A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

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Abbreviations

ADB	Asian Development Bank
AER	Agriculture Economic Research
AEZ	Ago-Ecological Zone
AIDC	Associated International Development Consultant
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Corporation
BBS	Bangladesh Bureau of Statistics
BCIC	Bangladesh Chemical Industries Corporation
BFA	Bangladesh Fertilizer Association
BFA	Bangladesh Fertilizer Association
BIDS	Bangladesh Institute of Development Studies
CBN	Cost of Basic Need
DAE	Department of Agricultural Extension
DAP	Di-ammonium Phosphate
DC	Deputy Commissioner
DCI	Data Collection Instrument
DFSMC	District Fertilizer and Seed Monitoring Committee
EU	European Commission
FAO	Food and Agriculture Organization
FDI	Fertilizer Distribution Improvement
FGD	Focus Group discussion
GoB	Government of Bangladesh
HIES	Household Income and Expenditure Survey
HYV	High Yielding Varieties
IFDC	International Fertilizer Development Center
ILC	Inland letters of credit
KII	Key Informant Interview
KSS	Krishi Samabaya Samity
ME	Monitoring and Evaluation
MIS	Management Information System
MMIS	Market Monitoring Information System
MoA	Ministry of Agriculture
MoP	Muriats of Potash
MP	Parliament Member
MRP	Maximum Retail Price
MSUK	Manob Sakti Unnayan Kendro
MT	Metric Ton

NFDCC	National Fertilizer Distribution Coordination Committee
NFPCSP	National Food Policy Capacity Strengthening Programme
NGO	Non-Government Organization
NMS	New Marketing System
OMS	Old Marketing System
PDP	Primary Distribution Point
PPS	Probability Proportionate to Size
PSI	Private Sector Importer
PSU	Primary Sampling Unit
QCO	Quality Control Officer
SAAO	Sub-Assistant Agriculture Officer
SRDI	Soil Resources Development Institute
SSP	Single Super Phosphate
TCCA	Thana Central Cooperative Association
TDP	Transportation Discount Point
TQM	Total Quality Management
TSC	Thana Sales Center
TSP	Triple Super Phosphate
UAO	Upazila Agriculture officer
UCCA	Upazila Central Cooperative Association
UFFL	Urea Fertilizer Factory Limited
UFSMC	Upazila Fertilizer and Seed Monitoring Committee
UNO	Upazila Nirbahi Officer
UP	Union Parishad
USAID	United States Agency for International Development
VGD	Vulnerable Group Development
VGF	Vulnerable Group Feeding
WTP	Willingness-To-Pay

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EXECUTIVE SUMMARY

Background Study: Fertilizer Production, Distribution and Marketing System

1. At the time of introducing chemical fertilizers into the Bangladesh Agriculture in the late 1950s, the fertilizer policy consisted of one basic tenet-- complete public sector control over its procurement and distribution. **This policy continued throughout the 1960s but since the War of Liberation the policy regime has undergone fundamental changes.**

2. Under the previous system, known as the Old Marketing System (OMS), Bangladesh Agricultural Development Corporation (BADC) used to deliver fertilizer to farmers through appointed dealers and TCCAs (Co-operatives) who could operate only within a specified area and sell at a fixed price in return for a commission. **The responsibility of procuring fertilizer from both domestic and external sources and reaching it to the level of a small administrative unit (thana) rested solely with BADC.**

3. There was a significant shift in policy on fertilizer distribution at the wholesale and retail levels during the late 1970s. **In place of the Old Marketing System, a New Marketing System (NMS) was introduced in the late seventies** as part of a general policy shift towards greater involvement of the private sector in the economy.

4. Finally privatization of fertilizer trade was implemented supported by a policy of price deregulation in the early eighties which empowered the traders to sell at any price they could fetch in the market. Farm level prices were decontrolled first in Chittagong and then by April 1983 it was implemented country wide. **This largely replaced BADC's retail trade of fertilizer.**

5. The government excluded fertilizers from the list of restricted imports and allowed the private sector to import fertilizer. **The subsidy on fertilizers was withdrawn completely in December 1992 and importation and distribution of fertilizer made open.**

6. Bangladesh witnessed fertilizer crisis in the years of 1974, 1984 and 1989. The open market system for domestically produced urea experienced a major setback in 1995. Government decided to bring the market under its direct control to mitigate the ensuring crisis reintroducing controls on the marketing and distribution of urea, which is in place till today. **Unfortunately some more cases of fertilizer crisis occurred in the years of 2005, 2007 and 2008 as well.**

7. **GoB has made drastic changes in the dealership of fertilizer and its distribution system in recent times.** The dealership policy 2008 and policy 2009 are the outcome of such an effort. In policy 2008 there are provisions for at least one dealer for each union by cancelling previous upazila based system. Union is now the focal point for fertilizer distribution. Appointment of union-wise dealer, abolition of sales representatives of dealers, restriction of dealership within the district, introduction of retail sale and arrangement of ID cards were some features of the Dealership Policy 2009. GoB has also made arrangements for subsidy or non-urea fertilizers in recent times.

8. **Fertilizer distribution network is composed of appointed/licensed dealers who are expected to observe limitation, including selling only within designated areas.** Government provides a supervisory role on the trade which also sets an indicative price level for traders to abide-by. Ministry of Agriculture (MoA) allocates urea quotas to the dealers and fertilizer factories deliver urea to the dealers, according to these quotas.

9. **In our survey it has been observed that the methods of selling fertilizers vary across districts and even across upazilas within districts.** The tools applied including cards, slips, farmers' lists or priority lists provided by local administration. In some districts fertilizers were only sold once a week and farmers had to queue for their allocation and many farmers reported that, despite losing several days of work, they failed to get any fertilizer and had to buy at high prices from private sources.

10. **Farmers collect fertilizers from three different sources: BCIC appointed fertilizer dealers and their representative (sub-dealer) shops, BADC dealers shops and local fertilizer retailer's shops.** The distribution channels for both urea and non-urea fertilizers have close resemblance. The BCIC dealers who lift urea fertilizer from factory gate and buffer godown also procure TSP from factory gate and importers warehouse. To the contrary, the BADC dealers collect non-urea fertilizers from BADC godown only. The farmers can buy fertilizer both from dealers (union level) and retailer (ward/village level) shops.

Observations from the Survey Data: Household Background Information

11. The findings reveal that on an average sample household comprises 5.5 members, which is slightly larger then the national average (4.9 members). **Among the five category of farmers the highest household members were found on large farmers (6.5) followed by medium (5.9) and landless farmers (5.5).** The smallest size households were found among marginal farmers (5.2).

12. **About 51 percent of the population in farm household is below 24 years of age which is similar to that of national average.** About 9 percent of population belongs to age group above 60, while nationally the same is about 6.38 percent. The survey reveals that highest group of population belongs to 15 to 24 group of age in all divisions (22 percent).

13. Analysis of mean age shows that **the mean age of all divisions is 27.9 years.** It also reveals that among 6 divisions the mean age in Barisal and Chittagong are 29.5 and 26.7 years which are respectively the highest and the lowest mean of age.

14. Dependency ratio refers to ratio of dependent population (population aged 0-14 years and 60 years and over) to the working age population (population aged 15-59). **The dependency ratio of farm households of all divisions is estimated to be around 60.** The dependency ratio in Khulna division is about 49 which is lower than the corresponding numbers in other divisions. On the same instant dependency ratio in Sylhet division is higher than the rest of the divisions.

15. Analysis of education shows that around 20 percent members of farm households in all divisions have no education. **The study reveals that landless farm household members have the highest percentage of no education (25 percent); followed by marginal (22 percent), small (15 percent) and medium farm household members (14.9 percent).** Large farm category has the lowest rate of no education (12 percent). Status of 'incomplete primary education' is similar to the category of 'no education'. Here the highest position of primary incomplete was found on household members of landless farmers (26 percent); followed by marginal (22 percent), small (20 percent) and large class of farmers (12 percent).

16. About 90 percent of household heads were found engaged in farming (as primary occupation). **Farming as primary occupation of household head is relatively low among large farmers (83 percent).** The scenario of farming as primary occupation is higher among landless (92 percent) and marginal farmers (93 percent). The study finds that primarily engaged with business is very low among all farmers (2 percent).

17. **Significant variation is visible from roof and wall materials of the main house of farmers.** Most of the farmers stay under tin shaded roof (90 percent). Among the farmers 'tin' as roof material is the highest on landless farmers (92 percent) followed by marginal (91 percent) and small farmers (90 percent). About 3 percent farmers were found having concrete as roof material of main dwelling house. About 50 percent farmers used tin as wall material of main dwelling house.

18. Electrification status shows that about 54 percent farmers have electricity at their houses. Among different types of farmers the highest rate of electrified house belong to large farmers (65 percent) followed by medium (61 percent) and small farmers (60 percent). **The percentage of electrified homestead is the lowest among landless farmers (44 percent).**

Observations from the Survey Data: Crop Shifting Pattern

19. **Analysis shows that farmers are concentrating on rice for cultivation; their involvement in all major three varieties of rice (*Aus*, *Aman* and *Boro*) has increased up to a moderate extent overall, during the last five years.** The highest increase was found on the variety of *Boro*. Survey data shows that five years ago 78.2 percent of farmers were engaged in cultivation of *Boro* but in the year of survey the number increased to about 82 percent. About 66 percent of farmers were engaged on cultivation of *Aman* which increased to about 68 percent and in the variety of *Aus*, number of farmers' involvement increased from 13.9 percent to 14.5 percent in last five years.

20. **Analysis shows that percentages of farmers cultivating jute or potato have also slightly increased.** In case of jute 6 percent farmers were previously engaged now this has increased to about 7 percent. Reported percentages of farmers in cultivation of potato increased from 5.8 percent it to about 7 percent in five years time.

21. **Data reveals that the average land use for Aus has reduced to some extent and that for Aman has remained same and in the case of Boro land use has increased to a distinctly higher amount, during the last five years.** The study finds that on an average 29.12 decimals of land per farmer household were used for Aus which have decreased to 23.04 decimals of land. In the case of Aman it was 141.14 decimals previously and now it stands at 144.91 decimals. In the case of Boro it was 110.6 decimals earlier and now it has increased to 131.44 decimals of land per farmer household. These changes are similar to those we notice in the national level data.

22. **Survey data shows that average amount of land under potato cultivation increased from 4.40 decimal to 5.62 decimal during the last five years.** It is to note that the year before the survey selling price of potato was higher which attracted farmers to cultivate potato. Survey data also provides support for the statement. National data shows that land use for potato cultivation was 74.0 thousand hectare in 1971-71 which increased to 107.6 thousand hectare in 1981-82, in 1991-92 it increased to 127.9 thousand hectare and finally in 2005-6 it increased to 301.2 thousand hectare. This shows increasing trend of potato cultivation.

23. **Farmers recall data shows that average land use for jute cultivation has increased from 3.79 decimals to 4.37 decimals per farmer household.** We note that landless farmers have increased their land from 3.28 decimal to 5.04 decimal under cultivation of this crop, which is the single largest increase among all land class categories. National data shows that total land use for jute was 678.2 thousand hectare in 1971-72 which increased to 571.3 thousand hectare in 1981-82 but in 2001-02 it decreased to 448.2 thousand hectare and in 2005-6 it decreased to 399.0 thousand hectare.

24. **In our survey 7.13 percent farmers were found who are not on cultivating same crop they cultivated five years before.** Among the farmers (131 farmers) highest number of shift was found from Aman (64.9 percent) followed by Boro (55 percent), Aus (19.1 percent), Potato (19.1 percent), Mustard (13.7 percent) different oilseeds (11.5 percent), Maize (10.7 percent) and Jute (9.2 percent). About 64.9 percent farmers reported less profitability and 14.5 percent reported natural cause behind their shift from Aman.

Observations from the Survey Data: Crop Yield: Actual and Expectations

25. **The study finds that for every 100 decimal of land, production of Aus turned out to be on an average 659 kg but farmers expected production was on an average 722 kg** (here the corresponding national data shows 664 kg of actual production in 2007-8). In terms of different categories of farmers the production of Aus was relatively higher by landless, marginal and small farmers, they produced higher amounts of Aus paddy (664 kg, 662 kg and 683 kg respectively) compared to the medium and large farmers.

    On the variety of Aman the study finds 770 kg of production per every 100 decimals of land which is 4 kg less than the official estimation and 48 kg less than farmers' expectation.

    In the case of Boro, the study finds 1554 kg of actual production for every 100 decimals of land which is 6 kg less than national estimation (of 2007-08) while the study finds that farmers' expected production was 1613 kg on the same amount of land. The study finds per acre production of Boro was the highest by small farmers and large farmers produced the lowest amount among all categories of farmers.

26. **In the study it was found that production of wheat was 879 kg in 100 decimal of land whereas farmers' expected production was 921 kg** and official estimation of actual production was 881 kg in 2007-8.

27. Official data shows increasing scenario of potato production in recent years. **In 2007-8 potato production for every 100 decimal of land was 6648 kg while the study finds 6690 kg of actual production where farmers' expected production was 6726 kg.** Landless farmers produced highest amount of potato (7400 kg on every 100 decimal of land) among all farm groups.

Yield Shortage of Crops

28. **We find that average yield shortage (farmers' stated highest amount possible given all factors were favorable minus the actual amount they could produce) for Aus paddy is 63 kg for every 100 decimal of land while national estimation shows 41 kg of crop loss in 2007-8.** An examination shows that 18 kg of paddy was yield less (perceived) due to use of less amount of fertilizer, 16 kg was yield less (perceived) due to untimely availability of fertilizer, 6 kg was lost (perceived) because of use of lesser

amounts of other inputs due to high cost, 20 kg was yield less due to various natural calamities.

The study finds that for various reasons the average amount of yield shortage of Aman paddy is 48 kg on every 100 decimal of land. Of this amount 14 kg of Aman yield has been less due to untimely availability of fertilizer.

On the variety of Boro the study finds that on an average 59 kg have been yield less (perceived) due to various reasons among them 13 kg yield have been less due to untimely availability of fertilizer in every 100 decimals of land.

29. **By analyzing the survey data we can state that during the year being covered by the survey questionnaire (year of 2008-09) nationally an additional total of 358,961 tons of paddy (36,320 tons of Aus, 174,636 tons of Aman and 148,005 tons of Boro paddy) could have been produced** if fertilizer could be distributed to all farmers on time (based on the perception of losses as stated by the farmers).

30. **The study finds that due to different reasons on an average 42 kg of wheat crop has been yield less on** (for every 100 decimal of land) of this 9 kg of crop yield has been less due to untimely availability of fertilizer and 6 kg has been yield less due to use of fake fertilizer. Analysis shows that nationally 8,622 tons of more wheat can be produced on every year if fertilizer can be distributed to all wheat cultivators on time.

31. From the overall discussion, we can state that **on an average an additional 16 kg of Aus, 14 kg of Aman and 13 kg of Boro can be produced for every 100 decimal of land if fertilizer can be distributed to farmers on time** (this is based on farmers' perception of crop losses). At the same time, it was noticed that a high amount of crop loss occurs due to various natural calamities.

Observations from the Survey Data: Agricultural Credit

32. **The study finds that around 38 percent farmers collected credit for agricultural activities.** The study reveals that farmers' credit collection is significantly high from their relatives and neighbors (30.4 percent) followed by NGOs (about 28 percent), Krishi Bank (17 percent), local *mohajon* (moneylender) (6.6 percent), government bank (5.6 percent) and local samiti (5 percent). Credit collection from private banks and influential rich person is not very high in number (only 2.6 percent and 2.4 percent).

33. **The study finds that more than half of landless farmers collected agricultural loan from informal sectors (56.6 percent).** Less then half of marginal (45.4 percent) and small (45.3 percent) farmers collected agricultural credit from informal sectors. Around 66 percent of the medium farmers collected agricultural loan from formal sectors. On the other hand **large percentages of large farmers (83.3 percent) collected credit from formal sectors.** This clearly reflects that access and benefit from formal credit institutes is greatly enjoyed by large farmers.

34. Farmers were asked about the month of their credit collection. **It is found that credit collection is the highest during the cultivation season of *Boro*.** Survey data shows that agricultural credit collection increased from 2.7 percent to 10.7 percent on the month of September to October by all farmers. In November it remains close (9.7 percent) to the rate of previous month's credit collection. In December it increases up to 12.2 percent and in January it rises to a significant number (23.3 percent). Credit collection in February, the later period of *Boro* cultivation season, is also high in number (11.1 percent).

35. **Overall credit collection scenario indicates that farmers are in need of credit from the month of October (continues up to the month of February).** The need continues for next four months, however, the highest demand for financial support remains in January. In this circumstances government banks can spread there banking activities with easy conditional lons from the month of October to late February.

36. In the study farmers were asked about for which crop they collected credit. **It was found that significant number of farmers had collected credit to cultivate Boro (66.4 percent).** The sequence also matches with the credit collection month's scenario. Next to Boro farmers' credit collection is highest for cultivation of Aman paddy (about 12 percent) followed by Aus (6.6 percent), potato (5.3 percent), jute (5 percent), tobacco (2 percent), maze (1.7 percent) and different variety of pulse (1.6 percent).

37. **The survey reveals that 58.2 percent of farmers used credit to procure fertilizers on cultivation period. 37.6 percent Farmers' credit has been used to pay wage of laborers and 27.1 percent farmers used credit to procure seeds.** Power tiller use cost was paid by 12.8 percent farmers' collected credit and 11.4 percent farmers used agricultural credit for the use against the tractor's use.

38. **Majority of farmers from all categories of credit used it to procure fertilizer.** Among these farmers 62.6 percent landless, 58.9 percent marginal, 55.3 percent medium, 50.5 percent small and 45.8 percent large farmers procured fertilizer by collected credit.

Observations from the Survey Data: Fertilizer Demand Estimation

39. **A mix of Urea, TSP and MoP is the most used fertilizer combination and the usages of other combinations are significantly lower compared to this.** More than half of the households use this fertilizer mix. The next two highest used combinations are that of urea, TSP and urea, TSP, MoP along with other fertilizers in that order, which are used by about eight and nine percent of the total households respectively.

40. In the case of regional distribution, **use of urea and TSP captures more than 60 percent of fertilizer use in most divisions.** Urea use ranges from 30 to 35 percent in all divisions except Sylhet where urea use is close to 50 percent. On the other hand, TSP and MoP use is quite low compared to other divisions in Sylhet. DAP use is almost non-existent in Chittagong and Barisal district.

41. **It is quite apparent that use of urea, TSP and MoP is very similar among all categories of land-holdings and nearly one-third each of total fertilizer users in each category.** In the case of DAP use, there is a discernible pattern that comparatively larger land-holdings use more DAP compared to smaller land-owners.

42. **Although urea is strictly to be sold by the dealers of the own unions only, yet more than 17 percent of it is put on the open market (an indication of leakage in the fertilizer distribution system).** Nearly 40 percent of DAP is supplied in the market, and of TSP and MoP, the amount is above 25 percent for each.

43. **The maximum urea requirement is in the Rajshahi division and the lowest demand is in Sylhet district.** The total urea requirement in the country boils down to about 45 million MT as per out calculations. We find that the estimates from the household level data are much higher compared to the official estimates. It warrants a closer look into the way how official requirement of fertilizer is collected.

44. **Apparently none of the fertilizers can meet up more than 40 percent of the households which requires it.** The most acute shortage is observed in the DAP category where around 85 percent of households do not get the required amount of fertilizer. **Even though urea users are the least deficit prone, still around 60 percent of households are suffering from urea deficit.** The fact that urea is the most crucial for agricultural production-- this large scale deficit actually paints a very alarming picture regarding fertilizer distribution management.

