (intra-district) movements, the planning of the PFDS stock movement is broadly based on two guidelines: (1) maintaining a minimum stock level, equal to 3-4 months of off-take requirement, at each storage facility, and (2) clearing food aid and commercially imported grain from the ports. The step-by-step procedure followed in making movement decisions is described below.

- The officer-in-charge of each storage facility submits a report to the District Controller of Food (DCF), indicating the current stock level, estimated month-end stock, and estimates a requirement (or excess stock) for wheat and rice.
- Based on the reports from the storage managers, the DCF prepares a consolidated document, showing requirements for each warehouse in his/her district, as well as excess stock that needs to be moved.
- This document is then sent to the DGF in Dhaka, where, in consultation with other departments, the Directorate of Supply, Distribution, and Marketing (DSDM) calculates a consolidated national requirement by district. The DSDM passes this document to the Directorate of Movement, Storage, and Silo (DMSS) so that the information may be incorporated into the Movement Plan (MP).
- For food aid and commercial imports, the DMSS obtains information from the WFP, other donors, and the MOF regarding ship arrival; and informs the FPMU/MIS about the stock positions in the main storage centers, including Silos and port CSDs. On the basis of estimated availability and requirement, a preliminary MP is prepared indicating quantities to be sent to each district by source of supply.
- Once a preliminary MP is prepared, a meeting is convened to discuss the proposed program. The DGF, DMSS, DSDM, and FPMU attend the meeting. The preliminary MP then goes to the DSDM, where the quantities allocated to each district are disaggregated into allocation for each storage facility within the district, based on the original submission of the DCF. The DMSS then finalizes the MP, specifying sources of supply, destination, quantity, and modes of transport to be used.

- Finally, the MP is submitted to the MOF for information and distributed to the Controller of Movements and Storage (CMS), DCF, Silo superintendent, CSD managers, and DGF-enlisted carrying contractors.
- Each MP remains valid until the next MP is issued.

It should be noted, however, that the above procedure is followed only in the case of centrally planned movements. If there is a need, mainly in the procurement zones, the DCF, with approval from the Regional Controller of Food (RCF), can plan movements within his/her district. Various implications of this intra-district movement are further discussed in the next section.

Institutional Mechanisms Used to Check Misappropriation in the PFDS

In order to address financial and procedural irregularities, the MOF has to undergo five main types of audit, which are (1) commercial audit, (2) internal audit, (3) local and revenue account audit, (4) foreign project audit, and (5) civil account audit. In the case of any irregularities in any office or establishment under the DGF, the internal audit department of the directorate initiates a departmental proceeding and the Director General of Food, on the basis of the power bestowed upon him, takes the necessary steps to resolve the case. Available DGF documents indicate that the process of internal dispute resolution is rather slow. For example, only 23.6 percent of the total internal audit cases filed during FY01 were resolved within the year. The commercial audit, on the other hand, appears to be much faster, where more than 76 percent of the disputes were resolved within the year (MOF 2001).

Review of departmental memos and discussions with relevant DGF officers suggest that, due to the lengthy legal process, the resolution of any misappropriation is even slower. For example, if an employee is proven guilty by the departmental proceeding, he/she can keep appealing from the lower court (civil court) to the higher court for a review of the case. Only after a final verdict is reached, which generally takes several years, can DGF take the necessary steps to realize the value of the misappropriated commodity. The process is very lengthy, requiring more than 10 years to come to a final settlement, i.e., to recover the value of misappropriated foodgrain. In fact, one DGF memo indicated that the cases initiated in 1986 were being resolved only in 2002.

After the submission of the preliminary report, a few reviewers commented that the issue is an important one and the Team should have explored it further. After receiving these comments, the Team conducted further interviews with the audit and administrative officials at the MOF to get further insights into the process, particularly to see if the MOF could take a lead role in the dispute settlement process. Based on these interviews, our understanding is that the MOF does not have a significant role to play, as its action depends on the final verdict from the court, which, as in many other countries, is a lengthy process.

Management of the PFDS Stock: Movement, Storage, Losses, and Quality

Stock Movement

Efficient movement of stock is an important element of the overall operational performance of the PFDS in Bangladesh. On average, the MOF transports about 1.3 million metric tons³⁵ of foodgrain every year from one storage facility to another, at an estimated cost of Tk 108.5 crore (equivalent to about \$19 million). Furthermore, these movements also involve transit losses, which, depending on geographic location and the methods of transportation used, may lead to a significant increase in costs. This section examines two important aspects of the PFDS stock movement: (1) the administrative guideline and pattern of stock movement, and (2) the changes in the cost structure and funding sources.

Administrative Procedures and Practices. As mentioned in the previous section, movement of the PFDS foodgrain is administered at three levels: central, regional, and district. One of the main rationales for this three-tier movement planning is to expedite the movement by decentralizing the decisionmaking. However, if not coordinated properly, this can also lead to inefficiencies. For example, the provision of intra-district movement was mainly intended to expedite the movement decisions in the procurement regions, where stock can quickly build up during the season. However, as Table 22 shows, local movements (LSD-to-LSD) have now become common even in nonprocurement regions. For example, even in Chittagong, where there was no local

³⁵ This is an average of annual movement, computed from MOF annual report, during FY97-FY01.

procurement in FY02, 18 percent of the total off-take from LSDs went to another LSD within the district. Total costs of this local transportation for FY02 was estimated at Tk 1.9 crore, which translates to about \$330,330 at the current exchange rate.³⁶ With improved planning and control, several of these local movements could be eliminated, which would generate savings in transportation costs and reduce claims for admissible losses.

Table 22—Extent of LSD-to-LSD movement

Region	Off-take to other storage		Loss due LSD-to-LSD movement			
	Quantity (metric ton)	Percent of total off-take	Transit loss		Storage loss	
			Quantity (metric ton)	Percent of total off-take	Quantity (metric ton)	Percent of total off-take
Barisal	12,118	17	29.09	0.24	55.74	0.46
Chittagong	33,661	18	77.42	0.23	107.72	0.32
Dhaka	47,926	23	95.85	0.20	191.70	0.40
Khulna	18,192	17	36.38	0.20	61.85	0.34
Rajshahi	204,487	48	102.24	0.05	511.22	0.25

Source: FPMU data and authors' calculations.

In order to examine whether the necessity for LSD-to-LSD movements had arisen from storage constraints, the Team compiled and analyzed monthly average stock levels and capacity utilization rates in all silos, CSDs, and LSDs in the nation during FY02. The results, presented in Table 23, clearly suggest that, except in the Rajshahi region where the bulk of the domestic procurement takes place, storage capacity was not a constraint in any of the PFDS regions in the country. More disaggregated monthly data suggest that some of the LSDs in the Rajshahi region did, in fact, go beyond their capacities during the procurement season. In all other regions, the stock level at any given point in time was substantially below capacity.

Just as there are three tiers of planning, there are three types of carrying contractors who are selected through an open tendering process. The MOF pre-specifies unit transport costs (termed as fair rate) for a set of routes and the contractors whose offers are within 5 percent of the fair rates are accepted. Note, however, that this applies

³⁶ This cost is the sum of the value of lost grain and costs of movement and handling. It is assumed that the lost foodgrain consisted of 43 percent wheat and 57 percent rice (actual product mix in FY02), which are valued at Tk 13.00/kg and Tk 15.31/kg, respectively; and the average movement cost per ton was Tk 510.00.

to transportation by road and waterways only, which account for 37 and 32 percent of total movement, respectively (MOF 2001). For railway carrying, which accounts for about 31 percent of the total PFDS movements, the MOF has nine private contractors who operate in nine different railway zones of the country on a commission basis. Appointing private railway contractors in 1990 was an innovative policy that resulted in a reduction of transit losses, as the risk of transit loss was shifted to those contractors.

Table 23—Capacity and utilization rates of the PFDS storage, by storage type, FY02

Regions	Type of storage	Capacity		Stock level	Capacity utilization
		Rated	Effective		
		(metric tons)			(percent)
Dhaka	Silo	50,000	50,000	39,397	79
	CSD	90,360	71,000	47,094	66
	LSD	267,888	248,831	137,745	55
Chittagong	Silo	150,000	150,000	67,259	45
	CSD	138,353	95,183	30,706	32
	LSD	240,922	192,731	106,774	55
Rajshahi	Silo	25,000	25,000	18,478	74
	CSD	99,465	76,608	41,318	54
	LSD	371,479	347,574	197,366	57
Khulna	Silo	800	800	0	0
	CSD	127,227	77,230	51,485	67
	LSD	126,637	117,773	81,555	69
Barisal	Silo	0	0	0	0
	CSD	22,780	17,775	4,086	23
	LSD	116,405	84,227	49,646	59
National (by storage type)	Silo	225,800	225,800	125,134	55
	CSD	478,185	337,797	174,689	52
	LSD	1,123,331	991,136	573,085	58
National (all storage combined)		1,827,316	1,554,733	872,908	56

Source: FPMU data and authors' calculation.

For transportation through waterways, MOF received eight barges as a donation from the WFP. These barges formerly operated under the management of the Bangladesh Inland Water Transport Corporation (BIWTC). In 1994, these barges were sold through tendering. Currently, the MOF has a contract with the BIWTC to carry foodgrain from Chittagong port, but private shipping contractors are used for the Mongla port.

Costs of Internal Movement and Handling. The Directorate General of Food (DGF) is responsible for transporting and handling all food aid from the port to the DGF's warehouses, which are located throughout the country. Food donors share the costs of ITSH, but the arrangements for sharing are not uniform across donors (Table 24). For example, while the WFP pays \$21/ton (in the form of commodity), the United States pays two-and-a-half percent of the total value of foodgrain that it monetizes to support CARE and World Vision programs. On the other hand, Japan pays one-third of the free on board (FOB) value as well as the cost of shipping. Furthermore, ITSH costs also vary, depending on how donors value the aid grain—that is, whether the food aid is valued at the PFDS cost price, the FOB price, the ration price, or the market price. Since per unit costs of ITSH can be easily calculated, it is hard to rationalize why so many different cost-sharing arrangements should be followed. A uniform ITSH cost-sharing arrangement across donors would improve the PFDS efficiency by eliminating some unnecessary complications in the PFDS accounting system.

Table 24—Arrangements of ITSH sharing between donors and the GOB

Countries/agencies	Basis for ITSH fixation	Other arrangement/cost
Australia	Pays through the WFP	Shipment costs by the GOB
Canada	7.5 percent of the gross monetized value	Shipment cost by the GOB
Japan (KR grant)	ITSH = one-third of FOB value	Shipment costs by the donor
United States of America		
PL 480 (CARE)	2.5 percent of the gross monetized value	Shipment costs by the donor
PL 480 (WVI)	2.5 percent of the gross monetized value	Shipment costs by the donor
PL 480- I		
US 416 B		
World Food Programme	US\$21.00 per ton in the form of nonwheat food aid	Shipment cost by the WFP

Source: Compiled from agreements between donors and GOB.

How should a uniform ITSH cost-sharing arrangement be devised? Since a food aid operation does not have any profit maximization objective, the question cannot be answered through any mathematical optimization. Both donors and the GOB have a common objective: to alleviate poverty and malnutrition in the country. If the donors do not distinguish between the poor by their national identity (global poor), then one could argue that the donors should bear the full costs of operation. On the other hand, sharing the costs of operation could enhance the partnership between the GOB and the donors.

Various stakeholders were consulted on this issue and most agreed that there should be a coordinated consultation process, led by the WFP, to design a uniform ITSH cost-sharing arrangement.

As per the TOR, the Team has also disaggregated the total ITSH cost by funding sources. The results suggest that, if WFP nonwheat contributions are excluded, more than 89 percent of the total ITSH costs, an estimated Tk 1.2 billion per year, are borne by the GOB (Table 25). Among the donors, only the contributions from Japan and the United States exceeded 5 percent during the FY99-FY02 time period. Given that food aid is about 33 percent of the total PFDS operation, and donors are willing to share ITSH costs, the donors proportion of a mere 11 percent of the total costs appears to be small.

Table 25—Actual transportation costs, by funding sources for selected years^a

Year	Total ITSH bill (billion taka)	Share of GOB	Share of Japan (KR Grant)	Share of CIDA	Share of PL-480 II	Total ITSH contribution
				(percent of total)		
1998-1999	1.27	89.85	5.67	2.88	1.60	10.15
1999-2000	1.20	95.18	--	2.39	2.43	4.82
2000-2001	1.09	76.99	15.04	0.59	7.46	23.01
2001-2002	0.92	94.09	--	--	5.91	5.91
4-year average	1.12	89.02	5.26	1.60	4.10	10.98

Source: Finance and Accounts Department of DGF.

^a This calculation does not include WFP's nonwheat contribution as ITSH costs.

Analysis of Stock Rotation

Stock rotation is an important element of efficiency in the PFDS that has implications for overall costs, utilization of storage facilities, and losses resulting from quality deterioration. If program beneficiaries receive low quality foodgrain from older stock, then the actual benefits that they derive from the program are reduced. In this context, the Team undertook three specific tasks: (1) a disaggregated analysis of stock composition by age and by storage type, (2) an assessment of the implicit costs of quality deterioration, and (3) an analysis of the association between food aid arrival and stock rotation.

Decomposition of Stock by Age. In determining stock age and average stock rotation time, the study has adopted the methodology proposed in Dorosh and Farid (2003). According to this method, the amount of *x-month old* stock in a given time, say *t*, can be

calculated as closing stock at $t - x$ minus total distribution from period $t - x + 1$ through period t . For example, the amount of three-month-old stock at the end of April of a given year is calculated as the closing stock of January minus total off-take during February to April of that year. Note that the two main assumptions in this analytical framework are very conservative. First, the method assumes that the PFDS stock is rotated on a *first-in-first-out* basis, which could be violated if there were a need for disposing of deteriorating stock. Second, stock received by any storage facility at any given time is assumed to be one-month old, which, as will be clear from the discussion below, is again a very conservative assumption. Therefore, the estimates of stock age presented in this section should be considered a lower bound. In other words, the actual stock age can be higher than what these estimates indicate.

As indicated earlier, all four silos and 13 CSDs, as well as a sample of 60 LSDs, were surveyed for the study, with questions on stock and flow of foodgrain from each of the storage facilities. The composition of wheat stock by age and storage type estimated using this survey data is presented in Table 26. The results suggest that, although 65 percent of the total PFDS wheat stock is less than three months old, a significant proportion of the wheat that beneficiaries receive can be older than nine months. As wheat stocks normally flow as Silo→CSD→LSD, it can be inferred that most of the stock received by LSDs (except local procurement) is at least three months old on the day they receive the supply. If the estimates for LSDs in Table 26 are adjusted according to this assumption, it follows that about 35 percent of the wheat distributed through LSDs is more than nine months old. If quality deterioration is assumed to be a function of stock

Table 26—Age of wheat stock, by type of storage during 2001/02

Storage type	Stock by storage type and age group							
	Less than 3 months		More than 3 but less than 6 months		More than 6 but less than 9 months		More than 9 months	
	Quantity	Percent of total	Quantity	Percent of total	Quantity	Percent of total	Quantity	Percent of total
	(mt)		(mt)		(mt)		(mt)	
LSD	158,226	65	53,896	24	21,824	9	5,505	2
CSD	44,370	56	19,495	27	9,975	13	3,220	4
Silo	85,594	66	29,129	29	7,619	5	218	0
National	288,190	65	102,520	25	39,418	9	8,943	2

Source: Team's calculation based on the survey of PFDS storage facilities.

age, this can have important implications for the beneficiaries who receive their monthly allocation from the older stock.

The results presented in Table 26 are aggregated and hence do not reveal much about the pattern of stock rotation at the regional level. To see such patterns, more disaggregated results are presented in Table 27, which reveals that there is a wide range of variation in stock rotation across silos and CSDs. For example, while Chittagong silo released 97 percent of its stock in less than three months, Ashuganj, Narayanganj and Shantahar silos released less than 50 percent of the stock in the same period of time. A similar pattern is also observed in the case of CSDs. Compared to the other three regions, Khulna and Barisal appear to be slow in rotating stocks. On average, stocks older than nine months in Khulna Sadar and Barisal CSDs represented 13 and 14 percent of their closing stocks, respectively.

Table 27—Decomposition of the PFDS stock, by age in Silos and CSDs, 2001/02

Storage type	Closing stock by age group			
	Less than 3 months	More than 3 but less than 6 months	More than 6 but less than 9 months	More than 9 months
	(percentage of closing stock)			
Silos				
Chittagong	97	3	0	0
Ashuganj	49	35	14	2
Narayanganj	45	42	13	0
Shantahar	44	40	15	1
CSDs				
Dhaka Region				
Dhaka Sadar	81	19	0	0
Tejgoan	79	21	0	0
Narayanganj	56	32	12	0
Mymansigh	63	31	6	0
Chittagong Region				
Halishahar	42	45	12	1
Dewanhat	59	29	10	2
Chandpur	88	12	0	0
Rajshahi Region				
Shantahar	58	38	4	0
Muladuli	42	36	18	3
Dinajpur	48	40	11	0
Khulna Region				
Khulna Sadar	24	30	32	13
Maheshwarpasha	80	20	0	0
Barisal Region				
Barishal Sadar	29	35	22	14

Source: IFPRI leakage study survey, 2002/03.

An important implication of these results is that the stock age is not taken into consideration in movement planning. However, given the current level of information technology in the PFDS, this is not unexpected. The Director of Movement Storage and Silo (DMSS) relies on the stock reports that s/he receives from the district-level offices, which do not specify stock ages at the storage level. This implies that in order to improve stock rotation (and to reduce the associated loss), there is a need to develop an information system that would provide an up-to-date status of stock age to the key movement planners.

Implicit Costs of Stock Rotation. While it is clear from the above analysis that a significant portion of the foodgrain that beneficiaries receive can be very old, it is difficult to come up with a rate at which an older stock should be discounted. There can be a number of a priori reasons why older stock should lose value, including discoloration, loss in nutritional content, as well as a change in taste. Instead of attempting to assign numerical values to each of these possible quality attributes, the Team has assumed that rice stock older than seven months and wheat stock older than eight months lose 15 percent of their value. After the submission of the preliminary report, many reviewers commented that the discount rate on the older stock should be based on a quantitative method and that 15 percent might be on the high side. Please note that the purpose of this exercise was to get a sense of the implicit costs associated with stock rotation, not to estimate the precise discount rate, which can be the subject of independent research in its own right. However, simple regression using the laboratory test results of foodgrains from selected LSDs clearly indicated that stock age is indeed significantly related to dust, broken grain, and foreign matters. Furthermore, the accumulation of dust and broken grain increases at an increasing rate with stock age.

The exercise suggests that the estimated implicit costs of quality deterioration are indeed substantial, even if the discount rate is revised down to 5 percent. For example, in FY01, total rice stock older than seven months was 13 thousand tons and wheat stock older than eight months was 2 thousand tons. The implicit cost of quality deterioration at 15 and 5 percent discount rates is estimated to be Tk 1.05 billion (about \$19 million) and Tk 0.35 billion (about \$6.33 million), respectively.

Food Aid Arrival and Stock Rotation. A number of factors influence stock rotation, including the flow of information from the food warehouses to the movement planners; sudden changes in GOB policies (particularly with respect to optimal stock, size of targeted food programs, announcements of procurement, and OMS prices); and the scheduling of food aid arrivals. An ideal way to investigate the numerical magnitudes of each of these factors would be to carry out a multivariate regression analysis, with the size of older stock in a given month as the dependent variable. Unfortunately, this could not be attempted due to the unavailability of data on relevant variables.

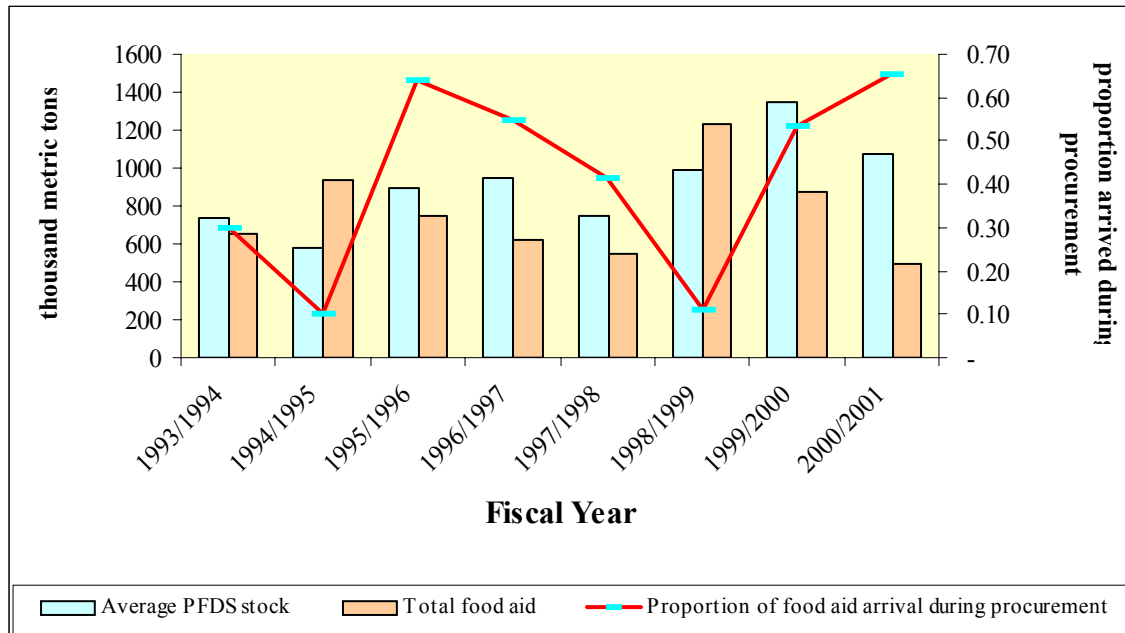
However, as per the TOR, the Team has investigated the relationship between the food aid arrival and the stock rotation for FY01 and FY02. The central hypothesis in this analysis is that “*the arrival of food aid during GOB procurement season can lead to higher stock rotation time.*” The underlying idea is that, since program distribution is somewhat fixed, and since both domestic procurement and food aid (more than one-third of the PFDS operation) are sizeable, the arrival of food aid during procurement season can adversely affect the PFDS stock management. In order to explore this hypothesis, proportions of food aid arriving during procurement season (represented by the line) are plotted along with the PFDS stock and total food aid (represented by the bars) in Figure 5. It is clear from the data that the arrival of food aid coincided with the procurement season in many years during the FY94-FY01-time period. The percentage of food aid arrival in procurement seasons was less than 15 percent in only two of the eight years. The relationship between the timing of food aid arrival and the PFDS stock build up is also evident. For instance, in FY00, when 65 percent of food aid arrived during the procurement season, the annual average PFDS stock went up to 1.3 million tons.

Storage and Transportation Loss

Trends in the PFDS Losses. During the early 1990s, the GOB undertook several initiatives to minimize losses in the PFDS operation. Among the most significant initiatives were (1) the rehabilitation of warehouses with donor funding, (2) the revision of the allowable losses,³⁷ (3) the recruitment of private railway and waterways transport

³⁷ See Appendix 1, Table 50 for the exact revision of allowable losses in the 1990s.

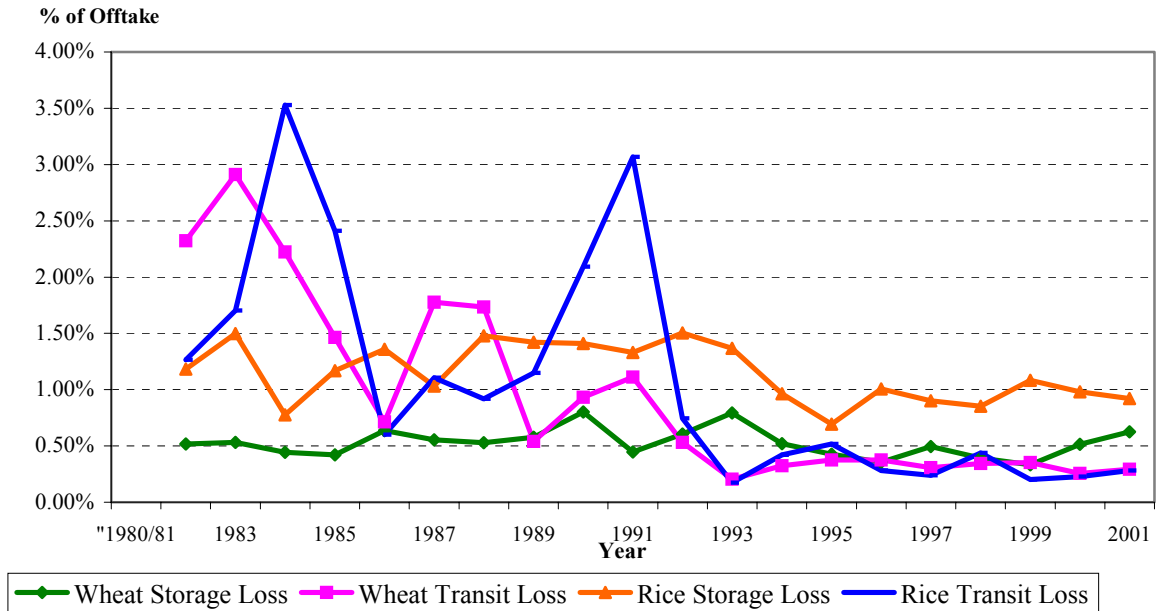
Figure 5—Arrival of food aid during PFDS procurement season, FY94-FY01



Source: Based on DGF data on food aid arrival.

contractors, and (4) improved management of information about stock and flow of foodgrain through regular computerization and analysis. The historical data on the PFDS foodgrain losses, presented in Figure 6, clearly indicate that these initiatives contributed to reducing losses in the subsequent years. In the early 1980s, the magnitude of losses fluctuated a great deal, ranging from 0.5 percent to 3.5 percent of total distribution. The magnitude of transit losses was particularly erratic for both wheat and rice. Since the mid-1990s, however, trends in losses have somewhat stabilized (less than 0.50 percent in transit and less than 1 percent in storage), indicating an overall improvement in the PFDS stock management.

Estimated PFDS Losses and Their Determinants. The previous subsection provided a historical review of changes in the extent of various types of losses, but it did not offer any analysis regarding the determinants and implicit financial values of transit and handling losses. In addition to filling up those gaps, using the survey data collected during the study, this subsection compares the efficiency of the PFDS stock management with the private sector.

Figure 6—Storage and transit loss of rice and wheat in the PFDS, FY82-FY01

Source: Based on the data compiled by the food aid leakage study team, 2002/03.

Although ITSH loss as a percentage of total distribution has declined in recent years, the associated financial value of this loss in any given year is still large (Table 28). When valued at the PFDS “full costs” (also termed as economic cost by the DGF), the estimated value of losses in wheat and rice comes to Tk. 23.6 crores, equivalent to \$4.1 million. Also, losses in rice appear to be higher than wheat both in relative and absolute terms, which may be attributable to the shorter shelf life of rice.

In order to compare losses in the PFDS with the private sector, the Team interviewed a small sample of wheat millers and private truckers in Dhaka, Chittagong, Rajshahi, Khulna, and Borga districts. Both millers and truckers reported that there are no allowable transit losses. The private markets operate under an arrangement where transporters assume sole responsibility for delivery of the full invoice quantity, which is true irrespective of the commodities they transport. Since many of the PFDS storage facilities are well connected, the GOB can significantly reduce transit loss by adopting the same policy as the private markets for transport by road. There is another way to

Table 28—Quantity and valuation of transit and storage losses, FY99-FY02^a

Year	Transit loss		Storage loss		Valuation of Losses at PFDS cost		
	Wheat	Rice	Wheat	Rice	Wheat	Rice	Total
		(metric tons)			(in thousand taka) ^b		
1998/99	5,529 (0.34)	2,325 (0.44)	6,298 (0.39)	4,521 (0.85)	135,058	102,069	237,127
1999/00	3,622 (0.35)	1,758 (0.20)	3,414 (0.33)	9,500 (1.08)	80,348	167,857	248,204
2000/01	1,996 (0.26)	2,232 (0.23)	4,004 (0.51)	9,638 (0.98)	68,517	176,977	245,494
2001/02	2,353 (0.29)	1,819 (0.28)	5,050 (0.63)	5,965 (0.92)	96,239	119,168	215,407
Average	3,375 (0.31)	2,034 (0.29)	4,692 (0.47)	7,406 (0.96)	95,041	141,518	236,558

Source: Authors' calculations based on PFDS audit and accounts departments' data.

^a Numbers in parentheses represent losses as percentage of total distribution.

^b PFDS "full cost" represents average procurement price during the year plus handling and administrative costs. For example, in 2001/02, these prices were Tk 13.00 and Tk 15.31 per kilogram for wheat and rice, respectively.

reduce transit loss. Under the current guidelines, higher transit losses are allowed (0.40 percent), mainly in the case of water transportation, if hundred percent weighing is not done. During their interviews, most of the senior officials at the DGF reported that the transport/shipping agencies tend to claim this loss, even when the actual loss is less. Therefore, it is perhaps time to revise this higher allowable loss and institute hundred percent weighing for all the PFDS carrying.

Quality of Wheat in the PFDS Storage Facilities

This study carried out laboratory tests of wheat samples in order to assess the quality of wheat in the PFDS storage facilities, as well as the wheat received by beneficiaries of the targeted food-based programs. Field investigators of the study collected wheat samples from all silos and CSDs in the country, all LSDs that supplied wheat to program beneficiaries in 12 sampled unions where household surveys were conducted (see Chapter 4 for survey locations), and program beneficiaries in each of the household survey locations. Two samples of wheat were collected from each LSD, CSD, and silo—one from the oldest stock and one from the most recent stock.

The Institute of Food Science and Technology (IFST) of the Bangladesh Council of Scientific and Industrial Research (BCSIR) conducted the analysis of the collected wheat samples. The IFST carried out two types of laboratory tests of wheat grains—

physical and chemical tests. The physical test assessed the levels of foreign matters (dust, stem particles, etc.), broken grain, grain size, damaged grain, and grain color and smell. The chemical test determined the protein, carbohydrate, ash, moisture, and fiber contents of the wheat samples. Appendix 2 provides details on the methodology of the tests, the results, and a discussion of the results. The summary of key findings of the laboratory-based analysis of wheat samples collected from LSDs, CSDs, and silos are presented here. The results of the tests for wheat samples collected from program beneficiaries are discussed in Chapter 4.

Table 29 presents the results of the physical test. The table shows the average dust and other foreign matters, broken grain, and damaged grain contents in the samples. The table also reports the 95 percent confidence interval for estimation, which suggests that the probability that the mean lies between the lower and the upper bounds of the range is about 95 percent. For wheat, the MOF set the maximum allowable foreign matter content at 3 percent, and damaged grain (including the damage caused by insect infestation) at 15 percent by weight. The average amounts of dust and other foreign matters, and damaged grains in the samples collected from silos, CSDs, and LSDs are well within these limits. No standard is set by the MOF for broken grains of wheat.

Table 29—Physical test results on the quality of wheat in the PFDS storage facilities

Physical parameters by type of storage facility	Mean	95 percent confidence interval for estimation
		(percent by weight)
Silos		
Dust and foreign matter	0.44	0.18 - 0.69
Broken grains	2.55	0.34 - 4.76
Damaged grains	11.42	5.09 - 17.75
CSDs		
Dust and foreign matter	1.33	0.80 - 1.86
Broken grains	10.03	2.80 - 17.27
Damaged grains	10.64	8.36 - 12.93
LSDs		
Dust and foreign matter	1.24	0.91 - 1.57
Broken grains	9.61	5.01 - 14.21
Damaged grains	10.20	7.95 - 12.44

Source: Laboratory tests of wheat samples collected during IFPRI's PFDS Storage Survey, 2002/03. Tests conducted by the Institute of Food Science And Technology (IFST) of the Bangladesh Council of Scientific and Industrial Research (BCSIR).

Table 30 provides the results of the chemical test. The MOF requires that the moisture content of wheat should not exceed 13 percent by weight. The MOF, however,

does not set standards for other chemical parameters of wheat. The analyses therefore used the recommended nutrient contents of wheat from the Institute of Nutrition and Food Sciences of the University of Dhaka as standards, which are 11.8 grams of protein, 1.5 grams of fat, 71.2 grams of carbohydrate, 1.2 grams of fiber, 1.5 grams of minerals (ash), and 346 kilocalories (kcal) of energy per 100 grams of wheat (INFS 1992). Table 30 indicates that the average protein content of wheat samples from silos, CSDs, and LSDs is about 16 percent, 12 percent, and 13 percent less than the standard, respectively. Ash represents the mineral content in the wheat. Small or shriveled kernels (grains) have more bran on a percentage basis (consequently yield less flour) and therefore more crude fiber and ash than large, plump kernels. The average fat, carbohydrate, ash, and fiber contents of wheat samples from silos, CSDs, and LSDs meet their standards. In terms of average calorie content, the wheat samples collected from the three types of the PFDS storage facilities do not deviate significantly from the standard.

Table 30—Chemical test results on the quality of wheat in the PFDS storage

Chemical parameters by type of storage facility	Mean	95 percent confidence interval for estimation
Silos		
Protein (percent)	9.96	9.29 - 10.62
Fat (percent)	2.09	1.65 - 2.53
Carbohydrate (percent)	71.73	67.86 - 75.61
Ash (percent)	1.47	1.30 - 1.64
Crude fiber (percent)	4.10	1.12 - 7.08
Moisture (percent)	10.65	9.32 - 11.92
Calorie (kcal / 100g)	345	328 - 362
CSDs		
Protein (percent)	10.38	9.68 - 11.08
Fat (percent)	2.35	2.22 - 2.49
Carbohydrate (percent)	72.08	70.78 - 73.39
Ash (percent)	1.80	1.42 - 2.19
Crude fiber (percent)	2.34	2.12 - 2.57
Moisture (percent)	11.03	10.47 - 11.60
Calorie (kcal / 100g)	351	347 - 354
LSDs		
Protein (percent)	10.30	9.86 - 10.74
Fat (percent)	1.81	1.65 - 1.96
Carbohydrate (percent)	71.56	70.71 - 72.41
Ash (percent)	1.68	1.57 - 1.79
Crude fiber (percent)	3.55	3.05 - 4.05
Moisture (percent)	11.05	10.65 - 11.46
Calorie (kcal / 100g)	343	340 - 346

Source: Laboratory tests of wheat samples collected during IFPRI's PFDS Storage Survey, 2003/03. Tests conducted by the Institute of Food Science And Technology (IFST) of the Bangladesh council of Scientific and Industrial Research (BCSIR).

Costs and Benefits of the PFDS Operation

In the preceding sections, the discussions and analyses have focused on various aspects of public foodgrain operations, namely institutional structure, storage facilities, and overall management of the PFDS stocks. However, as outlined in the TOR, the financial costs and implicit benefit of public food distribution have to be analyzed to get an overall view of the operational efficiency of the system. This section is devoted to this task. The financial accounts of the GOB for the PFDS have been analyzed in order to (1) estimate various cost components, (2) estimate consumer and producer subsidies, (3) determine cost-effective levels of public stock and distribution, and (4) suggest options for improving the efficiency of the system. Results on each of these issues are presented below after a brief description of the estimation method.

Method of Estimation

The figures on total receipts and outlays of the Public Food Operation Account are available from the financial accounts of the Government of Bangladesh. These numbers, however, reflect only the “book value” of the commodities that the Food Directorate handles and do not make adjustments for changes in market price or the value of stock due to quality deterioration. Since benefits to consumers depend on market price and the quality of grain that they receive, an ideal assessment of costs and benefits of the PFDS needs to be based on an accounting system, which adjusts for these factors. The Team has taken this into consideration and adjusted various costs and benefits accordingly. The general methods of estimating various cost components are presented in Table 31 and key elements of costs and subsidies are discussed below.

1. *Cost of domestic procurement.* Total outlays on domestic procurement is calculated as quantity procured (Q^p) times full costs of production (P^p), i.e., procurement price plus procurement incidentals. In notation,

$$O^p = Q^p \times P^p + Q^p C_p,$$

where O^p and C_p are total outlays and average costs of procurement, respectively.

2. *Outlays on food aid.* Food aid is shown as an expenditure of the PFDS in the GOB financial account; it is purchased by the PFDS from the government’s “foreign aid” account.

3. *Commercial imports.* There were no commercial imports during 2001/2002. However, if there were any, total outlays would have been calculated as quantity of import times unit cost of import at ongoing markets' exchange rates.
4. *Financial costs of the PFDS to the GOB.* Financial costs of the PFDS to the GOB for a given channel is calculated by multiplying the distributed quantity through that channel (Q_i^{pfds}) by the difference between the PFDS full cost price (P^{pfds}) and distribution price (P_i^c) for that channel.

Table 31—Methods of calculating various components of PFDS costs

<i>Notations</i>	
Q_j^p	= Quantity of domestic procurement of commodity j (rice or wheat)
Q_j^{Loss}	= Quantity of PFDS loss of commodity j
Q_{ij}^{pfds}	= Quantity of PFDS distribution of commodity j for a given channel i
P_j^p	= Procurement price of commodity j
P_j^m	= Market price of commodity j
p_{ij}^{wc}	= PFDS sales price of commodity j through channel i
P_j^{pfds}	= PFDS full cost price of commodity j
O_j^p	= Total outlays on domestic procurement of commodity j
C_p	= Average costs of procurement
<i>Calculations</i>	
Outlays on domestic procurement (O^p)	$= \sum_j (Q_j^p \times P_j^p) + Q^p C_p \dots\dots(1)$
Consumer subsidy	$= \sum_i \sum_j (P_j^m - P_{ij}^c) \times Q_{ij}^{pfds} \dots\dots(2)$
Producer subsidy	$= \sum_j (P_j^{pfds} - P_j^c) \times Q_j^p \dots\dots(3)$
Total financial costs of PFDS to GOB	$= \sum_i \sum_j (P_{ij}^{pfds} - P_{ij}^c) \times Q_{ij}^{pfds} \dots\dots(4)$
Difference in the value of PFDS loss	$= \sum_j (P_j^{pfds} - P_j^m) \times Q_j^{loss} \dots\dots(5)$

5. *Consumer subsidy.* In calculating consumer subsidy, it is assumed that the subsidy (or benefit) to a consumer for a given amount of the PFDS commodity is the difference between the value of the commodity at the market price and at the PFDS price. Since the expenditure of other Ministries (e.g., the Ministry of Disaster Management and Relief, Ministry of Local Government, Rural

Development and Cooperatives, and Ministry of Women and Children Affairs) for foodgrain is considered to be part of relief expenditure, and is valued at the PFDS full cost, those channels are excluded in estimating subsidies. Thus, the subsidy is calculated only for the sales channels—such as Open Market Sales (OMS), Essential Priorities (EP), and Large Employer Industries (LEI)—which is equal to the difference between the market price and sales price multiplied by the quantity of foodgrain distributed through each channel.

6. *Producer Subsidy*. The producer subsidy is calculated as the difference between the prevailing market price during the procurement season, and the procurement price times the quantity procured in a given cropping season. Note that, as a price incentive policy, the GOB procures both wheat and rice from the domestic market. The national aggregate estimate of producer subsidy is therefore calculated as the sum of subsidies on wheat and subsidies on rice.

Costs and Benefits of the PFDS Operation

The estimated GOB official costs of the PFDS operation for FY02 are summarized in Table 32, which includes four major items of outlay, and three items of receipts, as well as subsidies and intra-governmental transfers. Outlays include costs of procurement, costs of the food aid operation, and marketing and establishment costs. Note that food aid is shown as expenditure, since the GOB financial account considers it to be purchased out of the PFDS from the nation's "foreign aid" account. Total domestic procurement costs for rice and wheat are calculated by multiplying the total quantity procured by the respective procurement prices. The marketing and establishment costs consist of administrative costs, distribution costs, and storage and handling costs, but they exclude the expenditure incurred under the development budget and the interest cost of holding inventory. The administrative costs include staff salaries and other recurring expenditure of all offices and establishments under the DGF. The commodity-wise estimates of marketing and establishment costs are calculated by multiplying the quantities of each commodity by the unit cost.

Receipts from the sales channels include transfer payments for foodgrain received from other ministries (such as the Ministry of Disaster Management and Relief, the Ministry of Local Government Rural Development and Cooperatives, and the Ministry of

Women and Children Affairs) and sales value from distribution through OMS and priority channels. The value of foodgrain purchased by other ministries for their programs is calculated using the PFDS “full cost” price (also described by DGF as *economic price*), which represents the average procurement price during the year plus handling and administrative costs. Two adjustment figures reported in the table represent “change in the book value of stock” and the “physical stock loss” (evaluated at the PFDS full cost), respectively.

Table 32—Financial costs of the PFDS operation, FY02

	Rice	Wheat	Total
OUTLAY		(billion taka)	
Domestic procurement	9.48	2.91	12.39
Costs associated with food aid	0.13	5.25	5.38
Commercial imports	0.00	0.00	0.00
Marketing and establishment costs	1.01	1.82	2.84
Fixed costs per unit of procurement	0.61	0.67	1.28
Total outlay	11.23	10.66	21.89
RECEIPTS			
Sales channels	0.38	0.36	0.74
Non-sales, non-FFW (GOB receipts)	0	0	0
FFW	2.25	4.79	7.04
OTHER ADJUSTMENTS			
Value of physical stock loss	0.11	0.19	0.30
Change in value of stocks	1.20	-0.01	1.18
Total Receipts and Adjustments	3.94	5.33	9.26
Total Net Outlay	7.29	5.33	12.63
Subsidy on sales channels	0.91	0.72	1.63
Intra-Governmental Transfers	6.38	4.61	11.00

Source: FPMU data and the Team’s calculation.

As indicated earlier, since the expenditures of other ministries are considered as part of development and relief expenditure, and since they are valued at the PFDS full costs, there is no subsidy involved in those operations. Therefore, the calculation of food subsidy in Table 32 is based on the distribution through sales channels, particularly through OMS and other priority channels (subsidized sales to military and other priority groups). According to these estimates, total food subsidy on wheat and rice was Tk 1.63 billion during FY02, which is about 37 percent lower than the estimated subsidies, reported in Dorosh and Farid (2003), for FY01.³⁸ The intra-governmental transfer has

³⁸ The estimate of subsidy on sales channels was Tk 2.58 billion for FY01 (Dorosh and Farid 2003).

also declined from Tk 12.44 billion in FY01 to Tk 11.00 billion in FY02. The official food subsidy as a percentage of total intra-governmental transfer has also declined from 20.74 percent in FY01 to about 14.81 percent in FY02.

The estimates of costs and subsidies presented in Table 32 are based on the official GOB financial account, which does not reflect true benefits to the consumers and producers. To a consumer (or a producer), true benefit is the difference between the market price and the price he/she pays to (or receives from) the PFDS. This implies that the estimation of true benefits of the PFDS should be based on the market price, not on the GOB financial price. In order to address this issue, the PFDS stock, distribution, and procurement in each month are valued at the current market price and the actual costs and benefits of the PFDS are reestimated. The results from this exercise are presented in

Table 33—Comparison of PFDS subsidies on rice under GOB and market valuation, 2001/02

	Valuation as per MOF (PFDS) Account			Valuation at Market Prices			Transfer (bn Tk)
	Quantity (000 MT)	Price (Tk/kg)	Value (bn Tk)	Quantity (000 MT)	Price (Tk/kg)	Value (bn Tk)	
Sources of Foodgrain							
Opening Stock (at previous year's end price)	422	15.14	6.38	422	11.39	4.80	1.58
Opening Stock (at current year's end price)	422	15.31	6.45	422	11.10	4.68	1.77
Change in Value of Opening Stock			0.07			-0.12	0.19
Domestic Rice Procurement	726	13.06	9.48	726	9.56	6.94	2.54
Marketing, Management Cost (Domestic)	726	1.33	0.97	726	1.43	1.04	-0.08
Food Aid Rice Imports	8	16.21	0.13	8	15.05	0.12	0.01
Marketing, Management Cost (Food Aid)	8	6.36	0.05	8	6.36	0.05	0.00
Government Commercial Rice Imports	0	15.05	0.00	0	15.05	0.00	0.00
Marketing, Management Cost (Imports)	0	6.36	0.00	0	6.36	0.00	0.00
Fixed Costs per Unit of Procurement	734	0.83	0.61			0.00	0.61
Total Cost of Procurement	734	15.31	11.23	734	11.10	8.15	3.08
Uses of Foodgrain							
Rice Distribution ^a	648	4.06	2.63	648	10.08	6.53	-3.90
Sales Channels	128	3.00	0.38	128	10.08	1.29	-0.91
Non-Sales, Non-FFW (MOF receipts)	373	15.31	5.71			0.00	5.71
Non-Sales, Non-FFW (GOB receipts)	373	0.00	0.00	373	10.08	3.76	-3.76
FFW	147	15.31	2.25	147	10.08	1.48	0.77
Official Storage Losses	8	15.31	0.11	8	9.68	0.07	0.04
End Stock (at current year's end price)	500	15.31	7.65	500	11.10	5.55	2.10
							9.75
Consumer Subsidy on Rice			7.29				
Official PFDS Subsidy (sales channels only) ^b			1.58				

Source: FPMU data and the study team's calculation.

^a Market value is discounted by 15 percent for distribution of rice older than seven months.

^b Calculated as the difference between the value of distribution at the full financial cost (taka 15.31 /kg.).

Table 33 and Table 34 for rice and wheat, respectively. Clearly, the values of various cost and receipt items differ substantially, depending on how they are valued. For example, with respect to cost, the total value of domestic procurement of rice in FY02 is Tk 11.23 billion when valued at the PFDS full cost, but only Tk 8.15 billion when valued at market price. On the other hand, the value of receipts from the PFDS rice distribution at market price is Tk 6.53 billion, about 2.48 times larger than the corresponding PFDS actual receipts.

Table 34—Comparison of the PFDS subsidies on wheat under GOB and market valuation, FY02

	Valuation as per PFDS						Transfer (bn Tk)
	account			Valuation at market prices			
	Quantity (000 MT)	Price (Tk/kg)	Value (bn Tk)	Quantity (000 MT)	Price (Tk/kg)	Value (bn Tk)	
Sources of Foodgrain							
Opening Stock (at previous year's end Price)	445	12.18	5.42	445	9.85	4.39	1.04
Opening Stock (at current year's end Price)	445	13.00	5.79	445	9.18	4.09	1.70
Change in Value of Opening Stock			0.37			-0.30	0.67
Domestic Wheat Procurement	328	8.90	2.91	328	4.85	1.59	1.33
Marketing, Management Cost (Domestic)	328	1.23	0.40	328	0.73	0.24	0.16
Food Aid Wheat Imports	493	10.67	5.25	493	8.69	4.28	0.98
Marketing, Management Cost (Food Aid)	493	2.89	1.42	493	2.89	1.42	0.00
Government Commercial Wheat Imports	0	8.69	0.00	0	8.69	0.00	0.00
Marketing, Management Cost (Imports)	0	2.89	0.00	0	2.89	0.00	0.00
Fixed Costs per Unit of Procurement	820	0.81	0.67			0.00	0.67
Total Cost of Procurement	820	13.00	10.66	820	9.18	7.52	3.14
Uses of Foodgrain							
Wheat Distribution ^a	807	6.38	5.14	807	8.58	6.92	-1.77
Sales Channels	126	2.84	0.36	126	8.58	1.08	-0.72
Non-Sales, Non-FFW (MOF receipts)	313	13.00	4.06				4.06
Non-Sales, Non-FFW (GOB receipts)	313	0.00	0.00	313	8.58	2.68	-2.68
FFW	368	13.00	4.79	368	8.58	3.16	1.63
Official Storage Losses	14	13.00	0.19	14	7.84	0.11	0.07
End Stock (at current year's end Price)	444	13.00	5.78	444	9.18	4.08	1.70
Consumer Subsidy on Wheat			5.34				
Official PFDS Subsidy (sales channels only) ^b			1.28				

Source: FPMU data and the study team's calculation.

^a Market value is discounted by 15 percent for distribution of wheat older than eight months.

^b Calculated as the difference between the value of distribution at the full financial cost (Tk 15.31/kg).

Using this new framework, the total net outlay of the PFDS is broken down into benefits and costs and the results are presented in Table 35. The estimated consumer subsidy, calculated as the difference between the market price and the PFDS sales price

to consumers multiplied by the quantity distributed, is now estimated at Tk 5.6 billion (about 3.48 times larger than the estimate from the GOB official accounts). This accounts for 44.34 percent of total net outlays. The producer subsidy, on the other hand, is estimated at Tk 3.87 billion, accounting for 27.47 percent of total outlays. The next most significant cost item in the table is the change in the value of stock due to quality deterioration (assuming a 15 percent quality discount for rice stock more than seven months old and wheat stock more than 8 months old), comprising 14.25 percent of total outlays. As indicated earlier, the valuation of quality loss is subjective, but it does give a clear indication that the implicit costs of quality deterioration can be substantial, both for the PFDS and the beneficiaries who receive older stock as their allocation.

Table 35—Decomposition of PFDS net outlay, actual FY02

	Rice	Wheat	Total
		(billion taka)	
Net Outlay	7.29	5.33	12.63
Benefits and losses of the PFDS			
Producer subsidy (at market prices)	2.54	1.33	3.87
Excess Book Value of Food Aid	0.01	0.98	0.99
Excess marketing, import costs	0.54	0.83	1.37
Consumer subsidy (at market prices)	3.90	1.77	5.67
Sales Channels	0.91	0.72	1.63
Non-Sales, Non-FFW	3.76	2.68	6.44
FFW	-0.77	-1.63	-2.40
Quality adjusted storage loss	-0.04	-0.07	-0.12
Difference in value of opening stock	1.77	1.70	3.47
Difference in value of closing stock	-2.10	-1.70	-3.80
Change in the value of stock quality	0.68	0.50	1.18
TOTAL	7.29	5.33	12.63

Source: FPMU data and authors' calculation.

Costs and Benefits of PFDS Under Alternative Stock Options

The size of the PFDS operation has substantially declined from an annual off-take of over 2.00 million tons of foodgrain in the early 1980s to about 1.45 million tons in FY02. With the closure of Food-For-Education in 2002, and downsizing of other programs like FFW, it is going to decline further in the coming years. This decline has significant implications for overall costs and benefits of the PFDS, especially with respect to optimal stocks and associated costs. In order to evaluate the implications of recent changes in the national food policy, the Team has undertaken an analysis to

provide estimates of optimal stock levels that minimize losses and maximize benefits to consumers and producers.

Following Dorosh and Farid (2003), three different scenarios of stocks and distribution have been considered. The base scenario approximates the size of the PFDS operation in FY02, when total distribution of foodgrain was equal to 1.45 million tons and the opening stocks of rice and wheat were 421.5 and 445.5 thousand metric tons, respectively. The working database of this exercise, which provides monthly procurement and distribution figures, is presented in Appendix 1, Table 50. In the other two scenarios, stocks and distribution levels are changed to simulate the impact on stock availability, quality, and costs and benefits of the PFDS (Table 36). Note that the total net outlay and availability of stock for distribution does not change significantly between the options, but the distribution of older stock drops from 908 thousand metric tons to 332 thousand metric tons only, suggesting that the beneficiaries will benefit by receiving better quality foodgrain. More important, the welfare of the food aid beneficiaries, who mainly receive wheat, will improve, as the distribution of wheat older than eight months will be reduced.

Table 36—Availability of rice and wheat under various stock options

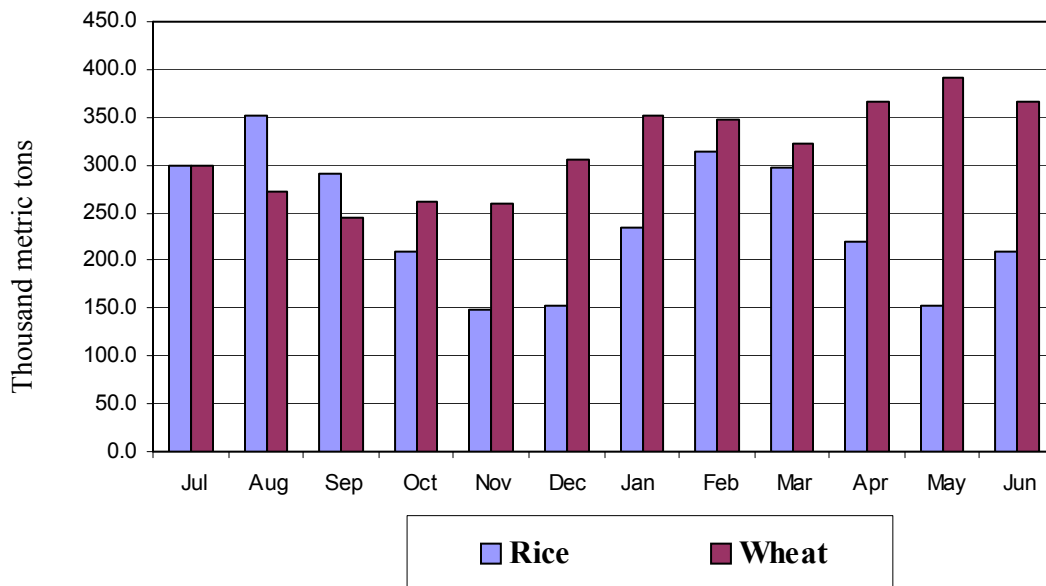
	Base	Option 1	Option 2
PFDS stock level→	0.7 million tons	0.8 million tons	0.6 million tons
Total distribution→	1.45 million tons	1.45 million tons	1.35 million tons
Stock available for distribution ('000 MTs)	700	773	600
Rice	300	390	300
Wheat	400	383	300
Lowest available in any month ('000 MTs)	624	689	408
Rice	200	214	148
Wheat	302	373	245
Total distribution ('000 MTs)	1,454	1,455	1,350
Rice	614	648	650
Wheat	840	807	700
Distribution of old stock ('000 MTs)	332	908	516
Rice (> 7 months)	332	557	234
Wheat (> 8 months)	0	351	282
Total Net Outlay (billion taka)	12.23	12.63	12.87

Source: FPMU data and authors' calculations.

The Team has also undertaken an analysis of costs and benefits under alternative levels of public stocks and their distribution. However, before discussing the results, two specific points need further clarifications. First, the stock level indicated in the table is

the opening stock of the fiscal year, which changes every month, depending on off-take and procurement. In other words, the optimal stock is a dynamic concept, not a fixed number for the entire year. Second, in order to be able to manage unanticipated food security threats, such as floods and other natural calamities, the stock level is not allowed to fall below 250 thousand tons at any given point in time. The dynamic pattern of security stock levels by month is presented in Figure 7. These clearly reflect the seasonality of food availability in the country. In particular, two peaks in the graph show two harvesting seasons and the dips reflect the lean seasons.

Figure 7—Monthly FPDS security stock, FY02



A decomposition of costs and benefits under alternative levels stock and distribution is presented in Table 37. As observed in the actual PFDS operation in FY02, when net stock increased to about 0.8 million tons, keeping the distribution level the same as the base scenario, the amount of old stock increases from 332 tons to 908 tons. This leads to a negative benefit (the sum of producer and consumer subsidies) with a benefit/cost ratio equal to -14 percent. Although not reported here, given the current program requirement of the PFDS, any increase in stock leads to the same conclusion.

Therefore, several combinations of reduced stock and distributions were tried. The best combination, reported as Option 2 in Table 37, was found to be 0.6 million tons of net stock (300 thousand tons of rice and 300 thousand tons of wheat) and 1.35 million tons of total distribution (650 thousand tons of rice and 700 thousand tons of wheat). Under this option, the benefit to cost ratio also increased from -14 percent to 74 percent.

Table 37—Decomposition of costs and benefits under alternative stock options

	Base	Option 1	Option 2
PFDS stock level →	0.7 million tons	0.8 million tons	0.6 million tons
Total distribution →	1.45 million tons	1.45 million tons	1.35 million tons
Total net outlay (billion taka)	12.23	12.63	12.87
Excess book value of FFW wages	-1.87	-2.40	-1.75
Adjusted net outlay	14.10	15.03	14.62
Change in net outlay	0	0.92	0.51
Change in net benefit ^a	0	-0.13	0.38
Change in net benefit/ change in net outlay	--	-14%	74%
Value of quality loss as % of net outlay	4.05	6.76	4.98

^a Benefits are equal to the sum of the producer subsidy and consumer subsidy at market price.

The Team concludes that with the closure of FFE (about 350 thousand tons) and downsizing of the PFDS operation, such as the FFW program (more than 200 thousand tons) in 2002, the ideal PFDS stock level and its distribution should be 0.6 and 1.35 million tons, respectively. Results also suggest that the implicit cost of holding higher stock can be substantially high: about Tk 0.85 billion, which translates to roughly \$15 million at FY02 average exchange rate (Tk 57 = US\$1).

An Option to Improve the PFDS Revenue

It is widely understood that a significant proportion of food aid wheat, particularly the hard red varieties arriving from North America and Australia, are of high quality and fetch higher prices in the market. The relatively high price of hard red wheat can be attributed to the fact that it is more glutinous, an essential property for high quality bread, *semolina*, and some popular local sweets in the country (Ahmed et al. 1996). High prices of hard red wheat can have important efficiency implications for both the PFDS and private wheat market in the country, particularly given the share of food aid in the wheat market of Bangladesh. More specifically, as long as the price differential is significant,

and imported hard red wheat is more expensive,³⁹ private traders will have an incentive to procure this high quality wheat, either through leakage from the PFDS or by collecting it from the beneficiaries. In both cases, it involves higher transaction costs, which lead to overall market inefficiency. The objective of this section is to explore alternative policy options in order to eliminate this inefficiency.

Given that there is a high demand, and beneficiaries prefer the soft variety to the hard variety, one obvious option would be to sell this high quality wheat to private traders/millers through a tendering process. To explore the feasibility of such an option, three key sets of information are essential: (1) variety-specific price information on wheat, (2) estimates of total private demand, and (3) estimates of private import of hard red wheat. The first set of information is necessary to establish that the price differentials are indeed significant and the second set of information is necessary to substantiate that the food aid wheat does enter the private market. The Team attempted to collect this information from nationally published statistics and available secondary documents, with limited success. The time series data on monthly prices of wheat are available from published sources, but these data are not disaggregated by variety. To overcome this problem, monthly prices by variety of wheat were collected from a sample of flour millers for a period of one year, starting from November 2001. A simple analysis of this data suggests that the price differentials between food aid wheat and local varieties are very high. For instance, the average price of Hard Red Winter (HRW) wheat for this period was Tk 12,300 per metric ton, which was 44 percent higher than the local variety (Tk 8,600 per metric ton) (Table 38). The differentials for the other two varieties were 42 and 27 percent, respectively.

Regarding the estimates of private market demand, available data indicate that total private demand is smaller than the private import of hard wheat, implying that private traders do rely on the PFDS wheat to meet their demand. For example, Baulch, Das, and Zohir (1998) concluded that out of a total demand of 841 thousand metric tons in major and compact flour milling, an estimated 300 thousand tons came through the

³⁹ Although private import of foodgrain has been liberalized since 1992/93, there was high duty on the import of wheat (7.5 percent during November 1992 to June 1993 and 15 percent during July 1993 to December 1993). Currently, there is no duty on the import of wheat, but there is an ad valorem charge of about 13 percent on its cost, insurance, and freight (c.i.f.) value (Baulch, Das, and Zohir 1998).

Table 38—Monthly prices of food aid and local variety wheat

Months	Monthly price by varieties				Price differentials as percentage of local variety wheat		
	Hard Red	Hard Red	Australian	Local	Hard Red	Hard Red	Australian
	Winter	Spring	White		Winter	Spring	White
	(thousand Tk/metric ton)				(percent)		
November-01	11.7	11.8	10.7	8.0	46	47	33
December-01	11.7	11.6	10.7	8.1	45	43	32
January-02	11.8	11.5	10.9	8.6	37	33	27
February-02	11.7	11.6	10.7	8.8	33	33	22
March-02	12.0	12.0	10.2	8.7	38	38	18
April-02	12.8	11.9	10.1	8.5	51	40	19
May-02	12.8	11.6	10.4	8.2	56	41	27
June-02	12.8	11.6	10.5	8.6	49	35	23
July-02	12.7	12.9	10.6	9.0	41	44	19
August-02	12.6	12.9	11.3	8.8	42	46	28
September-02	12.9	12.5	12.0	8.7	48	44	39
October-02	12.4	13.8	12.1	8.8	41	57	38
Annual Average	12.3	12.1	10.9	8.6	44	42	27

Source: Study team's calculation from the survey of flour millers, 2002-03.

PFDS, 240 thousand tons came through private import, and the rest was met by local supply. The other two types of wheat millers, crushers and roller millers, also receive an estimated 500 thousand tons from the PFDS, accounting for about 33 percent of their demand. It should be noted, however, that the total PFDS wheat distribution was much larger (1,000-1,500 thousand metric tons) when this study was conducted. Moreover, the distribution of wheat in some high leakage programs, such as FFW and TR, was also large (550-750 thousand metric tons).⁴⁰

Putting these results together, three appealing reasons for the GOB to explore this option emerge. First, if the high quality food aid grain can be sold through tendering at higher than OMS or GOB procurement prices, it has the potential to generate substantive revenue for the PFDS. Second, by formalizing an illegal trading practice, it will contribute to improving transparency and reducing the transaction costs of the private millers/traders. Finally, since the beneficiaries prefer soft wheat over hard, it will not reduce their welfare. This implies that tendering out high quality food aid wheat can be a *Pareto improving* solution to the problem of leakage. In other words, it will improve the benefits without hurting any of the parties involved.

⁴⁰ See Ahmed et al. (1996) for discussion on estimates of leakage in various channels.

Using the estimates of price differentials, transportation costs, and assuming that 60 percent of the food aid could be auctioned out for more than the OMS or GOB procurement price, some simple estimates of potential additional PFDS revenue for selected years are presented in Table 39.⁴¹ With reference to OMS and the procurement price, two sets of estimates are reported (columns 8 and 9 and 11 and 11), which are calculated under the assumption that food aid wheat can be sold at Tk 10.00/kg and Tk 11.00/kg, respectively. The results indicate that the gains from tendering out food aid wheat could have been substantial. They would have ranged from Tk 30.31 crore (or \$5.32 million) to Tk 176.16 crore (or \$30.9 million), suggesting that the PFDS balance sheet would have significantly improved, had the GOB adopted this policy option during the FY99-FY02 time period.

Table 39—Potential additional revenue from the sales of high quality food aid wheat

Year	Food aid wheat (in 000 tons)	GOB price of wheat (Tk/kg)					Additional revenue from the sales of food aid wheat (crore takas)			
		60 percent of total food aid (3)	Open Market (4)	Proc. Price (5)	Food aid wheat (6)	Local variety (7)	If sold at Tk 10/kg		If sold at Tk 11/kg	
							Compared to OMS price (8)	Compared to proc. price (9)	Compared to OMS price (10)	Compared to proc. price (11)
1998/99	1,174.4	704.6	8.5	8.8	12.45	9.1	105.70	84.56	176.16	155.02
1999/00	865.4	519.2	8.5	8.9	11.77	8.6	77.89	57.12	129.81	109.04
2000/01	459.2	275.5	8.5	8.9	11.90	8.7	41.33	30.31	68.88	57.86
2001/02	501.6	301.0	8.0	8.9	11.77	8.6	60.19	33.11	90.29	63.20

Notes: The additional revenue from the sales is the difference between the value of available high quality wheat at GOB prices and proposed prices.

⁴¹ There are two important assumptions in these calculations. First, it is assumed that 60 percent of the food aid wheat are of hard red variety and can be sold out through tendering. Since more than two-thirds of the food aid is normally supplied by Australia, Canada, and the United States, this assumption is rather conservative. Second, it is assumed that a price differential of at least Tk 700 to Tk 1,700 per metric ton between market price and the tender price would encourage private millers to participate in the tender, which is a conservative assumption. According to the survey of the transportation market for this study, average cost of transport per metric ton from Chittagong to Dhaka is Tk 700 per metric ton. Also note that if the grain is released from Narayanganj or Ashuganj silos, the transportation cost can be substantially lower, making it more attractive for the traders to participate in the tender.

Summary

This chapter has examined the operational performance of the PFDS, paying close attention to institutional structure, stock management, losses, and the economic and social costs of its operation. In addition to conducting three surveys, a large amount of secondary data/public documents has been analyzed to address these issues. The results show that compared to earlier decades, the performance of the PFDS improved in the 1990s, particularly in terms of reducing losses, managing stocks, and realigning its focus more toward poverty alleviation programs. However, there are still areas that, through appropriate policy interventions, can be further improved to enhance the overall operational efficiency of the system.

Losses in the PFDS have declined substantially in the 1990s. Transit loss of foodgrains, which was as high as 3.5 percent of total distribution in the 1980s, declined to 0.30 percent between 1998-2002. Storage losses have declined from 1.5 percent to 0.72 percent. The value of these losses, however, is still large.

Despite underutilization of storage facilities, the movement of PFDS foodgrain from one local supply depot (LSD) to another LSD within a district is high. The rationale for such intra-district movement is to increase the efficiency of storage in the domestic foodgrain procurement zones where local storage capacity can be quickly exhausted during the procurement season. However, such movement has also been common in the nonprocurement regions, such as Chittagong and Barisal.

Timeliness of food aid arrival is an important determinant in the PFDS stock management. Food aid arrivals frequently coincide with the GOB's domestic procurement seasons, leading to higher losses due to more movements and higher stock rotation time.

Contributions to the DGF's internal transportation, storage, and handling (ITSH) costs vary widely across donors. The donors' contributions to ITSH also vary, depending on whether food aid is valued at the PFDS cost price, the GOB ration price, or the open market price. When total costs are broken down, donors' contributions to ITSH are 11 percent, whereas food aid constitutes about one-third of the total PFDS operation.

Given recent changes in the national food policy, such as the closure of the Food-for-Education (FFE) and downsizing of the Food-for-Work (FFW) programs, the current national food security stock level of 800 thousand metric tons appears to be high. A

stock of 600 thousand metric tons of wheat and rice (300 thousand metric tons each) would be cost-effective. Stock levels greater than this increase total PFDS costs because of quality deterioration, higher transit costs and storage losses, and suboptimal use of its administrative structure.

The difference between the prices of local variety and food aid wheat serves as an incentive for private traders to procure food aid wheat, either from the PFDS or from the beneficiaries who often sell their ration to buy other necessary consumption goods. As the following chapter shows, beneficiaries prefer white wheat to red wheat.

4. Food Distribution at the Beneficiary Level

Background

Despite making remarkable progress in food production since 1975, and experiencing steady and significant economic growth in recent years, pervasive poverty and undernutrition persist in Bangladesh. The most startling consequence of widespread poverty in Bangladesh is that about half of the country's 133 million people cannot afford an adequate diet. About a quarter of the population—the hard-core poor—maintains a precarious existence. Chronically underfed and highly vulnerable, these people remain largely without assets (other than their own labor power) to cushion lean-season hunger or the crushing blows of illness, flooding, and other calamities. The need for targeted food interventions therefore remains strong.

However, program efficiency must improve, especially given the backdrop of declining donor and GOB resource commitment to targeted food assistance programs. In particular, it is necessary to reduce system leakage in order to realize greater benefits from the existing targeted programs. Achieving this objective would first require an assessment of the source and magnitude of system leakage. This information is critical in modifying the rules and operation of the distribution system in order to improve overall program performance.

There are a number of food-aided targeted assistance programs for the poor in Bangladesh. These programs represent the “non-sale” (nonmonetized) channels of the PFDS. In view of the nationwide coverage and new dimension of the food-aided activities, the TOR chose the Vulnerable Group Development (VGD) and the Integrated

Food Security (IFS) programs for this food aid leakage study at beneficiary level, with the following objectives⁴²:

1. To assess the capacity and the efficiency of the food distribution system (both in quantity and quality) used for delivery of rations to targeted beneficiaries under the VGD and IFS programs;
2. To review the systems and efficiency of the storage, carrying, and weighing of commodities, including equipment and cost management;
3. To review other factors that influence the food distribution to beneficiaries, starting from the LSD to household levels; and
4. To examine and recommend ways and means for minimizing problems/leakages in food distribution and management.

The VGD program in Bangladesh is the world's largest development intervention of its kind that exclusively targets women. About 500,000 ultra-poor rural women in the country receive support under the VGD program. Participants of the VGD program receive a monthly ration of 30 kg of wheat over a period of 24 months, combined with a package of development training and activities.

The IFS is a new component of the 2001-2005 GOB/WFP Country Program, which focuses on improving food security and the nutritional well-being of participants in the most food-insecure parts of the country. The program is currently implemented in three districts of northern Bangladesh. The IFS program includes three components: the Community Nutrition Initiative (CNI), Training and Nutrition Centers (TNC), and Food-for-Asset creation (FFA).