45. **We observe considerable variations across divisions when we analyze the fertilizer deficit according to the division-wise distribution.** Except for users in Rajshahi and Sylhet divisions, more than 70 percent of users in other divisions suffer from TSP deficit. TSP deficit is the most acute in Dhaka whereas farmers in Sylhet suffer from the least amount of deficit. On the other hand in Barisal division a farmer is likely to suffer most from urea deficit than any other division. In the case of both MoP and DAP, deficit is most observed in Khulna division. Overall a typical farmer household in Rajshahi division enjoys lesser probability of fertilizer deficit in all categories compared to a household in other division. On the other hand a household in Dhaka division is in greater risk of deficit compared to a household in other divisions.

46. **Across all categories we observe that as the land size is increasing, the percentage of farmers who experience fertilizer deficit is decreasing.** This is observed in all categories except DAP where we see among the medium land holding households, the deficit is much larger compared to other categories. **The observation that higher land-holding leads to lesser fertilizer deficit give credence to the belief that land-holding gives social power and influence in Bangladesh.**

47. **The reasons behind the huge deficit of the fertilizers can be specified as high price of fertilizers, lack of availability on time, transportation problem and so forth. In general, the major cause of deficit is the high price of the fertilizers.** This dearness of fertilizer price makes more than half of DAP and above 60 and 70 percent of MoP and TSP unaffordable in that order, which eventually turns into a large deficit on the whole. For urea, around forty percent of deficit is due to its high price. But if the other two reasons, time availability and inadequate supply, are combined, they together exceed the effect of high price on fertilizer deficit and account for nearly fifty percent of the total urea deficit. Financial problems also somewhat cause the deficit in all four types of the fertilizers. Above 16 percent shortfall in urea and DAP as well as 20 percent shortfall in TSP and MoP are instigated by the financial problems.

48. **Age of household, even though has a statistically significant impact and expected sign, does not have a strong impact on the probability of fertilizer deficit. Education of household, even though statistically significant at 10 percent level of significance, also does not have any meaningful impact on the probability of fertilizer deficit.** Education signals better human capital of the farmer but the availability of fertilizer is not affected by it. In the same manner, household size also does not have any significant impact, both statistically and in terms of magnitude, on the probability of fertilizer deficit.

49. **Amount of agricultural land has the expected sign and statistically significant in 10 percent level of significance. We expect the large farmers to face lesser probability of fertilizer deficit.** This is because farmers with large land holdings typically have political and social influence in the society and this is reflected in the results.

50. **The effect of land ownership is even more evident when we categorize the land ownership. It clearly shows that larger land ownership leads to lower probability of fertilizer deficit.** Small land owner has about 2 percent less probability of being in fertilizer deficit compared to landless. On the other hand, medium and large landowners have around 7 percent less probability of being in fertilizer deficit compared to landless.

51. **In the case of regional breakdown we find that most of the divisions have less likelihood of having fertilizer deficit compared to Dhaka.** Only division that shows higher likelihood of facing fertilizer deficit is Chittagong but the effect is not statistically significant. This puts Dhaka in the category of division which has the most likelihood of experiencing fertilize deficit. Results show that Rajshahi is 22 percent less likely to face fertilizer deficit compared to Barishal which reflects that Rajshahi faces the least probability of facing fertilizer deficit.

Debate on Fertilizer Subsidy

52. **The economic reasoning for providing fertilizer subsidy lies in the statement that it encourages farmers to produce more (food grain).** On the other hand, the economic reasoning for not providing subsidy for fertilizer lies in the argument that this is an "inefficient" allocation of resource in the sense that farmers pay for fertilizer a lower price compared to the world price of fertilizer, thereby has more incentive to use too much of fertilizer.

53. Yet the counterargument to the second line of argument is that, **with market imperfections such as low access to credit as well as liquidity constraints, farmers already face "inefficiency" in allocation of resources, find it difficult to finance fertilizer purchases, and therefore without "subsidy" would be using suboptimal amount of fertilizers.** Therefore "subsidy" is not about introducing "inefficiency" in an "efficient" world, but may be considered as a "correcting device" to address issues of imperfections in the developing country agricultural sector.

54. **The study data reveals that the smaller farmers are much restricted in their choices and opportunities because of their lack of assets, as compared to other farmers.** The economic profits from crop production activities have been found to very moderate for smaller category of farmers. Thus subsidy for fertilizer is just easing a bit of the monetary pressure on their part.

55. We also examine the farmers' willingness-to-pay assessments for different categories of fertilizers and the result is reported. **The smaller farmers overwhelmingly asked for even a lower price as against the then official price of Taka 12 per unit of urea, whereas larger farmers were on the average willing to pay a positive amount for avoiding hassles or delays in the system.**

56. **There is a strong case of continuing fertilizer subsidy for the landless, marginal and small categories of farmers (at least at the current scale), since these households have been found to be on the borderline of financial constraint and profitability.** It would be difficult for a large number of them to continue their food grain production activities at the current scale at least if the subsidy is withdrawn or reduced and price of fertilizer (particularly urea) have been given scope for rising up to a high level.

57. **Selective, targeted subsidy may be the correct fertilizer subsidy policy for the government to pursue**. There can be a concern that this may be difficult to administer in this country, since the "rich" farmers may try to steal the benefits designated only for the "poor" farmers. We recommend that pilot projects may be administered to examine their effectiveness of targeted fertilizer subsidy policy.

Scope for Further Research

58. **Farmers' cost management practices need to be examined further.** This is a complex issue which may have influence of traditional activities, social structure, and presence of formal or informal financial institutions. There need to be further research on the cost management practices of farmers and suitability of replicating the best practices throughout the country.
59. **Farmers sometimes lose their agricultural land for various reasons (may be for economic, social, political or/and natural reasons).** Why farmers are moving away from their own land or what measures can be done to stop the process of disposition of farmers -- need to be identified. To do this task detailed studies can be conducted.

60. **A wide variety of traditional norms still exists in rural economy, particularly, in the case of dealing of land (contract on land use especially in case of *Borga*), dealing with middlemen on markets, deals on credit collection, deals of labor wage etc.** These factors sometimes directly sometimes indirectly affects on ultimate gain of agricultural return. To understand the matter in detail new research can be conducted.
61. **The banking sector is changing their terms and conditions targeting poor farmers all over the country.** For sound recommendation in this regard a study can be conducted with larger sample.
62. **Farmers sometimes change their crop cultivation or change the amount of land on cultivation.** There must be economic and non economic reasons behind this incidence. To identify the causes behind crop shifting detail study need to be conducted.

63. Some more research needs to be conducted on the **application of selective, targeted subsidy policy** as is discussed in this study.

Policy Recommendations

Fertilizer Demand Management

64. Across all categories we observe that as the land size is increasing, the percentage of farmers who experience fertilizer deficit is decreasing. **Special emphasis has to be on the targeting of subsidy to the smaller farmers so that they actually get the benefits of subsidy** (in combination of discussions on subsidy, we actually recommend that subsidy is specifically targeted to the smaller farmers).
65. It has been found that fertilizers which are supposed to be sold completely through the dealers appointed by the government but significant portion of farmers have collected fertilizers from the open market. **Therefore it seems that there is substantial amount of leakage of fertilizer from government machinery for rent-seeking purposes by concerned distribution agents. Remedial steps have to be taken by concerned authority to stem these leakages.**

66. **Total fertilizer demand or requirement from household level (as per our findings) is considerably higher than the corresponding official estimates.** It has to be investigated whether the fertilizer shortage that often happens is due to this mismatch between farm household level information and the official data. This fertilizer requirement data has been collected from household level and it represents farmers' perception. Therefore we should interpret the data with caution. However, regardless of the reliability of household level data, these findings indicate that the whole process of estimation of fertilizer requirement has to be thoroughly reviewed.

67. It has been found that significant portion of farming households suffer from deficit in fertilizer in all major categories of fertilizer. If the fertilizer distribution were efficient which reduced this household level deficit, it would have contributed to a significant boost in agricultural production. Therefore **supply bottlenecks which are impeding efficient fertilizer distribution has to be removed for overall development of agricultural crop sector.**

68. **Regional distribution should also be further investigated.** We have found TSP and MOP is quite low in the Sylhet division. It should be investigated whether this low use is due to supply bottlenecks or geographical characteristics. In terms of regional variation, farmers in Dhaka division suffer from higher probability of fertilizer deficit compared to other divisions. Further research and investigation is needed to identify the factors behind this higher risk suffered by farming households in Dhaka.

69. Most farmers are concentrating on a particular mix of fertilizers which is urea, TSP and MOP. Since these three are the most used fertilizers, the availability of these three should be made the most efficient. **Currently the focus is mostly on the urea distribution but TSP and MoP also require major impetus in efficient distribution.**

70. Most of the farmers mentioned high price of fertilizer as a major reason that they could not avail the fertilizer. But even in the case of urea, more than fifty percent of farmers mentioned timely unavailability and inadequate supply as the major reasons of their fertilizer crisis. Therefore, **it should be thoroughly investigated the reasons for distribution inefficiencies that caused unavailability of fertilizer in these different channels of administration.**

Fertilizer Distribution Management

71. Involvement of Agriculture Extension workers needs to be lessened to allow them to give attention to the dissemination of technology information. SAAOs should be released from fertilizer marketing activities.

72. To improve fertilizer distribution system, fertilizers are to be supplied to dealers from the nearest buffer stocks instead of different plants. It can reduce shipment time and transportation cost of fertilizer;

73. From a number of key informant interviews in the border areas, we have found that there is a tendency for fertilizer to be smuggled in or out depending on the comparative prices of fertilizers on both sides of the border. The policy makers would need to take into consideration this issue of comparability of fertilizer prices in the neighboring countries while deciding on the official prices of these.

Credit Market

74. A large number of landless, marginal and small farmers do not or cannot collect agricultural credit from the government banks. Here we would like to recommend **spreading of banking branches in rural areas with focus to provide service to these three categories of farmers.**

75. It was reported that poor farmers have fear and less knowledge about banks. Here we recommend for **campaign about formal credit sources (banking institutions) and its benefits.**

76. It was found that farmers' credit collection gets higher from the month of October and remains high up to February. Moreover credit collection rise to the highest in the month of January. In this circumstance we recommend to **all rural banks to take special steps during the months of October to February.**

Fertilizer Subsidy Policy

77. **If subsidy is to address twin objectives-- not only that it matters how this provides incentives for more production, but also it matters it benefits someone who need it most-- we may have to reconsider the *universal coverage scheme*.** Based on our discussion, we propose an alternative *targeted scheme* under which the non-poor pay a cost recovery price and the poor pay a subsidized price. Our proposal is on the basis of the assumption that this new scheme does not hurt the incentives of the large farmers so much so that they give up crop production altogether (it is likely that marketed surplus from large farmers will decrease) and the society is willing to accept this reduction of marketed surplus and associated price increase of food grain for a greater emphasis on poverty alleviation among the poor farmers.

    We recommend that the Government of Bangladesh may opt for a *selective, targeted subsidy scheme* in place of the *universal coverage of subsidy* that is being practiced now. The current dealer system may continue, but now there will be two sets of prices for the same unit amount of fertilizer specifically allotted for two categories of farmers. **The poorer farmers (such as landless, marginal and the small) will be allowed to pay a *subsidized price,* whereas the medium and the large farmers will be charged a *cost recovery price* administratively set by the government.**

78. In order to implement the proposed selective subsidy policy **a large database of farmers' information throughout the country will be required, and this needs to be regularly updated.** An additional requirement will be that each farmer would have to open a bank account through which incentive packages from the government will be transferred.

Some additional research will be required for examining different alternative models within this broad framework of *selective subsidy* scheme. **It is recommended that this proposed subsidy system is examined in some pilot locations before this is implemented throughout the entire country.**

CHAPTER I
INTRODUCTION

1.1 Background and Rationale

In the last decade, hardly a year passed without complaints from the farmers about the low availability of fertilizer during the critical period of rice production. Often farmers' agitation against administration became the headline of the newspapers. Sometimes angry farmers were found to be engaged in clashes with law enforcement forces resulting in loss of lives. Beyond the casualties, another implication of the so-called fertilizer shortage was our failure to reach the targeted volume of rice domestically produced. Thus, the issue of fertilizer availability remains important for the policy makers who are concerned about food security which hinges on the domestic rice production. Fertilizer is a crucial input to maintaining productivity growth required to meet food security and poverty reduction objectives set forth in national budget. Direct involvement of the administration in the fertilizer distribution process reflects its sensitivity toward the issue.

Despite the administration's claim that adequate fertilizer was available, farmers, dissatisfied with the existing fertilizer distribution network, often complained that dealers had met only a small fraction of their fertilizer demand. When the administration said supply was adequate, it meant there was enough supply to meet demand at the administered price. Had it been true then the administration could have operated through market rather than the dealer's network. Use of the network implied fertilizer shortage at the administered price. Since the administered price of fertilizer (especially price of urea) was set to a very low level, border crossing of fertilizer was also highly likely.

Thus, a key challenge is determining the level of fertilizer subsidy which is most likely to assist farmers realize the full potential of available technologies and production practices while also reaching the twin goals of food security and poverty alleviation. One crucial step toward meeting the challenge is to estimate the total fertilizer demand for the agricultural sector. To the best of our knowledge, there has not been any systematic nationally representative study to estimate the demand for fertilizer. Often the administration sets its fertilizer policy based on fertilizer requirements.

But fertilizer demand and fertilizer requirement are fundamentally two different concepts. The fertilizer demand is often referred to as a "derived" demand because it is determined to a large extent by the final demand for the crop produced. In general, the demand for fertilizer depends on (1) the price of the crop(s), (2) the price of fertilizer, (3) prices of other inputs that substitute for or complement fertilizer, and (4) the parameters of the production technology. Fertilizer requirement, often referred to as potential demand, is experts' assessment of fertilizer need based on the information of total amount of land available for certain crops, land quality and other agro-ecological conditions.

There is often a significant gap between the two because farmers' knowledge of or experience with fertilizers may lead him/her to perceive the yield response and profitability as substantially lower than that perceived by experts and extension personnel. Thus, the estimation of fertilizer demand is necessary to provide a comprehensive overview of the technical, economic, and policy issues of relevance to fertilizer policy design and implementation in Bangladesh.

1.2 Objectives

The general objective of this study is to investigate the nature and causes of the often happening fertilizer crisis. Specific objectives are as follows:

(a) Estimate the total demand for fertilizer using a nationally representative sample of farm households. This demand can be found in two ways. One is by the quantity demanded of fertilizer directly revealed by the farmers in the sample survey. Another would be estimated demand for fertilizer from the input demand function[1]. It would be interesting to observe the difference between these two measures of input demand which might be an estimate of unobserved factor that affect demand for input.

(b) It is highly likely that actual consumption of fertilizer is much lesser than the amount originally intended for the agricultural sector. In that case the difference might be leakage to other commercial sectors, e.g. textile or smuggled to neighboring countries which are enjoying some benefit of this subsidy. Thus an important objective of this study is to redesign fertilizer subsidy to reduce this leakage as much as possible while reaching the twin goals of food security and poverty alleviation.

(c) Estimate the amount of shortage of yields due to untimely availability of fertilizer and that would give an estimate of how much production can be increased by making fertilizer available in time.

(d) Investigate if farmers are concentrating on crops which have lesser significance in terms of food security than rice or wheat. There is a growing concern that farmers are moving away to crops which uses less inorganic fertilizer because of apprehension about timely availability.

One of the major outputs of this project would be providing a concrete idea of the reasons behind fertilizer shortage. Precise demand estimation would lead us a long way to identify the factors that affect the demand. We would be able to judge the relative importance of different factors (price, crop pattern, land quality, credit constraint) that would affect the demand and at the end how those factors would affect the total production.

Evaluating the relevance and extent of current subsidy in the fertilizer sector at the prevailing product prices would be another major contribution of this study. A profit maximizing decision process at the farm level is often assumed to shape the demand of a factor. A farmer wanting to maximize profit would find the point at which the value of the marginal product of fertilizer is equal to the cost of adding the last unit of fertilizer optimal. When the output price increases the value of the marginal product of fertilizer increases resulting in an increased demand for fertilizer at a given fertilizer price. Also, in this case the price of fertilizer can be raised still preserving the same fertilizer demand. Thus, because of the recent price increase the administration might have ample space to ponder subsidy reduction.

Regional aspects of fertilizer distribution are also very important. Fertilizer demand per acre of land might vary across regions but the regional allotment might not reflect that heterogeneity. Thus, the fertilizer crisis might be augmenting more than what should be. This study might give a clear idea about the regional distribution of demand and thus help to alleviate this problem.

[1] Estimation of input demand function requires richer set of information which were not available in the data collected by the study.

CHAPTER II
OVERVIEW OF LITERATURE

The analysis of the demand for fertilizer use does not have many precedence. Two main related articles can be mentioned here. Coady (1995) focused on the variation in the level of chemical fertilizer applied, in particular to high yielding variety of wheat. The double hurdle model used to explain the variation in fertilizer input across farms incorporates the process by which 'zeros' are generated, in particular differentiating between households who do not apply because of 'lack of access' and those who do not apply out of choice. Using similar analysis, Croppenstedt *et al*. (2003) estimate a double hurdle fertilizer adoption model for Ethiopia. It is found that credit is a major supply side constraint, suggesting that household cash resources are generally insufficient to cover fertilizer purchases. On the demand side, household size, formal education of the farmer, and the value-to-cost ratio have the largest impact on adoption and intensity of fertilizer use. The results underline the importance of increasing the availability of credit, developing labor markets, and reducing the procurement, marketing and distribution costs of fertilizer.

There has been number of studies on fertilizer use in Africa. One of those studies, Minot et. al. (2000) used a Heckman model to identify the determinants of fertilizer use. The study finds that fertilizer use is closely related to crop mix and access to inputs on credit, but not to household income. In Malawi and Benin, the two countries which are focus of the study, farmers growing cash crops are three times as likely to fertilize their maize fields as other farmers. In Benin, 88 percent of the fertilizer purchased by farmers is bought on credit through the integrated cotton marketing system managed by the parastatal SONAPRA. However, almost one third of this fertilizer is diverted to maize and other crops. In Malawi, tobacco is the most important cash crop among smallholders, but less than half the tobacco growers are able to purchase fertilizers on credit. Maize accounts for about 60 percent of the fertilizer use, compared to less than a third for tobacco. This difference in the tradability of the main crop being fertilized helps explain some of the difference in performance. In Benin, fertilizer use was stimulated by the 1994 devaluation of the CFA franc, while in Malawi real depreciation of the currency has reduced the profitability of fertilizer.

There have not been not many studies on the determinants of fertilizer use or demand per se have been done in Bangladesh. One of those studies might be Parikh (1990) test four hypotheses in the context of Bangladesh fertilizer demand using tobit estimation on farm survey data of 457 farms. The hypotheses tested are: (1) Are fertilizers and labor complements or substitutes in Bangladesh? (2) Does the size of holding have any significant impact on consumption per acre? (3) Are fertilizers and manures substitutes or complements? and (4) Do prices play a dominant role? The study concludes that fertilizers and family labor are complements with non-price definition while fertilizers and hired labor are substitutes with price definition. The price elasticity of fertilizer demand ranges from -0.66 to -0.97 using various models.

In another related study, Islam and Islam (2002) analyzes factors demand for modern rice technology adoption in Second-Generation Green Revolution. A considerable progress in development and adoption of modern rice technology was observed in the country due to advent of 1st, 2nd and 3rd generation rice cultivation. Only seed and fertilizers were found to

have elastic demand. The price elasticities of land, labor and insecticides had positive coefficient. This could be due to scarcity of land and rational use of these inputs as marginal productivity of these inputs would be higher than their marginal costs. The complementary relationships of land-fertilizer, animal-seed-labor and fertilizer-insecticide pairs characterize the intensive inputs use in the third-generation modern rice technology. Considerable higher degree of substitutions was observed for animal-labor and land-labor pairs which indicate that, modern rice technology in Second-Generation Green Revolution could be labor intensive for the small farm holders.

CHAPTER III
METHODOLOGY

3.1 Introduction

In this chapter we discuss in detail the methodology of the research project on fertilizer demand and subsidy policy. First we discuss the theoretical aspects of the study, related to the fertilizer demand estimation and discussion on the fertilizer subsidy issue. Second we discuss our survey design and data collection instruments. Then we concentrate our discussion on the administrative aspects of our research project, this includes issues of quality control and data management procedures followed by the survey team.