Resources are contributed to the VGD and IFS programs by the WFP (40 percent), bilateral donors (30 percent), and the GOB (30 percent). In 2002, VGD and IFS used about 74 percent and 3 percent of the Country Program resources, respectively. Appendix 3 provides detailed descriptions of the VGD and IFS programs.

⁴² The TOR had included an assessment of the VGD *Atta* Fortification Pilot Project in the scope of work for the study. However, the Steering Committee of the study decided not to undertake this assessment under the study.

Methodology

Defining and Estimating Leakage

Measuring the magnitude of leakage for the VGD and IFS programs would depend on how leakage is defined. For this study, leakage is defined as the unintended diversion of allocated food from officially listed program beneficiaries. The magnitude of leakage due to loss of food can be approximated by subtracting the total quantity of VGD or IFS food actually received by consumers from the quantity of food disbursed by each of these programs. The difference between what is supplied and what is actually received measures the extent of leakage in the system. The following five steps were used to estimate leakage:

1. Estimate the difference between monthly food entitlements and the quantity of food actually received by VGD and IFS beneficiaries. A positive difference will represent short ration from the entitlement.
2. Compare the list of program beneficiaries obtained from Union *Parishad* with that of actual beneficiaries identified in the village census. If fewer beneficiaries from the UP list are found in the census, then the number of nonexistent beneficiaries will represent the number of false or fictitious cards. A positive difference between the number of officially listed beneficiaries and the number of actual beneficiaries represents undercoverage.
3. Calculate the total quantity of short ration in survey unions by multiplying the average quantity of short ration in a union with the total number of listed beneficiaries in that union.
4. Calculate the total quantity of ration allocated to false or fictitious cards in a union by multiplying the food entitlement per card with the number of false or fictitious cards in that union. This represents the quantity of leakage arising from undercoverage.
5. Add the quantities from short rations and undercoverage leakage across all survey unions. This will represent the total quantity of food that disappeared at the beneficiary level of distribution. Divide this quantity by the total allocation of program food for the survey unions to estimate the percentage of leakage.

Data Collection

The analysis of food distribution at the household level presented in this chapter is based on data collected in household and institutional surveys that were planned and designed by IFPRI researchers. The Data Analysis and Technical Assistance Limited (DATA), a Bangladeshi consulting firm with expertise in conducting household and market surveys, carried out the surveys from November 2002 to January 2003 under the guidance of IFPRI researchers. This section describes how the surveys were conducted and their content.

Nationally representative samples of VGD and IFS beneficiaries were drawn for the program beneficiary survey. A complete listing of VGD and IFS cardholders by union, supplied by the WFP, was used for the sample frame. The sampling process and survey administration for the VGD program included the following steps:

1. From all 64 districts in the country, randomly selected 10 districts using probability proportional to size (PPS) sampling method, based on district-level total number of VGD cardholders.
2. Randomly selected one union from each of the selected districts, using PPS based on union-level total number of VGD cardholders.
3. Randomly selected four *mouzas* (villages) from each of the selected unions, with PPS based on *mouza*-level population data from the 1991 population census.
4. Carried out a complete census of households in each of the four selected *mouzas*.
5. From *mouza* census data, identified all VGD cardholders, and administered a questionnaire module to them, capturing various aspects of VGD program participation.
6. From *mouza* census data, randomly selected 20 VGD cardholders from each of the selected unions, and administered a comprehensive household survey questionnaire on them.
7. From *mouza* census data, listed all households not participating in the VGD program, and randomly selected 30 nonparticipant households from each of the selected unions, and then administered a comprehensive household survey questionnaire to them.

The sampling process and survey administration for the IFS program included the following steps:

1. Purposively selected Rangpur and Kurigram districts, which have all three components of the IFS program (FFA, TNC, and CNI) in operation, for sampling program unions.
2. Randomly selected two unions from each of the above two districts, using PPS based on union-level number of program participants.
3. Randomly selected four *mouzas* from each of the selected unions, using PPS based on *mouza*-level population data from the 1991 population census.
4. Carried out a complete census of households in each of the selected *mouzas*.
5. From *mouza* census data, identified all households that participated in any of the three components of the IFS program, and administered to them a questionnaire module to capture various aspects of IFS program participation.
6. From *mouza* census data, randomly selected 45 IFS participants (15 participants from each of the three IFS program components) from each of the selected unions, and administered a comprehensive household survey questionnaire to them.
7. From *mouza* census data, identified all households who did not participate in the IFS program, randomly selected 30 of them from each of the selected unions, and then administered a comprehensive household survey questionnaire to them.

Table 40 provides the list of survey locations and the number of VGD and IFS program participants surveyed in each of these locations. In total, 546 VGD cardholders and 525 IFS participants were surveyed.

Several questionnaires were used to survey VGD and IFS program participants, and various members of the institutions (such as UP chairpersons, NGO officials, user committees, etc.), who provide service to the programs. In addition, a village census questionnaire collected information on household demography and program participation from 16,731 households. The content of various questionnaires is summarized below.

1. The program participant questionnaires collected information on various issues, such as knowledge about the program, selection process, quantity and quality of wheat received, and sharing of wheat with non-cardholders.

Table 40—Survey locations and number of beneficiaries surveyed

District	Upazila	Union	Number of beneficiaries surveyed
VGD			546
Lamonirhat	Patgram	Kuchlibari	115
Gaibandha	Sundarganj	Dhopadanga	71
Naogaon	Atrai	Bisha	37
Serajganj	Raiganj	Dhangara	35
Narail	Lohagara	Noagram	27
Barguna	Amtali	Amtali	24
Kishoreganj	Nikli	Jaraitala	51
Manikganj	Saturia	Baliati	55
Gopalganj	Muksudpur	Banshbaria	111
Comilla	Homna	Chandpur	20
IFS-FFA			455
Rangpur	Badarganj	Madhupur	327
Kurigram	Nageswari	Noonkhawa	128
IFS-TNC			40
Ranpur	Badarganj	Madhupur	21
Kurigram	Nageswari	Noonkhawa	19
IFS-CNI			30
Ranpur	Badarganj	Madhupur	15
Kurigram	Nageswari	Noonkhawa	15

Source: Based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

2. The household questionnaire collected information on a wide variety of topics, such as household composition, occupation, education, dwelling characteristics, assets, expenditures, food consumption, and program participation.
3. Questionnaires administered to service providers captured various operational aspects of the programs.
4. A questionnaire collected data on actual physical weighing of wheat received by program beneficiaries on distribution days.

IFPRI researchers designed the draft questionnaires, pretested the questionnaires in the field, and then finalized them. IFPRI researchers also provided intensive training on each of the questionnaires to a team of well-experienced enumerators and supervisors from DATA, who carried out the surveys. Senior DATA officials closely and intensively supervised the surveys in order to ensure high quality data. A computerized data entry system with logical checks was designed and used for survey data entry and cleaning.

Results and Discussion

Assessing Beneficiary Selection Process

VGD Program. The guideline for implementing the VGD program stipulates that the Union *Parishad* VGD selection committee, with assistance from collaborating NGOs, should use the following process for selection of VGD women (MWCA 2002).

The first screening process includes a set of preconditions that require that a VGD cardholder should be:

1. A female head of household who is either widowed, divorced, abandoned by husband, or whose husband is disabled;
2. A woman who did not have a VGD card before;
3. A woman who is not a member of any service-providing agency, such as, NGOs, Rural Maintenance Program (RMP), etc., and;
4. Holding only one card in the household.

A VGD cardholder should meet one or more of the following five selection criteria:

1. A functionally landless woman who owns less than 0.15 acres of land;
2. A woman with low family income (defined as an income less than Tk 300 per head per month);
3. A woman of childbearing age (aged between 18 and 49 years);
4. A day laborer or casual laborer; and
5. Lacking productive assets.

Women of the following categories should get preference in the final list:

1. Physically and mentally fit to participate in training and income-generating activities;
2. Able to contribute to economic and social development; and
3. Willing to participate in group activities.

The household survey was designed to permit an assessment of the beneficiary selection process on the basis of the established selection criteria. Table 41 presents the

results of the assessment for the VGD program. For the first set of preconditions (that is, a VGD cardholder should be a woman who is head of household and is either widowed, divorced, abandoned by husband, or whose husband is disabled), 41.7 percent of cardholders met at least one component of this precondition set. The table also provides a breakdown of who met each component of this set of preconditions. None of the VGD women in the sample is a divorcee. This finding is consistent with the fact that, in rural Bangladesh, poor people rarely follow the legal divorce procedure. About 37 percent of the VGD cardholders were members of NGOs or other service-providing agencies at the time of joining, hence they did not fulfill this precondition for selection. NGO membership among the rural poor is widespread, and in some areas, it is hard to locate a poor household who is not already a member of an NGO organization. However, the level of benefits derived through such membership varies widely for different types of NGOs.

Table 41—VGD beneficiaries fulfilling the selection criteria

Selection process	VGD beneficiary women who fulfilled selection criteria (percent of all beneficiaries)
Preconditions for selection	
Female-headed, widowed, divorced, deserted by husband, disabled husband	41.7
Female-headed household	32.2
Widowed	37.7
Divorced	0.0
Deserted by husband	3.0
Disabled husband	1.5
Did not have a VGD card before	89.8
Was not a member of any service providing agency (NGOs, RMP, etc.) at the time of joining	62.8
Holding only one card in the household	100.0
Selection criteria	
Less than 0.15 acres of land owned	69.8
Income less than Tk 300 per head per month ^a	7.0
Child-bearing age woman	68.8
Daily or casual laborer	26.1
No productive asset	59.8

Source: Based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

Note: Ninety-four percent of the VGD cardholders met at least one of the five selection criteria.

^a Per capita monthly consumption expenditures, excluding income transfer from VGD ration, are used as a proxy for income.

The analysis reveals that 94 percent of the VGD cardholders met at least one of the five selection criteria. However, among the five selection criteria, it is most difficult (if not impossible) for the selection committee to accurately assess whether a VGD cardholder's family has an income of less than Tk 300 per capita per month. Verifying income is difficult in developing countries and particularly so in rural Bangladesh, because of the difficulty of documenting the level and sources of income of household members. This is mainly due to the lack of income tax records, as well as due to fluctuations in the level and source of income. Cardholder's self-reported income is likely to be either understated or inaccurate. Measurement of household income or expenditure requires expensive and time-consuming surveys. For this analysis, the household survey provided the data needed to estimate household consumption expenditure, which was then used as a proxy for income.⁴³ The results suggest that only 7 percent of the VGD cardholders have an estimated per capita income less than Tk 300 per capita per month.⁴⁴ The latest Household Income and Expenditure Survey (HIES) suggests that only 5.8 percent of all rural households had an income less than Tk 300 per capita per month in 2000 (BBS 2001).

Another criterion that is difficult to assess is "lack of productive asset," because it is not well defined. An asset that is used by a household to generate income (such as agricultural implements) is usually termed a productive asset. However, households can use some assets for consumption or income-generation or both (for example, a sewing machine). In this analysis, by incorporating a list of productive assets in the household survey questionnaire, and then asking the respondents if they owned any such assets, it was possible to verify this criterion.

According to one of the selection criteria, a VGD woman should be of childbearing age (between 18 and 49 years). About two-thirds of the beneficiaries met this criterion. The household survey results suggest the following age distribution of

⁴³ In this study, per capita consumption expenditures are used as a proxy for income for two reasons. First, expenditures are likely to reflect permanent income and are, hence, a better indicator of consumption behavior (Friedman 1957). Second, data on expenditures are generally more reliable and stable than income data. Because expenditures are intended to proxy for income, the terms "expenditure" and "income" will be used interchangeably.

⁴⁴ It should be noted here that the sample of VGD households were interviewed toward the end of the VGD cycle during the household survey, and it might be expected that the livelihood of many of these beneficiaries has improved due to their participation in the VGD program.

VGD women: 1 percent of the VGD women are below 18 years of age; 3 percent, between 18 and 22 years; 13.6 percent, between 23 and 30 years; 30.6 percent, between 31 and 40 years; 21.1 percent, between 41 and 49 years; and 30.7 percent of the women are above the child-bearing age of 49 years.

IFS Program. Partner-NGOs for FFA and CNI components, and community-based organizations (CBOs) for TNC component of the IFS program are responsible for identifying the ultra poor households, including malnourished women and children. These are the criteria for selection of FFA participants (LGD 2002):

1. Economically most vulnerable and socially most disadvantaged households;
2. Poor household members having malnourished pregnant or nursing mothers and children;
3. Female head of household who is either widowed, divorced, abandoned by husband, or whose husband is disabled should be given preference;
4. A functionally landless household that owns less than 0.30 acre of land;
5. Household members with extremely low and irregular, or no, family income, who make their living as daily or casual laborers;
6. Households without productive assets;
7. Participants should be interested in learning and using income-generating skills. They should be willing and able to participate in group activities.

Persons fulfilling the above criteria but participating in other ongoing programs (NGOs, RMP, VGD, etc.) are not eligible to participate in FFA. However, ex-VGD dropout women still suffering from malnutrition and hunger will get preference for selection.

The selection criteria of TNC women participants are (DWA 2002):

1. Female head of household who is either widowed, divorced, abandoned by husband, or whose husband is disabled should be given preference;
2. Functionally landless women (less than 0.50 acres of land);
3. Women from households with extremely low cash incomes (less than Tk 300 per month), low and irregular incomes, or no family income;
4. Women who are daily or casual laborers;

5. Women who lack productive assets;
6. Women above the age of 18 years (except for women below 18 years who have a child or children and are female heads of households);
7. Women who are not members of any NGO that provides comprehensive development services, including skill training, savings, and credit;
8. Women who have not received WFP food assistance before; and
9. Preference is given to women who are trainable (physically and mentally fit, and willing to participate in group activities).

The criteria for selection of CNI participants are (LGD 2002):

1. All children aged between 6 and 11 months;
2. Children aged 12-24 months whose mid-upper arm circumference (MUAC) measurement is less than 13.5 centimeters; and
3. Pregnant and nursing mothers whose MUAC measurement is less than 23 centimeters.

The compliance of beneficiary selection as per the criteria was not assessed for CNI. The CNI beneficiaries had been in the program for 6 to 8 months at the time of the survey. Therefore, the MUAC measurements for CNI beneficiaries (mothers and children) were likely to be higher at the time of the survey than at the time of selection, due to their intake of nutrient-fortified blended food.

Table 42 presents the results of the assessment for the FFA and TNC components of the IFS program. All TNC participants (100 percent) and 96.7 percent of all FFA participants met at least one of the seven selection criteria. Compared to TNC women, a substantially larger proportion of FFA women are heads of household, and are either widowed or deserted by their husbands. Most of these women in rural Bangladesh are destitute, maintaining a precarious existence. FFA requires both male and female beneficiaries to participate in physical work that mainly involves earth moving. Only out of desperation would a Bangladeshi, rural woman be willing to work alongside men in onerous, low-paying manual labor.

Table 42—FFA and TNC beneficiaries fulfilling the selection criteria

Selection criteria	FFA beneficiaries	TNC beneficiaries
	(percent of all beneficiaries)	
Female-headed, widowed, divorced, deserted by husband, disabled husband	50.0	26.7
Female-headed household	36.7	16.7
Widowed	46.7	16.7
Divorced	0.0	3.3
Deserted by husband	13.3	6.7
Disabled husband	0.0	0.0
Was not a member of any service providing agency (NGOs, RMP, etc.) at the time of joining	93.3	93.3
Less than 0.30 acres of land owned	80.0	...
Less than 0.50 acres of land owned	...	90.0
Income less than Tk 300 per head per month ^a	...	0.0
Daily or casual laborer	23.3	20.0
No productive asset	86.7	76.7
Above the age of 18 years	...	100.0

Source: Based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

Notes: 96.7 percent of all FFA participants and 100 percent of all TNC participants met at least one of the selection criteria. Ellipsis (...) indicates not applicable.

^a Per capita monthly consumption expenditures, excluding income transfers from FFA and TNC rations, are used as a proxy for income.

Prior Knowledge of Programs

Practically all VGD participants (99.6 percent) surveyed had prior knowledge of the VGD program. About half of them (46.7 percent) learned of the program from their neighbors and relatives, and almost a quarter (24.3 percent), from Union *Parishad* (UP) members (Table 43). In fact, 47.6 percent of the surveyed current participants had made prior unsuccessful attempts to join the program. When doing so, most of them (68.8 percent) were told that they would have to wait their turn, while 17.3 percent reported that their voices were simply not heard.

In the IFS program, all TNC and CNI beneficiaries had prior knowledge of the respective programs, and only 5 out of the 455 FFA participants surveyed indicated that they were unaware of the FFA program before they were selected. However, unlike the longer established VGD program, most IFS participants (72.7 percent of FFA beneficiaries and 52.5 percent of TNC beneficiaries) learned of the program from institutional sources such as the NGO involved or UP members, rather than from friends, relatives, and neighbors (Figure 8 for FFA and Figure 9 for TNC).

Table 43—Knowledge about the VGD program and selection process, by survey districts

	Lalmonirhat	Gaibandha	Naogaon	Serajganj	Narail	Barguna	Kishoreganj	Manikganj	Gopalganj	Comilla	Total
(percent of respondents)											
How the respondents knew about VGD program											
Found out herself	8.7	5.8	2.7	5.7	11.1	4.2	17.6	1.8	3.6	10.0	6.8
From NGO workers	0.9	0.0	0.0	0.0	0.0	4.2	0.0	3.6	2.7	0.0	1.3
From neighbors or relatives	39.1	43.5	70.3	37.1	55.6	50.0	33.3	54.5	51.4	45.0	46.7
From previous VGD member	12.2	18.8	2.7	11.4	11.1	12.5	9.8	12.7	29.7	15.0	15.8
From UP members	32.2	30.4	21.6	34.3	22.2	29.2	39.2	10.9	8.1	30.0	24.3
Other	7.0	1.4	2.7	11.4	0.0	0.0	0.0	16.4	4.5	0.0	5.1
N	155	69	37	35	27	24	51	55	111	20	544
Made an attempt before to get into this program but failed											
Attempted	57.4	53.5	62.2	34.3	25.9	58.3	64.7	54.5	27.0	35.0	47.6
Did not attempt	42.6	46.5	37.8	65.7	74.1	41.7	35.3	45.5	73.0	65.0	52.4
N	115	71	37	35	27	24	51	55	111	20	546
If attempted, but failed---											
Was told that her turn would come in the future											
	74.2	63.2	73.9	75.0	14.3	35.7	66.7	66.7	86.7	85.7	68.8
Was told that she did not meet any criteria											
	6.1	10.5	8.7	8.3	14.3	0.0	3.0	13.3	6.7	0.0	7.3
No one listened to her											
	9.1	10.5	4.3	8.3	71.4	64.3	30.3	20.0	6.7	14.3	17.3
Did not know											
	3.0	15.8	4.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.5
Other											
	7.6	0.0	8.7	8.3	0.0	0.0	0.0	0.0	0.0	0.0	3.1
N	66	38	23	12	7	14	33	30	30	7	260
How selected for the current program											
UP or NGO selected her, she did not have to ask											
	7.8	23.9	16.2	11.4	7.4	8.3	7.8	9.1	27.9	5.0	14.8
NGO selected her, she did not have to ask											
	0.0	0.0	0.0	0.0	3.7	0.0	0.0	0.0	0.0	0.0	0.2
Had to request for selection											
	48.7	40.9	73.0	40.0	70.3	91.7	84.3	50.9	35.1	60.0	52.9
Had to pay for selection											
	15.7	12.7	0.0	14.3	0.0	0.0	7.8	1.8	0.0	35.0	8.1
Her husband helped her											
	13.0	8.5	8.1	22.9	11.1	0.0	0.0	32.7	18.0	0.0	13.4
Other											
	14.8	14.1	2.7	11.4	7.4	0.0	0.0	5.5	18.9	0.0	10.6
N	155	71	37	35	27	24	51	55	111	20	546

Source: Based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

Note: N denotes number of observations.

Figure 8—Source of knowledge about FFA before joining the program

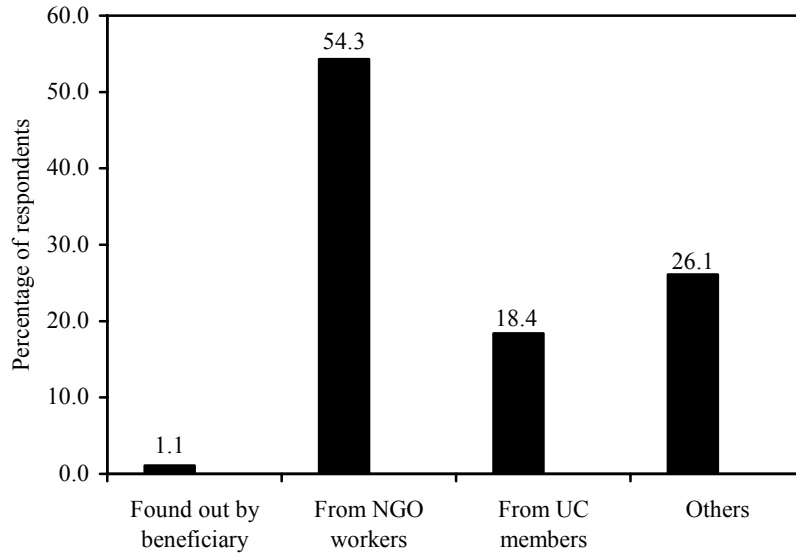
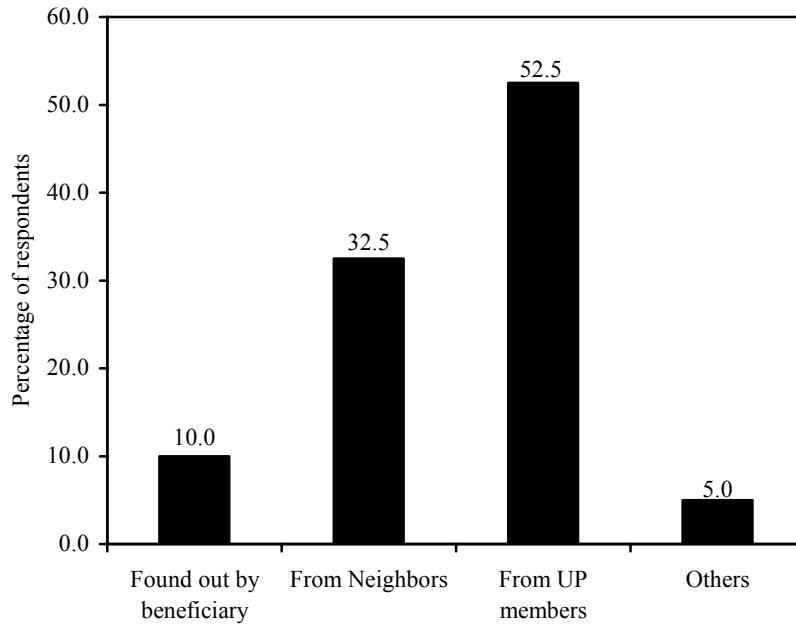


Figure 9—Source of knowledge about TNC before joining the program



Beneficiaries' Assessment of Selection Process

Respondents' descriptions of the basis of their selection into the VGD program (Table 43) indicate that persistent expression of demand by applicants played a very important role. More than half of the participants (52.9 percent) indicated that they had approached the program administrators themselves to request their selection. Only 15 percent indicated that they were included in the program without their asking either the relevant NGO or the UP chairperson. While VGD beneficiaries are only women, 13 percent indicated that their husbands played an important role in the selection process.

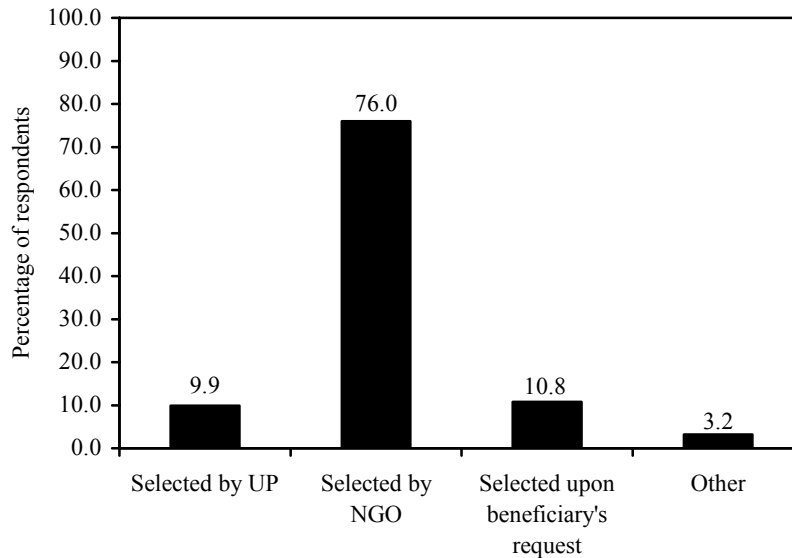
As far as the role of graft in securing selection is concerned, 8.1 percent of the VGD respondents indicated that they had "paid" to obtain the card. However, the prevalence of graft is by no means uniform across locations—no incidence of graft was reported in four of the VGD survey districts.

The selection process of IFS programs appears less "demand driven" than VGD programs. An overwhelming proportion of FFA participants (85.9 percent) reported that they were enrolled without their asking—76 percent reported that they were selected by the relevant NGO, while 9.9 percent reported that they were selected by UP members (Figure 10). TNC participants described similar circumstances: 96.6 percent reported that they were selected by the responsible NGO without their asking; they provided no specific answers to other selection-related questions, however.

While only about 4 percent of FFA participants reported that they "paid" to be enrolled in the program, an unusually high percentage of TNC participants—95 percent—reported paying cash. This finding for TNC can be partly explained by the malpractice of a CBO who was assigned to provide support to TNC in one of the two survey locations. This issue is further taken up in a section below.

Possession of VGD Cards and Collection of Rations

One of the operating rules of the VGD program stipulates that the women must possess their VGD cards, and this requirement is written on the card. It must, however, be noted that an overwhelming 76.9 percent of the VGD respondents indicated that they did not possess their VGD card at the time of the interview. When asked about the reasons, 62.0 percent of them reported that the UP officials kept their cards. In fact, the card was not even issued to 24.2 percent of them, even though they knew that they were

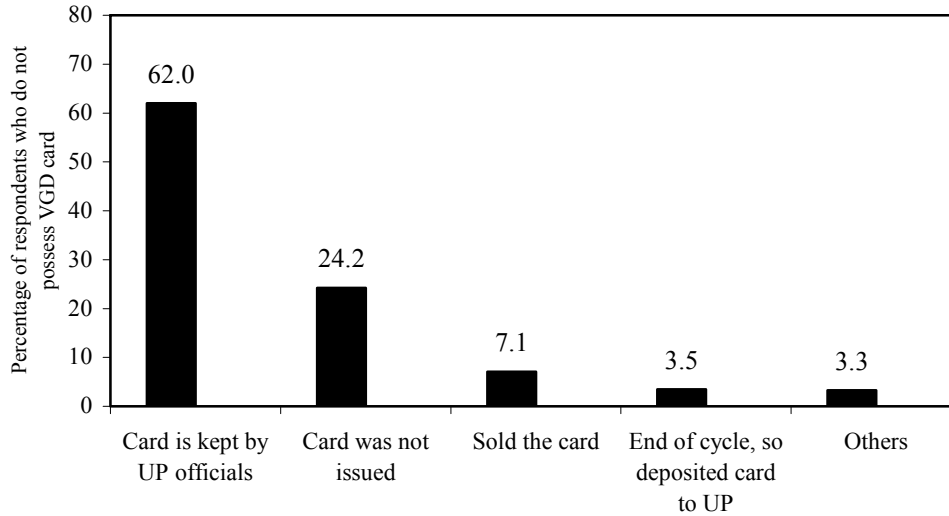
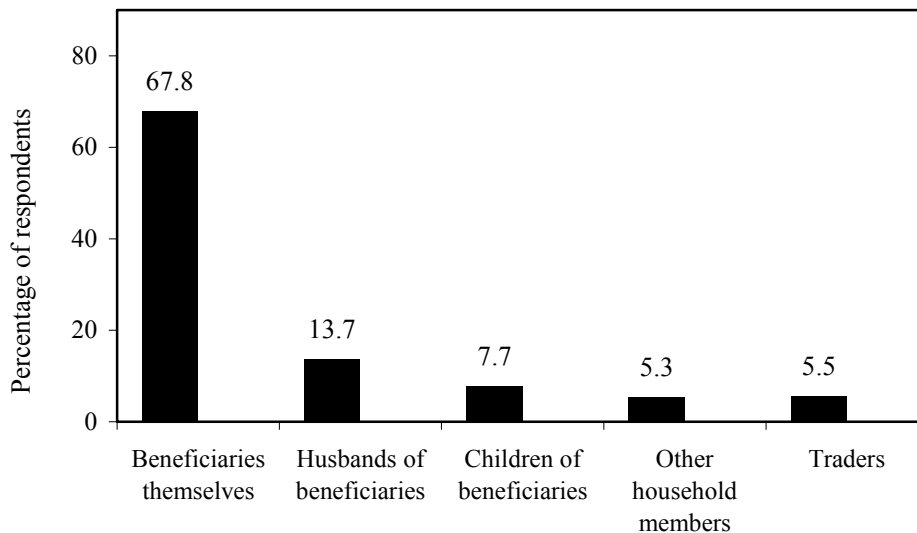
Figure 10—How selected in FFA

listed as VGD beneficiaries and received their rations by showing their BRAC savings passbook. Furthermore, 7.1 percent of the respondents without the card reported that they had sold their VGD cards to local traders who lift the ration (Figure 11). These findings are certainly a matter for concern and corrective action should be taken.

Almost a third of the beneficiaries reported that someone else and not themselves picked up their ration (Figure 12). Family members of the beneficiaries (husband, children, and other family members) collected rations for 26.7 percent of the beneficiaries. However, 5.5 percent of the beneficiaries admitted that local traders lifted their rations as they had sold their cards to these traders.

Color and Quality of Wheat Received, and Its Use

VGD beneficiaries' assessments of the quality of wheat receipts are provided in Table 44. More than two-thirds of the beneficiaries (64.4 percent) reported receiving red wheat, when individual preferences are quite the opposite: 85.8 percent of them reported white wheat to be preferable. When asked about the quality of wheat received at the last distribution prior to the survey, 63.8 percent of the respondents indicated the quality of

Figure 11—Reasons for not possessing VGD cards, by beneficiaries**Figure 12—Persons who collected VGD ration**

wheat to be either good or very good, while 36 percent rated the quality to be not good. Among the latter, about half (50.9 percent) reported that the quality was bad because of insect or pest infestation and 41.8 percent reported that their ration contained too much dust and other foreign materials. Only a negligible proportion of respondents (0.2 percent) indicated the received ration to be unfit for human consumption.

Table 44—Beneficiaries' assessments of quality of VGD wheat, by survey districts

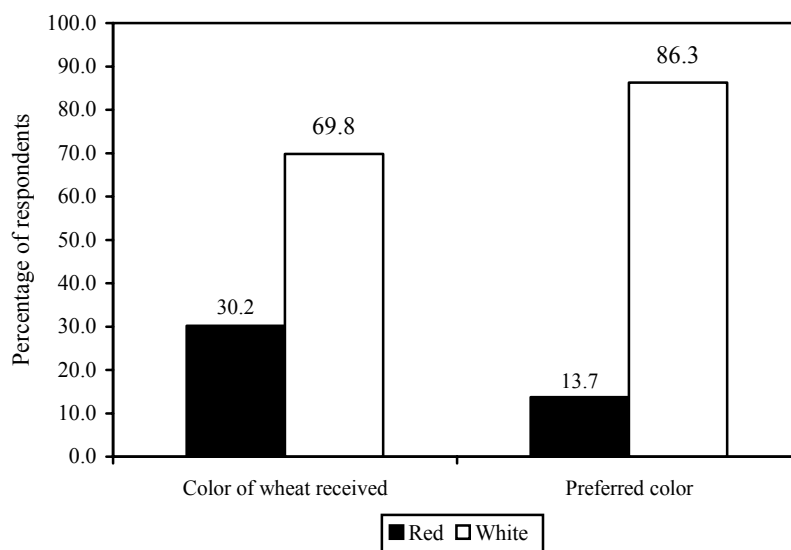
	Lalmonirhat	Gaibandha	Naogaon	Seraiganj	Narail	Barguna	Kishoreganj	Manikganj	Gopalganj	Comilla	Total
(percent of respondents)											
Color of wheat received											
Red	66.1	38.2	40.5	40.0	55.6	79.2	98.0	98.2	69.4	20.0	64.4
White	33.9	61.8	59.5	60.0	44.4	20.8	2.0	1.8	30.6	80.0	35.6
N	115	71	37	35	27	24	51	55	111	20	546
Preferred color of wheat											
Red	30.4	11.6	5.4	20.0	0.0	0.0	9.8	7.3	14.4	0.0	14.2
White	69.6	88.4	94.6	80.0	100.0	100.0	90.2	92.7	85.6	100.0	85.8
N	115	69	37	35	27	24	51	55	111	20	544
Quality of wheat in the last distribution											
Very good	1.8	1.5	0.0	0.0	11.5	0.0	5.9	0.0	1.8	15.0	2.6
Good	62.3	67.6	75.7	74.3	76.9	25.0	76.5	18.2	63.1	75.0	61.2
Not so good	13.2	19.1	21.6	2.9	11.5	33.3	15.7	9.1	19.8	0.0	15.3
Bad	19.3	7.4	2.7	14.3	0.0	37.5	2.0	56.4	14.4	10.0	17.0
Very bad	3.5	2.9	0.0	8.6	0.0	4.2	0.0	16.4	0.9	0.0	3.7
Unfit for human consumption	0.0	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
N	114	68	37	35	26	24	51	55	111	20	541
If bad quality, then what was the problem?											
Had too much dust and foreign particles	16.0	42.9	100.0	62.5	0.0	80.0	0.0	30.8	70.6	50.0	41.8
Insect/pest infested	72.0	42.9	0.0	37.5	0.0	20.0	100.0	61.5	29.4	0.0	50.9
Bad smell	12.0	14.3	0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0	6.4
Other	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	50.0	0.9
N	25	7	1	8	0	10	1	39	17	2	110

Source: Based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

Note: N denotes number of observations.