3.2 Demand Estimation Method

Demand for fertilizer could be estimated in a number of different methods. Before the data was available, the initial plan was to implement a double hurdle model. But the double hurdle model is applicable only for a sample of data set for which a significant number of farmers do not use fertilizer. The name double hurdle indicates that a farmer might face two types of hurdle in acquiring fertilizer. The first hurdle is that the farmer might not have access to fertilizer at all. The second hurdle is that even the farmer has some access, the access might be limited due to different constraints. The usual practice might be to eliminate such households from the analysis. This practice of omitting non-using households from the analysis might lead to biased estimates. Including those households and applying least square will also lead to biased estimates. This biased estimate might come from the fact some of those households might have actually positive demand but they could not have any because of credit constraint or had no access to fertilizer. But when we attach zero values with those households it becomes that those households do not have any demand or use of fertilizer which might not be appropriate at all.

The sample of farm households that we are dealing with does not require the implementation of double hurdle model. All the farmers in the sample use at least some positive amount of fertilizer. We therefore estimated fertilizer demand/use directly from the data since it is a nationally representative survey. The sample statistics should be unbiased estimators of population parameters. But in indentifying the households which face constraint in achieving the intended amount of fertilizer, we investigated the key distinguishing characteristics following the methodology described below.

One can define "fertilizer deficit" as $D_i^* = D_i - \gamma_i$ (D_i is the fertilizer requirement and γ_i is the amount of acquired fertilizer for that particular i-th farming household), and $D_i^* \geq 0$ indicates that the household is "fertilizer deficient" while $D_i^* < 0$ indicates that the household is "not fertilizer deficient". Assuming a linear function, one can write the fertilizer deficit equation as,

$$D_i^* = \sum_{j=1}^{n=k} \beta_j X_{ij} + \varepsilon_i$$

The household observed to be fertilizer deficient (Z_i= 1) is assumed to have $D_i^* \geq 0$; while the household observed to be not deficient (Z_i= 0) is assumed to have $D_i^* < 0$. Here the dependent variable Z_i is a discrete variable, the model is a qualitative response model where φ_i is the probability of fertilizer deficiency, such as,

$\varphi_i = \text{Prob}\ (Z_i = 1) = \text{Prob}\ (\sum \beta_j X_{ij} + \varepsilon_i > 0)$

One can consider a Probit regression model of fertilizer deficiency as

$\text{Ln}\ (\varphi_i\ (\beta X)) = \beta_0 + \sum_{j=1}^{n=k} \beta_j X_{ij} + \varepsilon_i$

-- here φ_i is the conditional probability of fertilizer deficiency and β_j's are parameters to be estimated. X_{ij}'s the independent variables.

3.3 Method of Subsidy Analysis

The subsidy analysis is a major focus of the study. This subsidy analysis includes the rationale and systematic procedure by which justification of subsidy can be validated or refuted. The discussion of subsidy consists of a number of sub-sections; these are as follows, discussion of the recent trend of fertilizer subsidy, investigation of rationale for subsidy and deals with the issue of justification of subsidy in the context of data from the field that has been obtained in the study. Here is a brief outline of these subsections.

Recent Trend of Fertilizer Subsidy

This sub-section discusses the current trend of fertilizer subsidy in the country, and this is linked with discussions in another chapter of the report.

Rationale for Subsidy

The starting point of discussion on fertilizer subsidy is the rationale for subsidy. It is a common policy making dilemma throughout the developing countries that, policy makers need, on the one hand, to keep food prices low so that food is accessible to all, particularly the lower income segments of the society, and on the other hand, to keep prices of food grain high enough to ensure sufficient incentives for farmers to grow food grain. This is a policy making dilemma which is not easily solved. The policy mix that is commonly followed is two-pronged, one is input subsidization (particularly, subsidy on fertilizers and irrigation), and the other is output price stabilization strategies (particularly, domestic procurement, open market sales and food imports by public organizations) (BIDS policy brief, 2009). The policy of input subsidization is to keep cost of production low for the food grain growers, so that they do not get discouraged from growing food grain due to credit and liquidity constraint and otherwise high prices of inputs. The government typically intervenes in the food grain market in the form of price stabilization policies, particularly domestic food grain procurement drives through which governments purchase food grain from growers at prices at "reasonable" prices (typically slightly higher than the ongoing market prices). The governments also oftentimes replenish their buffer stock of food grain by importing it from exporters in the world market. The government buffer stock of food grain is utilized for regular social safety net programs and sometimes open market sales in times of high food prices in order to reduce prices in the market. This is a very brief summary of government

interventions in the food grain market, and we notice that fertilizer subsidy is a form of government intervention oftentimes followed in the developing countries.

The next question to discuss is *why fertilizer subsidy is required in the first place*? Why is it that governments need to intervene in the food grain market in the form of fertilizer subsidy? The background of fertilizer subsidy in Bangladesh is the "Green Revolution" in the 1960s when food grain production was revolutionized in the form of new generation of seeds, use of chemical fertilizer, irrigation practices etc. Since the independence of the country, rice production has increased three fold whereas population has increased two fold, thus have increased per capita availability of rice in the country. During the early stage of use of chemical fertilizer, the government regularly controlled this market and provided subsidies in the form of artificially low prices of some important fertilizers. This was carried out with a view to encourage use of chemical fertilizer which was mostly unfamiliar to farmers during the early stage of the "Green Revolution". Later on this argument for subsidies for fertilizer lost its credibility since by this time farmers have become well familiar with different categories of fertilizers and their implications. Currently chemical fertilizer is subsidized principally due to two categories of reasoning: *economic* and *political*.

The economic reasoning for fertilizer subsidy can be described in the following flow chart:

Economic reasoning for providing subsidy for fertilizer:

- Cheaper agricultural input
  → higher demand for input
  → higher production of foodgrain
  → lower price of staple
  → higher food security & closer to self-sufficiency in foodgrain production
  → higher food security & less vulnerability to risks of facing high prices of import in the world market (review situation of 2007-08)

On the contrary, economic reasoning for not providing subsidy for fertilizer:

- Subsidy is an "*inefficient*" allocation of resource in the sense that farmers pay for fertilizer a lower price compared to the world price of fertilizer, thereby has more incentive to use too much of fertilizer (see Osmani and Quasem (1990)).

Yet the counterargument to the second line of argument is:

- With market imperfections such as low access to credit as well as liquidity constraints, farmers already face "*inefficiency*" in allocation of resources, find it difficult to finance fertilizer purchases, and therefore without "*subsidy*" would be using suboptimal amount of fertilizers. Therefore "*subsidy*" is not necessarily introducing "*inefficiency*" in an "*efficient*" world, but may be considered as a "*correcting device*" to address issues of imperfections in the developing country agricultural sector (op. cit.)

There are some political reasoning for providing subsidy for fertilizer, these are:

- Requirement of a democratically elected government to meet election pledges for "cheap rice".
- Since Bangladeshi households are, on the average, net buyers of rice, it may be politically costly for the government not to be able to keep rice prices low.

Thus the subsidy literature has two strands of arguments. One is that subsidy for fertilizer keeps prices of fertilizers artificially low as compared to the world price of fertilizers, thus creating an incentive for farmers to use more-than-optimal amount of fertilizers, and this creates inefficiency in the allocation of resources. One can bolster this argument by further adding that farmers actually receive fertilizer subsidy in two stages; one is at the stage of production of fertilizer itself, since the natural gas used to manufacture urea is sold to the five fertilizer factories at a subsidized rate, and the other is the ex-factory price of urea fertilizer dealers need to pay is lower than the cost of production of one unit of urea.

The other argument is that, as it is mentioned earlier, *subsidy* is a form of correcting device for existing market imperfections in the food grain production sector.

Examining Fertilizer Subsidy Issue at the Micro Level, Quantitative Information
(Farm Household Questionnaire)

Since we have collected primary level data, directly interviewing of farmers (including their cost and return, pricing, fertilizer use information), we can examine actual field level data of the farmers and try to understand their vulnerabilities to low prices, low returns, low availability of credit, etc. particularly for the landless and the marginal farmers, and assess how critical it is for them to have low fertilizer prices. This is the analytical approach that has been followed in this study report. We depend on two sets of information, one is a rich collection of cost, return, fertilizer use information set of farmers classified by land class category and by regions; and the other is the farmers' willingness-to-pay (WTP) for fertilizer information.

Examining Fertilizer Subsidy Issue at the Micro Level, WTP Approach
(Farm Household Questionnaire)

- Ask the farm household their Willingness to Pay (WTP) to be able to avoid occasional difficulties in obtaining fertilizers and getting this fertilizer in the market (assuming no speculative situation would be there in the free market of fertilizers)

- Compare this WTP (to avoid difficulties) with
  [E(P), (expected) free market price (unsubsidized)
  − P*, administered market price (subsidized)]
  WTP vs. [E(P) − P*]
  If WTP > [E(P) − P*] → removal of fertilizer subsidy is justified
  If WTP < [E(P) − P*] → removal of fertilizer subsidy is not justified

- Observe the socio-economic background of farmers for "WTP" and "expectations of market price E(P)" ranges

- If farmers' WTP is high for avoiding risk of hassle/delay/zero supply situations of fertilizers in the subsidized and administered system as of now, compared to price differentials of expected price and administered price, then there might be a case for opening up the fertilizer market completely. This could be an argument for removing subsidy altogether.

An analysis of these two sets of information will lead us to some comments on the issue of fertilizer subsidy policy in Bangladesh.

3.4 Sample Design: Selection of Sample

A statistically valid sampling approach has been adopted in determining a representative sample of respondents for the study. Basing on the nature of the study and socio- economic context of the target respondent, the following sampling strategy was adopted in the study.

3.4.1 Sample Design for Quantitative Survey

Since there is no data on fertilizer use by ago-ecological zone (AEZ), identification of sample location by AEZ is highly difficult due to inclusivity of upazilas in AEZ and government regulated fertilizer distribution system is based on administrative structure, the whole sampling procedure is based on administrative structure rather AEZ.

A multi-stage stratified sampling strategy has been adopted. Upazilas, as primary sampling unit (PSUs), are selected from the 6 divisions representing the whole area of Bangladesh by PPS (Probability proportionate to size) method. In each division, we formed three strata of upazila (PSUs) by calculating the quartiles on the basis of demand for fertilizer arranging the data in ascending order.

Fertilizer demand of different upazilas in Bangladesh is taken from **"**Monthly demand (in metric ton) of different chemical fertilizer of district (with crops, production, livestock, pisciculture) in 2008-2009 fiscal year**"** provided by Bangladesh Fertilizer Association (BFA), prepared by Field Services Wing of Department of Agricultural Extension, published in June 15, 2008.

Thus our strata in each division are as follows: Stratum 1: below first quartile i.e. $<Q_1$, Stratum 2: inter quartile range i.e. Q_3-Q_1, and Stratum 3: above the third quartile i.e. $>Q_3$. Then from each division, 25% PSUs are chosen from stratum 1, 50% PSUs are chosen from stratum 2 and the rest of 25% PSUs are chosen from stratum 3. Then two unions per contacted PSU and one village per union are randomly chosen. At final stage, around 12 farm households per contacted village are randomly chosen. Now, for a representative sample of PSU, we consider 95% confidence level and 5% precision level and using the following statistical formula as shown below.

$$n = \frac{Z^2 CV^2}{e^2}$$

Where,

n = Sample size of upazila
Z = Standard normal variate (1.96)
CV = Coefficient of Variation (0.20)
e = Precision level (5%)

A representative sample size of PSUs has determined to be n=73 with design effect 20%.

According to estimates based on information contained in Handbook of Agricultural Statistics, (December 2007), number of farm households in Bangladesh is 11,639,389**.** A representative sample size of farm households has been determined as, n=1,838 by adopting probabilistic sampling approach with 95% confidence level, 2.5% precision level, and 20% design effect. We have used following statistical formula

$$n = \frac{Z^2 PQ / C^2}{1 + (\frac{Z^2 PQ}{C^2} - 1) / N}$$

Where,

n = Sample size
P = A dichotomous probability (50%)
Q = 1-P
Z = Standard normal variate (1.96)
C= Precision level (2.5%)
N = Population size

Table 3.1: Sample size of Upazila, Unions, Villages and Households by divisions

Division	Total No. of District	Total No. of Upazila	Total sample Upazila	No. of sample Upazila in each stratum		No. of sample Union	No. of sample Villages	No. of sample households
				Strata	Upazila			
Barisal	6	40	6	$<Q_1$	1	2	2	32
				Q_1- Q_3	4	8	8	101
				$> Q_3$	1	2	2	31
Chittagong	11	100	15	$<Q_1$	4	8	8	98
				Q_1- Q_3	7	14	14	170
				$> Q_3$	4	8	8	98
Dhaka	17	121	18	$<Q_1$	4	8	8	100
				Q_1- Q_3	10	20	20	242
				$> Q_3$	4	8	8	98
Khulna	10	60	9	$<Q_1$	2	4	4	60
				Q_1- Q_3	5	10	10	122
				$> Q_3$	2	4	4	60
Rajshahi	16	125	19	$<Q_1$	5	10	10	122
				Q_1- Q_3	9	18	18	218
				$> Q_3$	5	10	10	122
Sylhet	4	38	6	$<Q_1$	1	2	2	32
				Q_1- Q_3	4	8	8	98
				$> Q_3$	1	2	2	34
Total	64	484	73		73	146	146	1838

Supposing that Barisal division contains 40 upazilas. We make three stratums by calculating quartile on the basis of demand for fertilizer. We find Q_1 = 1868 metric ton which indicate that 25% i.e. 10 upazilas' fertilizer demand is less than 1868 metric ton, Q_3=4997 metric ton which indicates that 25% i.e. 10 upazilass fertilizer demand is greater than 4997 metric ton. This indicates that 50% i.e. 20 upazilas' fertilizer demand is from 1868 to 4997 metric ton.

First stratum includes those upazila whose fertilizer demand are below 1868 metric ton. Second stratum includes those upazila whose fertilizer demand is greater than 1868 metric ton but less than 4997 metric ton and third stratum includes those upazila whose fertilizer demands are greater than 4997 metric ton. We have chosen 1 PSU, 4 PSUs and 1 PSU randomly from first stratum, second stratum and third stratum respectively. Selected sample upazila are given below.

Table 3.2: Selected sample upazila by division

Divisions	Strata	Total # of Sample Upazila	Selected Upazila	Selected Districts
Barisal	Stratum 1	9	Patharghata	Barguna
	Stratum 2	22	Muladi	Barisal
			Monpura	Bhola
			Kalapara	Patuakhali
			Mothbaria	Pirojpur
	Stratum 3	9	Uzirpur	Barisal
Chittagong	Stratum 1	24	Thanchi	Bandarban
			Sadar	Rangamati
			Mohalchori	Khagrachari
			Kutubdia	Cox'sbazar
	Stratum 2	51	Lama	Bandarban
			Theknaff	Cox'sbazar
			Kasba	B-Baria
			Chatkhil	Noakhali
			Sandeep	Chittagong
			Homna	Comilla
			Subornochor	Noakhali
	Stratum 3	24	Faridgonj	Chandpur
			Sadar	Laksmipur
			Burichong	Comilla
			Sadar	B-Baria
Dhaka	Stratum 1	30	Dohar	Dahaka
			Doilotpur	Manikgonj
			Gasairhatt	Sariatpur
			Sonargaon	Narayangonj
	Stratum 2	61	Durgapur	Netrokona
			Kaliakoir	Gazipur
			Katiadi	Kishorgonj
			singhair	Manikgonj
			Shibchar	Madaripur
			Muktagacha	Mymensing
			Moksedpur	Gopalgonj
			Araihazar	Narayangonj
			Sibpur	Narsingdi
			Husenpur	Kishorgonj
	Stratum 3	30	Fulbaria	Mymensing
			Modhupur	Tangail
			Damrai	Dahaka
			Nalitabari	Sherpur
Khulna	Stratum 1	15	Shitolmari	Bagerhat
			Khulna sadar	Khulna
	Stratum 2	31	Lohagora	Narail
			Koira	Khulna
			Paikgacha	Khulna
			Satkhira	Satkhira
			Bagarpara	Jessore
	Stratum 3	15	Zikorgacha	Jessore
			Maheshpur	Jhenaidah
Rajshahi	Stratum 1	31	Chowhali	Sirajgonj
			Chilmari	Kurigram
			Sonatola	Bogura
			Bochagonj	Dinajpur
			Kawnia	Rangpur
	Stratum 2	63	Kishorgonj	Nilphamari
			Fulbari	Kurigram
			Fulbari	Dinajpur
			Tarash	Sirajgonj

Divisions	Strata	Total # of Sample Upazila	Selected Upazila	Selected Districts
			Durgapur	Rajshahi
			Sadullapur	Gaibanda
			Nababgonj	Dinajpur
			Manda	Naogaon
			Chirirbandor	Dinajpur
	Stratum 3	31	Boraigram	Natore
			Ulipur	Kurigram
			Rangpur	Rangpur
			Birgonj	Dinajpur
			Baghmara	Rajshahi
Sylhet	Stratum 1	9	Goainghat	Sylhet
	Stratum 2	20	Kulaura	Moulavibazar
			Dharmapasha	Sunamgonj
			Azmirigonj	Habigonj
			Dirai	Sunamgonj
	Stratum 3	9	Shreemongal	Moulavibazar

3.4.2 Design for Qualitative Study

Beside quantitative survey, a qualitative technique has been used primarily to collect in-depth/particular information on selected indicators related to the study. Qualitative methods are being increasingly used in socio-economic assessment as credible and deeper understanding of collection. They provide clear insights into people's perceptions and deeper understanding of local context, complex coping strategies, major priorities and solutions used by people. While permitting an in-depth study of selected issues, they have the advantage of keeping data collection process free from predetermined categories of analysis. They allow for a level of depth and detail that quantitative strategies can't provide. Following tools has been employed for qualitative data collection.

Focus Group discussion (FGD)

Focus Group Discussion allows effective gathering of qualitative data. Focus Group Discussions were conducted around main study issues. For FGDs, a checklist was designed by creating a system and coding each comment into a particular category. Facilitators were provided a guide with key issues and indicators to steer the discussion and comments were prepared. FGDs were organized for farm households.

In total, 26 FGDs were conducted in 6 divisions of Bangladesh. The average number of FGD participants was 10.

Key Informant Interview

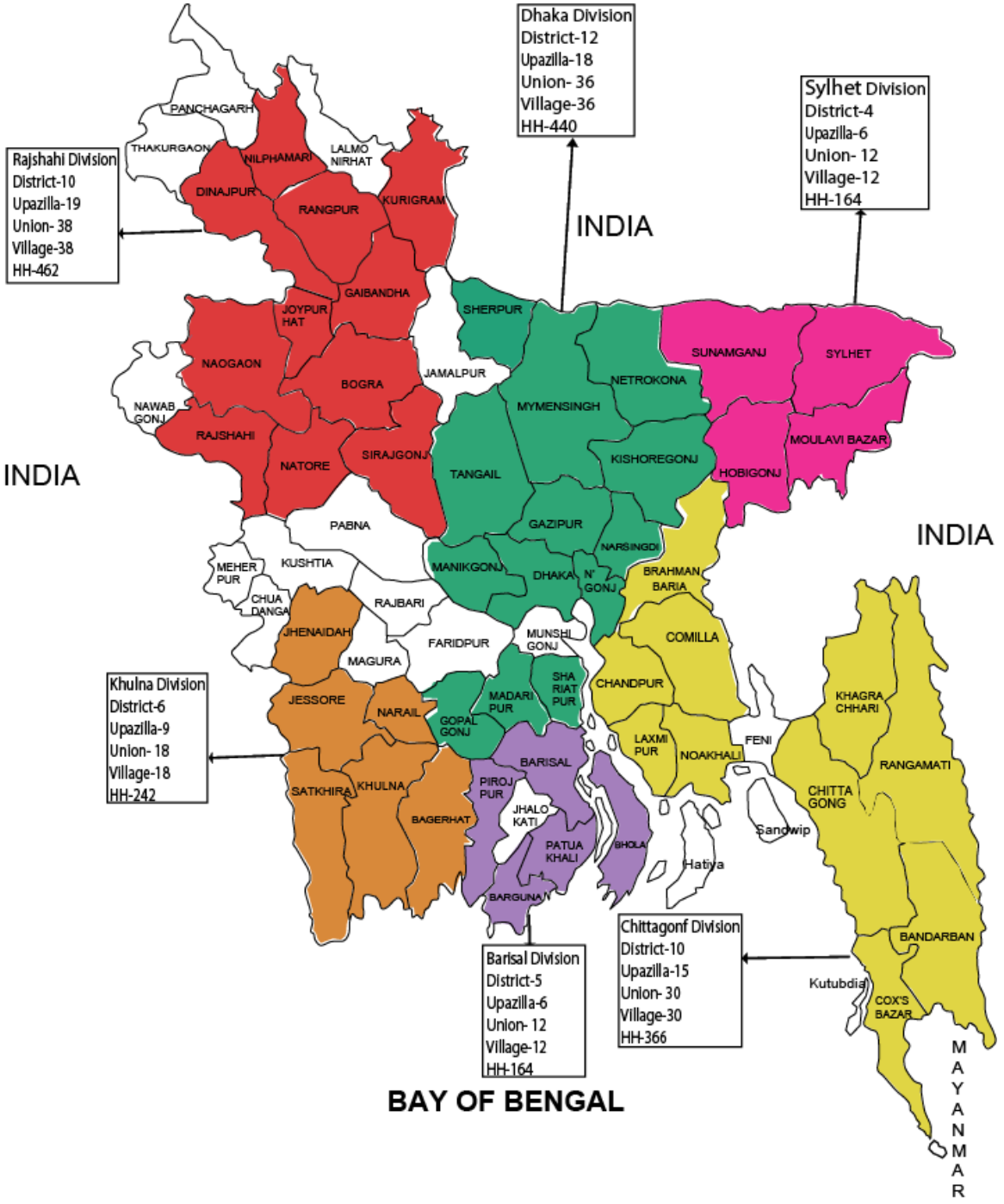
To gather qualitative data, Key Informant Interviews (KII) were carried out with 8 categories of people. A checklist for KIIs issues was designed in line with the objectives of the study.

Final Sample Size

Final sample sizes by respondent categories are as follows.

1. Interview Schedule: Farm Household = 1838
2. Key Informant Interview: Sub-assistant Agriculture Officer (SAAO) = 30
3. Key Informant Interview: Dealers at union level = 36
4. Focus Group discussion (FGD): Farm household = 26
5. Key Informant Interview: Knowledgeable persons in Border areas = 25
6. Key Informant Interview: BCIC Officials = 10
7. Key Informant Interview: Bangladesh Fertilizer Association (BFA) Officials = 5
8. Key Informant Interview: BADC Officials = 5
9. Key Informant Interview: Officials Ministry of Agriculture = 5
10. Key Informant Interview: Dealers at Upazila level = 36

Map 3.1: Figure showing sample districts on map of Bangladesh

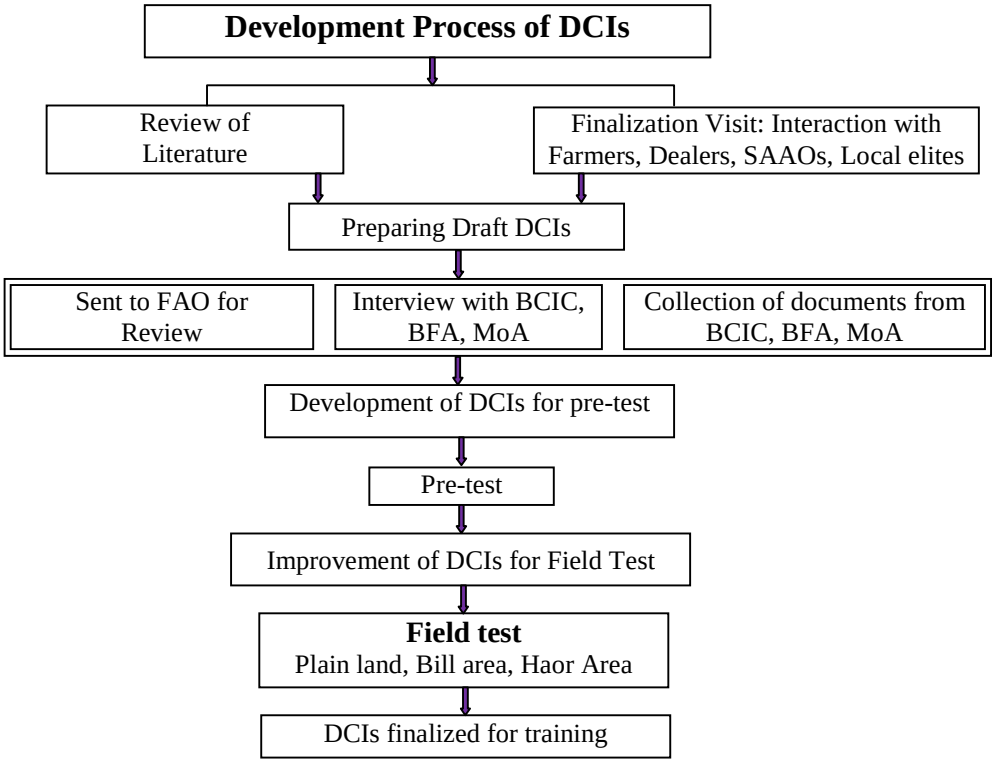


3.5 Data Collection Instrument

To explore demand and subsidy policy situation on fertilizer sector, the study team developed the Data Collection Instruments (DCI) in the line with the objectives of the study. During the design phase, the team interacted with the Technical Assistance Team of the NFPCSP on several. Moreover, repeated brainstorming sessions were carried out with the study team members at MSUK headquarters. Along with the DCIs, written instruction to select appropriate interviewees and to take additional notes about the locations and conversations were developed.

To develop DCIs, MSUK study team carefully followed a number of steps shown in Figure 3.1.

Figure 3.1: Flow Chart showing development process of Data Collection Instruments



The steps which were followed in the development of DCIs are as follows:

3.5.1 Collection and Review of Relevant Materials and Information

The team collected some relevant materials, data and information regarding research issues and reviewed some of these materials before familiarization visit. The outputs include review of relevant literatures, newspaper reports, brief description of key technical aspects, data analysis of historical trends, etc.

3.5.2 Familiarization Visit

In the process of preparation of draft data collection instruments, the whole study team visited two villages (out of sample village) namely *Rabirmara* and *Harinandi* of *Vitekandi* Union under *Phulpur* Upazila of *Mymensingh* District on February 12, 2009. The main objective of the familiarization visit regarding the study was to get an idea about the essence and importance of the key issues addressed in the study meeting with various stakeholders (farm households, government officials, fertilizer traders, Union Parishad personnel and local elites) by observing fertilizer use in the paddy field by farmers and its distribution by fertilizer dealers.

3.5.3 Preparation of Draft DCIs

After reviewing the literature and a familiarization visit in *Mymensingh* district, the study team prepared draft Data Collection Instruments (DCI) through a number of brain storming sessions. Initially four sets of DCIs were prepared including one set of Focus Group Discussion (FGD) instruments to administer interviews to farm households, fertilizer dealers and local Sub-Assistant Agriculture Officers (SAAO). Finally, ten DCIs were used to cover all the aspects of the study.

3.5.4 Pre-test of DCIs

To assess the quality of DCIs and to check for the need for improvement, the DCIs were field-tested. Accordingly, the study team prepared themselves for pre-test. One day long training of field officers was conducted in MSUK head quarters to give a clear idea about the DCIs and the objectives of the study. Village *Paniarup*, close to the Bangladesh-India border, was selected for pre-test. On June 17, 2009 the whole study team conducted pre-test of DCIs at village *Paniarup* (out of sample village) of *Kainpur* union of *Kosba* Upazila under *Brahmanbaria* district. In *Paniarup*, a low land agricultural area, the team interviewed a number of different types of farmers and also interacted with local knowledgeable people.

3.5.5 Reviewing Documents and Interview with Different Officials

After the pre-test of DCIs, the study team collected a number of documents, literature and newspaper reports. Simultaneously, the study team started discussions and interviews with stakeholders (BCIC officials, Bangladesh Fertilizer Association (BFA) officials and officials of Ministry of Agriculture (MoA)). By analyzing documents and information collected through interview, the DCIs were improved again in line with the objectives of the study.

3.5.6 Field test of DCIs in Different Geographical Location

After pretesting DCIs and reviewing documents, the study team made major improvement of DCIs. The household questionnaire was reviewed intensively. To assess regional diversity, it became necessary to conduct an intensive field test in different geographical locations. Consequently, a four day long field test was conducted in plain land and *Bill* area of *Narshingdi* and *Haor* area of *Kishorgonj* district. To ensure quality of data from the field test, a one day long training for Field Enumerators wasbeen conducted in MSUK head quarters with the improved version of DCIs. Field tests were conducted in three different areas from 30th August to 3rd September, 2009. After completion of this second field-test, the whole study team along with Field Enumerators had a daylong meeting for sharing field experiences.

3.5.7 Finalization of DCI

Some modifications on DCIs were also done at the training phase. All ten sets of DCIs were translated into Bangla and back into English to ensure quality of the translation.

Finalized DCIs are as follows:

1. Interview Schedule: Farm Household
2. Key Informant Interview: Sub-Assistant Agriculture Officer (SAAO)
3. Key Informant Interview: Dealers at union level
4. Focus Group discussion (FGD): Farm household
5. Key Informant Interview: Knowledgeable persons in Border areas
6. Key Informant Interview: BCIC Officials
7. Key Informant Interview: Bangladesh Fertilizer Association (BFA) Officials
8. Key Informant Interview: BADC Officials
9. Key Informant Interview: Ministry of Agriculture Officials
10. Key Informant Interview: Dealers at Upazila level

3.5.8 Rational of DCIs

Fertilizer as an agriculture input has an important role in food production. Estimation of actual fertilizer demand, timely and adequate availability of fertilizer, price of fertilizer, subsidy on fertilizer each plays a significant role in maintaining food security and boosting agricultural activities. To observe this reality, two different types of questionnaire, DCI-1 and DCI-4, have been developed. DCI-1, the interview schedule for farm households was designed to quantify most of the objectives of the study. At the same time, the Focus Group Discussion (FGD) instrument for farm households was designed to understand some deeper aspects. As per the proposed design, 1837 farm households were interviewed using DC-1 according to the nationally representative sample distributed under 146 villages of 146 unions in 73 upazilas under 43 districts of Bangladesh. FGDs with farm household were also conducted in 26 farm households in 6 divisions of Bangladesh.

Demand of fertilizer is estimated nationally. Sub-Assistant Agriculture Officers (SAAOs) play a vital role by collecting information from the field and compiling it. To study their activities in line with the study objectives, DCI-2 was designed. And accordingly 30 interviews were conducted with this instrument.

DCI-3 and DCI-10 were developed to study dealers' role at union and upazila level. To have better understanding of fertilizer smuggling in border areas DCI-5 was developed. DCI-6, DCI-7, DCI-8 and DCI-9 were developed to study distribution process of fertilizer.

3.6 Study Implementation

3.6.1 MSUK and FAO Collaboration

MSUK collaborated with NFPCSP throughout the study in the phase of preparation, pre-testing, and finalization of DCIs. In addition to that, MSUK discussed the analysis plan with the officials of NFPCSP, Bangladesh in review meetings and workshops.

3.6.2 Recruitment and Listing of Survey Personal

Recruitment of the field personnel was conducted carefully by taking viva, checking certificates and considering previous work experience of the relevant field. Finally 32 Field Enumerators, 12 Field Supervisors, 4 Quality Control Officers, 22 Data Entry operators, 10 Coders, 4 Registration Assistants were selected to accomplish the field survey as well as data and information management.

3.6.3 Training of Field Personnel

Training is a crucial phase for successful and quality data collection. In this regard, a 7 days (from 14th October to 21st October, 2009) rigorous training was provided to all categories of field personal including Field Supervisors, Quality control Officers and Field Investigators. Training was imparted regarding data collection instruments and quality control issues.

There were separate trainings for the Survey team and In-house (coding, editing, registration) team. During training sessions, overall objectives of the study, data collection instruments, sample selection technique, techniques of rapport building and interviewing was reviewed. In training both quantitative and qualitative tools were used. Training was conducted through classroom lectures, demonstration interviews, role playing, mock tests, field practice; review of lessons learned and suggestive solutions.

3.6.4 Field Data Collection

The field survey ensured for data collection involved generating information using DCIs. Because of the extensive nature of the study, sample planning of survey was also a serious task. To administer 1838 farm household interview as well as 26 FGDs and 8 different type of KIIs- 12 teams were deployed with 32 Field Enumerators, 12 supervisors and 4 Quality control Officers to ensure collection of high quality of data and information for the study. This team worked for 30 days at 146 villages under 146 unions of 73 upazilas under 43 districts of Bangladesh. The activities of the field were constantly monitored by MSUK Head Quarters and core study team members. Spot checking were also done to minimize errors.

3.6.5 Data/ Information Management

Data management comprised the following activities: (a) registration of DCIs, (b) data processing, and (c) computerization of data. Figure 3.3 shows process of data/information management.

Registration of DCIs

As soon as the questionnaires were received from the field, they were entered into registration books to ensure all schedules received from the field have been received at Dhaka office.

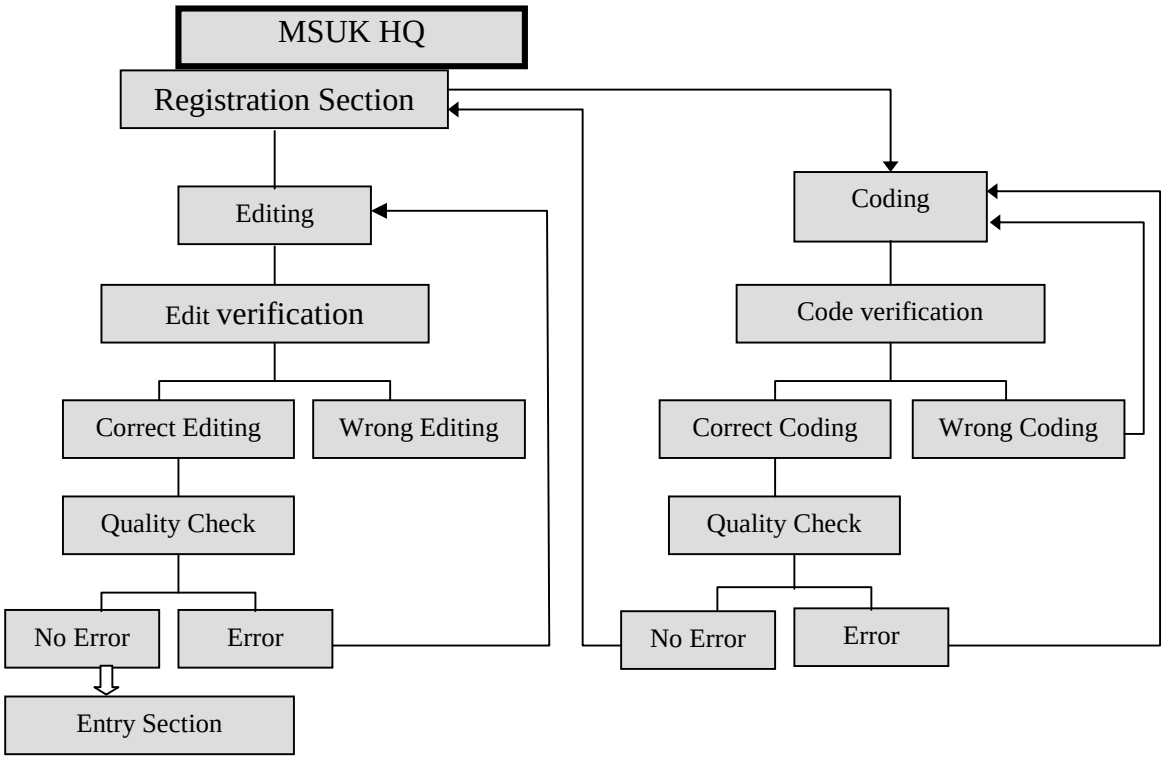
Data Processing

Data processing was done by searching and listing open-ended answers and transferring this information to the core study team and computerization unit for further processing.

Coding

Open-ended questions were coded according to the guidance of the study team members.

Figure 3.2: Flow chart showing interrelationship among registration, editing, and coding sections for survey part of the assignment



Computerization of Data

Data were analyzed using the in-house computer facility of MSUK under the overall guidance and supervision from core study team members and System Analyst.
Computerization of data involved the following major tasks:

(a) Entering data into the computer:
(b) Conducting validation checks to ensure that data had been correctly entered onto the computer:
(c) Preparation of output tables: and
(e) Ensuring that the output tables were correct.

A number of 22 Entry Operators were deployed for 30 days. The process was closely monitored/supervised by the System Analyst and core/study team members. Triangulation was done by cross checking data/information from different categories through different methods.

CHAPTER IV
OVERVIEW OF FERTILIZER MARKETING AND DISTRIBUTION POLICIES

4.1 Background

Public policy for agricultural development in Bangladesh consists of a wide array of policy instruments enshrouding almost every aspect of production and distribution. Of late, the set of policies with regard to pricing and distribution of inputs, especially fertilizer has averred a great deal of topical interest[2].

Within this policy purview, undeniably, chemical fertilizers and their judicious use have paramount importance as one of the most strategic and growth generating inputs required for increasing crop production and maintaining food security. But, it is necessary to ensure timely supply of fertilizers to match the demand.

From this standpoint, the availability of fertilizer "at the right time, in the right quantity, and at the right place" is considered climacteric to expanding agricultural production[3]. However, availability of fertilizer to farmers may depend, among other things, on the efficient marketing and distribution system. But, in many countries fertilizers are sometimes not available at the time and in quantities and forms required by farmers. It is in the distribution sector, after the fertilizers leave the plant or port that most inefficiencies occur[4].

In the early 1970s, the governments of most Asian countries and particularly of Bangladesh were heavily involved in the fertilizer sector. To ostensibly increase agricultural production, governments maintained a virtual monopoly over procurement, distributed through parastatal institutions, established fertilizer subsidy programs, regulated private trade, and controlled input and output prices. A policy reversal, creating competitive fertilizer market began in mid-1980s and almost completed by mid-1990s[5]. Since then, governments have reduced the role of the public sector and liberalized the fertilizer sector[6].

The Government of Bangladesh (GoB) has adopted a number of policies regarding price, marketing and distribution of fertilizers and these policies have undergone profound changes during the last four decades. In the early 1960s, when the HYV technology was first introduced, the government supplied fertilizers at highly subsidized prices, procured and distributed them through the public sector bodies. But since the mid-1970s, the government has been reducing the subsidy on fertilizer, and by 6 December, 1992, the subsidy has been completely eliminated and fertilizer trade was privatized. Such policy shifts during the late 70s, early 80s and till date have had significant impacts on the economy, especially in the quantum and efficiency of fertilizer use in agriculture. From this viewpoint, the changes in policies have become the subject of deep concern and a great deal of controversy[7].

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[2] Osmani, SR. Pricing and Distribution policies for Agricultural Development in Bangladesh, Special Issue on Agricultural Inputs in Bangladesh, Atiq Rahman (ed.), BIDS VoL XIII, September-December 1985, No. 3 and 4.

[3] Quasem. M.A., Supply and Distribution of Fertilizer in Bangladesh in Fertilizer Pricing Policy in Bangladesh in Bruce Stone, (ed) Washington DC: International Food Policy Research Institute, 1987, P. 357.