Compared to the VGD program, there is much better convergence between household preference and wheat variety supplied under the IFS program. In the FFA component, 69.8 percent of the beneficiaries reported receiving white wheat, the preferred variety of 86.3 percent of the beneficiaries (Figure 13). The situation is similar in the TNC program—69.6 percent of the beneficiaries reported receiving white wheat, the preferred variety of 87 percent of them (Figure 14).

Figure 13—Color of wheat received from FFA and beneficiaries' preferences



As far as quality was concerned, an overwhelming proportion of FFA (83.6 percent) indicated that the wheat they received was either good or very good, while 16.4 percent described it as not good (Figure 15). Among those dissatisfied with the quality, insect infestation was the concern of 76.9 percent of FFA respondents (Figure 16). Assessment of quality was similar in the TNC—95.8 percent of the respondents who actually received wheat considered it to be of good quality (Figure 17).

As mentioned in Chapter 3 of this report, laboratory tests were carried out for wheat samples collected from PFDS silos, CSDs, and LSDs; as well as from beneficiaries of VGD and IFS programs. Two sets of tests were conducted—physical and chemical. Physical tests investigated the wheat samples in terms of dust and foreign matter content,

Figure 14—Color of wheat received from TNC and beneficiaries' preferences

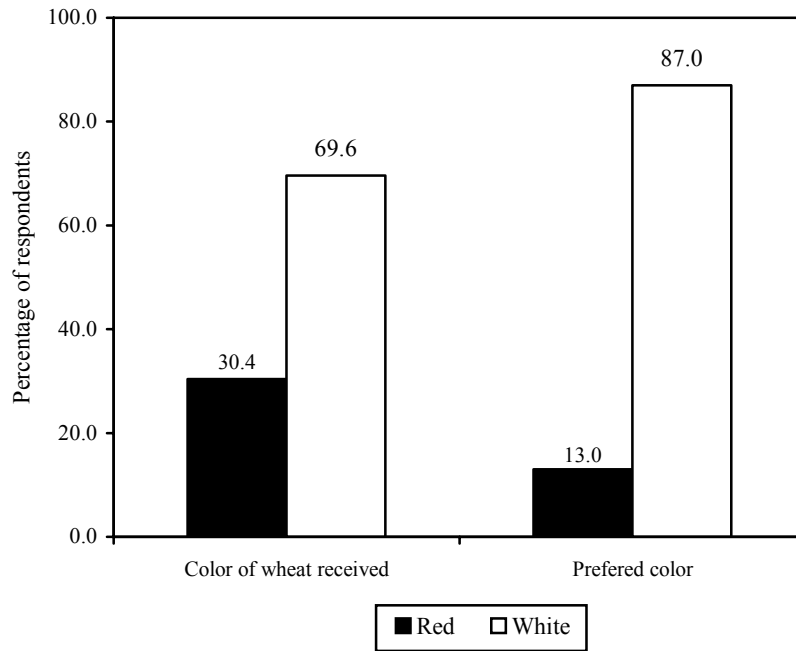


Figure 15—Beneficiaries' assessments of quality of wheat received from FFA

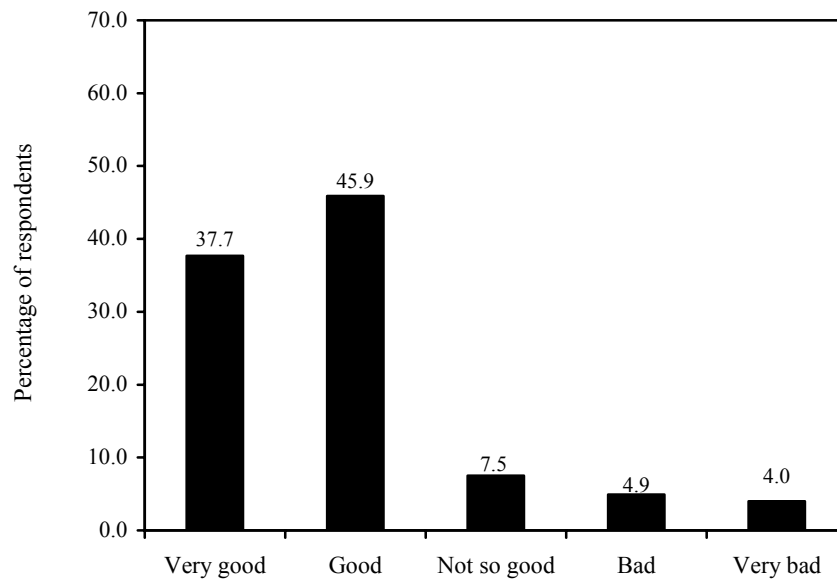
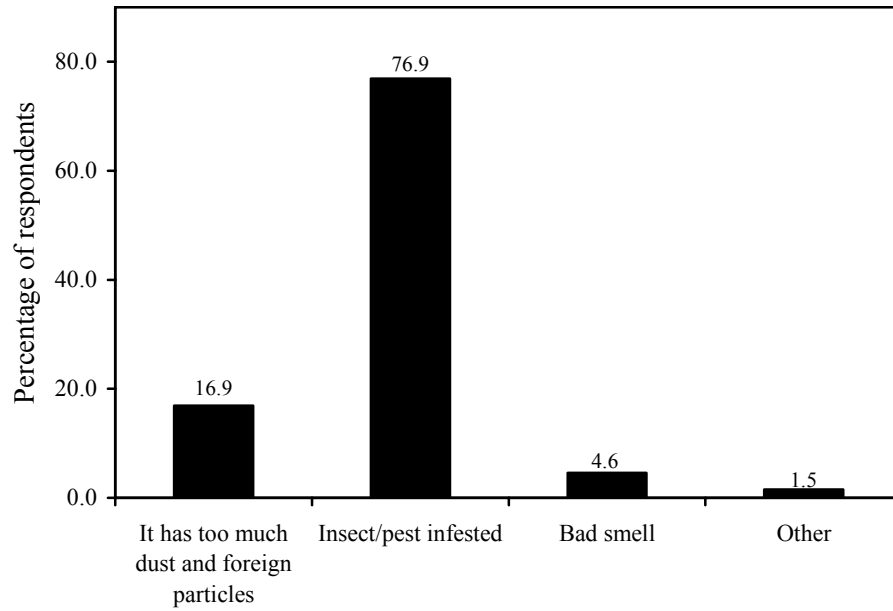
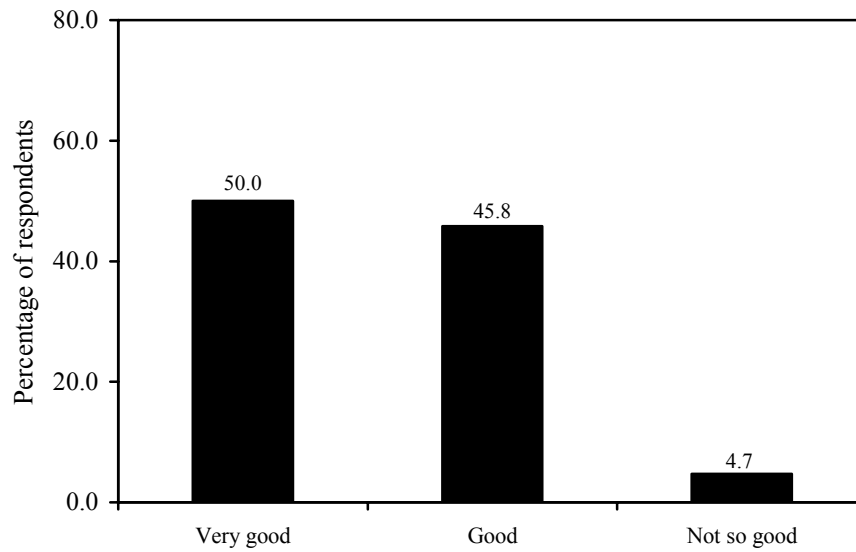
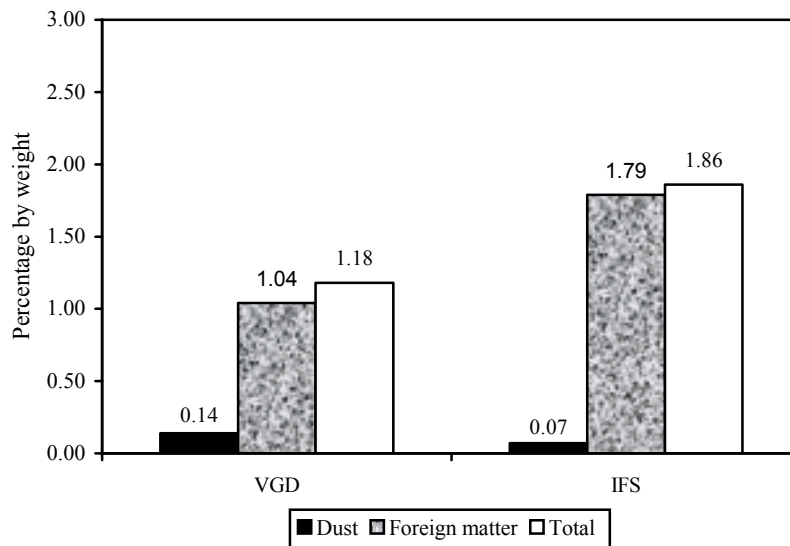


Figure 16—Problems with bad quality of wheat from FFA**Figure 17—Beneficiaries' assessments of quality of wheat received from TNC**

grain size, color, and smell, as well as broken and damaged grain content. Chemical tests assessed the moisture, protein, fat, carbohydrate, ash, and fiber contents of the wheat samples. Appendix 2 provides details on the methodology of the tests, the results, and a discussion of the results. The summary of key findings of the laboratory-based analyses of wheat samples collected from VGD and IFS beneficiaries during the beneficiary survey are presented in this section.

Figure 18 shows the average dust and other foreign matter content in the samples.⁴⁵ For wheat, the Ministry of Food set the maximum allowable foreign matter content at 3 percent by weight. The average amount of dust and other foreign matters in the samples collected from VGD (1.18 percent by weight) and IFS (1.86 percent by weight) beneficiaries are well within this limit.

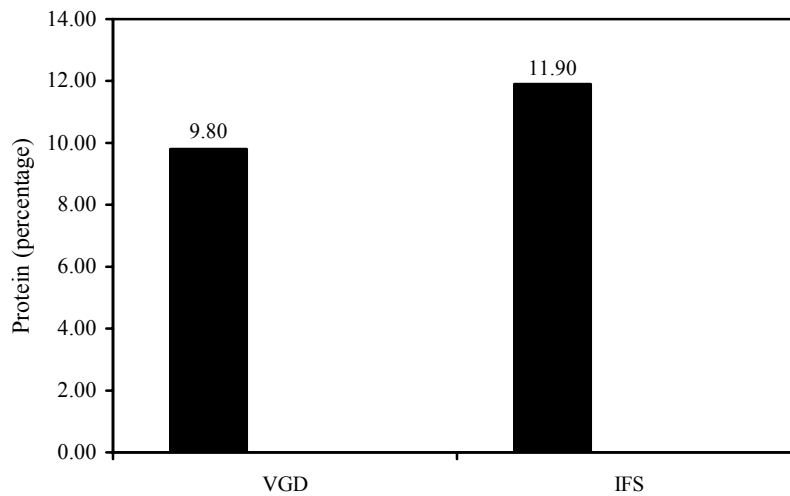
Figure 18—Laboratory test results on quality of wheat received by beneficiaries: Average dust and other foreign matter content



⁴⁵ Survey enumerators had collected wheat samples from VGD and IFS beneficiaries before the beneficiaries cleaned their wheat ration.

The Ministry of Food does not set standards for calorie and protein content of wheat. The analyses therefore used the recommended calorie and protein content of wheat from the Institute of Nutrition and Food Sciences of the University of Dhaka as standards. The recommended figures are 11.8 grams of protein and 346 kilocalories (kcal) per 100 grams of wheat (INFS 1992). Figure 19 indicates that the average protein content of VGD wheat samples is 9.8 grams—about 17 percent less than the standard. The average protein content of IFS wheat samples (11.9 grams) is slightly higher than the standard. In terms of average calorie content, VGD and IFS wheat samples do not deviate significantly from the standard (Figure 20).

Figure 19—Laboratory test results on quality of wheat received by beneficiaries: Average protein content



A sizable proportion of the VGD beneficiaries—47.1 percent—reported selling either a part or all of the received wheat ration, and the quantity of wheat sold accounted for about one-third of the total quantity of wheat that the beneficiaries received (Figure 21). There was, however, considerable variation in wheat sales by beneficiaries across locations, ranging from 16.2 percent of the beneficiaries in Gopalganj to 70.6 percent in Serajganj.

Figure 20—Laboratory test results on quality of wheat received by beneficiaries: Average calorie content

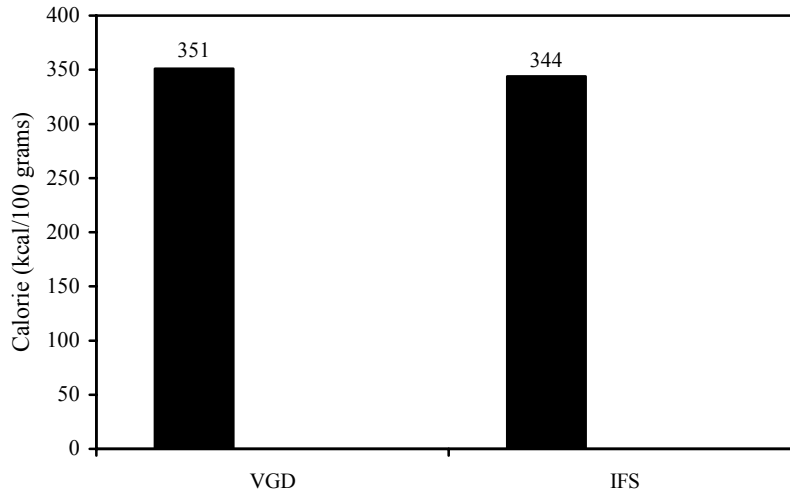


Figure 21—VGD wheat sales, by beneficiaries

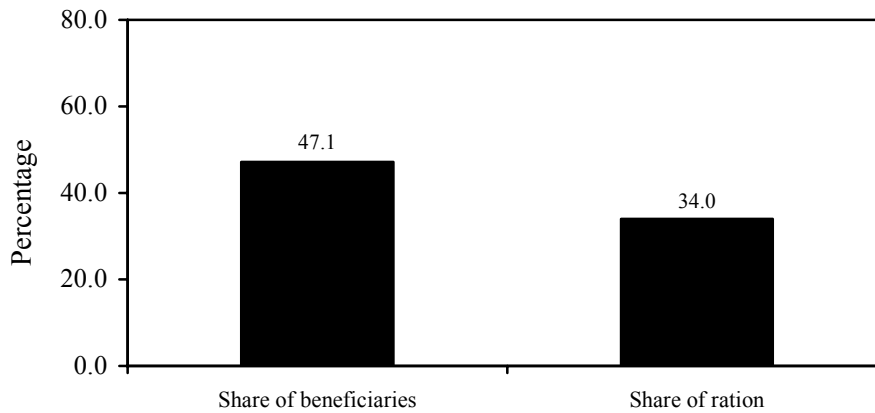
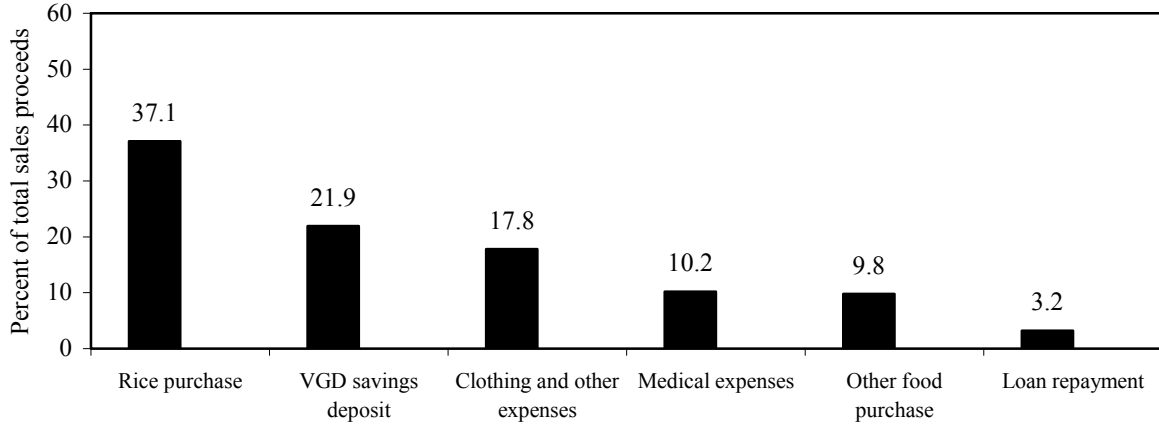


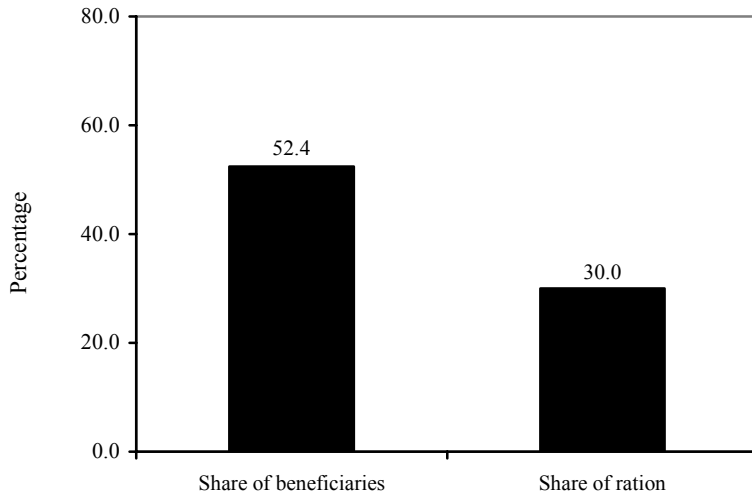
Figure 22 illustrates how the VGD beneficiaries who sold their ration used the proceeds. They spent a major share of the total sales proceeds (37.1 percent) to buy rice, which is the preferred staple food for Bangladeshis. They also used about 22 percent of the proceeds to make the mandatory monthly savings deposits in order to maintain their eligibility for the VGD program. This result suggests that there is a need to reform the system of savings deposits for the program.

Figure 22—Use of wheat sales proceeds, by VGD beneficiaries who sold their ration



While a little more than half of FFA beneficiaries (52.4 percent) reported selling at least some part of their wheat receipt (Figure 23), only 5 percent of TNC beneficiaries did so. The FFA beneficiaries who sold their wheat ration used 43.7 percent of the total sales proceeds to buy rice. They spent the remainder of the proceeds on buying other foods, covering medical expenses, and repaying loans.

Figure 23—Sale of FFA wheat by beneficiaries from last ration



Cost of Foodgrain Distribution and Verification of LSD Weighing Scales

One of the likely reasons for distributing less than the entitled quantity of wheat to VGD beneficiaries is that the authorized foodgrain distributors at the union level (usually UP chairpersons) supposedly sell a portion of the program wheat in the market in order to recoup the distribution costs. The study investigated this practice.

The UP chairperson-and-member survey for the VGD program obtained detailed information on the monthly cost of wheat distribution for six months prior to the survey date. On average, a UP foodgrain distributor covers about 194 VGD cardholders and distributes about 5.81 metric tons of wheat per month. Table 45 shows that the total cost of wheat distribution borne by distributors averaged Tk 278 per metric ton. Tk 150 per metric ton is realized from the sale of the empty wheat sacks. Thus, the average net cost of distribution per metric ton is Tk 128, which translates into 14.83 kilograms of wheat (calculated at the market price prevailing during the survey) per metric ton, or 1.5 percent of total VGD wheat allotment in a union.

Table 45—Average cost of VGD foodgrain distribution borne by Union *Parishad*, and proceeds from sales of empty sacks

Item	Cost and sales proceeds (taka per metric ton)
Foodgrain lifting, loading, and unloading cost	83
Foodgrain carrying cost	176
Other costs (gratuity and other transaction costs)	19
Total cost	278
Proceeds from sales of empty sacks	150
Net cost	128

Source: Based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Service Provider Survey," Bangladesh.

The VGD operational guideline estimates the average foodgrain transportation and handling costs from LSD to distribution site at Tk 205 per metric ton, and stipulates that half of this cost should be paid to each UP chairperson in cash (by check) as a commission to cover transportation and handling costs. The UP chairpersons should recover the other half of the stipulated cost from the sale of empty sacks. This means that each UP chairperson should receive a commission of Tk 102.50 per metric ton. This is about 20 percent less than the net cost borne by the UP chairpersons for wheat

distribution, as Table 45 suggests. The rate of commission was set in 1986 and has not been revised since that time.

Furthermore, 75 percent of the UP chairpersons report that either it takes a very long time to receive the permissible transport and handling commission (4 to 6 months after distribution), or they do not receive the commission at all. This provides an impetus for leakage. If the distributor does not receive the commission on time, then he may be compelled to sell a portion of the VGD wheat (about 1.5 percent, as the estimate above suggests) in order to recover the distribution cost. One of the UP chairpersons admitted that he had received 3.84 metric tons of wheat from LSD for distribution in the month preceding the survey, and that he sold 200 kilograms (5.2 percent of the quantity received) for Tk 1,400 (below market price) in order to recoup the transport and handling costs.

Most UP chairpersons (80 percent) report that the quantity of wheat they receive from LSD is less than their allotted quantity for the VGD program. Many of them believe that the main reason for this discrepancy is due to the LSD scales showing more than what the wheat actually weighs. During the LSD survey, the enumerators verified the LSD weighing scales by comparing their own body weight measured by UNISCALE⁴⁶ with that measured by the LSD scale. For the LSDs supplying wheat to the VGD beneficiary survey unions, the results suggest that the difference between the two measurements was negligible. LSD scales over-weighed the enumerators by only 0.03 percent (see Appendix 1, Table 54). The allegation that the LSD scales inflate the weight of the wheat is unfounded.

Nevertheless, the survey of UP officials indicates that, on average, they received 3.5 percent less wheat from LSDs than their allotted quantity. This finding is based on the triangulation of responses and verification of records of the UP officials who physically weighed the VGD wheat they received from the LSDs. Part of this shortage is due to the weight of the gunny bags that contain the wheat. This is not usually deducted at the time of weighing wheat at LSDs for delivery to UP officials. In order to estimate the shortfall arising from this practice, the enumerators weighed empty gunny bags that contained VGD wheat. The average weight of a gunny bag is 890 grams, which accounts for 1.1 percent of an 85-kilogram bag of wheat.

⁴⁶ A scale developed by UNICEF for weighing children and their mothers to assess their nutritional status.

Leakage in the VGD Program

Leakage Arising from Undercoverage of Beneficiaries. One potential leakage arises when the number of cards actually distributed to VGD beneficiaries is less than the number reported in program documents. These documents are used to set wheat allotments to a particular VGD program union. In order to check the prevalence of fictitious beneficiaries or simply undistributed cards, the names on the official list of program beneficiaries (kept at the Union *Parishad's* office) were tallied against the names of beneficiaries reporting enrollment in the program in the village census conducted for this study.

The survey showed leakage due to undercoverage to be insignificant in the VGD program. The incidence of false cards was only 0.48 percent of the total number of cards allocated to the VGD program. In fact, zero undercoverage was reported in 8 of the 10 districts. In the districts where undercoverage was found (Barguna and Gopalganj), it was quite low (3.45 percent and 1.43 percent, respectively). Undercoverage is therefore not a serious problem as far as the VGD program is concerned.

There are two main factors that might help to minimize the problem of undercoverage in the VGD program. First, undercoverage caused by the creation of fictitious beneficiaries can be easily detected during monitoring visits by the GOB and WFP officials. Second, the number of officially listed beneficiaries is automatically cross-checked against the number of actual beneficiaries in the process of executing the development activities of the VGD program by service providing NGOs.

Entitlement and Reported Receipts. Almost all VGD participants (98.7 percent) reported themselves to be knowledgeable of program entitlements (Table 46). However, this knowledge does not ensure receipt of the full entitlement of wheat. VGD rations are normally distributed by UP officials at the UP office premises on a designated day of each month (usually mid-month). When asked how much they received at the most recent distribution day prior to the survey, 94.3 percent of the surveyed VGD women reported receiving less than their full monthly entitlement of 30 kilograms. About 24.9 percent reported receiving at least 28 kilograms of wheat, while the majority—46 percent—reported receiving in the range of 25-28 kilograms. A further 18.6 percent

reported receiving in the range of 20-25 kilograms, and 10.5 percent reported receiving less than 20 kilograms.

Average receipts of wheat in the reference distribution day (as reported by participants) are provided in Table 46. The reported quantities of wheat received include those cardholder-beneficiaries whose rations were shared with non-cardholders by the persons responsible for distribution. The average receipt for the entire sample is 23.8 kilograms, which is 21 percent less than the official entitlement of 30 kilograms. There is, however, considerable variation in receipts by location: it ranges from 15.1 kilograms in Narail to 23.3 kilograms in Gopalganj to 28.2 kilograms in Naogaon.

Assessment of Discrepancies. VGD beneficiaries' assessments of wheat receipts are in considerable variance with wheat receipts recorded in their ration cards and the official 30-kilogram entitlement. In practice, wheat is usually brought in 85-kilogram jute bags from LSDs, and the UP distribution committee members at the distribution site individually weigh rations at the time of distribution. This weight is recorded in each beneficiary's ration card.⁴⁷ Can the discrepancy between beneficiary-assessed receipts (23.8 kilograms) and the 30-kilogram entitlements (amounting to 6.23 kilograms per beneficiary per month) provide a good measure of the scale of leakage at the distribution level? The answer is likely to be negative.

First, discrepancies are likely to be due to differences in the accuracy of weighing techniques and the devices used. Table 46 shows the reported method used by beneficiaries to assess the weight of a received ration. Nearly one-half of them (44.4 percent) report that they "weighed ration at home before cleaning" and another 23 percent indicated that they "weighed ration at home after cleaning." It is unrealistic to expect that impoverished households possess reasonably accurate weighing scales, especially ones calibrated in the metric system. Indeed, survey enumerators, based on group discussions with community members, reported that beneficiaries normally get

⁴⁷ The average amount recorded on VGD cards is 29.8 kilograms, though it varies somewhat across locations. A fuller discussion of this result is not presented as it is based on only a small fraction of the beneficiaries who could show their cards to survey enumerators. Receipts recorded on the VGD cards are slightly below the official entitlement of 30 kilograms. This is likely the result of a number of factors, such as short supply from LSD, error margins in weighing both at LSDs and distribution points, deductions from supply received from LSD to finance transportation or to distribute to needy persons present at the distribution site.

Table 46—Receipt of VGD wheat ration, by survey districts

	Lalmohrhat	Gaibandha	Naogaon	Seraiganj	Narail	Barguna	Kishoreganj	Manikganj	Gopalganj	Comilla	Total
	(percent of respondents)										
Knowledge about entitlement											
Know	98.3	98.6	100.0	94.3	100.0	100.0	100.0	100.0	98.2	100.0	98.7
Do not know	1.7	1.4	0.0	5.7	0.0	0.0	0.0	0.0	1.8	0.0	1.3
N	115	71	37	35	27	24	51	55	111	20	546
Beneficiaries' assessment of weight of wheat received (kg/month)											
Beneficiaries' assessment of the weight of wheat received	26.3	21.9	28.2	26.7	15.1	21.8	23.5	25.4	23.3	23.6	23.8
Beneficiaries weighed it at the site	115	71	37	35	27	24	51	55	111	20	546
Beneficiaries' assessment of the weight of wheat received											
Beneficiaries weighed it at the site	5.2	8.8	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.0	2.4
Asked someone to weigh it for her	29.6	7.4	2.9	42.9	0.0	4.2	5.9	3.6	1.8	5.0	11.8
Weighed it at home before cleaning	48.7	47.1	45.7	22.9	51.9	33.3	25.5	52.7	48.6	50.0	44.4
Weighed it at home after cleaning	11.3	26.5	28.6	8.6	18.5	29.2	7.8	36.4	36.9	25.0	23.3
Did not weigh	5.2	10.3	22.9	25.7	29.6	33.3	58.8	7.3	12.6	20.0	18.1
N	115	68	35	35	27	24	51	55	111	20	541
Reasons for receiving less quantity than entitlement											
Distributor received less from LSD	3.9	7.5	0.0	3.0	0.0	8.3	38.8	34.0	1.9	5.0	10.3
Distributor sold/used wheat to cover transportation and handling expenses, and paid distribution workers in wheat	48.0	29.9	11.5	21.2	64.0	70.9	36.7	11.3	39.2	60.0	37.6
Distributor gave to other needy people	7.8	11.9	0.0	18.2	20.0	4.2	2.0	7.5	14.0	0.0	9.5
Distributor gave to some as personal favors or kept for himself	21.6	43.2	15.4	12.1	8.0	0.0	2.0	24.5	13.1	15.0	18.2
Other	18.6	7.5	73.1	45.5	8.0	16.7	20.4	22.6	31.8	20.0	24.5
N	102	67	26	33	25	24	49	53	107	20	506

Source: Based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

Note: N denotes number of observations.

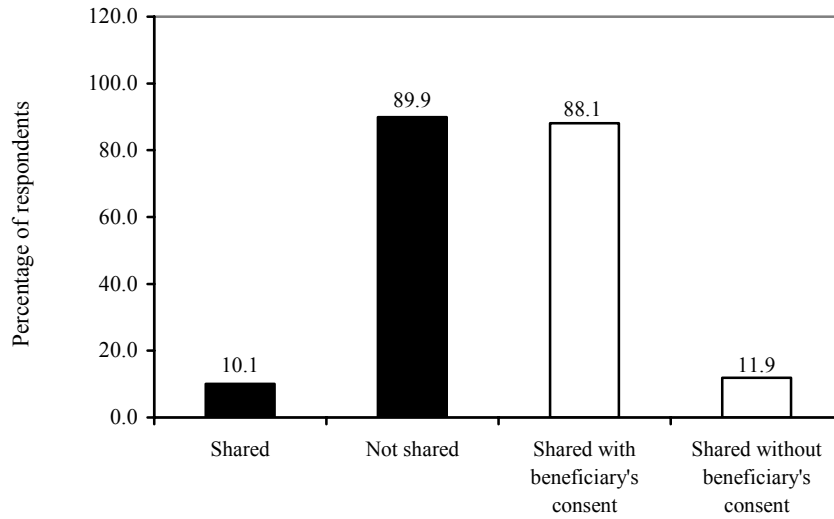
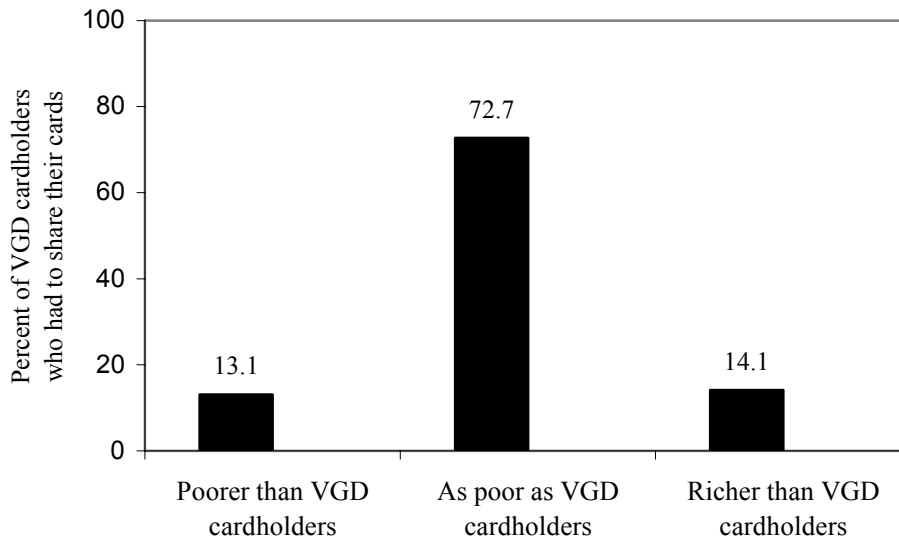
their rations weighed at local grocery shops. These shop owners have an incentive to show less than the actual weight of the ration by tampering with their scales, since many beneficiaries sell all or part of their rations to these shops. Discrepancies arising out of inaccuracies in weighing are therefore expected to be quite large.

Second, the discrepancy is also due to the prevailing practice of card “sharing,” whereby UP officials asked some selected beneficiaries to share their wheat ration with someone not selected for the VGD program. In the survey, 55 out of the 546 participants (10.1 percent) reported that they were made to share their ration in this manner (Figure 24). Even though 88.1 percent of the beneficiaries whose cards were shared reported that they had “consented” to the sharing rule, their consent was probably “on a take it or leave it” basis. This was evident in the fact that 74 percent of them actually took steps—although unsuccessfully—to prevent the UP distribution committee from making them share. Sharing clearly constitutes “leakage” when it is strictly interpreted to include any shortfall in food rations to beneficiaries resulting directly from any contravention of program rules. However, imposing sharing rules is also one way for UP officials to deal with the high excess demand for program enrollment by the poor at the local level. Indeed, about 86 percent of the VGD cardholders who had to share their cards perceived that the non-cardholders with whom they shared their ration were either poorer or as poor as the cardholders themselves (Figure 25). The issue of card sharing is further discussed below.

Third, it is usually the case that on distribution day, many needy persons not selected in the VGD program gather to plead or beg for food. Frequently, small portions of wheat from cardholder-beneficiaries’ entitlement are taken and distributed to such persons.

Fourth, the transportation and handling allowance provided to the UP distribution committee is frequently not sufficient to cover the actual cost of transporting wheat from LSDs to the final distribution sites. In such cases, a small portion of the wheat is often sold to finance transportation costs. The analysis concerning this issue was presented previously.

Beneficiaries’ own assessment of why they received less than the full entitlement of 30 kilograms, described in Table 46, also supports some of the above factors contributing to the shortfall. Many (37.6 percent) indicated part of the wheat received at

Figure 24—Involuntary sharing of VGD wheat ration**Figure 25—VGD cardholders' perceptions of economic status of persons with whom they had to share cards**

the distribution center was used to pay the workers, such as the weigh master (*Koial*) and the laborers who haul grains, or to finance transportation and handling of wheat bags from the LSD to the distribution site. The practice of ad hoc distribution to needy persons not covered by the program is reported by 9.5 percent of beneficiaries.