[4] Fertilizer use by Crop, FAO Fertilizer and Plant Nutrition Bulletin 17, P. 35, FAO, Rome, 2006.

[5] Ahmed, Raisuddin, Steven Haggblade and Tawfiq-e-Elahi Chowdhury (eds). Out of the Shadow of Famine: Evolving Food Markets and Food policy in Bangladesh. Johns Hopkins University Press, Baltimore, 2000.

[6] Hossain, Mahabub and Singh, V.P. Fertilizer use in Asian Agriculture: Implications for Sustaining Food Security and Environment.

[7] For details, see Kenneth L. Moots, Evaluation of the Bangladesh New Marketing System (Muscle Shoals, Ala,: IFDC 1982). See also the Technical paper by Quasem, M.A. in Fertilizer Pricing Policy in Bangladesh, Bruce Stone (ed), 1987.

This chapter takes a historical perspective to trace the path of evolutionary reforms in fertilizer input markets of Bangladesh. It attempts to review the fertilizer marketing and distribution policies adopted at different times by government of Bangladesh. Many recent studies including a comprehensive work done by the International Fertilizer Development Center (IFDC) have addressed this burning issue. This chapter is based on secondary data and reports published by Ministry of Agriculture (MoA), Government of Bangladesh, BADC, BCIC, BBS, Ministry of Finance (MoF) and Bangladesh Fertilizer Association (BFA) supplemented by publications from other sources like FAO, IFPRI, IFA, etc.

The chapter under discussion outlined as Section 4.1 identifies shifts in the public policy of agriculture development along with the importance of chemical fertilizers in Bangladesh. In Section 4.2 the old and new marketing system of fertilizer have been delineated. Section 4.3 deals with liberalization of fertilizer trade and the impact of liberalization of fertilizer sector. Besides, Bangladesh fertilizer policy environment and its impact on the market, fertilizer crisis, recent fertilizer policies, supply chain of fertilizer are dealt respectively in Sections 4.4 to 4.7. In Section 4.8 and 4.9 fertilizer distribution system, sources and channels of fertilizer distribution have been discussed followed by delivery system for urea and sources of constraints on its delivery, urea and non-urea fertilizer distribution system, streams of fertilizer marketing, conclusion and a few policy recommendations along with future research area in Sections 4.10 through 4.14.

Moreover, at the very outset a timeline (Table 4.1) indicating the main events of fertilizer marketing and distribution system, as described here, have been drawn for better understanding of the current chapter at a glance.

Table 4.1: Timeline indicating main events of fertilizer marketing and distribution in Bangladesh

Time span	Main Events
Late 1950s	Introduction of chemical fertilizers. Procurement, storage, distribution & retail sale of fertilizer were entrusted to Department of Agriculture.
1951	Introduction of urea fertilizer
16 October, 1961	Establishment of Bangladesh Agricultural Development Corporation (BADC)
1962-78	Free trading in fertilizer was almost absent. BADC played a dominant role in fertilizer distribution through transit, intermediate warehouses, TSCs andTCCAs. Private dealers got license to sell in a restricted area. Prices were fixed by the government. Private dealers had to maintain registers. Urea crisis happened in 1974.
Mid 1970s	Phasing out of fertilizer subsidies
1st December 1978-1st July 1980	The New Marketing System known as Fertilizer Distribution Improvement (FDI-1) was launched. The NMS was formally initiated first in Chittagong Division and then expanded to all over the country by July 1980.
1978-1983	BADC withdrew from retail and wholesale markets at thana levels, the primary distribution points.
1982-1983	Licensing requirement was abolished and restriction on movement removed (except for 8 kilometer border zones with India).
1982-84	Deregulation of fertilizer price took place by April 1983. Farm level prices and retail prices were decontrolled.
Mid-1980s	The creation of a competitive fertilizer market began and the process was almost completed by mid-1990s.

Time span	Main Events
1985-86	Wholesaling and dealership were made free from BADC.
March 1987-August 94	FDI-2 was launched concentrating less on BADC and more on strengthening the role of the private sector.
July 1987	Liberalization of fertilizer trade was initiated. Transport Discount Points were established.
1988-89	Private traders and distributors were allowed to make bulk purchase and import TSP and MoP.
1989	Severe urea crisis. The private sector dealers/distributors were permitted to lift urea first time from UFFL from March, 1989. They also lifted imported fertilizers directly from vessels and ports.
June 1989	Commercial Credit Program for private sector dealers
July 1990	Use of Inland Letter of Credit (ILC)
1990-91	Private dealers were allowed to importing all kind of fertilizers.
1992	End of public sector role in fertilizer distribution, and subsidy on TSP and MoP. Free import from world market began.
December 1992	Completion of deregulation in fertilizer marketing.
6th December, 1992	Total removal of explicit subsidy on fertilizer. The private dealers were allowed to importing urea. Import prices were liberalized.
1994	Completion of privatization of fertilizer market
December 94-March 95	Urea Crisis (supply and distribution crisis of urea) happened, with partial reversal of reform.
1996	Re-introduction of fertilizer subsidy.
2005-06	The subsidy on the imported fertilizer was introduced for the first time.
2005, 2007 and 2008	Urea Crisis
2007	Introduction of slip system
2008	In the dealership policy 2008, by cancelling upazila based system, provision was made for appointing at least one dealer for each union.
2009	In the new dealership policy introduced in 1st October 2009 a farmer-friendly distribution system was developed by invigorating union-wise dealer appointment. Under the modified dealership system 'Farmers' Register', 'Fertilizer Distribution Card' and 'Fertilizer Distrubution Register' were introduced.

4.2 Fertilizer Distribution System

4.2.1 The Old Marketing System (OMS)

In the early 1950s the Department of Agriculture was entrusted to procure, store, distribute and retail sale of fertilizer among farmers. But, inadequate, discordant arrangements and unsatisfactory progress in the programme to manage fertilizer gradually became visible. This led to the creation of Bangladesh Agricultural Development Corporation (BADC) in 1961. BADC took over the official responsibility of distribution and marketing of program in 1963 and continued till 1978-79 (Kafiluddin, 2008). Government tightly controlled fertilizer distribution. At that time, BADC was solely responsible for all import, procurement, transportation, storage, maintenance of sufficient stock at the godown and sale of fertilizer (except ammonium sulfate) all over the country and started selling fertilizers at highly subsidized prices[8]. BADC, a state entity, had an absolute monopoly in fertilizer procurement, marketing and distribution down to the level of the Thana (comprising 50-150 villages).

[8] It is estimated that in 1968-69, the average rate of subsidy was 58% for urea and TSP, and 67% for MoP. See F. Kahanert et al., Agriculture and Related Industries in Pakistan (Paris: Organization for Economic Cooperation and Development Center [OECD], 1970), P. 421. Also see Hossain, Mahabub. Fertilizer Consumption, Pricing and Food Grain Production in Bangladesh in Fertilizer pricing policy in Bangladesh, Bruce Stone (ed.), 1987.

Below that level, it licensed a set number of dealers (usually 15 per union, a unit comprising about 6-12 villages), fixed the retail price, and set the desired commission.

From 1962 to 1978 free trading was almost absent in the fertilizer market and until 1978 BADC sold fertilizers to farmers through its own appointed dealers. Thana Sales Centers (TSCs) were established for the distribution of fertilizers to farmers at highly subsidized prices. The dealers could lift fertilizers from TSCs or godown of the Thana Central Cooperative Associations (TCCAs) where the dealers were registered.

BADC dealers were appointed for each union and allowed to sell fertilizer only in a defined area of operation, and demarcated by distance from a thana warehouse. Farmers in the area had to purchase fertilizers from the dealer at an administrative price fixed by the government from time to time. Although a neighbouring thana warehouse may have been more accessible, dealers were only allowed to procure fertilizer from specified TSCs/TCCAs, they were registered and had to sell at a fixed price. The retail price was determined by the government. Dealers/TCCAs were paid a commission on the basis of distance from the TSC or TCCA warehouse to the operation center. This commission helped to cover transportation, storage, other incidental costs and profit margins. Dealers were required to maintain registers, which were subject to inspection by BADC officers. The price of fertilizers was supposed to be uniform throughout the country. The responsibility of procuring fertilizer from both domestic and external sources and reaching it to the level of the lowest administrative unit (Upazila)[9] rested solely with BADC. This distribution net work was popularly known as the Old Marketing System (OMS).

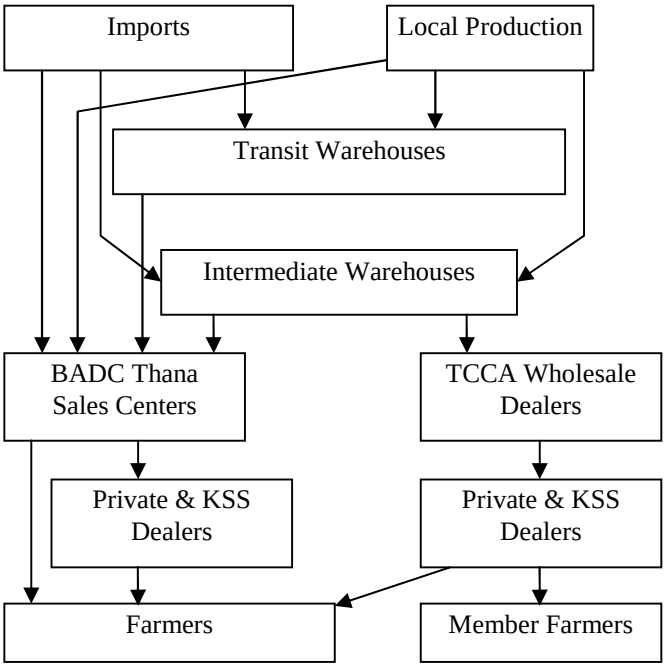
Under the Old Marketing System, BADC used to transport fertilizer to TSCs. Dealers were appointed/ nominated on ward-basis for each union. BADC remained the sole procurer and distributor of fertilizers using a limited number of retail and wholesale dealers respectively at the union and thana level through its own stores and 97 TCCAs. Figure 4.1 indicates movement patterns of fertilizer supply from imports and local production down through the BADC/OMS distribution system to the farmers. The TCCAs resold it to private dealers and to members of village cooperatives called Krishi Samabaya Samity (KSS). In this distribution system, when availability of fertilizer falls short, then dealers would have to sell fertilizer according to the list prepared by the UP Chairman/Members[10].

The OMS are schematically presented in the figure below.

[9] The Local Government (Thana Parishad and Thana Administration Reorganization) Ordinance, 1982 introduced Upazila system with elected chairman. An upazila is an administrative unit smaller than a district (previously called a "thana") and second tier of Local Government.

[10] Saha, Bimal Kumar. Agricultural inputs distribution system and subsidy problems in Bangladesh: A Review, The Bangladesh Development Studies, Volume XIV, Annual Issue, Bangla Calendar year 1403, P. 142.

Figure 4.1: Flow chart of BADC fertilizer distribution under the Old Marketing System, 1977-78 and 1979-80.



Source: International Fertilizer Development Center, Third Evaluation of the New Marketing System (Muscle Shoals, Ala,: IFDC, April 1982).

Note: TCCA = Thana Central Cooperative Association; KSS = Krishi Samabaya Samity (Agricultural Cooperative Society). A thana is an administrative unit smaller than a district. In 1982 the term "thana" was changed to upazila.

During the OMS there had some occasional deficit of fertilizers. Unfortunately, it led to black-market sales at higher prices that could be attributed partly to local monopolies in fertilizer distribution enjoyed by the appointed dealers[11].

4.2.2 Constraints of the Old Marketing System

This public sector system termed as OMS, suffered from excessive bureaucratic control and retarded the initiative of dealers. This arrangement of fertilizer distribution did not function well because of BADCs gross irregularities and also of unnecessary bottlenecks for getting clearance from thana committee and polices. Following constraints were identified under the Old Marketing System (OMS):

- Dealer appointments involved a time consuming selection procedure.
- Erratic and uncertain supplies of fertilizer from local production and imports.
- Limited internal transportation and fertilizer storage capacity.
- Low dealer commission.
- Inadequate dealer and farmer incentives.

Although some relaxation allowed dealers to sell in hats and bazars and to procure fertilizer from the most convenient BADC warehouses, on the whole, the system was cumbersome,

[11] Hossain, Mahabub, Fertilizer Consumption, Pricing and Food Grain Production in Bangladesh in Fertilizer Pricing Policy in Bangladesh, Bruce Stone (ed), 1987, IFPRI and BIDS, Washington, DC, USA.

inefficient, expensive, and entirely not conducive to sustainable agricultural growth and development.
In addition to retail and wholesale marketing constraints, heavily subsidized prices created a serious budget problem for the government. The fertilizer subsidy amounted to 59% of the total budget of BADC and 4% of the total expenditures of the government in 1976-77. Moreover, inefficient handling of fertilizer imports and foreign exchange shortages impeded the efforts of the government to meet fertilizer demand without the assistance of development partners.

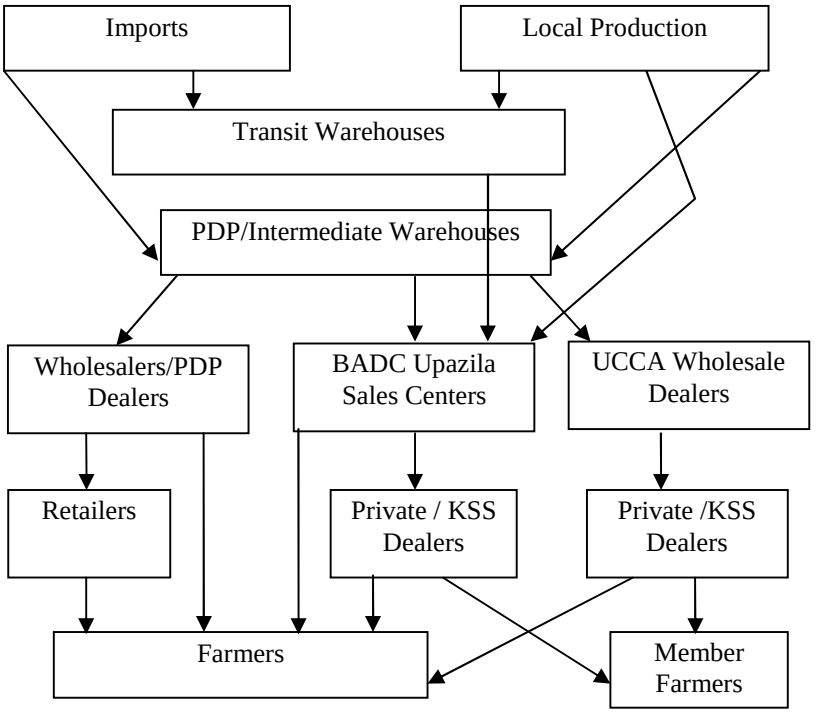
4.2.3 The New Marketing System (NMS)

The pressure for putting in place a transparent and efficient fertilizer marketing system through the intervention of the private sector emanated from the United States Agency for International Development (USAID). Thus, in 1977 and early 1978, the Government of Bangladesh (GoB) and BADC with assistance from USAID (under a contract with IFDC) made the decision to improve the fertilizer distribution system. The purpose was to increase fertilizer use on an equitable basis throughout Bangladesh. It was thought to be achieved through a New Marketing System (NMS) designed to remove supply and dealer constraints. Accordingly, USAID in 1987 agreed to provide a grant to finance fertilizer imports, warehouse construction and technical assistance on the plea that a new marketing system to be introduced, which would substitute the role of BADC as a wholesaler by a private retailer market with a more open market system[12]. This system known as Fertilizer Distribution Improvement (FDI-1) was launched from December 1st 1978 up to July 1st 1980. In this regard, BADC was the designated implementation unit of the NMS.

The major thrust of NMS was to remove marketing and distribution constraints by making BADC more efficient and market-oriented, strengthening the role and effectiveness of private dealers/sector in fertilizer marketing, improve farmers' access to fertilizers and boost up agricultural production Under the new marketing system, BADC still has the monopsony in procurement for Bangladesh and monopoly in distribution of fertilizers to PDPs[13]. The NMS are schematically presented below (Figure 4.2).

[12] Quasem, M.A. Impact of the New System of Distribution of Fertilizer and Irrigation Machines in Bangladesh – Survey findings, Research Report No. 62, 1987. Bangladesh Institute of Development Studies, Dhaka.
[13] Quasem M.A., Supply and Distribution of Fertilizer in Bangladesh in Fertilizer Pricing Policy in Bangladesh, Bruce Stone (ed), IFPRI and BIDS, Joint Study, 1987, International Food Policy Research Institute, Washington, DC, USA.

Figure 4.2: Flow Chart of fertilizer distribution under the New Marketing System, 1983-84



Source: International Fertilizer Development Center, Third Evaluation of the New Marketing System (Muscle Shoals, Ala,: IFDC, April 1982).

Note: UCCA = Upazila Central Cooperative Association; KSS = Krishi Samabaya Samity (Agricultural Cooperative Society). An Upazila is an administrative unit smaller than a district (previously called a "thana")

Under the NMS, the government launched a series of policy reforms between 1978 and 1992 to swing fertilizer marketing from a public sector monopoly to a competitive market system. The NMS was introduced in different phases. This system was first formally initiated in 1979 on a 1 year trial basis in the Chittagong Division[14] and had been expanded throughout the country by July 1, 1980.

The New Marketing System brought about quality changes in fertilizer distribution. The government control over fertilizer distribution was relieved somewhat in 1978, when dealers were permitted to set up shop by merely registering with BADC, and the dealers' commission was increased to provide more incentive. In April 1983, the price control under these distribution points was lifted.

Under the New Marketing System, instead of operating 423 Thana Sales Centers BADC relinquished its retail operations to the private sector and limited its role to that of wholesalers in the 97 strategically located major commercial centers known as Primary Distribution Points (PDPs) at different places of the country. Later on, the number of PDPs was reduced to 75. Under the NMS, fertilizer retailing was decontrolled. The major argument behind privatization of the retail distribution system was to reduce inefficiency of the

[14] Later on, this system was gradually expanded to include the Khulna and Dhaka Division in January 1980, and brought to the Rajshahi Division in July 1980; the final decision was introduction to what had become a considerable modified and regressive version of the original NMS concept.

government distribution mechanism at the farm level. But, still the BADC had enjoyed the monopoly over wholesale distribution system.
The NMS allows any individual, group of farmers or cooperative society to purchase fertilizers from any PDP after nominal registration. The registration procedure is simple. Moreover, wholesalers and dealers were allowed to buy, sell and transport fertilizer freely anywhere in the country except within a five mile border belt. To attract viable wholesalers to the fertilizer business and to economize on delivery cost, BADC introduced a minimum quantity restriction on fertilizer (at least 3mt at any lifting) being lifted from PDPs and provided higher rates of discounts to traders for lifting larger amounts. This was intended to discourage petty dealers at the PDPs and to encourage wholesaling.

The upshot of the above discussion of policy reforms adopted by government in fertilizer trade during 1978-86 and salient features of the NMS developed were as follows:

- Discontinuation of sale of fertilizer through BADC warehouses located at the Thana level and instead, selling these from 97 strategically located Primary Distribution Points (PDPs).
- Transfer of movement of fertilizers below the level of PDPs to private wholesalers.
- Removal of restrictions on fertilizer trading.
- Allowing the purchase of fertilizers by any individual, cooperative society or group of farmers from PDPs after a nominal registration.
- Allowing wholesalers and dealers to transport fertilizers freely, except within a 5-mile border-belt.
- Decontrolling of retail prices.
- Appointment of dealers and abolition of present price control system.
- Abolition of regional regulatory system in present fertilizer trading.
- Determining policy to buy at least 3 mt fertilizer from PDPs[15].