However, the perception of unauthorized diversion of VGD wheat was not uncommon, especially in some locations. For the sample as a whole, 18.2 percent of the beneficiaries opined that ration shortfalls were a result of the distributor keeping some wheat either for himself or for giving away to nonbeneficiaries as personal favors. In Gaibandha District, this perception was shared by as many as 43.2 percent of beneficiaries, while in Barguna District, it was markedly absent (Table 46). When asked about whom is primarily responsible for leakage, 44 percent of the 370 respondents who answered that particular question implicated the UP chairperson. About 20 percent indicated that other UP members were responsible.

Three main conclusions emerge from this section. First, it is probable that receipts reported by beneficiaries are likely to be riddled with errors arising out of inaccuracies in weighing. This is a serious concern as relying on beneficiaries' assessments can potentially result in erroneous conclusions about leakage. Second, even after accounting for weighing inaccuracies, all shortfalls from the 30-kilogram entitlement cannot be interpreted as unauthorized leakage. Some of the received wheat is used as payment to cover legitimate expenses related to transportation, handling, and distribution. Third, given the practice of sharing as well as ad hoc distribution to the needy at distribution centers, what constitutes "leakage" becomes somewhat ambiguous. Under a strict interpretation of leakage, the practice of sharing clearly violates program rules, and therefore, constitutes a leakage. On the other hand, card sharing is most often used to address the otherwise irreconcilable chasm between the number of VGD cardholders and the large number of eligible non-cardholders. To the extent that no corrupt motive is involved, and since sharing helps make the VGD program more acceptable to communities, it is indeed difficult to term it "leakage."

Estimates of Leakage Based on Actual Weighing. A number of studies in Bangladesh estimated leakage in the food intervention programs (Ahmed 1992; Ahmed 1993; Ahmed and Billah 1994; Ahmed and Shams 1994; Asaduzzaman and Huddleston 1983; Chowdhury 1993; del Ninno 1998; World Bank 2002). However, leakage estimates in all of these studies were based on program beneficiaries' self-reported weights of rations received.

Because self-reported weights contain large measurement errors, IFPRI conducted a separate survey for this study (parallel to the beneficiary household survey). In that

survey, field surveyors physically weighed received ration amounts on the day of the distribution itself, using UNICEF-developed “UNISCALE” weighing scales that are accurate to the nearest gram.⁴⁸ In order to do this without influencing the distribution process itself, surveyors made unannounced visits to the survey sites and intercepted beneficiaries returning home after collecting their ration from the distribution center. Beneficiaries were first asked whether they were “carrying” the whole amount of ration that they had collected. In order to obtain an estimate of leakage that does not depend on self-reported (and therefore potentially error-laden) quantities sold or shared, only wheat receipts of beneficiaries “carrying” the entire amount of ration were weighed.⁴⁹ The results of the survey are summarized in the upper part of Table 47.

The results of the on-the-spot physical weighing suggest that VGD beneficiaries received an average monthly amount of 27.75 kilograms of wheat, implying an average shortfall of 2.25 kilograms (7.53 percent of the full entitlement). Variation across districts is not significant except for Barguna, where an average weight of 25.48 kilograms was recorded. The estimated leakage of 7.53 percent is considered the preferred estimate, because it avoids the most problematic error arising in self-reported shortfalls—errors related to weighing by beneficiaries.

The estimated 7.53 percent shortfall from the VGD allocation can be broken down as follows:

- 3.5 percent of the allocated quantity of wheat is not received by UP officials from LSDs at the time of delivery. The weight of the gunny bags probably accounts for 31 percent (1.1 percent of the total allocation) of this shortfall. The weight of the total amount of wheat delivered to UP officials typically represents gross rather than net weight, as the weight of the gunny bags is seldom deducted from the gross weight (see earlier discussion).
- 0.3 percent (due to inadequate commissions to cover transport and handling costs) to 1.5 percent (when UP officials do not receive any of their commission) of the allocated wheat may be sold by UP officials if they choose to recover the

⁴⁸ UNICEF developed this scale for weighing children and their mothers for assessing their nutritional status.

⁴⁹ Physical weighing excluded those VGD cardholders whose rations were shared or who already sold a portion of their ration.

distribution cost by selling a portion of the VGD wheat in the market (see earlier discussion).⁵⁰

- 2.53 percent to 3.73 percent of the allocation is due to pilferage and *ad hoc* distribution to the needy who come begging for wheat at the distribution center at the time of ration delivery to VGD women.⁵¹

In computing the total leakage, however, leakage due to undercoverage and use of fictitious cards needs to be added to leakage due to short ration. This is done in the second last column in Table 47 (undercoverage is discussed above). Total leakage at the distribution stage therefore amounts to 8.01 percent of the total quantity of wheat allotted to the VGD program in the survey districts—a nationally representative sample of the VGD program in Bangladesh. The lower part of Table 47 shows the estimate of leakage based on the beneficiary-reported weight of wheat received: 13.30 percent. On the whole, the estimate of leakage based on beneficiary's assessment of weight exceeds the actual leakage by 66 percent.

Short Ration Due to the Sharing of VGD Cards. It should be noted that the estimates of leakage mentioned above do not include either card sharing *or ad hoc* distribution to noncardholders. Though the concept of leakage becomes somewhat ambiguous when card sharing is considered, not including it at all would result in an underestimate of the true leakage, because the practice of involuntary card sharing clearly violates program rules. A further disturbing factor is that the decision about which cardholders will be required to share appears to be made on an *ad hoc* basis. Such practice opens the door for perverse discretion and corruption. Hence, an assessment of short-rationing due to sharing is also of interest.

The findings of the assessment are presented in Table 48. About 10 percent of the VGD cardholders reported that they had received only one-half of their ration entitlement because UP members made them share their cards with a non-cardholder woman. Though sharing is not prevalent in two districts (Naogaon and Serajganj), the shortfall

⁵⁰ These percentages are calculated at the average market price of wheat prevailing at the time of conducting field surveys for the study. The percentages would be higher if UP officials sell VGD wheat at a price below the market price.

⁵¹ These poor people do not include those noncardholder women who receive wheat due to the practice of VGD card-sharing.

Table 47—Leakage estimates for the VGD program

Survey district	Survey union	Total		Wheat received per card	Short ration per card	Total short ration in union		Total wheat allotment in union	Short ration relative to allotment	Incidence of false cards (undercoverage)	Leakage
		number of cards in union	number of cards in union			kilograms per month	percent				
Estimates are based on physical weighing of wheat received (excluding shared rations)											
Lalmonirhat	Kuchlibari	235	28.63	1.37	322	7,050	4.57	0.00	4.57	0.00	4.57
Gaibandha	Dhopadanga	248	26.74	3.26	808	7,440	10.87	0.00	10.87	0.00	10.87
Naogaon	Bisha	374	27.82	2.18	815	11,220	7.27	0.00	7.27	0.00	7.27
Serajganj	Dhangora	231	28.27	1.73	400	6,930	5.77	0.00	5.77	0.00	5.77
Narail	Noagram	128	26.7	3.3	422	3,840	11.00	0.00	11.00	0.00	11.00
Barguna	Amtali	101	25.48	4.52	457	3,030	15.07	3.45	18.52	0.00	18.52
Kishoreganj	Jaraitala	150	28.74	1.26	189	4,500	4.20	0.00	4.20	0.00	4.20
Manikganj	Baliati	160	28.73	1.27	203	4,800	4.23	0.00	4.23	0.00	4.23
Gopalganj	Bashbaria	259	n.a.	1.43	...	0.00	...
Comilla	Chanderpur	50	26.61	3.39	170	1,500	11.30	0.00	11.30	0.00	11.30
Total		1,936	27.75	2.25	3,786	50,310	7.53	0.48	8.01	0.48	8.01
Estimates are based on beneficiary reported weight of wheat received (excluding shared rations)											
Lalmonirhat	Kuchlibari	235	26.49	3.51	825	7,050	11.70	0.00	11.70	0.00	11.70
Gaibandha	Dhopadanga	248	24.16	5.84	1,448	7,440	19.47	0.00	19.47	0.00	19.47
Naogaon	Bisha	374	28.24	1.76	658	11,220	5.87	0.00	5.87	0.00	5.87
Serajganj	Dhangora	231	26.67	3.33	769	6,930	11.10	0.00	11.10	0.00	11.10
Narail	Noagram	128	25.22	4.78	612	3,840	15.93	0.00	15.93	0.00	15.93
Barguna	Amtali	101	24.74	5.26	531	3,030	17.53	3.45	20.98	0.00	20.98
Kishoreganj	Jaraitala	150	24.27	5.73	860	4,500	19.10	0.00	19.10	0.00	19.10
Manikganj	Baliati	160	26.55	3.45	552	4,800	11.50	0.00	11.50	0.00	11.50
Gopalganj	Bashbaria	259	26.55	3.45	894	7,770	11.50	1.43	12.93	1.43	12.93
Comilla	Chanderpur	50	24.08	5.92	296	1,500	19.73	0.00	19.73	0.00	19.73
Total		1,936	25.90	4.10	7,445	58,080	12.82	0.48	13.30	0.48	13.30

Source: Estimated by authors based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

Notes: n.a. = data not available; ellipses (...) indicate not applicable.

Table 48—VGD wheat shortfall from entitlement due to sharing of cards

Survey district	Survey union	Total number of cards in union	Shared cards (percent of all cards)	Wheat received per card	Total shortfall in union (kilograms per month)	Total wheat allotment in union	Shortfall from entitlement (percent)
Lalmonirhat	Kuchlibari	235	0.87	13.00	35	7,050	0.49
Gaibandha	Dhopadanga	248	10.14	12.21	448	7,440	6.02
Naogaon	Bisha	374	0	...	0	11,220	0.00
Serajganj	Dhangora	231	0	...	0	6,930	0.00
Narail	Noogram	128	66.67	12.42	1,500	3,840	39.07
Barguna	Amtali	101	12.50	13.67	206	3,030	6.80
Kishoreganj	Jaraitala	150	3.92	12.00	106	4,500	2.35
Manikganj	Baliati	160	5.45	16.33	119	4,800	2.49
Gopalganj	Bashbaria	259	18.92	13.38	814	7,770	10.48
Comilla	Chanderpur	50	0	...	0	1,500	0
Total		1,936	10.13	13.04	3,228	58,080	5.56

Source: Estimated by authors based on data from IFPR's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

Note: Ellipses (...) indicate not applicable.

arising out of sharing is exceptionally high in Narail (39.07 percent of entitlement). Overall, it amounts to 1.67 kilograms per beneficiary per month, or 5.56 percent of the full entitlement. Thus, if leakage includes short rations due to sharing, then total leakage in the VGD program becomes 13.57 percent of the total wheat allotment.

Comparison with Recent World Bank Estimates. The leakage estimates for the VGD program reported in this study are much lower than the leakage estimated in a 2002 World Bank report on poverty in Bangladesh (World Bank 2002). The World Bank study concludes, like this report, that leakage in the VGD program arises principally out of short ration (beneficiaries are provided with less than their full entitlement) rather than undercoverage (the number of true beneficiaries is less than the number for whom food was allocated). However, their estimate of leakage (41-66 percent) is far higher than the best estimate of 8.01 percent reported in this study when sharing is not included, and 13.57 percent when sharing (5.56 percent) is included. What are the reasons behind this wide divergence?

The World Bank estimate is based on the 2000 Household Income and Expenditure Survey (HIES) conducted by the Bangladesh Bureau of Statistics (BBS), in which sample households were asked the amount of wheat and rice received in the past 12 months from the VGD, VGF, GR, and FFE programs. To use the information derived from the 2000 HIES in conjunction with program off-take figures may lead to an inaccurate estimate of leakage in the VGD program. The reasons for this are discussed below.

First, the sampling framework of the HIES, based on the geographic distribution of the population, does not provide a representative sample of the VGD beneficiaries. The VGD coverage is higher in relatively more food-insecure areas. About half of all VGD cardholders belong to only 21 percent of all unions in the country. Hence, the distribution of VGD beneficiaries across Bangladesh is not similar to the distribution of the population of Bangladesh. As a result, the population-based sampling weights that the World Bank study used to estimate the total number of beneficiaries and average foodgrain receipts are not appropriate. The sampling framework used in this study is especially designed to draw a representative sample of VGD beneficiaries. Sampling weights used to compute averages are based on beneficiary numbers rather than total population (see discussion above).

The World Bank leakage estimates are based on self-reported wheat receipts by beneficiaries. As this study shows, self-reported receipts of wheat are significantly contaminated by measurement errors and are likely to be much lower than the actual receipts. Errors in self-reporting in the World Bank estimates are further aggravated by the exceptionally long recall period of 12 months used in the HIES. These considerations give rise to serious concerns regarding the overall accuracy of World Bank leakage estimates based on the HIES data.

As the World Bank report itself recognizes, the VGD wheat receipts reported in HIES are not properly referenced to the length of the respondent's enrollment in the program. This is an area of concern especially since the 2000 HIES was staggered over 12 months (started in January and ended in December); interpretation of reported quantities becomes highly problematic. For example, two otherwise identical beneficiaries would have reported different amounts of total rations received over the previous 12 months, depending on at what point of the VGD cycle they were interviewed for the 2000 HIES. The VGD cycle for these beneficiaries was an 18-month cycle, which started in July 1999 and ended in December 2000.

*Leakage in the IFS Program*⁵²

Leakage Arising Out of Undercoverage of Beneficiaries. As in the case of VGD, program managers use a pre-set number of the TNC or FFA program participants as the basis for specifying wheat allotment to each program location. In order to check for leakage due to undercoverage or use of fictitious names, the names on the official beneficiary list were tallied with the list of actual participants obtained from the IFPRI village census data. No inconsistency between the two lists was found in both the TNC and FFA programs. Therefore, there is no leakage arising out of undercoverage of beneficiaries in the IFS program.

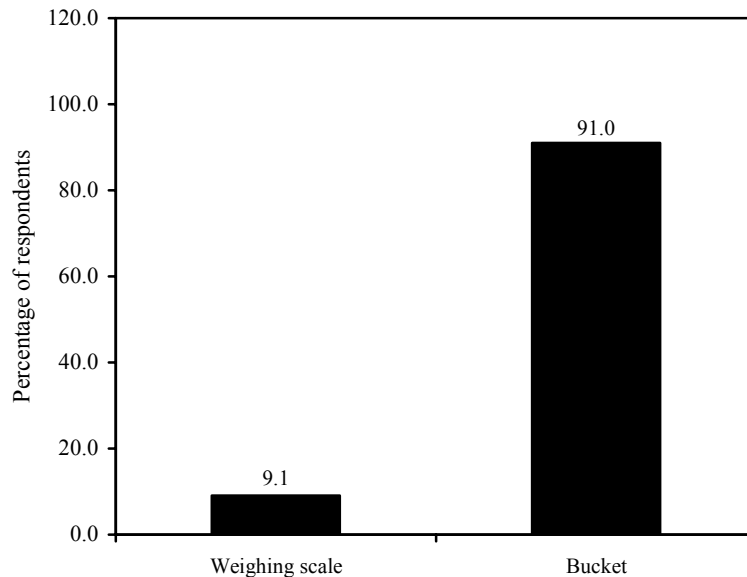
Entitlement and Reported Receipts. All FFA and TNC beneficiaries were aware of the program entitlements of wheat ration. This is not surprising, since responsibility for

⁵² In this study, leakage estimates are made for wheat rations only. Since the CNI component of the IFS does not provide wheat rations, leakage estimates are made only for the FFA and TNC components of the IFS.

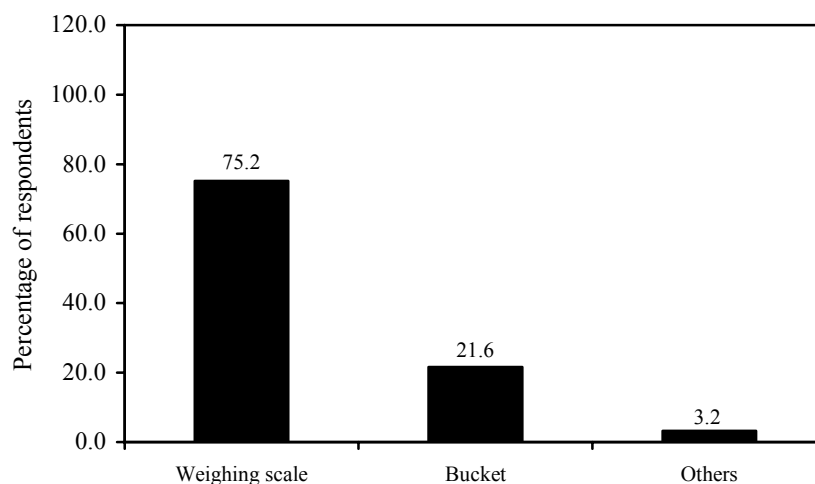
acquiring the wheat from the LSD and distributing it to beneficiaries lies with the program user group or the Community-Based Organization (CBO) contracted to support the groups.

In the case of the TNC, weighing scales were not used frequently: 91 percent of the TNC beneficiaries reported that “buckets” were used to distribute foodgrains (Figure 26). Weighing scales were more prevalent in the FFA program: only 21.6 percent reported the use of buckets to measure wheat rations (Figure 27).

Figure 26—Method of weighing during distribution of TNC wheat



Surprisingly, in spite of the central role played by the user committees, beneficiaries’ assessments of wheat receipts in both programs, especially TNC, are below the entitlement. In the case of the FFA, only 1.1 percent of the beneficiaries reported receiving the full monthly wheat entitlement of 20 kilograms, while a majority (68.6 percent) reported receiving 18-19 kilograms. About 12.8 percent reported receiving less than 18 kilograms. The sample average of the self-reported weight of received wheat per FFA beneficiary is 18.18 kilograms (see Table 49), implying a rate of leakage of 9.1 percent.

Figure 27—Method of weighing during distribution of FFA wheat

Reported receipts of wheat in the TNC program are disturbingly lower than the monthly entitlement of 30 kilograms of wheat. Only 30 percent of the beneficiaries reported receipts of at least 28 kilograms, while 27.5 percent reported receiving between 20-28 kilograms. The most alarming finding was that 42.5 percent of the beneficiaries reported not having received any wheat at all at the reference distribution day. Further enquiry revealed that this was due to the fact that, in one of the sample areas of Kurigram district, the service providing CBO, distributed cash sums of Tk 180 in lieu of wheat to 90 percent of beneficiaries. This constituted a serious contravention of program rules. Moreover, this implied substantial pilferage, as at the local market price of Tk 8.63 per kilogram of wheat prevailing during the survey, the cash distribution was equivalent to only 20.86 kilograms of wheat. Beneficiaries were given only 70 percent of their entitled amount. The average receipt of 21.82 kilograms reported for Kurigram in Table 49 is an average of the “equivalent” 20.86 kilograms for 89.5 percent of the beneficiaries, and 30 kilograms for the remaining 10 percent, implying a leakage of 27.27 percent.

Assessment of Discrepancies. In both the TNC and FFA, beneficiaries’ assessments of the quantity of wheat received was predominantly based on “weighing at home before cleaning” (about 52 percent). Approximately 20 percent in both programs reported that they simply did not weigh their rations (Figure 28 for TNC and Figure 29 for FFA). Hence, as in the case of the VGD program, beneficiaries’ assessments of the quantity of

Table 49—Leakage estimates for the IFS program

Survey district	Survey union	Total number of cards in union	Wheat received per card	Short card	Short per card	Total short per union	Total wheat allotment in union	Short ration relative to allotment	Incidence of false cards (undercoverage)	Leakage percent
IFS-FFA										
Estimates are based on physical weighing of wheat received^a										
Rangpur	Madhupur	900	18.83	1.18	1,058	18,000	5.88	0	5.88	
Estimates are based on beneficiary-reported weight of wheat received^a										
Rangpur	Madhupur	900	17.68	2.32	2,092	18,000	11.62	0	11.62	
Kurigram	Noonkhawa	900	18.69	1.32	1,184	18,000	6.58	0	6.58	
Total		1,800	18.18	1.82	3,275	36,000	9.10	0	9.10	
IFS-TNC										
Estimates are based on beneficiary-reported weight of wheat received^a										
Rangpur	Madhupur	50	27.00	3.00	150	1,500	10.01	0	10.01	
Kurigram ^b	Noonkhawa	50	21.82	8.18	409	1,500	27.27	0	27.27	
Total		100	24.41	5.59	559	3,000	18.64	0	18.64	

Source: Estimated by authors based on data from IFPRI's "Food Aid Leakage Study, 2002/03: Beneficiary Survey," Bangladesh.

^a Physical weighing of wheat received by beneficiaries could not be carried out in Noonkhawa Union for FFA and for the two TNC unions due to the problem of rescheduling survey with distribution dates.

^b In the TNC program at Noonkhawa Union in Kurigram District, 89.5 percent of the TNC beneficiaries received Tk 180 for the month, instead of receiving 30 kilograms of wheat per month for training. This translates into 20.86 kilograms of wheat, calculated at the market price of wheat at Tk 8.63 per kilogram (this price was obtained from the household survey in that union).

Figure 28—Beneficiaries’ assessments of the weight of wheat received from TNC

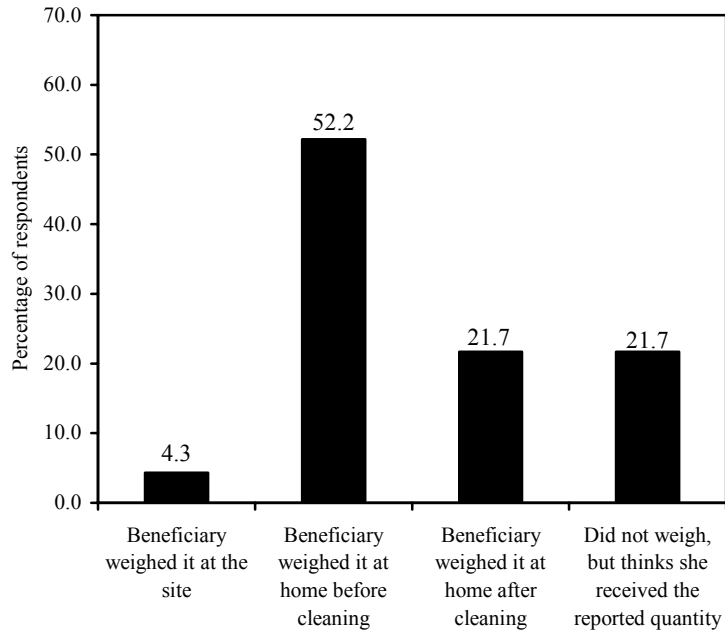
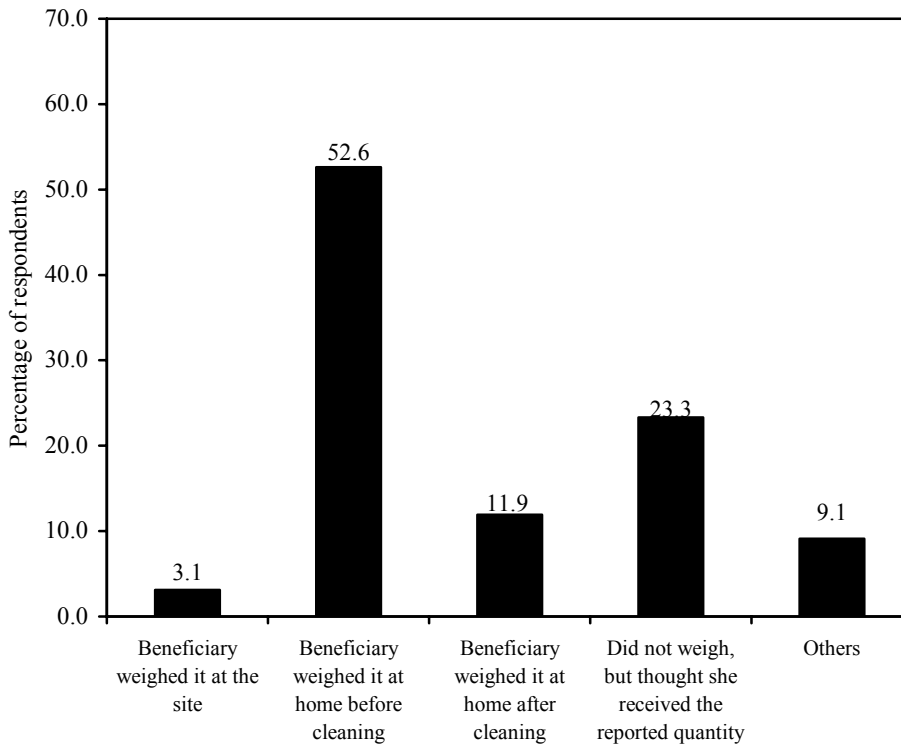


Figure 29—Beneficiaries’ assessments of the weight of wheat received from FFA



wheat receipts under the FFA and TNC components of IFS also suffer from measurement errors arising out of inaccuracies in weighing scales and techniques. One potential difference is that both the FFA and TNC components presume proactive roles for the user group in managing distribution. For this reason, better sensitization regarding weighing techniques and accuracy may be expected to prevail among FFA and TNC beneficiaries (as compared to VGD beneficiaries). However, as the Kurigram experience described above indicates, the role of user groups may not be that proactive in practice. In reality, the service-providing CBO makes most of the key decisions and so significant measurement errors in reported weights cannot be ruled out. For these reasons, the results of the physical verification survey reported in the next section are considered the preferred estimate. Physical verification was done only for the FFA sample in Rangpur, due to scheduling difficulties encountered in the other remaining sample areas.

When questioned about the causes of the shortfalls in received wheat, 60.9 percent of the FFA beneficiaries and 72.7 percent of the TNC beneficiaries believed that it was primarily due to less-than-adequate supplies arriving from LSD (Figure 30 for FFA and Figure 31 for TNC). About 29 percent of the FFA beneficiaries also reported that some of the wheat had to be given away as payments to foodgrain handlers at the time of distribution. Only 10.3 percent of the FFA beneficiaries and 4.5 percent of the TNC beneficiaries opined that the shortfall was due to pilferage by the distributor. Finally, unlike in the case of VGD, no beneficiary in either program reported that a distributor had required that they share their ration.

Estimates of Leakage Based on Actual Weighing for FFA and Self-Reporting for TNC.

Results of the physical verification survey are presented with self-reported quantities in Table 49. As explained above, the physical verification survey was done only for the Rangpur FFA sample. Physical weighing of wheat rations received by FFA participants indicated an average shortfall of 1.18 kilograms per beneficiary per month from the monthly entitlement of 20 kilograms of wheat, or 5.88 percent of the full entitlement. Despite its limited geographic coverage, the leakage estimate of 5.88 percent for the FFA is preferred, as the reported leakage based on self-assessment by beneficiaries is significantly affected by measurement errors.

Figure 30—Beneficiaries' assessments of the reason for receiving less than entitled quantity of wheat from FFA

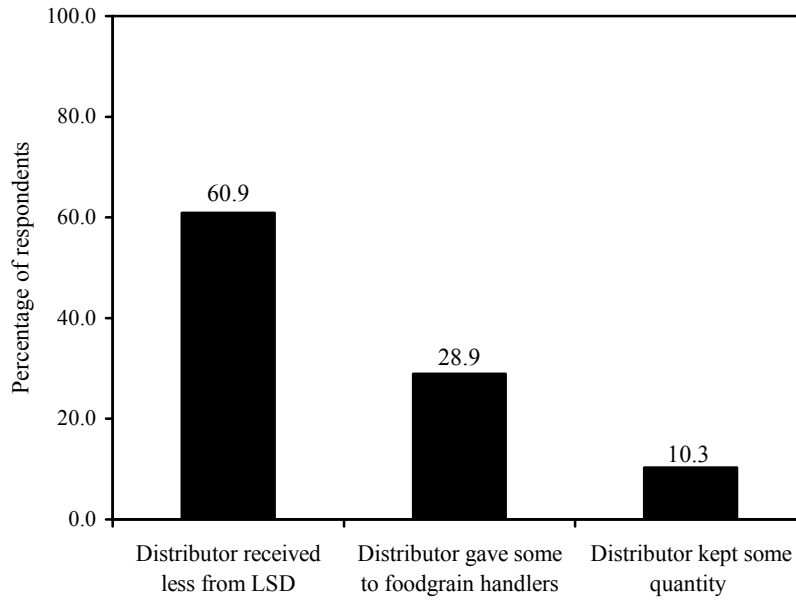
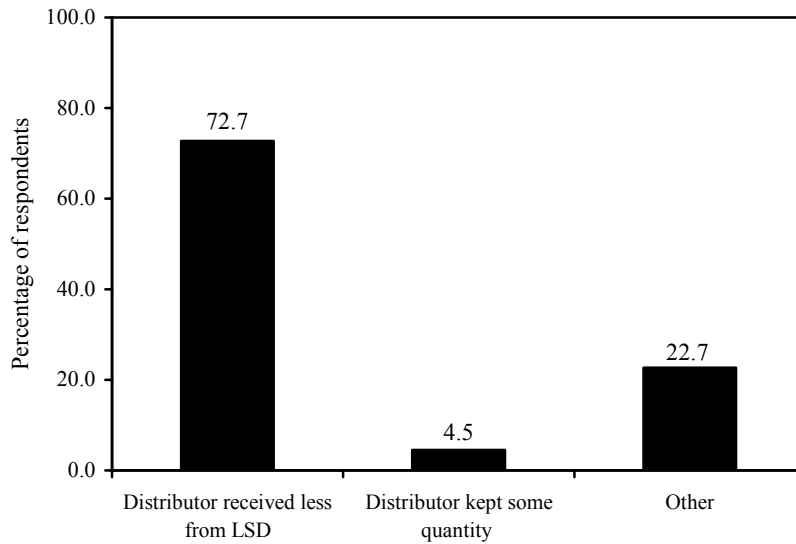


Figure 31—Beneficiaries' assessments of the reason for receiving less than entitled quantity of wheat from TNC



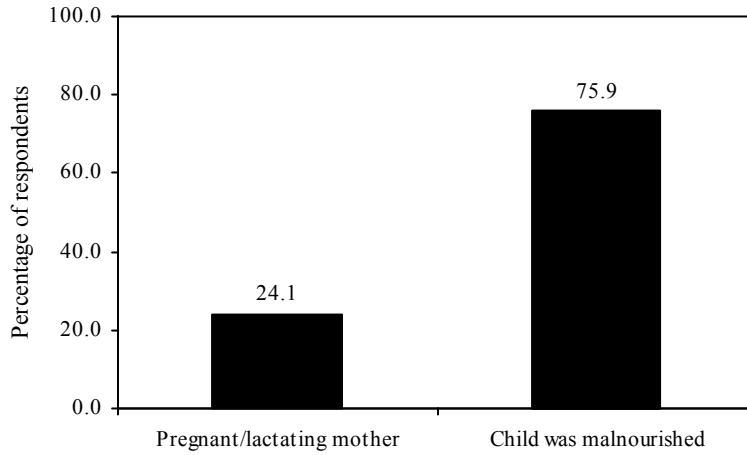
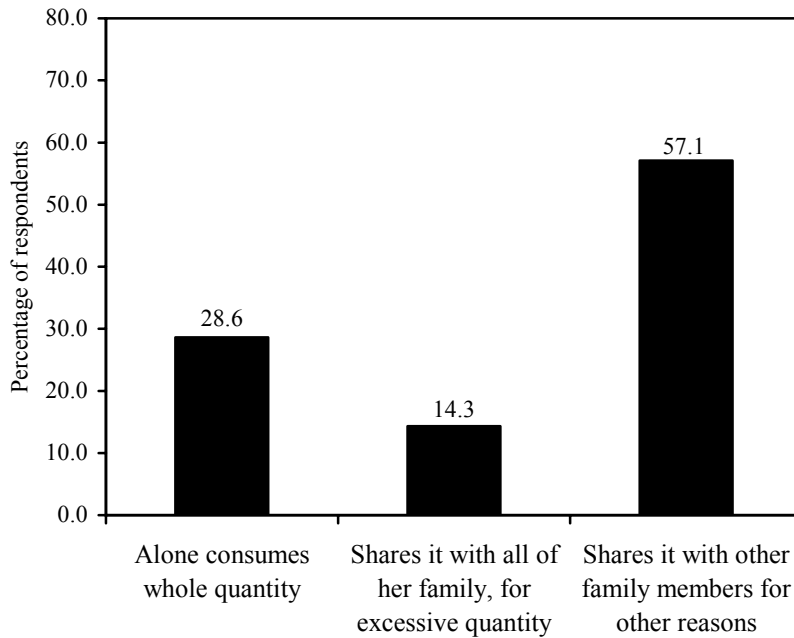
In the case of the TNC, the leakage estimate is calculated as the average of the self-reported figures, for those who received wheat in kind, and the “equivalent” receipt of 20.82 kilograms for those who were provided with cash. The overall leakage within the TNC is estimated to be 18.64 percent of the monthly entitlement of 30 kilograms of wheat per beneficiary. However, this estimate of leakage for the TNC component of IFS should be interpreted with caution for a number of reasons. The estimate is based on data from a survey conducted in two randomly selected TNC locations (see previous discussion). However, the service-providing CBO in one of these two locations was corrupt, as explained above. The malpractice by the CBO led to a high estimate of average leakage for the TNC. Furthermore, it should be noted that the TNC accounts for less than one percent of the GOB-WFP Country Program resources.

Some Aspects of the CNI Program

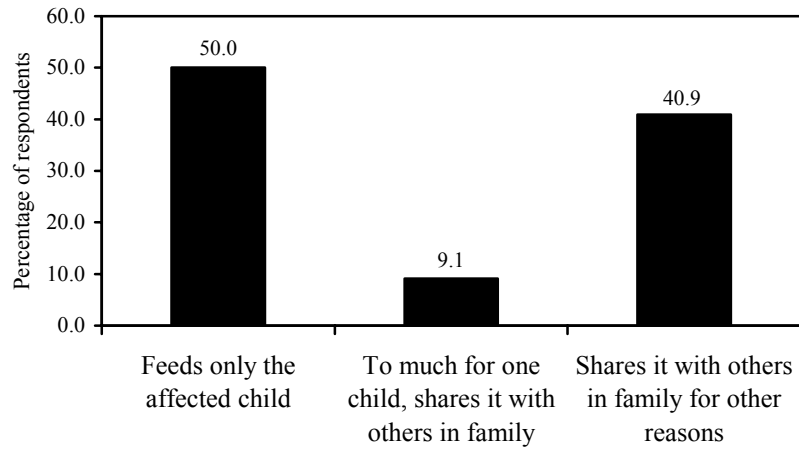
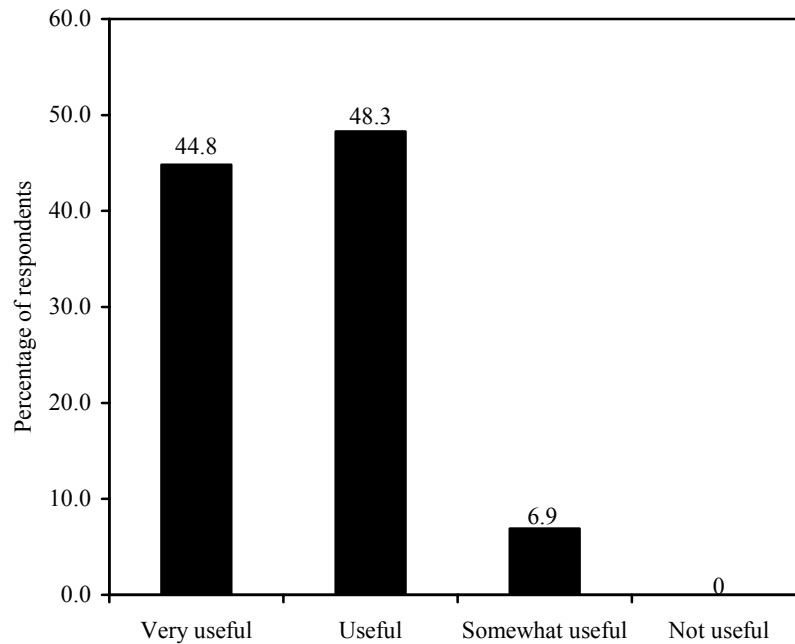
This section provides information of households’ assessments of several aspects of the CNI program. Since CNI provides processed and packaged, blended food, no attempt is made to estimate leakage of food distributed in the program.

Selection Process and Use of Program Benefits. The majority of CNI beneficiaries were chosen because their child/children were found to be suffering from malnutrition. Only a quarter of the beneficiaries were pregnant or lactating mothers (Figure 32).

CNI provides nutrient-fortified blended food for both mothers and their children. Where food is provided to mothers, less than a third of the beneficiaries reported that the mother alone consumes this food. The remaining beneficiaries share it with other members of the family. About 14 percent of the mothers share food because the food given to them was more than they alone could consume, while more than half reported sharing simply because it was their preference to do so (Figure 33). In the case of blended food given to children suffering from malnutrition, 50 percent of the mothers reported that they gave this food only to the affected child/children. The other half reported that they shared the food with other children in the household. Among those who shared, only 9.1 percent said they did so because individual rations were too large for a single child (Figure 34). Most (96.6 percent) did not sell any of the blended food that they received.

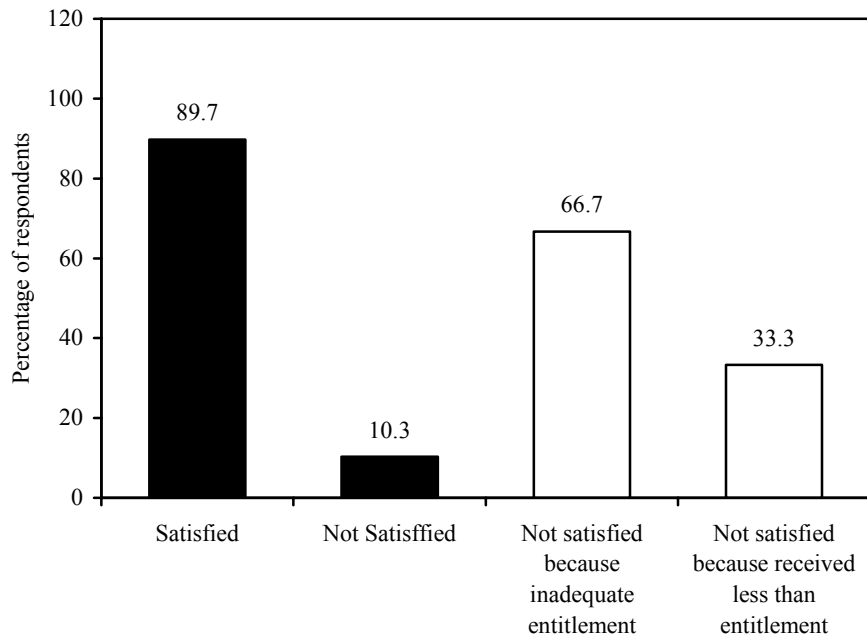
Figure 32—Reason for being selected in CNI program**Figure 33—Consumption of blended food, by mothers in CNI**

Beneficiaries' Assessments of Program Benefits. All beneficiaries evaluated the CNI program to be beneficial to them. Among them, 44.8 percent expressed the view that it was very useful, while the rest rated it as at least somewhat useful (Figure 35). When

Figure 34—Use of blended food for child in CNI**Figure 35—Perception of usefulness of nutrition training in CNI**

questioned as to whether they were satisfied with the program overall, only 10.3 percent replied that they were not satisfied. Among those who were not satisfied, more than two-thirds cited inadequate entitlement as the reason, while the other third explained that their dissatisfaction was due to not receiving their full entitlement of food (Figure 36).

Figure 36—Satisfaction with CNI program



Summary

The study found no major anomalies in the selection process for the VGD and IFS programs. Ninety-four percent of the VGD cardholders met at least one of the official selection criteria for the program. In the IFS program, all participants of the TNC component and 96.7 percent of all FFA participants met at least one of the selection criteria.

There are problems regarding transportation and handling of grains for distribution at the beneficiary level. The VGD program has provision to pay food distribution operators the transport and handling costs from LSDs to distribution sites. However, Union *Parishad* (UP) chairpersons and members who distribute foodgrain to

beneficiaries report lengthy delays or nonreceipt of transport and handling commissions. Moreover, the commission is not sufficient to cover the costs.

To assess the physical quality and nutrient contents of wheat, laboratory tests were carried out on wheat samples collected from beneficiaries during the surveys. The test results do not indicate any significant deviation from standards in terms of the physical quality and nutrient content of the wheat. Most beneficiaries of the VGD and IFS programs prefer the white wheat variety to the red variety. A large number of VGD and FFA beneficiaries reported selling part of the received wheat ration. They used a sizable portion of the proceeds to buy rice, which is the preferred staple food for Bangladeshis. VGD beneficiaries used about 22 percent of the sales proceeds to make the monthly savings deposit required by the program.

The study estimated average leakage in the VGD program due to short ration to be 7.53 percent, or 2.25 kilograms per month per beneficiary. Leakage due to undercoverage (when the actual number of beneficiaries is less than the officially determined number for whom food was allocated) was 0.48 percent. Hence, the overall leakage in the VGD program is 8.01 percent of the total wheat allotment. Leakage in the FFA component of the IFS program is estimated to be 5.88 percent.

About 10 percent of the VGD cardholders reported that UP members made them “share” their VGD card with a non-cardholder woman, and that as a result, they received only one-half of their ration entitlement. If leakage is defined to include short rationing due to sharing as well, then total leakage in the VGD program becomes 13.57 percent of total wheat allotment.

All shortfalls from the entitlements cannot automatically be interpreted as leakage. Some of the food received by distribution operators is used to cover legitimate expenses related to transport and handling of foodgrain from the LSDs to distribution sites.

5. Conclusions and Recommendations

The Food Aid Leakage study has been conducted by IFPRI under a contract with the World Food Programme-Bangladesh. Its purpose was to identify the main factors contributing to leakage of food aid arriving in Bangladesh, and to provide policy

recommendations on ways to control this leakage. The study has three major components dealing with food leakage occurring at three stages, namely (1) food discharge at harbors, (2) the Public Food Distribution System (PFDS), and (3) the final distribution to program beneficiaries. The main conclusions and recommendations of the study are presented below. An Action Plan for implementing the recommendations is provided in Appendix 4.

Substudy 1 on food discharge at harbors reveals a wide number of issues involving governance, interagency cooperation or lack of it, interagency collusion for rent-sharing, and institutional failure due to ill-defined ownership status. The discussions essentially laid out the basis for addressing the more specific operational issues that confront donors, GOB agencies, and others who strive for greater efficiency of foodgrain discharge at the two harbors. Conclusions and recommendations emerging from Substudy 1 are set out below.

Actual performance on discharge rates is influenced by two factors—technical factors at the operational level and incentives. The range of achievable discharge rates depends on the mix of the various modes employed; and so the definition of discharge rate should be flexible. An average, or weighted average, discharge rate could be stipulated in the contract in order to distribute the risk evenly (or to ensure that the risk is inversely associated with the strength of a party).

The optimal discharge rate could be lower than the maximum (technically efficient) achievable. This would permit a reward system for enhanced efficiency. Although “dispatch” money is the instrument to play such a role, the recipient of dispatch money (in contracts with the GOB’s Directorate General of Food) in the current system does not forward it to the party who was responsible for the additional effort. There are three possible solutions to this problem. First, future contracts may move into liner terms, and disregard the deals that a shipping agent and its stevedore may negotiate with different parties. Interestingly, this is one proposal that received the greatest support from officials at all levels within the Directorate General of Food (DGF). Alternatively, one may pursue the difficult route of persuading the DGF to pass the benefits to the groups engaged in discharge operations. However, this might introduce new tensions into the system. The final choice is to maintain the status quo in the case of shipping arrangements, but make the required discharge rate specific to the particular mix of discharge modes.

The Team recognizes that discharges at one port, and through mechanized routes (silo and/or lightering with vacuators), will increase discharge rates. In the event of a reduced inflow of foodgrain through the ports in the near future, WFP may find it beneficial to negotiate with the GOB so that future discharges are made to lighter vessels and/or silos. The savings on freight due to reduced lay time could be transferred to the GOB account for the additional costs of handling. This change would require a willingness to renegotiate prices with the carriers, and coordinate all foodgrain arrivals with the DGF in order to make such discharges feasible. Contracts would require provisions for the upward revision of allowable lay time (i.e., reduced discharge rate) in periods of emergency so that the cost is not unfairly distributed among parties.

The provision of effective incentives should increase the discharge rate. In this regard, the current WFP contract, which deducts half the Fridays and holidays used from allowable dispatch time, is counterproductive. One may examine alternatives to improving the system through introducing the right kind of incentives. Reducing pilferage or the opportunity for it may enhance the discharge rate. However, prior to introducing changes in the contracts, these changes could be negotiated and need to be formed carefully so as to reduce pilferage. The following options may be considered in this regard.

The first step in reducing disputes and improving monitoring to reduce pilferage is to develop an information system. This information system should be developed and owned by all concerned parties. Three or four parties may join together to initiate the process: the WFP on behalf of all donors, the Controller of Movement and Storage (CMS), the DGF, and the shipping agent (chosen for a period). A fourth party could be the Economic Relations Division (ERD), who negotiates with the WFP and other food aid donors. The GOB could be urged to give a legal basis to this entity (at the least from the GOB side), so that all figures, agreed upon by the parties in this committee, would be binding on all relevant transactions, including amount received, demurrage, and dispatch. Regular monitoring by such a committee will restrict undue late adjustments of figures, and thereby discourage pilferage. This will also replace many activities currently undertaken, which do not effectively contribute towards improving efficiency and reducing pilferage. Some of such activities include the appointment of a superintendent by the WFP, engaging more than one surveyor per arrival, etc.

To begin developing this partnership, all parties should agree to design a common structure of data compilation, and agree on mandatory sharing of information on some key variables on a day-to-day basis. The transparency thus established will help to reduce disputes among parties at the top, and would facilitate the creation of a more formal committee in the future.

Finally, the DGF should investigate several areas for possible improvement. First, find a way to pass rewards from dispatch money to the agents engaged in discharge operations. Second, assess the desirability of the current practice of block adjustments by carrying contractors (balancing their accounts on a four-month basis).⁵³ Third, assess and make a decision on the future relocation of the port in the southwest of the country. In the event of a decision to relocate it in the near future, and possibly build a new silo, it would be desirable to assess the role and legal standing of labor institutions (especially the Dock Labor Management Board) in the new setup. Lastly, it is time for the GOB to strike the right balance between the roles to be played by the ERD, the Ministry of Food (MOF)/DGF in matters of food aid. Agency problems appear to be a critical factor, and without addressing them, not much will be achieved.

Substudy 2 analyzed the operational performance of the PFDS, paying close attention to institutional structure, stock management, losses, and the economic and social costs of its operation. In addition to conducting three surveys, a large amount of secondary data and public documents has been examined to address these issues. The results show that, compared to earlier decades, the performance of the PFDS improved in the 1990s, particularly in terms of reducing losses, managing stocks, and realigning its focus more towards poverty alleviation programs. However, there are still areas that, through appropriate policy interventions, can be further improved to enhance the overall operational efficiency of the system.

Six important conclusions have emerged from the analysis of the PFDS. First, despite under capacity utilization of storage facilities (approximately 56 percent), the extent of intra-district (that is, Local Supply Depot (LSD)-to-LSD) movement of PFDS foodgrain is found to be large—17 to 48 percent of total off-take during FY02. With improved planning and control, several of these local movements could be eliminated, leading to lower transportation costs and fewer claims for admissible losses. However, to

⁵³ Such a practice is not compatible with the proposed monitoring mechanism.

achieve successful planning and control, movement planners need to have access to an information system that provides updated information regarding stock and flow at the storage level.

Second, the PFDS transit loss—although it has declined in the 1990s—can be further reduced. There are two ways to do this. First, the survey results reveal that private flour millers do not incur any transit loss in transporting their grain, as they operate under an arrangement whereby transporters assume responsibility for delivery of full invoice quantity. In places where the storage facilities are well connected, the GOB can adopt the same policy for transportation by road. Second, by introducing hundred percent weighing in water transportation, higher permissible limits of losses (currently 0.4 percent) can be revised.

Third, the analysis of stock rotation shows that approximately 35 percent of the foodgrain distributed to beneficiaries is more than nine months old. If older stocks are discounted for quality deterioration, the implicit costs to the PFDS for holding old stock are substantial. For example, assuming a 15 percent discounted value of older stock (rice older than seven months and wheat older than eight months), the implicit cost of stock deterioration is large: about Tk 1.05 billion in FY02, equivalent to \$19 million at the current exchange rate.⁵⁴ However, this is not unexpected, particularly since the movement planners do not have ready access to information regarding the age of the stock. This implies that in order to improve stock rotation (and to reduce the associated loss), there is a need to develop an information system that would provide an updated status of stock age to the key movement planners.

Fourth, the timeliness of food aid arrival is also an important determinant of the PFDS stock management. The analysis of the past eight years of data indicates that food aid arrival frequently coincided with the GOB's domestic procurement seasons, leading to higher losses due to more movements and higher stock rotation time. The relationship between the timing of food aid arrival and the PFDS stock build-up is also evident. For instance, in FY00, when 65 percent of food aid arrived during the procurement season, the annual average PFDS stock went up to 1.3 million tons.

⁵⁴ The assumption of 15 percent discount rate is subjective, but it gives a sense of the implicit costs associated with inefficient stock rotation.

Fifth, given the recent changes in the national food policy, such as the closure of Food-for-Education (FFE) and downsizing of Food-for-Work (FFW), the national food security stock level should be revised downward. With the current size of the PFDS operation, an annual distribution of about 1.35 million metric tons, and a stock of 600 thousand tons of wheat and rice (300 thousand tons each) is found to be most cost effective. Any levels greater than this will increase the total PFDS costs, because of quality deterioration, higher transit and storage losses, and suboptimal use of its administrative structure. Two specific points about this finding need further clarification. First, the recommended 600 thousand tons represents the fiscal year opening stock, which changes every month, depending on off-take and procurement. In other words, optimal stock is a dynamic concept, not a fixed number for the entire year. Second, in order to be able to manage unanticipated food security threats, such as floods and other natural calamities, the calculation accounted for a security reserve of 300 thousand tons at all points in time.

Finally, the PFDS revenue budget can be significantly improved by auctioning out high quality wheat, particularly the hard red varieties arriving from North America and Australia, which fetch a higher price in the market. The survey results suggest that the difference in the prices of local and food aid wheat range from 27 percent for the Australian variety to about 44 percent for hard red winter varieties from North America. This high price differential serves as an incentive for the private traders to obtain this wheat, either by leakage or by procuring it from the beneficiaries, who prefer the softer, white wheat. Conservative estimates for the past four years suggest that the gains from auctioning out food aid wheat could have been substantial—ranging from Tk 303 million (or \$5.32 million) to Tk 1.76 billion (or \$30.88 million). Consequently, the PFDS balance sheet would have significantly improved had the GOB adopted this policy option during the FY99 to FY02 time period.

Substudy 3 on food distribution at the beneficiary level studied the performance of the Vulnerable Group Development (VGD) program and the Integrated Food Security (IFS) program. This substudy analyzed various factors that influence food distribution to VGD and IFS beneficiaries, starting from the LSD to the households of the program beneficiaries. The following conclusions emerged from the analysis.

VGD is a well established and widely known program, while the IFS is a relatively new program that continues to evolve. However, in both of the programs,

beneficiaries had clear knowledge of entitlements and responsibilities. This knowledge is essential in ensuring some minimum levels of social accountability in both programs.

Selection into the VGD program is heavily demand driven in the sense that there exists a very large pool of eligible candidates expressing a strong demand to participate. In contrast, the IFS program, perhaps because it is new, is much more supply driven, with the program administrators selecting beneficiaries without the latter's asking. Moreover, the coverage of the Food for Asset (FFA) component of the IFS is relatively higher in the communities where the program is implemented, compared to the VGD program coverage per community.

No major gaps in the selection process were found in both the VGD and IFS programs. Ninety-four percent of the VGD cardholders met at least one of the five selection criteria of the program. However, some of the selection criteria—those related to income and assets caps—are very difficult to verify and implement in practice. All participants in the Training and Nutrition Centers (TNC) component and 96.7 percent of all FFA participants met at least one of the seven selection criteria.

One of the operating rules of the VGD program requires that VGD beneficiaries must possess their VGD cards. However, 77 percent of the VGD women did not possess their cards at the time of the interview. This finding is certainly a matter of concern and therefore corrective action should be taken.

Another weakness in both the VGD and IFS programs is the ration-weighting system at distribution sites. Lack of standards in weighing techniques and equipment makes monitoring and verification of program performance difficult, both for beneficiaries as well as for program administrators.

There are problems regarding transportation and handling of grains for distribution at the beneficiary level. The VGD program has provision to pay food distribution operators the transport and handling costs from LSDs to distribution sites. However, Union *Parishad* (UP) chairpersons and members who distribute foodgrain to beneficiaries report lengthy delays or nonreceipt of transport and handling commissions. Moreover, the commission is not sufficient to cover the costs.

The survey of UP officials indicates that, on average, they received 3.5 percent less wheat from LSDs than their allotted quantity. The weight of the gunny bags accounts for a third of this shortfall.

In the VGD program, a third of the beneficiaries expressed concern about the quality of wheat. Insect infestation was the most common problem. IFS program beneficiaries were generally satisfied with the quality of wheat received. To assess the physical quality and nutrient content of the wheat, laboratory tests were carried out on wheat samples collected from beneficiaries during the surveys. The test results do not indicate any significant deviation from standards in terms of the physical quality and nutrient content of the wheat.

As for preferences, while it is red wheat that is mostly distributed in the VGD program, most beneficiaries actually prefer the white wheat variety instead. More white wheat than red wheat is distributed in the IFS programs. Therefore, convergence between household preferences and received rations is better in the case of the IFS programs.

A large number of beneficiaries—47 percent of VGD and 52 percent of FFA beneficiaries—reported selling part of the received wheat ration. They used a sizable portion of the proceeds to buy rice, which is the preferred staple food for Bangladeshis. VGD beneficiaries used about 22 percent of the sales proceeds to make the monthly savings deposit required by the program.

Estimating leakage due to short ration (beneficiaries receive less than their full entitlement) is problematic, since quantities of wheat reported by beneficiaries are likely to be riddled with errors arising from inaccuracies in weighing. This is a serious concern as sole reliance on beneficiaries' assessments could result in erroneous conclusions. For this reason, field surveyors of this study physically weighed ration amounts received by the beneficiaries. These findings estimated average leakage in the VGD program due to short ration to be 7.53 percent, or 2.25 kilograms per month per beneficiary. Leakage due to undercoverage (when the actual number of beneficiaries is less than the officially determined number for whom food was allocated) was 0.48 percent. Hence, the overall leakage in the VGD program is 8.01 percent of the total wheat allotment. This leakage estimate corresponds to food distribution from the LSDs to the program beneficiaries.

About 10 percent of the VGD cardholders reported that UP members made them “share” their VGD card with a non-cardholder woman, and that they received only one

half of their ration entitlement.⁵⁵ Given the practice of sharing and ad hoc distribution to the needy at distribution centers, what constitutes “leakage” becomes somewhat ambiguous. At one level, under a strict interpretation of leakage, the practice of sharing clearly violates program rules and therefore constitutes a leakage. Turning a blind eye to violations of program rules goes against the basic tenets of rule-based community governance, and opens the door for perverse discretion and corruption.

On the other hand, card sharing is most often used to address the otherwise irreconcilable chasm between the current size of the VGD program and the very large number of eligible candidates. Indeed, 86 percent of the VGD cardholders who had to share their cards considered the recipients of the shared rations to be either poorer or as poor as the cardholders themselves. To the extent that no corrupt motive is involved, and since sharing helps make VGD programs more acceptable to communities, it is indeed difficult to term it “leakage.”

Overall, the practice of ration sharing reduces the average receipt per VGD cardholder beneficiary by 1.7 kilograms of wheat per month per beneficiary, or 5.56 percent of the full entitlement. Therefore, if leakage is defined to include short rationing due to sharing as well, then total leakage in the VGD program becomes 13.57 percent of the total wheat allotment.

Leakage within the IFS programs is worrisome in the case of TNC where beneficiaries received 18.64 percent less than their full entitlement. It should be noted, however, that this estimate of leakage is based on data collected from the surveys carried out in two randomly selected TNC locations. The analysis reveals that the relatively high leakage in TNC was mainly due to malpractice by a Community Based Organization (CBO) assigned to support the TNC user committees in one of these two locations. Moreover, TNC accounts for less than one percent of the GOB-WFP country program resources. Leakage was found to be significantly lower in FFA, another IFS component. Physical weighing of wheat rations received by FFA participants indicated an average shortfall of 5.88 percent from their full entitlement. The problems of undercoverage and ration sharing do not exist in the FFA and TNC components of the IFS program.

⁵⁵ Receiving only one-half of their rations reduces the cardholder VGD women’s incentive and capacity to participate in the training activities of the VGD program. This could weaken the development focus of the program.

All shortfalls cannot automatically be interpreted as leakage. Some of the food received by distribution operators is used to cover legitimate expenses related to transport and handling of foodgrain from the LSDs to distribution sites. Indeed, in explaining the shortfall, a significant proportion of the beneficiaries (29 percent) attributed this to the need for UP officials to pay for foodgrain handling. A smaller proportion (18 percent) of the beneficiaries blamed shortfalls on corruption.

The Team recommends that the following measures be considered in order to improve program performance.

Transportation and handling costs from the LSD to distribution centers should be assessed for each Union. Based on this information, transportation and handling allowances should be allocated in advance to each Union.

Care should be taken in selecting and monitoring the CBOs that support the TNC and FFA user committees.

Weighing of rations at distribution sites should be replaced by standard volume measures when distributing wheat rations. The use of clearly calibrated and tamper-proof metal buckets that indicate the amount of grain appears to be the most cost-effective and accurate option in the Bangladesh context.

Actions should be taken to ensure that the weight of the total amount of wheat delivered from LSDs to the ration distributors is net of the weight of the gunny bags.

As involuntary sharing of food rations violates program rules, steps should be taken to eliminate this practice.

The operating rule regarding the possession of VGD cards should be strictly enforced to ensure that the official VGD beneficiaries possess their cards.

The GOB (particularly, the Ministry of Women and Children Affairs) and the WFP should monitor program activities regularly to observe whether unauthorized activities persist in food distribution at the beneficiary level. Representatives of program beneficiaries should be involved in the monitoring. Strict disciplinary actions should be taken whenever any malpractice is detected.

A monitoring system should be designed and implemented to ensure that the beneficiaries receive good quality of wheat ration.

Appendixes

Appendix 1: Tables

Table 50—Changes in the allowable limits to storage and handling losses by type of storage and modes of transportation

Losses	1980s	1990s
Storage loss		(percent)
CSDs and LSDs		
0 to 6 months	0.50	0.50
6 to 12 months	0.75	0.75
Every additional 3 months	0.25	0.25
Silo	0.00	0.00
Transit loss (percent of dispatches)		
Lighterage	1.00	0.50
Boat	0.50	0.125-0.40*
Rail	1.00	0.125
Trucks	0.25	0.125
BIWTC operators	1.00	0.125
Bullock cart:		
Up to 10 miles	0.50	0.125
10 to 20 miles	0.75	0.50*
20 miles +	1.00	

Source: Ministry of Food.

Note: * means that the rates are applicable in the absence of 100 percent weighing.

Table 51—Perceived physical conditions, by type of storage facilities

Storage type	Total capacity	Average age of the storage	Perceived physical conditions				Total
			Good	Fair	Bad	Unusable	
			(percent of capacity)				
<i>Dhaka</i>	579,061	21.3	55.60	28.30	12.30	3.70	100
Calcutta	41,430	26.6	50.00	20.00	10.00	20.00	100
Prismatic/shell	300,416	2.5	100.00				100
Twin Nissan	16,000	23.6	40.00	40.00	20.00		100
Danish	3,000	27.0				100.00	100
Salt Type	32,630	30.67				100.00	100
Bins	213,065	29.5	70.00	30.00			100
Other	151,162	30.93	33.30	6.70	6.70	53.30	100
Average	167,096	24.01	43.61	15.63	6.13	34.63	100.00

Source: IFPRI Food Aid Leakage Study survey, 2002/03.

Table 52—Stock maintenance equipment in the sampled storage facilities

Equipment	Number of equipment	Age of equipment (years)	Functional conditions				Unusable
			Perfectly functional	Needs cleaning/ adjustment	Can be used with minor repair	Can be used only after major repair is done	
			(percent of respondent reporting)				
Fumigators	3.23	6.04	48.1	14.8	14.8	3.7	18.5
Moisture meter	1.65	11.15	75.9	10.8	3.6	1.2	8.4
Weighing scale	1.78	17.78	75.0	6.3	6.3	2.1	10.4
Weighing machine	9.25	40.41	71.6	9.5	6.8	5.4	6.8
Gas proof sheet	3.55	10.60	70.9	6.3	20.3	2.5	
Other	5.00	23.84	56.1	4.5	10.6	--	28.8
Total	4.08	18.30	66.27	8.70	10.40	2.48	12.15

Source: IFPRI Food Aid Leakage Study survey, 2002/03.

Table 53—PFDS stocks and Flows, actual 2001/02

Month	Addition										Off-take													
	Domestic					Import					Rice					Wheat								
	Opening stock		Procurement		Food aid		Total import		Total addition		Priced		Non-priced		Total		Priced		Non-priced		Total		Closing stock	
Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total	Rice	Wheat	Total	
July	421.5	445.3	866.9	222.2	33.6	255.8	0.0	1.7	0.0	1.7	1.7	11.6	0.90	12.5	7.9	14.2	22.1	34.6	630.7	458.1	1,088.9			
August	630.7	458.1	1,088.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	10.3	0.90	11.2	8.2	14.2	22.4	33.6	618.9	435.3	1,054.3			
September	618.9	435.3	1,054.3	0.0	0.0	0.0	0.0	83.8	0.0	83.8	83.8	10.6	0.40	11.0	9.9	15.1	25.0	36.0	607.6	492.3	1,100.0			
October	607.6	492.3	1,100.0	0.0	0.0	0.0	1.9	74.8	1.9	74.8	76.7	11.3	6.6	17.9	10.0	15.3	25.3	43.2	590.9	541.2	1,132.2			
November	590.9	541.2	1,132.2	0.0	0.0	0.0	0.0	91.0	0.0	91.0	91.0	10.2	22.9	33.1	10.6	24.3	34.9	68.0	557.2	596.7	1,154.0			
December	557.2	596.7	1,154.0	9.0	0.0	9.0	0.0	119.7	0.0	119.7	128.7	10.6	40.2	50.8	11.0	36.8	47.8	98.6	514.7	667.1	1,181.9			
January	514.7	667.1	1,181.9	45.4	0.0	45.4	0.0	22.0	0.0	22.0	67.4	11.1	53.1	64.2	9.4	90.0	99.4	163.6	495.2	587.5	1,082.8			
February	495.2	587.5	1,082.8	43.3	0.0	43.3	0.0	27.5	0.0	27.5	70.8	11.0	146.9	157.9	12.8	72.9	85.7	243.6	380.0	527.2	907.3			
March	380.0	527.2	907.3	14.4	17.2	31.6	0.0	0.0	0.0	0.0	31.6	10.9	58.2	69.1	10.8	74.8	85.6	154.7	324.8	457.8	782.7			
April	324.8	457.8	782.7	0.0	191.5	191.5	0.0	72.0	0.0	72.0	263.5	11.0	67.3	78.3	10.8	81.6	92.4	170.7	245.8	627.8	873.7			
May	245.8	627.8	873.7	75.7	39.9	115.6	0.0	0.0	0.0	0.0	115.6	10.6	40.0	50.6	14.1	57.5	71.6	122.2	270.4	595.1	865.6			
June	270.4	595.1	865.6	316.0	45.3	361.3	5.9	0.0	5.9	0.0	367.2	9.1	82.4	91.5	10.5	184.0	194.5	286.0	499.7	444.3	944.0			
Total	726.0	327.5	1,053.5	7.8	492.5	500.3	1,553.8	7.8	492.5	500.3	1,553.8	128.3	519.8	648.1	126.0	680.7	806.7	1,454.8						

Source: FPMU, Ministry of Food.

Table 54—Physical verification of the accuracy of LSD weighing scales

LSD location by upazila	Enumerator's body weight measured by LSD scale	Enumerator's body weight measured by UNISCALE	Difference in weight (LSD-UNISCALE)	Difference in weight	Difference in weight for LSDs serving the VGD survey upazilas
	(kilograms)	(kilograms)	(kilograms)	(percent)	(percent)
Gaibandha	82.50	80.70	1.80	2.23	
Saghata	71.00	70.70	0.30	0.42	
Sadullapur	81.00	80.70	0.30	0.37	
Sundarganj	87.50	87.70	-0.20	-0.23	-0.23
Gobindaganj	73.75	75.20	-0.05	-0.04	
Patgram	87.50	87.00	0.50	0.57	0.57
Hatibandha	86.00	85.60	0.40	0.47	
Lalmonirhat	76.50	75.15	1.35	1.95	
Mohadevpur	77.50	77.50	0.50	0.65	
Neyamatpur	84.75	84.75	0.00	0.00	
Manda	87.00	85.80	1.20	1.40	
Atrai	88.00	87.00	1.00	1.15	1.15
Raninagar	70.50	69.90	0.60	0.86	
Adamdighi	74.50	74.05	0.45	0.61	
Shahjadpur	86.38	85.50	0.88	1.02	
Kazipur	86.00	86.20	-0.20	-0.23	
Faridpur	71.00	70.50	0.50	0.71	
Kushtia Sadar	74.75	74.30	0.45	0.60	
Daulatpur	78.50	78.00	0.50	0.64	
Harirampur	80.00	79.20	0.80	1.01	
Manikganj Sadar	79.44	79.20	0.24	0.30	
Saturia	87.00	85.90	1.10	1.28	1.28
Dhaka	76.75	77.00	-0.25	-0.32	
Tejgaon	70.25	70.10	0.15	0.21	
Siddhirganj	70.50	70.00	0.50	0.71	
Kasiani	79.50	79.50	0.00	0.00	
Muksudpur	79.50	79.00	0.50	0.63	0.63
Gopalganj Sadar	80.00	79.90	0.10	0.13	
Kotalipara	79.95	79.80	0.15	0.19	
Shibchar	78.50	78.00	0.50	0.64	
Kalikini	73.50	73.35	0.15	0.22	
Lohagara	78.00	78.10	-0.10	-0.13	-0.13
Kalia	81.00	80.75	0.25	0.30	
Khulna Sadar	74.50	74.05	0.45	0.61	
Badarganj	80.80	80.80	0.00	0.00	
Rangpur	81.45	81.50	-0.05	-0.06	
Pirgacha	81.50	81.50	0.00	0.00	
Dinajpur	51.25	52.00	-0.75	-1.44	
Bhurungamari	59.90	60.00	-0.10	-0.17	
Nageshwari	61.35	61.20	0.15	0.25	
Fulbari	61.85	62.00	-0.15	-0.24	
Rajarhat	43.70	43.20	0.50	1.16	
Ulipur	81.85	82.00	-0.15	-0.18	
Chilmari	82.00	81.50	0.50	0.61	
Rowmari	82.80	82.30	0.50	0.61	
Amtali	78.48	79.25	-0.77	-0.97	-0.97
Bamna	84.00	83.50	0.50	0.60	
Barisal Sadar	78.50	78.00	0.50	0.64	
Brahmanpara	83.90	83.90	0.00	0.00	
Homna	82.40	82.50	-0.10	-0.12	-0.12
Chandpur	83.25	83.00	0.25	0.30	
Halishahar	80.00	80.00	0.00	0.00	
Kishorganj Sadar	84.10	83.40	0.70	0.84	
Karimganj	79.50	79.10	0.40	0.51	
Tarail	84.50	84.50	0.00	0.00	
Nikli	81.80	82.20	-0.40	-0.49	-0.49
Mymensingh	85.10	84.70	0.40	0.47	
Total	78.24	77.96	0.29	0.37	0.03

Source: IFPRI's "Food Aid Leakage Study, 2002/03: LSD Survey."

Appendix 2: Laboratory Tests of Wheat Samples

Background

This study carried out laboratory tests of wheat samples in order to assess the quality of wheat in the PFDS storage facilities, as well as the wheat received by beneficiaries of the targeted food-based programs. Field investigators of the study collected wheat samples from all silos and CSDs in the country, all LSDs that supplied wheat to program beneficiaries in 12 sampled unions where household surveys were conducted (see Chapter 4 of this report for survey locations), and program beneficiaries in each of the household survey locations. Two samples of wheat were collected from each LSD, CSD, and silo—one from the oldest stock and one from the most recent stock.