With the introduction of NMS the number of traders, inclusive of seasonal operators increased by about 50% over those under the OMS. This increase is quite significant in the peak period of demand (January-February) when HYV Boro is transplanted. The number of regular traders differs little from what it would have been under OMS. Immediately before the NMS, this number of regular traders had been raised to 16 per union, since BADC was in the habit of raising the number appointed dealers at regular intervals. Seasonal traders are generally petty traders who shift from one commodity to another, depending on the employment opportunities and relative rates of profit[16].

The government also monitored the prices of the fertilizers along these reforms all over the country during 1982-83. These reforms brought a major improvement in fertilizer distribution system as there was no hike in fertilizer price. This system continued up to 1987.

4.2.4 Evaluation of NMS

The New Marketing System (FDI-1) is considered a major success in some important areas. Studies reveals that the NMS has (1) privatized fertilizer distribution at the retail level and increased farmer's access to fertilizer sources, (2) comparatively lowered/deregulated retail

[15] Quasem M.A. Fertilizer Distribution System: Impact of Liberalization, Bangladesh Development Review, vol. 2, Annual Publication 1983 BIDS, Dhaka.
[16] Quasem M.A., Supply and Distribution of Fertilizer in Bangladesh in Fertilizer Pricing Policy in Bangladesh, Bruce Stone(ed), 1987, IFPRI and BIDS, Joint Study, International Food Policy Research Institute, Washington, DC, USA. P.384

prices, (3) consolidated government warehousing and (4) minimal effect on the government's distribution costs.

In spite of achievements in some particular areas, the NMS had also in-built flaws. These are:[17]

- Distribution constraints continued to exist and the farmer's full demand for fertilizer has not been realized during peak demand periods. The farmer's fertilizer use as well as dealer's lifting has been constrained by the failure of the BADC distribution system to make fertilizer available in an adequate, timely and convenient manner.
- The lack of a viable dealer/farmer credit program was a critical factor in fertilizer demand. Institutional sources provided a very small percentage of fertilizer credit, the bulk being supplied by non-institutional sources.
- Fertilizer prices had increased more than 55% since December 1978 but farmer's output prices during the same period have changed little.
- The dealer lifting procedure is complicated and time consuming; it is not unusual to require 3-5 days of a dealer's time for an individual lifting.
- BADC sold a significant portion of the fertilizer in damaged and reduced weight bags which further reduced dealers' margins and restricted farmer use.

The new system has not worked well in underdeveloped areas where transportation and communications were inadequate and where fertilizer sales are low[18]. Though commissions were given to the dealers at a high rate, the fertilizer price in Chittagong division was much higher than other divisions. Moreover, adequate supply and availability of fertilizers was not ensured[19]. It was observed that the desired outcome could not be achieved from the experimental new system in Chittagong. Because, without making any proper evaluation, the new fertilizer marketing system was introduced in 1980 very hasty in all over Bangladesh.

BADC's shilly-shally operation and dealer policies needed much improvement since fertilizers were constantly in short supply and this state enterprise faced many snags and ingrained ataxia in making a transition to a market orientation. As a consequence, USAID and the Bangladesh Government agreed to launch FDI-2. This program concentrated less on BADC and more on strengthening the role of the private sector.

4.3 Liberalization of Fertilizer Trade

It is no denying that stringent provisions incorporated in the OMS, and distribution constraints along with absence of a viable dealer credit program, complicated and time consuming lifting procedure, BADCs selling of low grade fertilizers, hasty and unwise implementation of the NMS all have impeded smooth functioning of fertilizer trade and created an urge for open market system (Box 4.1) of fertilizers in Bangladesh.

The main argument in favour of the privatization in fertilizer trade in Bangladesh is that the private sector responds quickly to market signals and can operate more efficiently than the government bureaucracy in ensuring adequate supply of fertilizers at the right time. The government system is slow to respond to a crisis, as it has to go through a number of layers of

[17] Third Evaluation of the Bangladesh New Marketing System, Muscle Shoals, Ala,: IFDC, April 1982.

[18] Second Evaluation of the Bangladesh New Marketing System, International Fertilizer Development Center (IFDC), Prepared by John M Hill and Robert D. Benton for USAID/Dhaka under the BADC/IFDC contract, July 1980

[19] Jabbar M. A. Supply, Distribution and Pricing of Chemical Fertilizer in Bangladesh, The Journal of Social Studies, No. 13, 1981.

decision making before action could be initiated. Since fertilizer is a key agricultural input whose effectiveness depends on timely application on the crop, delayed actions could have disastrous effects on crop production. Under the government system it was necessary to maintain large inventories of fertilizer (three months requirement for urea, and five months for TSP and MoP) in order to minimize the risk on account of the delay in government action. This, together with the inherent inefficiency in the bureaucratic system meant that the cost of marketing would be higher under the government compared to private distribution system. It was also assumed that competition among private traders would eliminate abormal profits and ensure fair prices to farmers[20].

Box 4.1: Agri-experts want open market for fertilizers

Farmers and agricultural experts said that the distribution of fertilizers through the open market can ensure unhindered supply and will be good for boro production

At present the fertilizers are being sold under the dealership system which causes a lot of suffering for the farmers and also deprives them of cheaper prices.

Although the newly elected government has reduced the price of non-urea fertilizers, the farmers are not quite satisfied as the fertilizers are not available in nearby localities and they have to buy them from rather distant places which increase their expenses due to transport cost.

'We are telling the government to sell the fertilizers in the open market which will be helpful for the farmers as they do not buy all their fertilizer at a time,' said Mahbub Hossain, the executive director of BRAC. He said the government prefers the fertilizer rationing system as the supply of fertilizer is not adequate, but it should allow sale of fertilizer in the open market after assessing the total demand.

Meanwhile, the government has decided in principle to incorporate around 1,500 seed dealers of the Bangladesh Agriculture Development Corporation temporarily into the fertilizer distribution system for ensuring uninterrupted supply during the current boro season, said agriculture ministry sources.

At present, over 15,000 authorised fertilizer dealers and sub-dealers are selling fertilizers directly to the farmers across the country.

The newly-elected Awami League government on January 14 reduced the prices of non-urea fertilizers by almost 50 per cent and gave a 50-55 per cent subsidy amounting to about Tk 2,700 crore.

The previous army-led interim government made it mandatory for the farmers to collect cards from the local Union Parishad chairmen and members to buy fertilizers. The rule was made to ensure that no one excepting farmers could buy fertilizer.

The present government has scrapped the rule.

The government does not have any other plan to make changes in the existing fertilizer distribution system but is monitoring it closely.

Source: The New Age, 20.02.09

Privatization of fertilizer trade was supplemented by a policy of price deregulation in early 80s which empowered the traders to sell at any price they could fetch in the market. Under FDI -1, by October 1982, the last reform in the fertilizer policy was price decontrol over the sale fertilizer at the farmers level (Table 4.2).

[20] Hossain Mahabub. Agricultural Policies in Bangladesh: Evolution, and Impact on Crop production in State, Market and Development, Abu Abdullah and Azizur Rahman Khan (ed) University Press Limited, Dhaka, 1996, Chapter 11, P. 318

Table 4.2: Liberalization of Fertilizer Sector at a Glance[21]

Year	Areas of Reform	Measures
Mid 70s	Fertilizer Distribution system	Replacing OMS (Old Marketing System) by NMS (New Marketing System). From total public sector monopoly to largely competitive free marketing system.
1982-83	Pricing of fertilizer	Farm level prices were decontrolled first in Chittagong and then by April 1983, it was done country wide. Largely replaced the BADC's retail trade of fertilizers.
1984-85	Privatization of sale of fertilizer	By July 1985, BADC closed almost all 423 Thana Sale Centres (TSCs). By mid 1988, eight thousand wholesalers and dealers lifted (collection of fertilizer by the dealer from the distribution points) 97% of the total quantity of fertilizer sold from primary Distribution points (PDPs).
March, 1989	Private sector lifting from factory/farm ends	Government allowed direct sales of urea from all five factories beginning March 14, 1989. The government also allowed the distributors to lift TSP and MoP from port/factory.
1992	Privatisation of import	The government excluded fertilizers from the list of restricted imports and allowed the private sector to import fertilizers. On 6 December 1992 the subsidy on fertilizers were withdrawn completely and importation and distribution of fertilizer made open.
1995	Reversal of Urea Marketing policy Current System	The open market system for domestically produced Urea experienced a setback in 1995. Government decided to bring the market under its direct control to mitigate the crisis reintroducing controls on the marketing and distribution of Urea, which is in place today.

Source: Titumir and Sarwar (2006)

With a quaesitum in moving forward to an open marketing system, farm level prices and retail prices were decontrolled from 1982-83. By April 1983, retail prices were decontrolled over the whole country and it completely replaced BADC's retail trade of fertilizers. With the decontrol of price and withdrawal of restrictions on retail fertilizer trade, BADC's role in fertilizer distribution was gradually confined to only 75 PDPs. During 1985-86 wholesaling and dealerships were make free from the grip of BADC. BADC continued the selling activities in 1987. But its role in fertilizer distribution became totally limited.

The consequences of the deregulation of the fertilizer market[22] can be summarized as follows:

- The market structure has undergone a radical transformation. A large number of private distributors have started direct loading from the factories and their share of the urea market has steadily increased from 6.14% in March 1989, to over 90% in January 1990. Simultaneously, private wholesaler handling of TSP and MoP from the PDPs had also gone up from 12% and 6% in March 1989 to 46% and 25%, respectively by January 1990. A parallel reduction has taken place in ex-PDP sales by BADC from 77% of total national sales (all products) in March 1989, to less than 30% by January 1990.
- The effect on farm-level fertilizer prices has been dramatic. Since the introduction of private distributor handling, the consequent intense competitive pressure has forced distributors, dealers and retailers to economize on costs, reduce marketing margins and offer lower prices to farmers. As a result, farm level urea prices have steadily declined; national average monthly prices of urea at the farm level fell by Tk. 336.4/mt during April to September 1989. This fall has been recorded for all regions, though not to the

[21] Meheruna Islam Chowdhury and Akand Muhammad Faisal Uddin, Agrarian Transition and Livelihoods of the rural poor: Agricultural Input Market, P. 22, Unnayan Onneshan- The Innovators, 2009.
[22] Samad. A., W.T. Brooks and S.S. Sidhu, Private Sector Import of Fertilizers in Bangladesh, 1990, IFDC, USA.

same extent due to differences in transport costs. The trend continued; average farm-level prices declined by a further Tk. 200/mt between October 1989 and January 1990.

- Private distributor sales had penetrated markets in all regions and fertilizer availability had significantly improved. Steady fall in urea prices in the face of sharp rise in consumption is an indirect but unmistakable proof of improved availability.
- Savings to the economy have been substantial. Computed on the basis of decline in farm-level prices, farmers would have saved over Tk. 400 million on their urea purchases during the fiscal year 1989/90. Substantial savings would have also accrued to the government as the discount to private distributors (Tk. 550/MT below ex-PDP price was considerably lower than BADC's marketing and distribution costs.

Apart from lower price, farmers also received better customer services in the shape of correct weight and better bags. Fertilizer trade as a whole benefitted from the availability of credit extended by the private distributors to dealers and retailers.

Total consumption of fertilizers almost quadrupled from 0.87 million MT in 1960/81 to 3.04 million MT in 1996/97, recording a growth rate of 8.36% per annum.

Carlos, et al., 1993, analyzed the impact of fertilizer subsidy removal and reported that farmers' profits associated with fertilizer use could be expected to have decreased by less than 5% if fertilizer-paddy price ratio had increased by 30% or less as a consequence of the subsidy removal.

Before, deregulation in marketing, the cost of distribution of fertilizer by the BADC was estimated at US$ 25-30 per ton[23]. The IFDC estimated that under the private sector, the cost of distribution was about US$ 15 per ton. Thus, the privatization in fertilizer trade had a positive effect in reducing the cost of marketing.

On the basis of recommendations of FDI-II project, the liberalization of fertilizer trade was initiated in July 1987 and Transportation Discount Points (TDPs)[24] were established. As an unfaltering effort and step towards liberalization of fertilizer trade sector, FDI-I1 removed BADC from retail sales without threatening the organization's role in distribution. Private distributors /traders were allowed to lift fertilizers in bulk from factories and four "Transport Discount Points" (with a discount price) operated by BADC in convenient locations. This was the first step towards privatizing fertilizer distribution.

By mid-1988, 8 thousand private sectors' wholesalers and dealers were involved with distributing over 97% of the total fertilizers sold from primary distribution points. Consequently, an estimated 50 thousand private dealers replaced BADCs retail trade of fertilizers.

To be more explicit, by 1988-89, private traders and distributors were permitted to make bulk purchases of chemical fertilizers as well as import TSP and MoP fertilizers. BADC was no longer responsible for fertilizer distribution except in remote areas. The prices of fertilizers was reduced under command areas of the dealers. It also led to increased availability and greater adoption of chemical fertilizers at the farm level.

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[23] Ahmed, R. "Structure, Dynamics and Related policy Issues of Fertilizer Subsidy in Bangladesh" in Fertilizer Pricing Policy in Bangladesh, Bruce Stone (ed.), International Food Policy Research Institute, Washington DC, 1987.

[24] The concept of marketing fertilizers through Transportation Discount Points (TDPs) is to provide a discount as compared to the ex-PDP price for large quantity purchases which would permit wholesalers' to cover transportation costs from a TDP to an unidentified service area. TDPs were introduced on an experimental basis in 1985-86 to explore the effects of a few large volume sales centers on various aspects of fertilizer distribution.

However, in 1989 farmers witnessed a severe crisis of urea fertilizer availability despite sufficient stocks in the godown. To recover the situation, the government made some major policy reforms. The private sector dealers/distributors were permitted to lift urea first time from Urea Fertilizer Factory Limited (UFFL), from March 1989 and then gradually direct procurement from other factories beginning on July 1, 1989 at prices fixed up for BADC. The government also allowed fertilizer distributors to lift (collection by the dealer from the distribution point) TSP and MoP from the port/factory. Beginning July 1989, the government allowed private traders to lift imported fertilizers directly from vessels at Chittagong and Chalna ports with a discount of TK. 400.00 (about 10% of government price) per ton. With the introduction of direct lifting from factories and ports, BADCs business in fertilizers began to fall substantially. During July-December 1988, about 80% of the total sales were from the PDPs, and 18% from TDPs. By July-October 1989, the share declined to 32% and 5% respectively, and the traders' direct lifting from factories and ports rose from nil to 63% within a year[25]. By 1991, private traders procured 100% of urea, and 70% of phosphate and potash from factory/port terminals.

Initially, government allowed the private distributors to procure urea directly from factories on a 50:50 quota with BADC. But BADC failed to compete with the private sector and the government decided to discontinue the 50:50 quota systems. From December, 1989 supply was closed down and factories started supplying on 'first come first' basis. From 1990-91 the private companies/dealers were allowed by the government to import all kinds of fertilizers. For sometime BADC and private companies/dealers both imported fertilizers from external source. Later on, due to high competition with the private companies along with high prices of fertilizers imported by BADC, Government ordered BADC to close down all fertilizer related activities.

In 1991, the government permitted the private sector to import fertilizers. On August 16, 1991, subsidies on some fertilizers were partially withdrawn. In 1992, public sector involvement in the fertilizer distribution and subsidies on TSP and MoP in the fertilizer ended. In the FY 1992-93, major policy decisions were taken and implemented such as the complete elimination of subsidy from fertilizer, the freedom of the private sector to import fertilizer on a full cost basis along with its marketing and distribution and permitting the private sector access to foreign exchange reserves to import fertilizer. The deregulation in fertilizer marketing was completed in December 1992.

The explicit subsidy on fertilizers was totally removed on 6 December 1992. The private dealers were allowed to import urea from abroad. Thus, extensive monopoly of importing fertilizer by BADC and its supremacy in fertilizer distribution came to an end. Import prices were also liberalized[26]. Such a phased programme of subsidy removal not only reduced fertilizer prices and saved millions of takas in subsidies for the GoB but also sustained the tempo of rapid growth in fertilizer use[27]. This is how the privatization of fertilizer distribution started in the country.

[25] Hossain, Mahabub and M.A. Dhaly, 1991. "Tracer Study on Recent Agricultural Policies in Bangladesh" (mimeo). A report prepared for the Asian Development Bank, Dhaka, BIDS.

[26] Input Subsidies and Agricultural Development: Issues and Options for Developing and Transitional Economies, Background Papers, IFDC, Paper Series, July 2003, Muscle Shoals, Ala; USA.

[27] Sidhu, S.S. Development of a Competitive Free Market Structure for Fertilizers in Bangladesh: IFDC Experience in Policy Reform, 1992 IFDC, Muscle Shoals, Alabama, USA. Also see, Fertilizer Distribution Improvement Project II: End of the Project Report, IFDC 1994, Muscle Shoals, Alabama, USA.

However, fertilizer subsidy was re-introduced in 1996 when a new government came in power[28]. At that time the fertilizer subsidy amounted to only Tk. 100 crores.

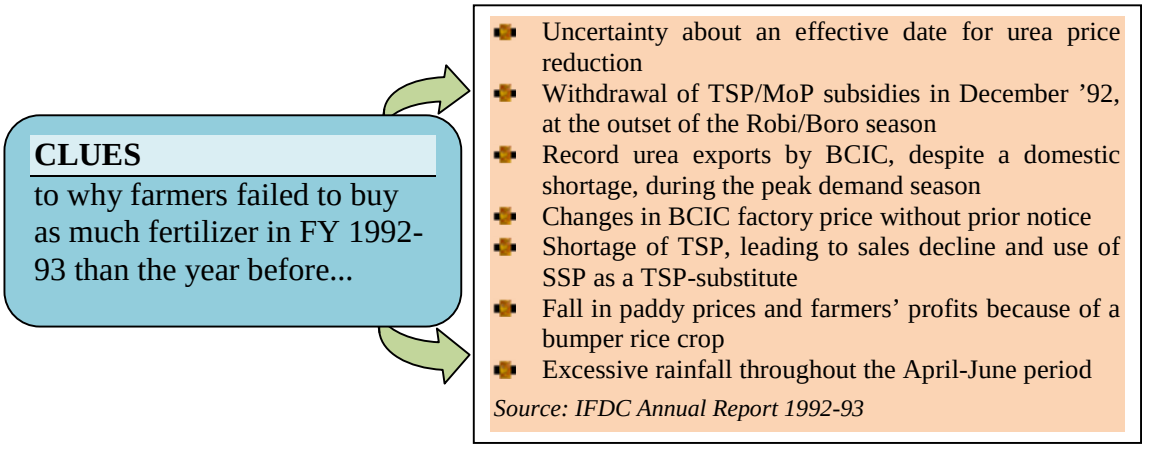
The whole process of transition from public sector to open market mechanism was completed with the adoption of the following policies in fulfillment of the agreement signed with donor agencies like World Bank and Asian Development Bank and Government of Bangladesh during 1989-90:

- Public sector PDPs began closing from July, 1989.
- Allowing direct procurement of urea, TSP and MoP from factories and ports by the private sector from July, 1989.
- Transferring of BADC warehouses to the private sector began from July, 1989.
- Commercial credit program for private sector fertilizer dealers implemented from June, 1989.
- Use of Inland letters of credit (ILC) introduced from July, 1990.
- Allowing direct import of fertilizers by the private sector from July, 1991.
- Closing down of public sector fertilizer distribution system from December, 1992.
- Complete elimination of subsidies on TSP and MoP from December, 1992.

These policy reforms have met with great success. Enhanced competition in the market resulted in improved fertilizer availability and lower prices at the farm level.

It is to be noted that due to withdrawal of subsidies in December 1992, the prices of urea, TSP and MoP at the procurement source increased by 13%, 35% and 47% respectively during 2nd quarter (October-December). Fertilizer sales in FY 1992-93 decreased as a consequence. During the 4th quarter, (April-June) sales declined again by 14% due to the confusion surrounding the effective date of BCIC's new urea price which dealers expected any time after newspaper reports in May that such a reduction was imminent.

Some clues for this unexpected failure on the part of farmers to buy adequate fertilizer are highlighted below.