The Institute of Food Science and Technology (IFST) of the Bangladesh Council of Scientific and Industrial Research (BCSIR) conducted the analysis of the collected wheat samples. The IFST carried out two types of laboratory tests of wheat grains—physical and chemical tests. The physical test assessed the levels of foreign matters (dust, stem particles, etc.), broken grain, grain size, damaged grain, and grain color and smell. The chemical test determined the protein, carbohydrate, ash, moisture, and fiber contents of the wheat samples. The summary of key findings of the laboratory-based analysis of wheat samples collected from LSDs, CSDs, and silos are presented in Chapter 3. The results of the tests carried out for wheat samples collected from program beneficiaries are discussed in Chapter 4.

Methodology for the Physical Tests

Grain size, color, smell, dust and foreign matter, broken grains, damaged grains, and sound grains were assessed by the physical tests. Grain size (i.e., the length and thickness of the grains) was determined by using slide calipers; and grain color and smell were examined by a group of food scientists by observation. Dust and other foreign matter were determined by separating them from the grains and then weighing them. Levels of broken and damaged grains were determined using the same method used for assessing the dust and foreign matter content. The results are presented in Tables 55, 56, 57, and 58.

Table 55—Results of the physical tests on the wheat samples collected from LSDs

Sample no.	LSD locations	Color	Smell	Length variation: Size (mm)			Breadth variation: Size (mm)			Foreign matter	Dust	Broken grains (percent)	Damaged grains	Sound grains
				Minimum	Maximum	Minimum	Maximum	Minimum	Maximum					
				Size	Size	Size	Size	Size	Size					
1st	Sundarganj	Normal	Normal	6.1	7.3	3.1	3.9	2.72	0.30	4.57	12.80	79.44		
2nd	Sundarganj	Brown	Damp	6.2	7.2	2.6	4.1	1.60	0.18	4.49	17.72	75.36		
1st	Bamandanga	Normal	Normal	5.1	7.3	2.6	4.1	1.77	0.03	6.71	8.09	83.33		
2nd	Bamandanga	Fungal brown	Damp	5.6	7.5	2.7	4.1	2.98	0.85	21.80	2.52	70.76		
1st	Patgram	Normal	Normal	5.9	6.8	2.9	3.7	0.88	0.02	6.27	21.78	69.28		
2nd	Patgram	Normal	Normal	5.6	6.7	2.7	3.5	1.18	0.20	8.19	15.86	74.46		
1st	Atrai	Normal	Normal	5.5	6.5	2.4	3.5	0.72	0.05	5.51	11.66	82.47		
2nd	Atrai	Normal	Normal	6.2	6.7	2.8	4.8	0.89	0.03	7.37	8.18	82.86		
1st	Chandaikona	Normal	Normal	5.7	7.1	2.5	3.7	0.57	0.00	4.86	7.52	86.88		
2nd	Chandaikona	Normal	Normal	5.5	6.5	2.1	3.3	0.30	0.02	15.58	4.70	78.12		
1st	Saturia	Normal	Normal	6.3	7.4	2.7	3.4	1.77	0.13	7.89	4.79	85.77		
2nd	Saturia	Normal	Normal	5.8	7.3	2.3	3.7	1.04	0.28	25.91	1.55	71.34		
1st	Sindhuaghat	Normal	Normal	5.1	6.4	2.5	4.1	0.79	0.05	4.22	7.19	86.94		
2nd	Sindhuaghat	Normal	Normal	5.1	7.1	3.0	3.5	0.96	0.03	4.54	9.55	83.46		
1st	Lohagara	Normal	Normal	5.4	7.1	2.5	3.4	1.79	0.05	4.23	12.37	81.31		
2nd	Lohagara	Normal	Normal	6.4	7.5	2.4	3.8	0.34	0.02	5.99	4.20	89.46		
1st	Nageshwari	Normal	Normal	5.6	7.3	2.2	3.3	2.09	0.05	0.41	23.74	73.64		
2nd	Nageshwari	Normal	Normal	5.5	7.1	2.5	3.7	1.06	0.08	6.06	14.24	78.00		
1st	Amtali	Fungal brown	Damp	6.1	7.2	2.3	4.9	1.22	0.20	12.00	14.36	71.54		
2nd	Amtali	Fungal brown	Damp	5.3	7.2	2.3	4.9	0.17	0.17	64.44	2.51	31.77		
1st	Taltali	Normal	Normal	5.4	7.1	3.3	3.5	0.15	0.24	18.47	12.42	67.57		
2nd	Taltali	Normal	Normal	6.5	7.9	3.1	3.7	0.25	0.10	6.18	8.53	85.12		
1st	Homna	Normal	Slight da	3.2	7.1	2.3	4.1	0.16	0.26	8.56	4.52	85.07		
2nd	Homna	Normal	Normal	5.4	6.5	2.3	3.7	0.17	0.06	4.87	7.93	84.75		
1st	Dampara	Yellow	Normal	6.3	7.4	3.3	3.8	0.80	0.04	3.27	9.68	85.93		
1st	Badarganj	Fungal brown	Damp	5.4	6.7	2.5	3.5	2.05	0.09	9.43	13.67	73.79		
2nd	Badarganj	Fungal brown	Damp	5.4	7.9	2.7	3.7	1.60	0.15	3.26	21.10	72.95		
1st	Naldi	Normal	Normal	6.2	6.9	2.5	3.6	1.80	0.06	0.32	6.45	91.28		
2nd	Naldi	Brown	Normal	5.9	7.1	2.4	3.9	0.28	0.07	3.40	6.10	90.32		
Mean				5.6	7.1	2.6	3.8	1.11	0.13	9.61	10.20	78.38		
Standard deviation				0.6	0.4	0.3	0.4	0.79	0.16	12.09	5.90	11.25		
95% confidence interval of the mean														
Lower bound				5.41	6.95	2.48	3.66	0.81	0.07	5.01	7.95	74.10		
Upper bound				5.88	7.24	2.72	3.99	1.41	0.19	14.21	12.44	82.66		

Table 56—Results of the physical tests on the wheat samples collected from CSDs

Sample no.	CSD locations	Color	Smell	Length variation:		Breadth variation:		Foreign matter	Dust	Broken grains (percent)	Damaged grains	Sound grains
				Size (mm)		Size (mm)						
				Minimum	Maximum	Minimum	Maximum					
1 st	Khulna	Normal	Damp	5.1	7.1	2.3	4.1	1.35	1.79	69.03	3.76	24.22
2 nd	Khulna	Brown/yellow	Damp	6.2	7.2	2.5	3.7	0.76	0.71	34.14	20.18	43.94
1 st	M. pasha	Normal	Normal	5.1	6.4	3.1	3.7	0.84	0.04	6.78	12.49	80.10
2 nd	M. pasha	Normal	Normal	6.1	6.5	2.7	3.7	1.92	0.06	5.66	14.08	78.08
1 st	Shantahar	Normal	Normal	6.1	6.7	2.4	3.7	2.54	0.03	1.12	9.14	87.42
2 nd	Shantahar	Normal	Normal	5.7	6.5	2.8	3.5	1.90	0.15	9.12	12.37	75.36
1 st	Tejgaon	Normal	Old smell	6.2	7.2	2.5	4.7	0.50	0.06	8.85	14.66	76.90
2 nd	Tejgaon	Yellow	Normal	5.5	7.1	2.8	4.1	0.48	0.04	5.42	10.38	84.10
1 st	Narayanganj	Normal	Normal	5.4	7.2	2.1	3.6	0.03	0.04	3.92	6.24	90.62
2 nd	Narayanganj	Yellow	Normal	6.3	7.3	2.8	4.2	0.38	0.12	4.27	11.68	83.04
1 st	Muladuli	Normal	Normal	5.8	7.3	2.3	3.8	0.34	0.02	7.09	6.76	86.82
2 nd	Muladuli	Normal	Normal	6.6	7.3	2.1	3.6	0.31	0.01	4.50	4.52	90.17
1 st	Dewahat	Normal	Damp	5.1	6.5	2.7	3.5	1.16	0.07	5.24	10.54	81.59
2 nd	Dewahat	Normal	Normal	5.8	7.2	2.6	3.8	1.01	0.04	8.00	6.01	85.17
1 st	Chandpur	Normal	Damp	5.7	6.7	2.4	3.5	4.51	0.13	6.11	22.39	66.58
2 nd	Chandpur	Brown/yellow	Normal	5.1	6.4	2.7	3.5	0.70	0.02	2.68	12.62	84.85
1 st	Mymensingh	Normal	Damp	5.6	7.3	2.3	3.5	1.90	0.04	8.28	11.40	77.42
2 nd	Mymensingh	Normal	Normal	5.1	7.2	2.8	3.7	0.19	0.02	2.32	4.36	92.48
1 st	Dinajpur	Normal	Normal	6.4	7.2	2.3	3.5	1.06	0.02	2.99	9.90	83.98
2 nd	Dinajpur	Normal	Normal	5.3	6.7	2.5	3.5	1.22	0.10	5.17	9.39	84.06
Mean				5.7	7.0	2.5	3.7	1.2	0.2	10.0	10.6	77.8
Standard deviation				0.5	0.3	0.3	0.3	1.0	0.4	15.5	4.9	16.4
95% confidence interval for the mean												
Lower bound				5.48	6.79	2.41	3.60	0.67	-0.02	2.80	8.36	70.16
Upper bound				5.94	7.11	2.66	3.89	1.64	0.37	17.27	12.93	85.53

Table 57—Results of the physical tests on the wheat samples collected from silos

Sample no.	Silo locations	Color	Smell	Length variation Size (mm)		Breadth variation Size (mm)		Foreign matter	Dust	Broken grains (percent)	Damaged grains	Sound grains
				Minimum	Maximum	Minimum	Maximum					
1 st	Narayanganj	Normal	Old smell	5.8	7.1	2.6	3.9	0.16	0.02	2.79	12.74	84.73
2 nd	Narayanganj	Normal	Normal	5.1	6.5	3.1	3.8	0.15	0.03	2.33	4.71	93.18
1 st	Shantahar	Brown/yellow	Damp	5.4	6.4	2.0	3.4	0.60	0.02	1.38	19.37	77.87
2 nd	Shantahar	Brown/yellow	Damp	5.5	6.5	1.9	3.3	0.61	0.03	1.07	22.05	75.02
1 st	Ashuganj	Brown/yellow	Normal	5.3	6.8	3.1	3.8	0.17	0.01	1.08	7.00	92.18
1 st	Chittagong	Brown/yellow	Normal	5.3	6.5	2.4	3.5	0.40	0.00	1.44	6.68	89.69
2 nd	Chittagong	Brown	Normal	5.7	7.9	2.3	3.7	0.83	0.02	7.77	7.39	84.58
Mean				5.4	6.8	2.5	3.6	0.4	0.0	2.6	11.4	85.3
Standard deviation				0.2	0.5	0.5	0.2	0.3	0.0	2.4	6.8	7.0
95% confidence interval for the mean												
Lower bound				5.22	6.32	2.04	3.42	0.17	0.01	0.34	5.09	78.89
Upper bound				5.67	7.31	2.93	3.84	0.67	0.03	4.76	17.75	91.76

Table 58—Results of the physical tests on the wheat samples collected from program beneficiaries

Sample no.	Name of upazila	Color	Smell	Length variation: Size (mm)		Breadth variation: Size (mm)		Foreign matter	Dust	Broken grains	Damaged grains	Sound grains
				Minimum	Maximum	Minimum	Maximum					
67	Amtali	Fungal white/ brown	Damp	5.1	7.1	3.1	4.2	0.48	0.21	14.62	6.80	78.10
68	Patgram	Brown/yellow	Normal	5.1	7.3	2.8	4.1	0.71	0.04	0.37	36.25	62.30
69	Nikli	Brown/yellow	Normal	5.2	7.3	2.3	3.6	0.04	0.02	1.63	16.80	81.01
70	Saturia	Normal	Off-flavor	7.0	7.5	2.3	3.2	0.75	0.30	12.47	5.12	81.58
71	Raiganj	Normal	Normal	5.1	7.3	2.1	3.5	1.19	0.05	10.01	10.84	77.90
72	Sundarganj	Normal	Off-flavor	5.8	6.4	2.3	3.5	2.27	0.33	18.34	11.24	67.60
73	Lohagara	Normal	Off-flavor	5.2	6.7	2.4	3.2	2.15	0.26	4.86	10.24	82.43
74	Homna	Normal	Normal	6.1	7.2	2.6	3.4	0.01	0.03	2.70	7.14	89.61
75	Atrai	Brown/yellow	Normal	5.6	6.1	2.5	3.1	0.73	0.06	1.40	16.23	80.60
76	Muksudpur	Normal	Normal	5.9	6.9	2.8	3.5	2.04	0.12	1.69	16.98	78.68
77	Badarganj	Normal	Normal	5.9	6.2	2.5	3.9	2.90	0.10	1.14	44.00	52.94
78	Nageswari	Brown/yellow	Normal	4.4	7.1	2.1	4.1	0.68	0.04	1.85	33.18	64.50
Mean				5.5	6.9	2.5	3.6	1.2	0.1	5.9	17.9	74.8
Standard deviation				0.7	0.5	0.3	0.4	0.9	0.1	6.2	12.8	10.5
95% confidence interval of the mean												
Lower bound				5.11	6.63	2.29	3.37	0.56	0.06	1.96	9.75	68.07
Upper bound				5.96	7.22	2.67	3.85	1.76	0.20	9.89	26.06	81.47

Methodology for the Chemical Tests

The chemical tests were carried out to determine the chemical parameters of the wheat samples. Moisture, protein, fat, crude fiber, carbohydrate, and ash contents in the samples were assessed using the following methods.

Moisture Content

The moisture content of the wheat samples was determined by weighing 10 grams of sample in a pre-weighed moisture dish, and then drying in an oven at 100° C to 105° C till the weight of the dish along with the content was constant. Each time before weighing, the dish was cooled in a desiccator. Then the percentage of moisture was calculated from the difference of weight of the sample as follows:

$$\text{Moisture \%} = \frac{\text{Initial weight} - \text{Final weight}}{\text{weight of the sample}} \times 100 .$$

Protein Content

The protein content of the wheat samples were determined by estimating the nitrogen content of the wheat using the Kjeldahl method, and multiplying the nitrogen value by 6.25.

Fat Content

The fat content was determined by the extraction of the powdered wheat with chloroform-methanol (2:1) in a conical flask. The solvent from the extract was then completely evaporated, and the flask with the residue is dried in an oven at 80° C to 100° C, cooled in a desiccator, and then weighed. The total fat content was calculated as follows:

$$\text{Fat content \%} = \frac{\text{weight of the extract}}{\text{weight of the sample taken}} \times 100 .$$

Crude Fiber Content

The crude fiber content of wheat samples was determined by boiling 5 grams of moisture- and fat-free sample in 200 milliliters of 0.255N sulphuric acid for 30 minutes

in a 500-milliliter beaker, keeping the volume constant by the addition of water at frequent intervals. After that period, the content was filtered through a muslin cloth and residue was made acid free by hot water washing. The washed material was then transferred to the same beaker and 200 milliliters of boiling 0.313N NaOH was added and boiled for 30 minutes by keeping the volume constant. Then the mixture was filtered through muslin cloth. The residue was washed with hot water to make it free from alkali, followed by washing with some alcohol and ether. The material was then transferred to a crucible, dried overnight at 80-100° C, and weighed. The crucible was heated in a muffle furnace at 600° C for three hours, cooled, and weighed again. The difference in weight was the weight of the crude fiber.

$$\text{Crude fiber} = \frac{\{100 - (\text{moisture} + \text{fat})\} \times \text{weight of the fibre}}{\text{weight of the sample (moisture and fat free)}} \times 100 .$$

Ash Content

About 5-10 grams of sample was weighed in a tared platinum or porcelain crucible, which had been previously heated to about 600° C and then cooled. The crucible was then placed on a clay pipe triangle and heated first over a low flame till all the material was completely charred, followed by heating in a muffle furnace for about 3-5 hours at 600° C. It was then cooled in a desiccator and weighed. To ensure completion of washing, the crucible was again heated in the muffle furnace for half an hour, cooled, and weighed. This was repeated till the weight was constant and the ash was white or grayish in color.

$$\text{Ash content} = \frac{\text{weight of the ash}}{\text{weight of the sample}} \times 100 .$$

The results of the chemical tests are reported in Tables 59, 60, 61, and 62. Furthermore, calorie values were estimated for the wheat samples from the chemical parameters. The results of the calorie values are provided in Tables 63, 64, 65, and 66.

Table 59—Results of the chemical tests on the wheat samples collected from LSDs

Sample no.	LSD locations	Moisture	Protein	Fat (percent)	Ash	Crude fiber
1st	Sundarganj	11.89	10.65	2.48	1.83	2.31
2nd	Sundarganj	11.28	11.18	1.55	2.50	5.70
1st	Bamandanga	10.57	11.75	1.46	1.73	5.59
2nd	Bamandanga	12.04	9.58	1.69	1.67	2.63
1st	Patgram	11.49	10.85	1.41	1.65	6.58
2nd	Patgram	11.04	9.64	1.56	1.50	2.77
1st	Atrai	11.66	10.97	2.29	1.63	2.41
2nd	Atrai	10.48	10.82	1.97	1.87	2.11
1st	Chandaikona	9.08	9.48	1.19	1.60	4.10
2nd	Chandaikona	10.69	10.98	1.85	1.72	2.77
1st	Saturia	8.55	12.06	1.68	1.49	2.40
2nd	Saturia	11.53	8.36	1.40	1.50	3.55
1st	Sindhuaghat	10.94	9.84	2.01	1.17	2.74
2nd	Sindhuaghat	10.86	11.09	1.90	1.64	3.26
1st	Lohagara	9.05	10.70	1.77	1.90	2.77
2nd	Lohagara	11.09	9.98	2.08	1.71	2.23
1st	Nageshwari	10.73	10.19	2.02	2.37	3.28
2nd	Nageshwari	10.46	10.37	1.58	1.87	2.94
1st	Amtali	11.84	9.95	1.25	1.49	2.07
2nd	Amtali	12.12	12.76	1.77	1.56	4.96
1st	Taltali	10.16	9.59	1.51	1.61	3.21
2nd	Taltali	10.01	8.94	3.01	1.39	2.78
1st	Homna	12.64	9.32	1.73	1.42	5.28
2nd	Homna	11.36	7.46	2.24	1.44	3.01
1st	Dampara	12.49	9.65	2.57	1.50	2.59
1st	Badarganj	12.08	12.01	1.69	1.62	4.97
2nd	Badarganj	13.05	11.03	1.80	1.59	2.97
1st	Naldi	11.06	10.65	1.58	2.21	5.56
2nd	Naldi	10.30	8.84	1.38	1.46	5.42
Mean		11.05	10.30	1.81	1.68	3.55
Standard deviation		1.07	1.16	0.41	0.29	1.32
95% confidence interval of the mean						
	Lower bound	10.65	9.86	1.65	1.57	3.05
	Upper bound	11.46	10.74	1.96	1.79	4.05

Table 60—Results of the chemical tests on the wheat samples collected from CSDs

Sample no.	CSD locations	Moisture	Protein	Fat	Ash	Crude fiber	Carbohydrate
					(percent)		
1st	Khulna	11.61	8.25	2.02	1.61	2.42	74.09
2nd	Khulna	10.92	10.88	2.13	1.65	2.47	71.95
1st	M.pasha	11.96	9.81	2.56	1.27	1.90	72.50
2nd	M.pasha	11.39	11.19	2.56	1.67	1.84	71.35
1st	Shantahar	10.83	12.90	2.34	3.78	2.65	67.50
2nd	Shantahar	12.20	8.94	2.44	1.90	3.50	71.02
1st	Tejgaon	8.91	9.06	2.28	1.50	2.24	76.01
2nd	Tejgaon	11.93	9.13	2.26	1.32	2.14	73.22
1st	Narayangaj	9.61	9.94	2.31	1.39	2.06	74.69
2nd	Narayangaj	12.56	8.56	2.08	1.40	1.99	73.41
1st	Muladuli	9.61	10.50	1.96	1.52	2.41	74.00
2nd	Muladuli	9.55	8.25	2.09	1.45	2.49	76.17
1st	Dewanhat	11.98	12.85	2.48	1.66	1.78	69.25
2nd	Dewanhat	8.81	11.87	2.26	1.58	2.05	73.43
1st	Chandpur	11.94	12.21	2.75	4.51	3.59	65.00
2nd	Chandpur	11.97	8.99	3.15	1.54	2.29	72.06
1st	Mymensingh	9.64	10.15	1.90	1.63	2.09	74.59
2nd	Mymensingh	11.80	11.19	2.51	1.37	1.98	71.15
1st	Dinajpur	11.38	11.55	2.41	1.66	2.48	70.52
2nd	Dinajpur	12.08	11.37	2.60	1.68	2.51	69.76
Mean		11.03	10.38	2.35	1.80	2.34	72.08
Standard deviation		1.21	1.49	0.30	0.82	0.48	2.79
95% confidence interval of the mean							
	Lower bound	10.47	9.68	2.22	1.42	2.12	70.78
	Upper bound	11.60	11.08	2.49	2.19	2.57	73.39

Table 61—Results of the chemical tests on the wheat samples collected from silos

Sample no.	Silo locations	Moisture	Protein	Fat	Ash	Crude fiber	Carbohydrate
					(percent)		
1st	Narayanga	8.60	10.90	2.69	1.25	1.91	74.65
2nd	Narayanga	10.11	9.58	2.60	1.18	2.06	74.47
1st	Shantahar	11.21	9.51	2.45	1.57	2.42	72.84
2nd	Shantahar	12.02	11.02	1.74	1.67	4.87	68.68
2nd	Ashuganj	11.97	9.93	1.69	1.52	11.03	63.86
1st	Chittagon	11.69	9.49	1.93	1.53	3.58	71.78
2nd	Chittagon	8.94	9.26	1.55	1.59	2.82	75.84
Mean		10.65	9.96	2.09	1.47	4.10	71.73
Standard deviation		1.44	0.71	0.47	0.18	3.22	4.19
95% confidence interval of the mean							
	Lower bound	9.32	9.29	1.65	1.30	1.12	67.86
	Upper bound	11.98	10.62	2.53	1.64	7.08	75.61

Table 62—Results of the chemical tests on the wheat samples collected from program beneficiaries

Sample no.	Upazila	Moisture	Protein	Fat	Ash	Crude fiber	Carbohydrate
					(percent)		
67	Amtali	11.87	9.01	1.91	1.46	2.68	73.07
68	Patgram	10.81	11.11	2.56	1.71	2.08	71.73
69	Nikli	11.98	9.77	2.44	1.60	2.49	71.72
70	Saturia	9.68	7.96	1.85	1.61	2.23	76.67
71	Raigonj	9.63	12.37	2.22	1.85	1.93	72.00
72	Sundorgon	10.70	11.70	1.94	1.71	2.48	71.47
73	Logaraga	11.56	10.41	2.24	2.24	2.57	70.98
74	Homna	11.61	7.65	2.75	1.41	2.35	74.23
75	Atrai	11.12	8.26	2.59	1.56	2.14	74.33
76	Moksedpur	12.57	9.87	2.67	1.63	2.20	71.06
77	Badarganj	11.81	12.34	2.90	2.30	2.77	67.88
78	Nageswari	13.71	11.40	2.89	2.02	2.60	67.38
Mean		11.42	10.15	2.41	1.76	2.38	71.88
Standard deviation		1.15	1.67	0.38	0.29	0.26	2.59
95% confidence interval							
	Lower bound	10.69	9.09	2.17	1.57	2.21	70.23
	Upper bound	12.15	11.22	2.65	1.94	2.54	73.52

Table 63—Calorie values of the wheat samples collected from LSDs

Sample no.	LSD locations	Protein	Fat	Carbohydrate	Kilocalorie per 100 grams wheat
1st	Sundarganj	42.60	22.32	283.36	348
2nd	Sundarganj	44.72	13.95	271.16	329
1st	Bamandanga	47.00	13.14	275.60	335
2nd	Bamandanga	38.32	15.21	289.56	343
1st	Patgram	43.40	12.69	272.08	328
2nd	Patgram	38.56	14.04	293.96	346
1st	Atrai	43.88	20.61	284.16	348
2nd	Atrai	43.28	17.73	291.00	352
1st	Chandaikona	37.92	10.71	298.20	346
2nd	Chandaikona	43.92	16.65	287.96	348
1st	Saturia	48.24	15.12	295.28	358
2nd	Saturia	33.44	12.60	294.64	340
1st	Sindhuaghat	39.36	18.09	293.20	350
2nd	Sindhuaghat	44.36	17.10	285.00	346
1st	Lohagara	42.80	15.93	295.24	353
2nd	Lohagara	39.92	18.72	291.64	350
1st	Nageshwari	40.76	18.18	285.64	344
2nd	Nageshwari	41.48	14.22	291.12	346
1st	Amtali	39.80	11.25	293.60	344
2nd	Amtali	51.04	15.93	267.32	334
1st	Taltali	38.36	13.59	295.68	347
2nd	Taltali	35.76	27.09	295.48	358
1st	Homna	37.28	15.57	278.44	331
2nd	Homna	29.84	20.16	291.88	341
1st	Dampara	38.60	23.13	284.80	346
1st	Badarganj	48.04	15.21	270.52	333
2nd	Badarganj	44.12	16.20	278.24	338
1st	Naldi	42.60	14.22	275.76	332
2nd	Naldi	35.36	12.42	290.40	338
Mean		41.20	16.27	286.24	343
Standard deviation		4.65	3.72	8.96	8.16
95% confidence interval of the mean					
	Lower bound	39.43	14.85	282.83	340
	Upper bound	42.97	17.68	289.65	346

Table 64—Calorie values of the wheat samples collected from CSDs

Sample no.	CSD locations	Protein	Fat	Carbohydrate	Kilocalorie per 100 grams wheat
1st	Khulna	33.00	18.18	296.36	347
2nd	Khulna	43.52	19.17	287.80	350
1st	M.pasha	39.24	23.04	290.00	352
2nd	M.pasha	44.76	23.04	285.40	353
1st	Shantahar	51.60	21.06	270.00	342
2nd	Shantahar	35.76	21.96	284.08	341
1st	Tejgaon	36.24	20.52	304.04	360
2nd	Tejgaon	36.52	20.34	292.88	349
1st	Narayangaj	39.76	20.79	298.76	359
2nd	Narayangaj	34.24	18.72	293.64	346
1st	Muladuli	42.00	17.64	296.00	355
2nd	Muladuli	33.00	18.81	304.68	356
1st	Dewanhat	51.40	22.32	277.00	350
2nd	Dewanhat	47.48	20.34	293.72	361
1st	Chandpur	48.84	24.75	260.00	333
2nd	Chandpur	35.96	28.35	288.24	352
1st	Mymensingh	40.60	17.10	298.36	356
2nd	Mymensingh	44.76	22.59	284.60	351
1st	Dinajpur	46.20	21.69	282.08	349
2nd	Dinajpur	45.48	23.40	279.04	347
Mean		41.52	21.19	288.33	351
Standard deviation		5.96	2.68	11.15	6.93
95% confidence interval of the mean					
	Lower bound	38.73	19.94	283.12	347
	Upper bound	44.31	22.44	293.55	354

Table 65—Calorie values of the wheat samples collected from silos

Sample no.	Silo locations	Protein	Fat	Carbohydrate	Kilo calorie per 100 g wheat
1st	Narayanganj	43.60	24.21	298.60	366
2nd	Narayanganj	38.32	23.40	297.88	359
1st	Shantahar	38.04	22.05	291.36	351
2nd	Shantahar	44.08	15.66	274.72	334
1st	Ashuganj	39.72	15.21	255.44	310
1st	Chittagong	37.96	17.37	287.12	342
2nd	Chittagong	37.04	13.95	303.36	354
Mean		39.82	18.84	286.93	345
Standard deviation		2.86	4.27	16.77	18.78
95% confidence interval					
	Lower bound	37.18	14.89	271.42	328
	Upper bound	42.47	22.78	302.43	362

Table 66—Calorie values of the wheat samples collected from program beneficiaries

Sample no.	Upazila	Protein	Fat	Carbohydrate	Kilocalorie per 100 grams wheat
67	Amtali	36.04	17.19	292.28	345
68	Patgram	44.44	23.04	286.92	354
69	Nikli	39.08	21.96	286.88	347
70	Saturia	31.84	16.65	306.68	355
71	Raigonj	49.48	19.98	288.00	357
72	Sundarganj	46.80	17.46	285.88	350
73	Lohagara	41.64	20.16	283.92	345
74	Homna	30.60	24.75	296.92	352
75	Atrai	33.04	23.31	297.32	353
76	Muksudpur	39.48	24.03	284.24	347
77	Badarganj	49.36	26.10	271.52	346
78	Nageswari	45.60	26.01	269.52	341
Mean		40.62	21.72	287.51	349
Standard deviation		6.70	3.39	10.36	4.82
95% confidence interval of the mean					
	Lower bound	36.36	19.57	280.92	346
	Upper bound	44.87	23.87	294.09	352

Appendix 3: Salient Features of the VGD and IFS Programs

The Vulnerable Group Development Program

The Vulnerable Group Development program in Bangladesh is the world's largest development intervention of its kind that exclusively targets women. About 500,000 ultra poor rural women in the country receive support under the VGD program. The program was originated in 1975 as a relief program for families affected by natural calamities. The current VGD program seeks to integrate food security and nutrition with development and income-generation. The VGD program is a collaborative food security intervention jointly managed and implemented by the GOB and the WFP. In 2002, VGD used about 74 percent of the WFP Country Program resources.

The VGD program is implemented through three components: Union *Parishad* (council) VGD (UPVGD), Women Training Center (WTC), and Group Leader Extension Workers (GLEW). The UPVGD component is the largest, covering about 450,000 VGD women in all unions of 461 rural *upazilas* of Bangladesh.⁵⁶ The WFP support to the WTC component has been reduced, and its support to the GLEW component was phased out in mid-2002.

Since 1997, responsibility for the overall management and coordination of the VGD program has been transferred from the Ministry of Disaster Management and Relief (MDMR) to the Ministry of Women and Children Affairs (MWCA). The responsibility for its implementation has been shifted from the Directorate of Relief and Rehabilitation (DRR) to the Department of Women Affairs (DWA). However, in those *upazilas* where DWA has no officials yet, DRR continues to carry out the *upazila*, and union-level management, and monitoring responsibilities of the VGD program. The *Upazila* Project Implementation Officer (PIO) is responsible for program implementation.

Participants of the VGD program are all women who receive a monthly ration of 30 kilograms of wheat over a period of 24 months.⁵⁷ This food support period is referred

⁵⁶ The administrative structure of Bangladesh consists of divisions, districts, *upazilas*, and unions, in decreasing order by size. There are 6 divisions, 64 districts, 507 *upazilas* (of which 29 are in four city corporations), and 4,484 unions (all rural) (BBS 2001).

⁵⁷ Since 2002, VGD women in three *upazilas* have been receiving 25 kilograms of nutrient-fortified *atta* in sealed bags under the *Atta* Fortification Pilot Project.

to as the “VGD cycle.” In addition, two NGOs—the Bangladesh Rural Advancement Committee (BRAC) and *Jagorani Chakra* (JC)—provide development support. This is comprised of: training on income-generating activities (such as poultry rearing, livestock raising, fishery, and sericulture); raising awareness on social, legal, health, and nutrition issues; basic literacy and numeracy training; and access to credit. VGD participants are required to make a monthly savings deposit of Tk 25 into an interest-bearing account maintained by the VGD service providing NGOs. Savings should be deposited into a bank or post office in areas not served by the VGD partner NGOs.

Although the VGD program operates nationwide, it concentrates more resources in food-insecure areas of the country. About two-thirds of the resources are directed to about one-third of the *upazilas*. Consequently, coverage is higher in more food-insecure areas. The GOB and the WFP have devised a resource allocation map for food-assisted development where each *upazila* of the country has been categorized by its relative food insecurity level. The level of food insecurity is determined by factors such as foodgrain surplus or deficit, the agricultural wage rate, infrastructure status, population density, landless households, employment opportunities, and susceptibility to natural disasters. Based on this map, VGD food resources are allocated on a geographical targeting of *upazilas* in proportion to their food insecurity levels.

The VGD program beneficiaries are selected by administrative review, using *upazila*-level committees of government officials, elected representatives of local government, and NGO representatives. The VGD selection committee selects the beneficiaries according to officially prescribed criteria.

Food allocation and distribution involve the following administrative steps:

1. Allocation plans are prepared jointly by WFP and MWCA as per signed project agreement.
2. MWCA issues the Government Order (GO) to DRR/DWA to release the food stocks required for the program. The GO specifies the number of VGD cardholders, total quantity of foodgrain, and transportation cost allowance.
3. DRR/DWA subsequently issues Allotment Orders (AOs) in favor of the concerned *Upazila Nirbahi* (executive) Officers for program implementation.
4. Upon request from the *Upazila Nirbahi* Officer, the *Upazila Food Controller*—an official of the Ministry of Food—issues a foodgrain Delivery Order (DO) in favor

- of UP chairpersons of the unions in the *upazila*. The DO is then forwarded to the Officer-in-Charge of the Ministry of Food's Local Supply Depots (OC LSDs).
5. UP chairperson takes delivery of the monthly supply of food commodities from the LSD and carries to the distribution point at union level. UP chairperson is entitled to receive an allowance equivalent to Tk 205 per metric ton of wheat to cover transport costs, half of which is to be paid in cash and the other half is to be realized from the sales proceeds of empty bags that contained the wheat. With the recent introduction of fortified *atta*, NGOs are contracted to carry the food up to the distribution points.
 6. VGD beneficiaries receive food from the union distribution centers once a month on a prespecified date.

The Integrated Food Security Program

The GOB and the WFP signed an Operational Contract in March 2001 to support ultra poor people through development activities as specified in the Country Program 2001-2005. The three activities to be undertaken during the Country Program are the two existing activities—the VGD and the Rural Development (RD) programs, and a new activity, the Integrated Food Security (IFS) program. The IFS program was introduced in February 2002 in 10 *upazilas* under three districts in the Rangpur Cluster of Northern Bangladesh. It used about 3 percent of the WFP Country Program resources in 2002.

The IFS program is designed as follows. The program will allocate resources to the most food-insecure areas in the country identified by Vulnerability Analysis and Mapping (VAM), and will target the ultra poor individuals living in these areas. Local NGOs follow a very simple and result-oriented participatory planning process to identify the ultra poor households, including the malnourished women and children. The program follows an area-based approach and aims at improving the household food security and nutrition of the rural ultra poor. It is beneficiary-driven through using participatory techniques for micro planning at the village level and through allocating resources to community bodies. The program is based on the lessons learned from the well-established VGD and RD programs as well as other development activities in Bangladesh and elsewhere.

The IFS program includes three components: the Community Nutrition Initiative (CNI), Training and Nutrition Centers (TNC), and Food-for-Asset Creation (FFA) activities. The Local Government Engineering Department (LGED) under the Ministry of Local Government Rural Development and Cooperatives (MLGRDC) coordinates CNI and FFA activities. The Department of Women's Affairs (DWA) under the Ministry of Women and Children Affairs (MWCA) is the coordinating agency for the TNC component.

The WFP and the LGED, based on mutual consultation, select NGOs working in the project areas to support and facilitate the implementation of IFS activities. The NGOs are to facilitate a simple, but result-oriented, participatory process for the selection of appropriate participants. They also organize training on social awareness, including disaster preparedness, nutrition education and income-generating activities, and assist with organizing supplementary feeding as part of the implementation; and provide various follow-up services to the participants.

Food allocation and distribution for the IFS program involves the following administrative steps:

1. MLGRDC allocates resources to the relevant *upazila* authorities of LGED, while MWCA issues GO to the DWA.
2. Upazila Engineer/Officer of LGED/DWA issues delivery request to the Upazila Food Controller/OC LSDs.
3. Local committees in the field take delivery of food from local LSDs.
4. Distribution is made to the beneficiaries at centers/project sites.

The three IFS components are described below.

Community Nutrition Initiative (CNI)

The CNI component addresses the problem of malnutrition through community managed supplementary feeding interventions, combined with nutrition education for the community. It is implemented in only non-NNP (National Nutrition Program) areas. Children aged 6-24 months (50 percent girls and 50 percent boys) receive supplementary food; and expectant and nursing mothers receive supplementary food and nutrition education. Village Nutrition Promoters (VNPs) chosen by the community facilitate

supplementary feeding and nutrition training. VNPs are also responsible for identifying malnourished children aged 6-24 months, and malnourished pregnant and nursing mothers for supplementary feeding.

Daily take-home rations of 200 grams of micronutrient fortified blended food are provided to all malnourished children of 6-11 months of age. Malnourished children aged 12-24 months receive a daily take-home ration of 200 grams for four months. Malnourished pregnant and nursing mothers receive a daily take-home ration of 250 grams for six months. VNPs receive a monthly incentive of 50 kilograms of wheat and the cash equivalent of 50 kilograms of wheat (about Tk 475).

Training and Nutrition Centers (TNC)

The TNC component provides training in marketable skills and awareness of human development issues, particularly on nutrition and early childhood development (ECD), for ultra poor women. It also provides training on nutrition, reproductive health, preventive health care, and home development skills for adolescent girls. Moreover, on-site supplementary feeding is provided for one year for adolescent girls from ultra poor households and children from 6 months to 6 years who accompany their mothers in training. Community Based Organizations (CBOs) are responsible for selecting the beneficiaries based on the stipulated criteria.

Women trainees from extremely poor households (who are not already VGD beneficiaries) receive daily dry take-home rations of 30 kilograms of wheat (or a value-based equivalent amount of fortified *atta*) per month over one year. Children of 6 months to 6 years and adolescent girls receive cooked, fortified, blended food rations as on-site feeding, six days per week for one year. The ration size per day for children is 150 grams, and for adolescent girls, 150 grams. Facilitators for ECD and trainers for adolescent girls receive a monthly incentive of 50 kilograms of wheat and a cash equivalent of 50 kilograms of wheat (about Tk 475).

Food-for-Asset Creation (FFA)

The FFA component promotes human and capital resource development of the ultra poor by providing awareness and training in legal, social, health and nutrition issues, enabling participants to work for community infrastructure development and productive

asset creation, and by providing marketable skills training for income-generating activities. Both women and men participate in FFA. However, at least 70 percent of the participants should be women. User committees are formed from among the participants, who are responsible for organizing village-based micro planning to identify participants of FFA activities. Stipulated selection criteria are to be followed in the selection of participants. Local service providers/NGOs facilitate this process. User committees also participate in identification of schemes and activities, and are responsible for lifting and distributing wheat.

Participants of the FFA component (who are not already VGD beneficiaries) receive food and cash compensation. Each participant of the community infrastructure and asset building works receives 2 kilograms of wheat and Tk 15 per working day. They receive a monthly ration of 20 kilograms of wheat and Tk 100 when they participate in awareness, nutrition, and skill training sessions. The payment, however, depends on the quality/quantity of work and/or attendance at the training sessions.

A 1-to-2-year project cycle will be followed for FFA. Food-for-work activities are carried out during December to May, which is the period suitable for earthwork. Depending on the type of activities, however, the implementation period may vary. For the training on awareness building and income-generating activities, it is recommended that a flexible schedule be followed as per the convenience of the project participants.

Appendix 4: Action Plan for Implementation of the Recommendations of the Food Aid Leakage Study

Background

The IFPRI Study Team (the Team) identified the main factors contributing to leakage in the food distribution system from entry ports to the targeted beneficiaries and provided recommendations on ways to control this leakage. The Team offered three sets of recommendations to check leakage occurring at three stages, namely (1) food discharge at harbors, (2) the Public Food Distribution System (PFDS), and (3) the final distribution to program beneficiaries. The Team provided these recommendations in earlier drafts of the study report and the executive summary of the report. In addition, the Team designed an expert opinion survey questionnaire to receive feedback on the recommendations from the members of the joint Government of Bangladesh (GOB)-donors Steering Committee on the Food Aid Leakage Study, and other stakeholders. The Team also presented the recommendations to the participants of the Policy Dialogue Session on the Food Aid Leakage Study, which was held on July 24, 2003, in Dhaka, Bangladesh.

The Team received valuable written comments and suggestions on the draft report from the members of the Steering Committee, as well as from other reviewers. Many of the officials of the GOB and donor agencies completed the expert opinion survey questionnaire and returned it to the Team with insightful responses. The participants of the Policy Dialogue Session provided useful and stimulating comments on the feasibility of implementing the recommendations, and suggested revisions to some of the recommendations. Drawing upon all feedback, the Team prepared this Action Plan for implementing the recommendations of the Food Aid Leakage Study.

Recommendations made by the Team did not necessarily enjoy the same degree of acceptability across all stakeholders. Please note that the recommendations presented in the final report on the Food Aid Leakage Study reflect some modifications resulting from the feedback received from stakeholders. Moreover, the final report on the Food Aid Leakage Study addressed the concerns and clarified confusion on the part of the

reviewers of an earlier draft of the report. The Team hopes that this will result in a better understanding of the recommendations.

This Action Plan document first provides the original set of recommendations under each of the three substudy headings. Readers who want to see what changes the authors made in the recommendations in the final report can compare the original recommendations with those in the executive summary of the present report on the Food Aid Leakage Study. This document then lays out the feasibility of implementing the recommendations, and areas of consensus and disagreement on the recommendations. This lays the groundwork for the subsequent presentation of action plans.

Action Plan for Substudy 1: Foodgrain Discharge at Harbors

The seven original recommendations of Substudy 1 were:

Recommendation A1 (R-A1):

The quantity recorded in a Bill of Lading should be considered the reference quantity for agreements between the GOB and donors on the amount of foodgrain delivered.

Recommendation A2 (R-A2):

Institutionalizing multiple independent arrival draft surveys would be costly; therefore, the number of agents engaged in such surveys should be reduced.

Recommendation A3 (R-A3):

The WFP could consider stipulating variable discharge rates in its contracts with the GOB, which would be made specific to points of discharge.

Recommendation A4 (R-A4):

A temporary switch to single port discharge at the Chittagong outer anchorage and silo jetty would enable the GOB to reshape the institutional arrangements at Mongla port once it is relocated or a silo is established at a suitable place.

Recommendation A5 (R-A5):

A collaborative database should be developed with WFP, DGF, shipping agents, and lightering agents. A common set of information, available to all parties without time lags, will reduce the likelihood of pilferage.

Recommendation A6 (R-A6):

(i) A mechanism within the GOB should be formulated to transfer funds from dispatch money to provide incentives to workers, DGF staff, and other parties engaged in discharge. (ii) The WFP could revise its calculation of lay time relating to Fridays and holidays.

Recommendation A7 (R-A7):

To make the DGF more accountable, appropriate institutional arrangements should be made within the GOB to enhance its role in food-related negotiations with donors.

Degree of Consensus and Feasibility of Implementation

Seven recommendations were explicitly identified under Substudy 1 and reactions to these were sought in the questionnaire administered prior to the Policy Dialogue Session in July 2003. Five additional recommendations are provided in the final report. These 12 recommendations are abbreviated and listed in Table 67.

Other than the difficulty in introducing a variable discharge rate in the Charter Party (R-A3), and the practical difficulty with transfer of dispatch money within the GOB hierarchy (R-A6), implementation of all other recommendations is considered feasible. There were tacit agreements on recommendations R-A8 to R-A12, even though they were not discussed at length. There was also a general appreciation of the recommendation on the enhanced role of the Directorate General of Food (DGF) of the Ministry of Food (MOF) in negotiations on food aid (R-A7). However, there was no unanimity on R-A2 and R-A4.

All parties acknowledged that timely monitoring with a commonly shared computerized information system would help in reducing pilferage. Thus, at a practical level, R-A5 may be implemented with subsequent follow-up on all other issues through the committee, which will coordinate the monitoring activities.

Table 67—Substudy 1 recommendations: Degree of consensus and feasibility of implementation

Recommendations	Feasibility	Degree of consensus
R-A1. Consider Bill of Lading (B/L) as the reference quantity.	Feasible	Procedures to reconcile B/L quantity and draft survey figure should be agreed upon early on. A DGF response agreed with all the assumptions underlying the recommendation, yet, did not agree with the recommendation on the ground that reconciliation of different figures may be difficult.
R-A2. Reduce the number of surveyors.	Feasible among few stakeholders	Some donors remained silent and one was in favor of independent draft surveys from three agencies.
R-A3. Introduce variable discharge rates.	Difficult to introduce in the Charter Party	There was a lack of awareness among the donor representatives. Several stakeholders from the Bangladesh side preferred to qualify the rates further in terms of number of hatches and load proportion.
R-A4. Temporarily switch to single port discharge at Chittagong.	Feasible even though politically sensitive	Several stakeholders felt that single port discharge would not be beneficial even though no strong reservation was raised from the DGF.
R-A5. Collaborate to compile and share a common database on arrivals and discharges for timely monitoring.	Feasible	All parties agreed and this was formally endorsed in the policy workshop.
R-A6. Initiate transfer of funds from dispatch money to provide incentives to workers, DGF staff and other parties engaged in discharge operations.	Those aware of the intricacies feel that it is not feasible	Everyone recognized the need. Some people, especially within the DGF, acknowledged that such transfers of incentives are better handled under the liner term through the private shipping agent. WFP finds the latter proposition difficult to accept.
R-A7. Enhance the role of DGF in food-related negotiations with donors.	Feasible, but requires decisions within the GOB	The issue is politically sensitive and there was no explicit formal response. However, all parties generally appreciated the problem and the need to make the process of negotiation participatory.
R-A8. Review the practice of block adjustments	Feasible	The DGF representative informed the Team that the decision to withdraw the arrangement has been made.
R-A9. Assess the need to trim the size of DGF	Feasible	Since the linkage is not obvious, the proposal got little attention.
R-A10. Ensure independent monitoring of silo weighing instrument	Feasible	There was generally a lack of awareness of technical matters and the issue was not separately discussed in the policy workshop.
R-A11. WFP may consider excluding full Fridays and holidays from the calculation of lay period.	Feasible	There was a general consensus about this recommendation and the WFP registered no reservations.
R-A12. If RA-4 is adopted, WFP/donors may use part of the savings (on account of lower freight) to meet the additional expenses on inland transfers.	Feasible	No specific reservation was registered. DGF appears to accept R-A4 if this proposal is also approved.

The recommendations are grouped into three categories: (1) A set of recommendations that involve decisions at technical levels in order to define the rules of business, and on which there is a good deal of consensus; (2) R-A5 that everyone endorses and involves an institutional arrangement to be sustained over a long time; and (3) a set of recommendations that may be addressed in the process of implementing R-A5.

Action Plan

Implementing Recommendations R-A1, and R-A8 to R-A12

These recommendations may be immediately endorsed by the Steering Committee, and the relevant agencies may be requested to take necessary steps to realize them. The Coordination Committee proposed below may monitor progress in their implementations by respective agencies.

The representative of the DGF in the Policy Dialogue Session informed the audience of a decision to withdraw the block adjustment practice (R-A8). Implementation of this may only require follow-up.

R-A9 is a suggestion that may be taken up by the MOF, and some donors may be urged to take up the issue in a future review study. The same applies for R-A10 with regard to putting in place an independent monitor for the weighing at Chittagong silo. With endorsement from the Steering Committee, the WFP may initiate the process for realizing R-A11. Finally, R-A12 is a suggestion that is to be addressed in conjunction with R-A4, and the decisions on them involve both donors and the GOB.

Setting Up a Monitoring System (R-A5)

The proposed action plan may involve the following steps:

Step 1: To be implemented immediately and completed within three months.

The Economic Relations Division (ERD) and the WFP may jointly set up a Coordination Committee with representatives from the following agencies: ERD, WFP, DGF (Dhaka), Food Planning and Monitoring Unit (FPMU), and Controller of Movement and Storage (CMS)-Chittagong. The committee may subsequently invite

additional observers, including representatives from food donors, private shipping agents, and the Bangladesh Shipping Corporation (BSC).

FPMU may be requested to act as the Secretariat of the newly formed committee, and until an appropriate time (when DGF takes up greater responsibility), ERD and WFP may jointly coordinate all activities of the committee.

The committee may be requested to table a proposal identifying the cost-effective way to put in place a Management Information System (MIS) for the purpose of monitoring all foodgrain discharges and flows at harbors. The proposal should also identify the appropriate agencies in the information network, their responsibilities, and the supports required for each of them.

Once the interagency coordination is established, it is expected that intra-agency coordination will be established within each agency. It is therefore pertinent to consider the secondary linkages at the initiation of the monitoring system.

It is expected that at the initial stage, discharges from all WFP vessels will be monitored. Subsequently, other donors may join in if they want to.

Step 2: To be implemented within three months of proposal submission.

Once the proposal along with the budget is approved, it is expected that the WFP and the GOB would share the cost. The donors may decide to contribute through the WFP. All procurement and training may be done by the FPMU, which will be coordinated by its representative on the Committee. One or two support persons may therefore be necessary to be deputed under the command of the FPMU.

Step 3: Pilot monitoring for one year.

During this phase, the system will be put into operation. A higher body, such as the Steering Committee or an independent advisory committee (to be identified in Step 1) may be made responsible to oversee the monitoring activities undertaken by the FPMU. It is important that this committee meet at least once a month to ensure that all parties coordinate during the trial phase of one year.

Step 4: A review at the end of one-year trial period and decision on long-term arrangement.

Addressing Other Recommendations

All other recommendations (R-A2, R-A3, R-A4, RA-6, and R-A7) may be reviewed half way into the monitoring period, and the newly formed committee dealing with monitoring may be requested to place them to the higher body.

Action Plan for Substudy 2: The Public Food Distribution System

The six original recommendations of Substudy 2 were:

Recommendation B1 (R-B1):

Both local movement (LSD-to-LSD) and stock rotation have significant cost implications for PFDS operations. Successful planning and control requires up-to-date information regarding stock and flow of foodgrain at the storage level. Therefore, an information system that would provide current information to the key decision-makers should be developed. The study team has developed a GIS database for the surveyed storage facilities. This database can serve as a basis for the DGF to integrate stock movement and rotation information into its movement decision-making process, provided the DGF updates the database on a regular basis.

Recommendation B2 (R-B2):

The PFDS transit loss can be further reduced. First, private flour millers do not incur any transit loss in transporting their grain, as they operate under an arrangement where transporters assume sole responsibility for delivery of full invoice quantity. If the storage facilities are well connected, the GOB can adopt the same strategy for transportation by road. Second, by introducing hundred percent weighing in water transportation (except unavoidable cases at Mongla port), higher permissible limits of losses (currently 0.4 percent) can be revised downward.

Recommendation B3 (R-B3):

With the current level of PFDS operations (that is, an annual distribution of about 1.35 million metric tons), the national security stock level can be revised downward from 800 thousand metric tons to 600 thousand metric tons. There are two justifications for this change. First, after liberalization of the regional trade of foodgrain, the private market now plays a more important role in price stabilization. Second, the country has been able to cope with a major natural disaster—the devastating floods of 1998—with only about 500 thousand metric tons of public stock.

Recommendation B4 (R-B4):

Although the flow of food aid to Bangladesh has been declining, it still constitutes about one-third of the total PFDS operation. Since foodgrain distribution under various programs is stable, and since domestic procurement is sizeable, arrival of food aid during the procurement season can adversely affect PFDS stock management. Therefore, food aid arrivals should be scheduled so that they do not coincide with the GOB's procurement season.

Recommendation B5 (R-B5):

The GOB and the donors should formulate a single cost sharing arrangement to cover ITSH costs, eliminating unnecessary complications in PFDS accounting.

Recommendation B6 (R-B6):

The PFDS revenue budget can be significantly improved by auctioning out hard red wheat varieties, which fetch a higher price in the market. There are four reasons to pursue this policy. First, the poor prefer white varieties to red. Second, given the current movement patterns, food aid wheat rarely goes to the northern part of the country, where the majority of the poor live. Third, formalizing an otherwise illegal trading practice will improve transparency and reduce transaction costs. Finally, conservative estimates for the period 1998/99 to 2001/02 suggest that the revenue gains from tendering out food aid wheat could have been substantial—ranging from Tk 30.31 crore (\$5.32 million) to Tk 176.16 crore (\$30.9 million).

Degree of Consensus and Feasibility of Implementation

The feedback received in the Policy Dialogue Session, comments on an earlier draft of the report, and responses in the completed expert opinion survey questionnaires indicate that there is a high degree of consensus regarding the importance and feasibility of implementing four out of six recommendations. The two recommendations for which a consensus could not be established for immediate policy actions are (1) revising year-end national food security stock from 800,000 tons to 600,000 tons (R-B3), and (2) auctioning off high-quality food aid wheat (R-B6).

A general concern about R-B3 was that the potential risk of reducing the national food security stock might be too high. In particular, stakeholders were concerned that 600,000 tons may not be enough to successfully manage unforeseen food security threats, such as floods and other natural disasters, which the country periodically encounters.

However, the Team's stand on the issue is that given the fact that PFDS has been downsized by more than 500,000 tons, attempting to maintain a security stock of 800,000 tons will lead to higher stock rotation time, requiring open market sales to dispose of older stocks. Furthermore, instead of fixing security stock at a given level for the entire year, it should be seasonally adjusted and geographically targeted, paying close attention to the vulnerability of a given location to natural disaster at a given point in time. After much deliberation during the policy dialogue session, it was agreed to further evaluate this recommendation.

The responses regarding auctioning off high quality food aid wheat (R-B6) have been mixed. While the MOF considered the recommendation to be administratively complicated for implementation, some donors viewed the recommendation as undermining the rights of the poor to consume high-quality foodgrain for their nutritional needs. The Team explained that in addition to revenue gain, the recommendation was based on three arguments: (1) the poor prefer white over hard red varieties of wheat, (2) given current movement planning, food aid wheat rarely flows to the regions of the country where the majority of the poor live, and (3) auctioning would minimize transaction costs and bring transparency to the PFDS operation. This recommendation was debated extensively during the Policy Dialogue Session, and it was agreed to include R-B6 as a nonbinding recommendation for further evaluation.

The recommendations, their perceived feasibility, and their degree of consensus are summarized in Table 68. Note that although implementation of these recommendations will require coordinated efforts, the MOF and the WFP will certainly have to play bigger roles. For instance, an essential element of R-B4 and R-B5 is improved coordination among the donors, and WFP is the appropriate organization to facilitate such coordination. On the other hand, the MOF will have to take the lead role in implementing R-B1 and R-B2, particularly in assessing the costs, designing the information system, and proposing modalities to implement the first two recommendations.

Table 68—Substudy 2 recommendations: Degree of consensus and feasibility of implementation

Recommendations	Feasibility	Degree of consensus
R-B1. Develop an information system for successful planning and controlling stock movement and rotation.	Feasible	All stakeholders considered it to be important and feasible. However, one of the donors was concerned about the costs of setting up and maintaining such an information system.
R-B2. Minimize transit losses by: (i) eliminating allowable transit loss in case of road transportation, and (ii) introducing 100% weighing and revising permissible losses in water transportation	Feasible	Although donors expressed doubts, both DGF and the Mongla Port Authority think that 100% weighing is feasible and can be implemented in six months. The DGF also agrees with the recommendation of revising the allowable transit losses.
R-B3. Revise security stock downward to 600, 000 metric tons.	Needs further evaluation	It should be determined whether 600,000 tons would be enough to address unforeseen food security threats, such as floods and other natural disasters.
R-B4. Schedule food aid arrival during nonprocurement season for domestic foodgrain.	Feasible	Some donors have concerns. But the DGF and most of the other participants have agreed with the recommendation; and a common suggestion has been to improve the coordination between the GOB and the donors.
R-B5. Formulate a uniform ITSH cost sharing arrangement.	Feasible	Most participants considered it to be an important step toward harmonizing policies across donors. It was agreed in the policy dialogue session that the WFP would coordinate among the food donors to explore options for setting up a uniform ITSH cost sharing arrangement.
R-B6. Tender out high-quality, food-aid wheat in order to gain revenue and improve transparency for PFDS.	Needs further evaluation	The recommendation was bracketed for further consideration.

Action Plan

The sequential plan of actions, key organizations, and timeline for implementation are summarized in Table 69. Although the table is self-explanatory, two points need further clarification. First, the timelines specified in the table for each of the actions are based on a limited number of responses from the expert opinion survey. Therefore, that the timeframe may change during the actual implementation process. Second, the sequencing of specific actions, particularly relating to R-B1 and R-B2, are based on informal discussions with DGF officials and the Team's knowledge of the functioning of

administrative system in the country. Note that except for R-B1, which involves long-term commitment and allocation of resources, none of the recommendations should take more than one year to be implemented.

Table 69—Substudy 2 recommendations: Actions and time frame for implementation

Recommendations	Proposed sequential actions	Timeline^a
R-B1. Setting up an information system.	Step-1: With inputs from FPMU, DGF prepares a budget, with breakdown of set up, training, and maintenance costs.	2 Months
	Step-2: MOF, Ministry of Finance, and WFP procure funding	2 Months
	Step-3: DGF hires information technology (IT) consultants to develop the software and train FPMU staff.	2 Months
	Step-4: System goes in operation by linking all District Controller of Food (DCF) offices, silos, and CSDs.	6 Months
	Step-5: Upon successful completion of step 4, extend the coverage to <i>upazila</i> level.	1 year
R-B2. Revising allowable transit loss.	Step-1: DGF prepares a proposal for revising the allowable losses.	2 Months
	Step-2: The proposal goes to MOF for evaluation and approval.	2 Months
	Step-3: DGF enforces revised allowable losses and weighing policy.	2 Months
R-B3. Revising security stock to 600,000 tons.	This recommendation will be further evaluated once the DGF has more accurate, location-specific stock information, which is likely to result from the implementation of R-B1.	Further evaluation within a year and a half
R-B4. Scheduling food aid arrival during the GOB's nonprocurement season.	Step-1: WFP organizes a meeting with representatives from food donors, ERD, MOF, and DGF.	2 Months
	Step-2: With inputs from the initial meeting, MOF and WFP prepare a food aid arrival plan.	To be decided after initial meeting
R-B5. Formulating a uniform ITSH cost-sharing arrangement.	Step-1: Same as R-B4.	2 Months
	Step-2: Based on the consensus, a uniform ITSH cost sharing arrangement is agreed.	To be decided after initial meeting
	Step-3: Enforcement of the new ITSH cost sharing.	To be decided
R-B6. Auctioning off high-quality, food-aid wheat.	Put forward as a nonbinding recommendation. DGF will examine whether it will be administratively feasible.	----

^a Timeline specified for R-B1 and R-B2 are based on the feedback from the DGF and the Mongla Port Authority.

Action Plan for Substudy 3: Food Distribution at the Beneficiary Level

The five original recommendations of Substudy 3 were:

Recommendation C1 (R-C1):

- (i) *Transportation and handling costs from the LSD to distribution centers should be assessed for each Union. Based on this information, transportation and handling allowances should be allocated in advance to each Union.*
- (ii) *Union Parishads receive annual grants out of the local government budget for their normal operation. Provision for additional grants to UPs to cover the actual transport and handling cost could be considered.*
- (iii) *If this is not feasible, procedures to use part of the wheat supplies to finance distribution costs should be documented so as to facilitate audit.*

Recommendation C2 (R-C2):

Care should be taken in selecting and monitoring the CBOs that support the TNC and FFA user committees.

Recommendation C3 (R-C3):

Weighing of rations at distribution sites should be replaced by standard volume measures when distributing wheat rations. The use of clearly calibrated and tamper-proof metal buckets that indicate the amount of grain appears to be the most cost-effective and accurate option in the Bangladesh context.

Recommendation C4 (R-C4):

As involuntary sharing of food rations violates program rules, steps should be taken to eliminate this practice.

Recommendation C5 (R-C5):

The GOB and the WFP should monitor program activities regularly to observe whether unauthorized activities subsist in food distribution at the beneficiary level, and take strict disciplinary actions whenever such activities are detected.

Degree of Consensus and Feasibility of Implementation

The expert opinion survey questionnaire also asked whether the respondent accepted the leakage estimates at the beneficiary level. This question was also raised during the Policy Dialogue Session. There was general acceptance of the leakage estimates by the officials of the GOB and donor agencies. However, one donor representative thought that the estimate of undercoverage in the VGD program could be higher than the 0.48 percent reported in the study. In order to address this concern, the Team provided clarification in the final report, supported by results of additional analysis of the survey data, to confirm the estimate of undercoverage. Furthermore, in the Policy Dialogue Session, two donor representatives thought that the estimate of leakage in the VGD program should include the estimate of short rationing due to the practice of involuntary sharing of VGD cards.

The recommendations of Substudy 3 on food distribution at the beneficiary level, the implementation feasibility of these recommendations, and the degree of consensus are summarized in Table 70. Except for the two sub-options of R-C1, all five recommendations are considered feasible for implementation. There was a high degree of consensus on the desirability of the recommendations.

In addition to the five original recommendations, three recommendations emerged while addressing the comments and suggestions of the reviewers on an earlier draft of the report, and from discussions during the Policy Dialogue Session. These three additional recommendations are incorporated in the final report, and presented here in Table 70.

Action Plan

The Team formulated the following action plan for implementing the Substudy 3 recommendations. This action is based on the responses received from the expert opinion

Table 70—Substudy 3 recommendations: Degree of consensus and feasibility of implementation

Recommendations	Feasibility	Degree of consensus
<p>R-C1. (i) Assess transportation and handling costs from the LSD to distribution centers for each Union. Based on this information, allocate transportation and handling allowances in advance to each Union.</p> <p>(ii) Consider providing additional grants to UPs out of the local government budget to cover the actual transport and handling.</p> <p>(iii) If (ii) is not feasible, then use part of the wheat supplies to finance distribution costs.</p>	(i) is feasible	All stakeholders agreed on part (i) of the recommendation. A WFP representative suggested piloting of (i) in selected districts before it is implemented nationwide. However, most stakeholders suggested that options (ii) and (iii) should be dropped.
<p>R-C2. Carefully select and monitor the CBOs that support the TNC and FFA user committees.</p>	Feasible	All stakeholders agreed with this recommendation.
<p>R-C3. Replace weighing of rations at distribution sites by standard volume measures when distributing wheat rations. Use clearly calibrated and tamper-proof metal buckets that indicate the amount of grain.</p>	Feasible	While most stakeholders agreed that the use of calibrated, tamper-proof buckets for ration distribution to beneficiaries would reduce leakage, two respondents of the opinion survey believed it is worth testing on a pilot basis.
<p>R-C4. Take steps to eliminate involuntary sharing of food rations.</p>	Feasible	All parties agreed with this recommendation.
<p>R-C5. Monitor program activities regularly to observe whether unauthorized activities subsist in food distribution at the beneficiary level, and take strict disciplinary actions whenever such activities are detected.</p>	Feasible	There was a general consensus on this recommendation. Some stakeholders proposed rewarding well-performing unions in addition to disciplinary measures against the bad performers.
<p>R-C6. Take action to ensure that the VGD beneficiaries possess their VGD cards.</p>	Feasible	There was a general consensus on this recommendation.
<p>R-C7. Take steps to ensure that the weight of the total amount of wheat delivered from LSDs to the ration distributors is net of the weight of the gunny bags.</p>	Feasible	There was a general consensus on this recommendation.
<p>R-C8. Design and implement a monitoring system to ensure that the beneficiaries receive good-quality wheat rations.</p>	Feasible	There was a general consensus on this recommendation.

survey, discussions held in the Policy Dialogue Session, and comments and suggestions received on an earlier draft of the Food Aid Leakage report.

Assessing transportation and handling costs from LSD to distribution centers for each Union (R-C1)

Step 1: The assessment of transportation and handling (T&H) costs at the union level should be pilot tested in four or five randomly selected districts. A union-level assessment committee should be formed, which may comprise members from the Project Implementation Committee (PIC), UP office, service-providing NGOs (BRAC or *Jagoroni Chakra*), and representatives of program beneficiaries. This assessment committee will be responsible for assessing the T&H costs. Timeline: 1 month.

Step 2: Based on the information from Step 1, T&H allowances should be allocated in advance to each of the unions in the pilot districts. Making the T&H amount flexible and allocating the T&H allowances in advance may require the following reforms in the existing T&H allocation system:

- Although the VGD program is not included in the Annual Development Program (ADP), the T&H cost of VGD is a part of ADP under the Ministry of Disaster Management and Relief (MDMR). ADP allocations are released in four quarters, which cause long delays in allocations. This process makes it difficult to allocate T&H allowances to unions in advance. In order to overcome this problem, the T&H allocation should be made non-ADP.
- The Allotment Order (AO) issued by the Directorate of Relief and Rehabilitation (DRR)/the Department of Women Affairs (DWA) to Upazila *Nirbahi* Officer (UNO) should authorize the UNO to withdraw funds for T&H allowances, so that the UNO can make advance payment of T&H allowances to UP chairpersons.

Step 3: The pilot program should be monitored for one year to observe whether the leakage situation is improved due to the adequate and timely receipt of T&H allowance by UP officials. If the pilot test results indicate that leakage is contained, then the recommendation should be implemented nationwide.

Timeline: 15 months.

Selecting and monitoring the CBOs that support the TNC and FFA user committees (R-C2)

Step 1: Selection criteria for CBOs may include the following:

- Past record of successful implementation of assigned job,
- Financial solvency of the CBO,
- CBOs that have a gender-sensitive organizational culture and a well-balanced workforce in which males and females are represented at all levels,
- Managed by persons who have a good reputation in the community as trustworthy persons and have high levels of acceptability within the community,
- Good working relationship with government agencies,
- Innovative and skilled in implementing participatory approaches and community based planning.

Step 2: A cost-effective monitoring system should be developed to monitor CBO activities in order to guard against pilferage. The monitoring system should include participation of program beneficiaries.

Timeline: 6 months.

Using clearly calibrated and tamper-proof metal buckets for weighing rations at distribution sites (R-C3)

This recommendation is worth testing on a pilot basis. The system would need to identify a way to reconcile its weight-based and volume-based records. Implementing the recommendation on a pilot basis would involve the following steps:

Step 1: Calibrated and tamper-proof metal buckets may be produced by WFP. The buckets should have clearly engraved kilogram markings in Bangla on the inside wall of the bucket, so that a beneficiary can determine if she received the full ration.

Step 2: The buckets should be distributed to Union *Parishads* (UP) by WFP. UP officials should use the buckets to measure rations at the time of distribution to beneficiaries. Each

UP should receive 3 buckets, and the UP officials should use them simultaneously in order to minimize the waiting time of the beneficiaries.

Step 3: Beneficiary awareness campaigns about the use of buckets for measuring rations should be conducted before introducing the system. These campaigns may be conducted by the service-providing NGOs. Extensive media campaigns about the use of the tamper-proof buckets for ration distribution at the distribution centers through radio and television will also be required. Funds for the campaigns may be mobilized from the GOB and food-aid donor agencies.

Timeline: 12 months.

Implementing recommendations R-C4, R-C5, R-C6, R-C7, and R-C8

The implementation of these recommendations essentially requires strengthening the GOB-WFP-NGO monitoring systems and designing and implementing a new monitoring system for R-C8. In order to strengthen the monitoring system, the following questions need to be addressed:

- What are the bases for developing the monitoring indicators?
- What type of training/capacity-building system is in place for the monitoring activities?
- Who collects the monitoring data? Who verifies the data? How often?
- Who prepares the monitoring reports? Who receives them?
- How often are monitoring reports made, received, and reviewed?
- Are local administrators, NGOs, representatives of program beneficiaries, and civil society involved in monitoring? If yes, how are they involved? If not, why not? How can they be involved?
- What process is followed to take corrective/disciplinary action when unauthorized activities are detected?
- Is it feasible to introduce a reward system for well-performing unions in order to provide incentives? What criteria should be used to evaluate performance? What types of reward should be given?

As the stakeholders attending the Policy Dialogue Session suggested, a participatory monitoring system, involving representatives of program beneficiaries and members of the local civil society (e.g., school teachers, entrepreneurs, professionals, etc.), should be designed and implemented. Under such a system, stakeholders at different levels would work together to collect information, identify problems, and generate recommendations for corrective actions.

In addition, a system of monitoring beneficiary satisfaction should be introduced. The results of such monitoring would identify corruption in the system (if any), the constraints the beneficiaries face, their views about the quality and adequacy of the program, and the responsiveness of program-implementing agency officials.

As some participants of the Policy Dialogue Session proposed, rewarding well-performing unions (such as higher VGD card allocation for the unions) should be considered.

Finally, for implementing the recommendation R-C8 (i.e., designing and implementing a monitoring system to ensure that the beneficiaries receive good-quality wheat rations), a system should be developed to collect wheat samples from the program beneficiaries, and then analyze the samples for their physical and chemical (nutrition) properties.

Timeline: 12 months.

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