[28] Mudahar Mohinder S. and Ahmed Raisuddin, Government and Rural Transformation Role of Public Spending and Policies in Bangladesh PP. 242-243, The University Press Limited, 2010, Dhaka, Bangladesh.

The gradual subsidy phase out eased the transition to privatization. Price efficiencies were also achieved in the import of fertilizers with the average price of TSP imported by the private sector being about $ 16/MT lower than the BADC imports and MoP imports lower by approximately $ 11.45/MT.

Box 4.2: IFDC's Impact in Asia
The Bangladesh as an Example

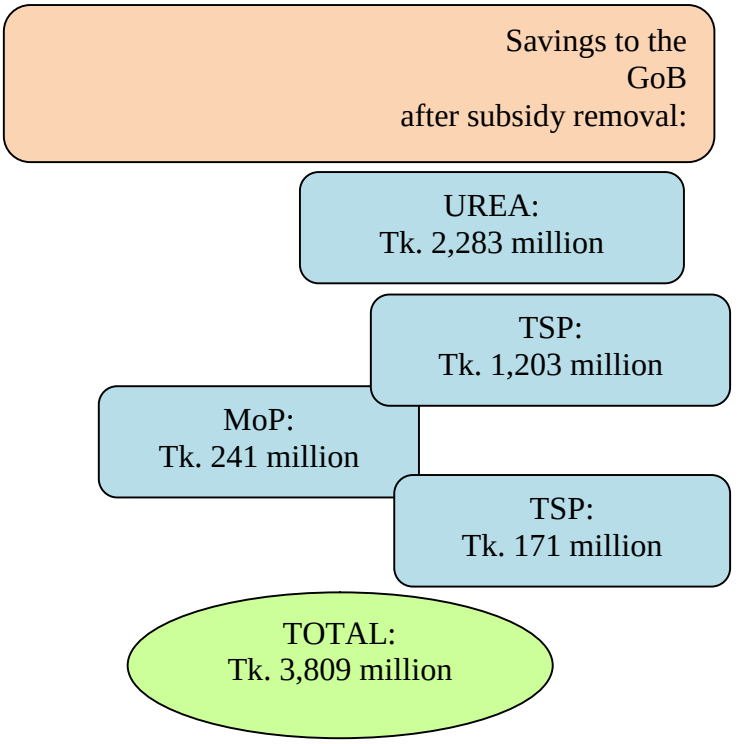
One of IFDC's most outstanding success stories is in Bangladesh, where a 15-year project has completely restructured the fertilizer sector and instituted a freely competitive marketing system, which created a network of 170,000 private entrepreneurs. By eliminating fertilizer subsidies and other support costs, the Government of Bangladesh has been saved more that US$100 million since 1988. A prime result of this project was Bangladesh's achievement of self-sufficiency in rice in the early 1990s. As a result of this project, all fertilizer importation is handled by the private sector.

Source: International Fertilizer Development Center Annual Report 1994.

As a benefit of privatization, the wholesalers and importers/distributors together employ around 15,361 full-time workers and 38,912 part-time workers. Total employment generated in fertilizer marketing, including the self employed retail network is estimated to be about 1,70,000 (Box 4.2).

Privatization has directly benefited the GoB financially by relieving it of the burden of fertilizer subsidies which amounted to Tk. 883 million annually. Considering that approximately 2.3 million MTs of fertilizer were sold during the year by the private sector, the savings to the GoB at about Tk. 1,656/ MT in marketing cost add up to an estimated total of Tk. 3,809 million for the year (Figure 4.3). In addition to these direct benefits, the import cost was dropped (about $ 16/MT for TSP and $ 11.45/MT for MoP).

Figure 4.3: Subsidy removal and GoB Savings, 1992-93



Source: IFDC Annual Report 1992-93

Under the open market mechanism, there were about 40 importers/distributors, 1345 wholesalers and 112 thousand dealers/retailers in the fertilizer marketing network serving the farmers. As a consequence of privatization, urea sales increased considerably. In addition to providing employment for a sizeable number of people, privatization of fertilizer marketing benefited the Government financially with an amount of about Tk. 500 cores from 1988-89 to 1993-94. This achievement was attributable to the implementation of FDI-II project by the Ministry of agriculture from 1987 to August 1994.

To be more precise, this openness or liberalization of the fertilizer market continued through the early 1990s. By 1993, a vibrant private import and marketing system had developed and public subsidies to fertilizer had been largely eliminated.

4.3.1 Impact of Liberalization of Fertilizer Sector

Privatization of the fertilizer market was completed in 1994 and all fertilizer imports were handled by the private sector. All in-country from import arrival to final sales to farmers was done by private sector firms. At various levels in the fertilizer sub-sector, significant economies were achieved as a result of increased private participation in fertilizer import and marketing. Farm level prices, in real terms, declined by Taka 50 (approximately US$ 1.00) per bag during the project life. Increased fertilizer use; an established commercial credit system; major policy reforms especially 1989 and 1992; creation of dealer association and Bangladesh Fertilizer Association (BFA); increase in number and effectiveness of private fertilizer importers, distributors and dealers; fertilizer market more responsive to customer needs, increased employment, agriculture production and also generation of increased profits all were the benefits of liberalization of fertilizer trade.

However, the liberalization of fertilizer trade failed to produce a favourable impact on the agriculture sector. Some of its adverse impacts are discussed below.

Unabated price like and profiteering

- The fertilizer market was liberalized with the aim of developing a competitive free market. But, unfortunately, the subsequent impact was antipodal. In Bangladesh, it is a common phenomenon for the fertilizer price to soar during the Boro season when fertilizer is very crucial to the farmers. This leads to private profiteering.
- The fundamental premise of fertilizer trade liberalization was to reduce fertilizer prices by increasing import of TSP and MoP by the private traders. The farm gate price has rocketed up, excepting urea (which continues to be subsidized). The urea price marked up 30% during 1990-91 to 2004-05, with an annual average increase by 2% while the rise in the case of TSP and MoP it was 187% and 180% respectively. The price hike was due to syndicated and oligarchic behaviour by importers and distributors despite the fact that prices were supposed to decline due to import subsidy[29]. The import subsidy was introduced for the first time in 2005-06 in the backdrop that the prices of imported fertilizers like TSP and MoP was spiky relative to that of the domestically produced urea during the reforms period and aftermaths. So, it was a kind of policy reversal from so called liberalization measures aimed to discontinue sharp rise in the price imported fertilizers.

[29] Meheruna Islam Chowdhury and Akand Muhammad Faisal Uddin, Agrarian Transition and Livelihoods of the Rural Poor: Agricultural Input Market, P. 22, Unnayan Onneshan- The Innovators, 2009.

With liberalization fertilizer distribution was opened to the wholesalers at the district levels The majority of this said wholesalers are linked to the political parties in power and socially influential persons, as reported by the farmers[30]. Often they are not the regular dealers (do not do fertilizer business for the whole year as they have other businesses) and are only active during the peak season and force the regular dealers to raise the price up through hoarding and syndication to make quick profit.

In Bangladesh, the fertilizer market is not integrated with respect to location and temporal variations. Price differentials in the source market and terminal market are sharp for TSP and MoP and during the peak season these differences becomes too prominent for all fertilizers.

The composition in the use of fertilizers also remained unchanged. The share of urea in total use of fertilizer remain also constant over the period accounting for 67% of the total use of fertilizer in 2004-05 while it was 69% in 1992-93. This suggest that liberalization failed to trigger the use of other fertilizers at expected rate due to their higher price level while on the other urea price remains same for the subsidy provided to it at factory level.

Unbridled adulteration of fertilizer

There are complaint from farmers that they are often victims of fertilizer adulteration. At the storage and distribution points adulteration might also occur. Fertilizer sacks contained less than the specified amount the farmers are thus deceived by unexpected higher prices for lower quantities. Fertilizer market is vitiated with low grade fertilizers imported mainly from India and China for higher profit by the importers. The MoA in one of their review[31] also acknowledged the issue of unbridled adulteration of fertilizer (Box 4.3). Quantity of non-urea fertilizers are often of low quality with more than 80% adulteration for mixed fertilizers (NPKS), above 50% for privately imported SSP and TSP and 25-30% for MoP and DAP.

[30] Titumir R.A.M. and Sarwar Golam, Failing Farmers: Liberalization in Agriculture and Farmers' Profitability in Bangladesh. August 2006 P. 15, Unnayan Onneshan-The Innovators, Dhaka, Bangladesh.

[31] Agriculture Sector Review, Ministry of Agriculture, GoB, Dhaka, October, 2004.

Box 4.3: Toxic chemicals found in fertilizer

Scientists have found high concentration of toxic chemicals like cadmium, lead and chromium in fertilizers which may affect agriculture ecosystem and thereby human health through food chain. About 40% urea and non-urea fertilizers available in the market is adulterated, reports BSS. This has been revealed in a recent sample analysis of different kinds of fertilizer by the Soil Resources Development Institute (SRDI).

The SRDI has identified highest 40,258 ppm (parts per million) cadmium and 31,292 ppm lead in locally produced zinc sulphate available in the local market. This amount is alarmingly higher as allowable level of cadmium and lead is only 10 ppm and 100 ppm respectively. Chromium is also found to be higher than its allowable level of 50 ppm in some organic fertilizers, said SRDI in its report without specifying the amount.Annually, around 50,000 tonnes of zinc sulphate are used in Bangladesh.

Expressing concern on the issue, Prof ABM Faroque of Pharmacy, Dhaka University, said, once in food chain, cadmium and lead could affect livers, kidneys and cause blood cancer and thalassemia. Local fertilizer manufacturers, however, say they are "unaware" of such high concentration of heavy metals in zinc or organic fertilizers. In laboratory tests of 658 samples conducted during July 2009 and May 2010, SRDI found 72% of available mixed fertilizer like NPKS and zinc sulphate adulterated, which means those either lack required zinc or are contaminated with heavy metals. In 234 samples, SRDI found 42% locally manufactured zinc sulphate contaminated with cadmium and lead, while the percentage is 3 in imported ones. The samples were collected from the licensed dealers, manufacturers and importers.

Agriculture Minister Matia Chowdhury said, presence of heavy metals in fertilizers is not new. "However, we are taking action and will continue to act against fertilizer adulteration," she told The Daily Star. In 2009-10 the SRDI analyzed a total of 3780 samples of different fertilizers received from different sources like the Department of Agricultural Extension (DAE), Bangladesh Agricultural Research Council (BARC), private importers and entrepreneurs, dealers, law enforcement agencies and NGOs. Of the samples, 1516 (40%) were found adulterated.

Adulteration at the rate of 64% has been detected in other fertilizers while in Single Super Phosphate (SSP) it is at 55%, Organic fertilizer at 51%, Triple Super Phosphate (TSP) at 39%, Gypsum at 36%, Boron fertilizer at 35%, Di-ammonium Phosphate (DAP) at 20%, Muriate of Potash (MOP) at 19% and magnesium sulfate at 9 per cent, the survey report showed.

Adulteration of these fertilizers is caused mainly for lower levels of nutrients that cause soil degradation and thereby affect productivity. "The most dangerous thing is cadmium, lead and chromium," said Dr Zainal Abedin, Senior Scientific Officer of the central laboratory of SRDI. Adulteration rate of zinc fertilizers was 71% in 2008-09, 67% in 2007-08 and 57% in 2006-07. Most of the tested fertilizer samples contained high rate of cadmium, but comparatively less concentration of lead or nickel.

In 2008 SRDI identified a high level of cadmium and lead in imported zinc fertilizers. Zinc sulphate imported mainly from China contains heavy metals.

Long term use of such adulterated fertilizers in an imbalance proportion may further aggravate the situation substantially reducing production and affecting food security in the country, the official added. The SRDI official said, an effective quality control programme is a must to stop the production and marketing of substandard fertilizers and monitor the quality of the agri- input at all levels.

Source: Daily Star, 21 August, 2010 and News Today, 20 August, 2010

4.4 The recent Bangladesh Fertilizer Policy Environment

4.4.1 Introduction

The historical perspective on the Bangladesh fertilizer industry and the evaluation of the market-oriented policy is adequately detailed in some recent studies such as Infanger and Gertsch (1989), Sidhu (1991) and IFDC (1994). Allgood's market appraisal in February, 1995 chronologically listed 10 (ten) policy actions taken by the GoB in the fertilizer market during the four months period of November through February, 1995 (Annex 1.1). The thrust of Allgood's analysis was that the GoB's intervention into the market was a major precipitant of the 1994-95 fertilizer year "urea crisis". Unfortunately, the major flaws in Allgood's

analysis was that the policy of lowering of the issue price of urea to TK. 186/50 kg in July, 1994 in the face of rising international prices and accompanied by increasing prices for rice at the farm-level, was not scrutinized[32].

Other significant policy actions and changes have been made also by the GoB with respect to fertilizer. The actions include: maintenance of the TK. 186/50 kg issue price; re-establishment of distribution by private distributors from the factories; various limits on size of liftings by a dealer; sales on a cash basis only (requiring deposit in full at placement of the order); a 10% penalty if the Delivery Order (DO) is not lifted within 30 days of obtaining notification of serial delivery; continued enforcement of the command area; discontinuance of the Maximum Retail Price (MRP); reopening of exports consistent with domestic demand and excluding peak demand months; announcements of development of government-owned buffer stocks at a variously reported number of locations; and, the opening of additional sales points including the selection of "authorized" dealers.

4.4.2 Impact on the Market: Observations

The frequency of policy actions taken and reversed has intercalated a significant element of risk into the emerging, but far from mature, free market for fertilizer. The phosphate and potash sectors are appreciably more open than urea but these sectors are far from open in any practical sense. The establishment of ex-factory prices for TSP and SSP (especially for TSP) causes significant distortions in the market.

The urea sector with government monopoly in production and GoB fixed ex-factory or issue prices at below international price parity is far from being a free and open market. In general only the downstream distribution channels – the distributors, wholesalers, and retailers – can be considered open and competitive. But this sector is not insulated from government intervention and the resulting distortions.

The policy issues currently facing the Bangladesh fertilizer industry and their impacts are highlighted below:

1. Coordination in fertilizer trade. There are no effective mechanisms of coordination among urea factories, importers, dealers, extension staff and operators of intermediate fertilizer storage points. The task of coordination rests with no single body. The whole supply sector of modern agricultural inputs and fertilizer, in particular, has become a destabilising force for agricultural production.
2. Domestic Urea Pricing. The establishment of a fixed price for urea insulates the market from supply and demand in both the domestic and international market. The initial obvious impact is to increase the financial impact on the national budget where urea had an implicit subsidy of approximately 60-66%. Deprived of the rationing benefits of price, farmers are not given the signal to rationalize urea consumption accordingly. The market cannot fairly signal the impending short supply situation to either producers or consumers until it is too late – as in the 1994-95 crisis[33].
3. Command Areas. The command area concept as a market intervention policy has been advanced to ensure that farmers in all areas of the country have roughly equal access to

[32] Thomas H. Foster and Abu Abdullah, Special study of the Fertilizer Situation in Bangladesh: With an Emphasis on urea, Agro based Industries and Technology Project (ATDP), P. 34, Dhaka, November, 1995

[33] Thomas H. Foster and Abu Abdullah 35.

urea. The concept had some adverse impacts on the urea market. The most obvious and easily confirmed of these are the increased transportation cost and the fact these forced increases in transportation costs are not equitably distributed.

4. Buffer Stocks. Keeping a buffer stock is a government action taken to ensure the availability of urea in selected areas in case the private sector could or would not so provide through competition.
5. TSP/SSP Prices. There are reports from several areas that farmers are being sold SSP as equivalent in nutrient value to TSP. Therefore, it is readily apparent why Bangladeshi traders have been reluctant to import TSP and the farmers are in effect paying higher real prices per unit P^2O^5.
6. The Inland Letter of Credit (ILC). In November, 1994 BCIC, in a decision subsequently endorsed by the Ministry of Agriculture, discontinued sales under the ILC system and reverted to a "first come served" cash basis. The ILC had been demonstrated to be effective in increasing the participation of small and medium entrepreneurs and in increasing the competitiveness of the marketing channel with its attendant benefits.
7. Nature and frequency of Action. Recent GoB policy action (with respect to fertilizer) appear to have been reactive rather than proactive and crisis management in nature. Bangladesh's open fertilizer market is just emerging, it is not matured. The policy markets – they are new to harnessing the benefits of a more competitive fertilizer industry.

4.4.3 Concluding Observations

GoB fertilizer policy actions appear to have been reactive and pro tempore in nature. Policy actions all too often appear to reflect emphasis on political objectives rather than on strengthening private sector participation and performance. There appears to be a critical need for an open rationalization of government policy with respect to the fertilizer industry, rigorous study of the options to achieve these ends, and implementation of a comprehensive and consistent set of policy guidelines with the commitment to a sufficient period of time to allow the market system to stabilize.

4.5 Fertilizer Crisis

Since liberation, Bangladesh has witnessed some occasional crisis in the availability of fertilizer at the right time and at the right place. Shortages of fertilizer supply at the beginning of Boro season has become a common phenomenon in this country. One of the major reasons for the crunch has been the absence of sensible coordination between relevant agencies and timely distribution so that farmers get what they need during the peak cultivation season. Moreover, the shortage arises due to pesky management and lack of proper surveillance e.g., delays in the procurement of fertilizer in right quantity, hassles in distribution system for lack of availability of transports. Sometimes to gain supernormal profit dealers create artificial crisis.

In the 1960s there was impressive and steady growth in fertilizer use. But this use decelerated during the early 70s due to liberation war, diversion of resources for construction and successive bad weather years between 1971-75. Moreover, the dropping sales during 1971-72 and 1974-75 was fueled by the breakdown of Urea Fertilizer Factory Limited (UFFL), Ghorashal which disrupted the supply for 4 months and ultimately led to the fertilizer crisis and it was aggravated more by the exceptional oil crisis between 1972-75.

It is generally held that adequate quantities of fertilizer depends on proper stock planning and close monitoring of the procurement program. But during the period 1977-84 stock levels of fertilizers have fluctuated sharply, leading shortages in some periods and oversupply in others. BADC faced severe scarcity in 1974-75 and in the winter season of 1981-82.

During the fall of 1984 Bangladesh experienced a severe fertilizer shortage for complex reasons. The fertilizer crisis in the second half of 1984, was marked by the shortage in some parts of the country as early as August and became severe throughout the country by October. The crisis reached its peak in November when, according to some reports, farmers were paying prices 60-100% higher than normal. The one-ton ceiling place on removal from PDPs by dealers and restrictions on inter-district movement of fertilizer that were imposed dislocated the distribution system and may actually have intensified the crises. The situation eased somewhat towards the end of December when substantial imports arrived.

The Ministry of Agriculture appointed a high-level committee to determine the causes of the scarcity. They found three fundamental reasons for the crisis: **first**, BADC started with low stocks in 1984-85; **second**, planned procurement allowed for almost no growth; and **third**, actual procurement fell far short of planned levels[34].

In 1989, again there was a severe crisis of fertilizer availability at the farmer's level despite the adequate stock in the godown[35].

The "Urea Crisis 1995" was another unfortunate situation – a severe crisis[36] of domestically produced urea, happened during Boro season (Box 4.4 and Box 4.5). It was a seasonal shortage of fertilizer during December 1994 to March 1995. During peak periods of early 1995, urea demand by farmers exceeded the daily capacity of BCICs urea delivery system. This led to an increase in the farm level prices of urea that turned into a fertilizer crisis. The main reasons were:

- Insufficient/short supply of fertilizer in the market
- BCIC exported urea fertilizer injudiciously without considering the supply and demand situation in the country.
- Low stock in the BCIC factories
- Demand for urea increased due to increase of crop area during Rabi Season
- There was no information on the supply situation of urea fertilizer when the FDI-II project activities and ATDP ended at the end of 1994
- Transport problem caused by hartal
- Unscrupulous activities of dishonest fertilizer traders
- Reduction in BCIC daily delivery schedule of urea.

[34] Samad. A, National Fertilizer Supply and Adjustment Planning in Bangladesh in Fertilizer Pricing Policy in Bangladesh, Bruce Stone (ed). International Food Policy Research Institute, Washington DC, 1987.

[35] Fertilizer Distribution, Subsidy, Marketing, Promotion and Agronomic use efficiency Scenario in Bangladesh, Ahmed Kafiluddin, BFA, presented in IFA Crossroads Asia-Pacific 2008, Melbourne, Australia, 16-18 December 2008.

[36] There are varying perception of the causes of the crisis. A World Bank (1997) report suggests that a favorable international price led the government to excess exports of urea, depleting domestic stock at only 73,000 tons on October 31, 1994 – 69% less than 235,000 tons of stock on October 31, 1993. The government did so at a time when domestic demand for fertilizer shot up to 2 million tons, as the farmers received better price. See Dowlah CAF, Agriculture and the New WTO Round Economic Analysis of Interests and Options for Bangladesh. Workshop Paper, New Delhi, January 11-13, 2001.

Box 4.4: Fuel, Fertilizer Crises Hamper Irri-Boro Farming in Bangladesh

Scarcity of irrigation water, price hike of fuel and fertilizer are threatening IRRI-Boro cultivation in the Manikganj district. If these problems persist for another two weeks, one-third of the target of IRRI-Boro cultivation in the district could not be achieved, farmers said.

Farmers have become worried as the target of Boro production may not be achieved due to the price hike of fertilizers. Bablu, a farmer of Bamna village in Ghior upazila said he cultivated IRRI-Boro on five bighas of land this year against 10 bighas in the last year due to fertilizer crisis.
Karim, a farmer, said this time is pick season for IRRI-Boro cultivation. But he is not getting fertilizer, especially TSP and Potash.

A 50-kilogram bag of urea fertilizer is selling at Tk 300 to Tk 320 instead of government fixed price Tk 280. The TSP is selling at Tk 1475 to Tk 1750, Potash at Tk 1125 against Tk 700. They alleged that the dealers appointed by the government in collusion with the retail dealers had created the fertilizer crisis.

A fertilizer dealer at Manikganj Sadar upazila complained about insufficient supply of fertilizer from the factories. Farmer Nawab Ali of Gangdhushuria village under Harirampur upazila said he reduced Boro cultivation to three bighas of land from five bighas due to the high price of Potash.

Source: EB REPORT

This crisis was a major rebuff for the free market system of fertilizer. In spite of the claim by the government about the sufficient stock to fulfill the demand in the peak season, the crisis became acute. Shortage in the supply of urea fertilizer created unrest among the farmers. The agitated farmers demonstrated[37] in village streets of Magura District. The government had to engage law enforcing agencies to control the situation. According to some accounts, 18 farmers were killed following disturbances about urea supply[38].

After the incident, the government made a pellucid discussion with BFA about the supply and availability issues of fertilizers and decided to implement the system of both buffer stock and appoint dealers in 1995. Thus, with the appointment of new dealers, the distribution of urea entered a new era which is still being continued. These dealers can lift TSP and SSP from the BCIC factories and buffer stocks for distribution among the farmers in their command areas.

The fertilizer subsidy programme is, inter alia, aimed at reducing price differences between urea and non-urea fertilizers, ensuring a balanced use of fertilizers, maintaining soil fertility, and reducing crop production costs. In 2004-05, Tk 5 billion was allocated for the (imported) fertilizer subsidy programme. But, fertilizer subsidy did not percolate down to farmers in 2005. Moreover, delays in the release of the promised subsidy to private traders caused a distribution crisis in 2005.

The country faced another unexpected fertilizer crisis in 2007. Newspaper reports claims that there had a fertilizer crisis in 16 northern districts of Bangladesh. This time the supply could not match with the demand and ultimately it led to a supply-demand crisis. The total annual urea demand exceeded 2.7 million MT and roughly one half of the total demand is needed. It was expected that the fertilizer crisis 2007 and subsequent decline in the yield to significantly less than optimum can be the alarm that there will not be a repeat of the catastrophe in February/March 2008.

[37] Even in 2006 Boro season, scattered demonstration of farmers alleging unavailability of fertilizers in markets were reported in daily newspaper.
[38] Editorial, New Age, Dhaka, Thursday, 26 May 2005.

Box 4.5: Fertilizer Crisis Head it off for a Good Boro Crop

Farmers in the northern part of the country are once again facing a crisis due to inadequate supply of urea fertilizer despite claims made by the Bangladesh Fertilizer Association (BFA) that there is enough of its stock in the country. It has been alleged that a good part of the problem is due to the Bangladesh Chemical Industries Corporation (BCIC) selling to retailers instead of selling directly to farmers. Besides, the situation is further complicated owing to corporation's failure to release adequate quantity of fertilizer to the dealers from its buffer stock since November, whereas the earlier practice had been to release the goods from September.

Whatever amount of fertilizer farmers are able to lay their hands on, they are having to pay per bag a much higher price between TK. 400 and TK. 425, while the price paid earlier was between TK. 295 and TK. 300.

To top it all, the major factories are also producing below their respective capacities. We don't know whether any import is in the pipeline.

Today Bangladesh is self-sufficient in food and certainly much of the credit for that goes to our industrious and innovative farmers along with timely and adequate supply of various inputs including fertilizer over the years. Admittedly, one of the lesser reasons for supply shortfall could have been the disruption in the transport networking caused by siege program (oborodh) and the foggy weather yet the fact remains that there is more to it than that. Clearly, the main problem lies with the production deficit and distribution anomalies. We strongly believe that fertilizer crisis recurs due to sheer bad planning including inefficient and corrupt management practices on the part of the concerned agencies.

At the outset of the boro season we cannot afford such an input shortage in the northern region of the country where seasonal food deficit remains a major concern.

Source: The Daily Star, January 10, 2007

But, unfortunately in FY 2008 total supply of fertilizer was less than the requirement and another fertilizer crisis ocurred in the country. Availability of urea fertilizer was reported as a serious problem in some area including Madhukhali (Jamalpur), Rajbari Sadar, Narail Sadar, Baganpara (Jessore). In these areas, farmers bloked highways demanding urea fertilizer according to their need. The farmers failed to purchase fertilizer timely in required amount due to paucity in the availability. The main reason behind was the controlled sale system where urea was sold in 4-5 days a week in presence of SAAO. On account of high price the farmers could not also buy non-urea fertilizers like TSP and MoP as per amount they needed. News report says, Aman cultivation is being hampered in the northern region of the country due to acute scarcity of TSP and MoP. In this situation, farmers apprehended that they would not be able to achieve the cultivation target of Aman paddy[39].

Associated International Development Consultants, LLC (AIDC) with its headquarters at Arizona, USA, and liaison office at Dhaka, has initially diagnosed the fertilizer crises in Bangladesh mainly to be a "management problem" in spite of huge quantity or fertilizer (urea in particular) stocked in different fertilizer factory ware-houses and godowns at different places of the country. The crisis expanded seriously and speedily due to inordinate delay in approving the fertilizer sale by the respective UNOs and UAOs, less supply of fertilizer than the approved allotment to the dealers/farmers, limiting the area (Union Parishad) of fertilizer lifting and sale by the listed fertilizer dealers, and collection of obligatory recommendation slip from UP member, UP chairman, block supervisors etc, by the farmers to purchase fertilizers, which at times takes days plus unbearable harassment.

[39] UNB, August 7, 2008.

During the early months (January-April) of 2009, the fertilizer availability improved. There was no crisis of urea fertilizer. Fertilizer was sold every day but not necessarily in presence of SAAOs. Farmers were able to purchase the amount they required, there was no time lost and no tendency to hoard fertilizer. Daily sale of fertilizer was monitored by the Department of Agriculture Extension.

Under these circumstances, on 13 January 2009, the newly elected government fixed the price of TSP, MoP and DAP at Tk. 40, Tk. 35 and Tk. 45 per kg, respectively. It was a timely decision to provide subsidy for non-urea fertilizer which contributed to promoting balanced fertilizer use and reduction in cost of production. The government was able to implement the decision at the local level and farmers could obtain fertilizers at the declared prices.

In view of the decline in fertilizer prices in the international market, and to promote balanced use of all fertilizers, in November 2009, the government announced the reduction of the administered price of non-urea fertilizers. Administered prices of a kg of TSP, MoP and DAP were re-fixed at Tk. 22.00, Tk. 25.00 and Tk. 30.00 from Tk. 40.00, Tk. 35.00 and Tk. 45.00, respectively. With the reduction of administered price of non-urea fertilizers, use of such fertilizers is expected to increase substantially in FY2009-10 and beyond. Considering the currently prevailing low prices of fertilizers in the international markets, the government may now consider importing the required amount of fertilizer for the coming seasons.

4.6 Recent Fertilizer Policies

4.6.1 Dealership System

Following the fertilizer crisis in early 1995, a judicial commission was formed by the government to probe into the matter. Meanwhile, the government, in consultation with the Bangladesh Fertilizer Association (BFA), appointed district level dealers through public advertisements and district-based selection committees headed by the Deputy Commissioners. BFA and the local Chambers of Commerce and Industries had their representations in the Selection Committees. A total of about 4000 dealers were appointed by BCIC to make the fertilizer distribution system more efficient and also to serve areas where there were no dealers previously. Later, the dealer network was extended to the thana level for even distribution of fertilizer. The number of fertilizers dealer was limited to a maximum of 10 (ten) in each thana. The responsibility of dealer selection/scrutiny at district/thana level was entrusted to the District Fertilizer and Seed Monitoring Committee.

Like urea, TSP and SSP fertilizer produced by BCIC are also now being distributed and marketed through dealers. Dealers may lift urea as well as TSP and SSP from BCIC factory gates and may also purchase urea from buffer stock centres. The Government has control over the sale prices of urea (ex-factory price + buffer stock price), also TSP and SSP produced by BCIC but not over the retail prices.

It is noteworthy that following some disruptions in the fertilizer supply, the interim government during the period of 2007 allowed the appointment of three sales representatives under each of the government authorized dealers all over the country. The aim was to enhance farmers' access to fertilizer input. As a result, about 15,000 new representatives joined with the new 5,000 union level authorized dealers.

Over the years, the government made drastic changes in the dealership system for fertilizer distribution. As an outcome of this effort, fertilizer dealers were appointed as per the

integrated fertilizer distribution methods 2008 and 2009 respectively effective from 1st July, 2008 and 1st October 2009.

4.6.2 Dealership Policy 2008

The main objective of the Dealership Policy 2008 was to appoint at least one dealer for each union by cancelling the previous upazila-based system. The Union was the focal point for fertilizer distribution.

Under the revised dealership policy, priority will be given to selection of new union/ municipality dealers from amongst the local residents of respective unions/municipalities.

Except in unions/municipalities, no dealers will be appointed in police/metropolitan thanas.

Except BCIC-approved dealers, the sale of urea will remain restricted for others. Fertilizer can be sold by opening fertilizer sales centers and appointing one sales representative for each block/municipal ward in the area specified for the dealer. In the Policy of 2008, fertilizer dealership was made non-transferable; and in case of a new appointment, only one dealer can be appointed for each union.

In appointing new dealers for the union/municipality, the Upazila Fertilizer and Seed Monitoring Committee, (Annex 1.2) after proper scrutiny, will send the applications for dealership to the District Fertilizer and Seed Monitoring Committee (Annex 1.3). On the basis of recommendation made by the District Fertilizer and Seed Monitoring Committee, BCIC will finally appoint dealers.

As envisaged in the Policy of 2008, the District Fertilizer and Seed Monitoring Committees to be headed by the Deputy Commissioners were to monitor the overall fertilizer situation like supply of urea and other fertilizers in each district, lifting/storing situation, sale, observation of fertilizer price situation, selection of fertilizer dealers and evaluation of the dealers' performances.

Moreover, with a view to monitoring the fertilizer and seed situation in each union/municipality under upazila, it was proposed to organize an Upazila Fertilizer and Seed Monitoring Committee headed by the UNO. To ensure effective fertilizer distribution, it was also proposed to introduce a Card System among the farmers.

With regard to the lifting of fertilizers, it was decided to allot equal amounts of fertilizers to every dealer depending on the actual timeline-based demand for such fertilizers. Fertilizer is to be distributed from the nearest factory/buffer godown for convenience of transporting fertilizer to any district. Fertilizer produced in the factory and imported should be supplied directly to the buffer godown. In cognizance with the Policy 2008 and subject to the availability of fertilizer, BCIC is supposed to supply allotted quota of urea, TSP, DAP and SSP to the public or private organizations at prices fixed by the Government.

Urea, DAP, TSP, SSP produced by BCIC and imported fertilizer are included within the jurisdiction of this Policy. Fertilizers of other sectors may also be included.

4.6.3 Dealership Policy 2009

The 2008 Dealership Policy seemed weak in its implementation. As such, with approval of the National Coordination and Advisory Committee for Fertilizer, the government has formulated the Integrated Policy 2009 to guide appointment of fertilizer dealers and fertilizer distribution. It is intended to stamp out the old arrangement and streamline the field level distribution of fertilizers. The new policy was scheduled to come into force from 1st October, 2009. Its main objective was to ensure adequate and timely supply of fertilizers (especially urea) to the farmers. The salient features of the policy are as follows:

- Appointment of union-wise dealers
- Abolition of sales representatives of dealers
- Restrict dealership within the district
- Fix-up priorities in appointment of dealers
- Introduction of retail sale of fertilizers
- Arrangement of ID Cards for the retailers.

The main thrust of this policy is to remove all intricacies of the past developing a farmer-friendly distribution system by invigorating union-wise dealer appointment. Union will be the 'focal point' for fertilizer distribution, and each union parishad will have one authorized dealer. In the appointment of new dealers for union/municipality, the residents of the union will be given first priority. Dealers will be appointed through public advertisements.

In the new policy, If there is only single applicant in a union, then he will be treated as a dealer subject to the fulfillment of other preconditions. BCIC, on recommendation of the District Fertilizer and Seed Monitoring Committee (Annex 1.4), will appoint dealers. Except in case of inheritance of an enterprise having a fertilizer dealership, the dealership is non-transferrable.

It has been decided to reorganize the District Fertilizer and Seed Monitoring Committee (DFSMC) to monitor the overall fertilizer situation. All parliament members (MPs) of a district will act as advisers to the District Fertilizer Seller Selection Committee headed by the Deputy Commissioner. Besides, the MPs in a Upazila will be advisers to respective Upazila Fertilizer and Seed Monitoring Committees (Annex 1.5). In the new policy, the MPs are also empowered to select retailers.

The DFSMC is assigned with the responsibility to determine the maximum retail price of fertilizers for each district. However, the DFSM Committee is not empowered to allot/sub-allot urea or non-urea fertilizers to any institution under any circumstances.

According to the MoA, the new Policy if properly implemented will enable the farmers to purchase fertilizers from the local market as per their demand pattern.

As regards to the mechanism in selecting retail sellers, an ID Card of fertilizer retail dealership (Annex 1.6) from the Upazila Agriculture Office (UZAO) is to be collected for retail sale of fertilizer. Headed by the UP Chairman, the retail fertilizer sales selection committee will be formed in each union for sorting out the retail seller. Out of the 6 committee members, 4 are to be nominated by the local MP. This committee is designated to appoint retail sellers of fertilizer.

It is clear that local retailers with their ID cards are allowed to purchase fertilizer from the authorized dealer and sell it to the farmers. However, in case of insufficient stock of fertilizer with the dealer, the retailer can purchase fertilizer from any dealer of the upazila using his own valid ID Card.

It is stressed that if the contract is not renewed due to under/non-performance as reflected in the annual evaluation (Annex 1.7), dealership will be cancelled. Any party, dealer or authority (in 2008, only authority), can withdraw/cancel his/her dealership by issuing a 3-month prior notice in this regard.

In the new Policy, there is no provision for sales representatives. Henceforth, appointment of 3 sales representatives for each dealer (countrywide total number being 15327) are cancelled.

In light of this policy, those dealers who were previously appointed and have, at the same time, all eligibility to be appointed as dealers will be retained, and their contracts will be renewed and adjusted.

Regarding the scope of the Policy, it may be said that urea, DAP, TSP, SSP produced and imported by the BCIC and the non-urea fertilizers imported by BADC and private importers have been included in this Policy.

4.6.4 System/Method of Payment/Allotment of Subsidy

The salient features of the system and method of payment and allotment of subsidy for TSP, DAP and MoP (Potash) fertilizers for FY 2008-09 as declared by the Agriculture Economic Research (AER) and MoA are as outlined below (see details in

- Continuation of the payment of subsidy to the TSP, DAP and MoP fertilizers imported through bonafide importers registered solely by the Department of Agricultural Extension (DAE)
- Import of TSP, DAP and MoP of specific quality as per annual demand and in coordination with the Bangladesh Fertilizer Association (BFA).
- Due to differences in ‘country of origin’ and ‘location’, C&F and CFR prices of fertilizers should be determined before payment of subsidy.
- Subsidy to be given only when the amounts of imported TSP, DAP and MoP are equivalent to their demands estimated by the government.
- Subsidy is to be paid for each fertilizer by type & source of fertilizers.
- Selling Price of fertilizers is to be determined by incorporating 15% subsidy with total import value.
- Release of the subsidy money on the basis of documents evidencing amounts of fertilizer sold by the importer and lifted by the dealers.
- Strengthen present monitoring system to ensure the benefit of subsidy to the dealers.

4.7 Supply Chain of Fertilizer

4.7.1 Fertilizer intermediaries

Factories: The Bangladesh Chemical Industries Corporation (BCIC), a parastatal organization is responsible for fertilizer production and the operation of six urea fertilizer factories, one TSP and one DAP plant in the country (Annex 1.8). Distribution of BCIC's fertilizer production is made from the factory gate to the appointed dealers at prices determined by the Government. The BCIC's production is uneven, rarely producing at a rated capacity. Production and import of urea is always controlled by the government and is distributed to the farmers through the 4850 BCIC's appointed dealers at heavily subsidized rates. Moreover, the production of small quantities of TSP, SSP and DAP are also at the government's command.

Importers: Bangladesh imports all of the DAP, MoP and a part of SSP and Gypsum, Zinc, and Ammonium sulphate (AS). Import and marketing of a portion of the TSP, DAP and other fertilizers (MoP, SSP, Gypsum, magnesium sulphate and micronutrients) are controlled by the private sector. The government determines the requirement for different fertilizers for a budget year and then allows importers to meet up the demand. There are 140 importers in Bangladesh. Currently, the importers import DAP and zinc from USA, TSP from China, MoP from CIS, SSP (powder) and Gypsum from India, and AS from Korea according to the annual needs of the country.

Dealers: The fertilizer dealers are usually large, affluent traders. They invest large amounts of capital in their businesses. They have their own warehouses. They either lift their fertilizers from local factories or import them from abroad. In case of urea and TSP, they only collect the Delivery Order (DO) for lifting fertilizer, from factory and sell them to sub-dealers. Their activities are concentrated in the local market. In fact, they are the traders who mainly control the fertilizer market. The dealers purchase a fixed portion of the fertilizer from the factories and another portion of fertilizers from the importers.

Sub dealers: The sub-dealers are the smaller traders. Their investment is much smaller than those of the union dealers. They purchase fertilizer mainly from wholesale dealers. Occasionally, they collect fertilizer from the factories or import fertilizer through joint initiatives. Shamsul Alam, *et.al.* (2007) found that on an average sub-dealers purchased 80% from dealers. They sell fertilizer to the farmers at fixed prices.

4.8 Fertilizer Distribution System

The distribution network of the fertilizer market is composed of appointed/licensed dealers who are expected to observe certain limitations, including selling only within designated areas. The government carries out a supervisory role on the trade which also sets an indicative price level for traders to abide by. The Ministry of Agriculture (MoA) allocates urea quotas to the dealers and the fertilizer factories deliver urea to the dealers according to the given quotas. A district level committee, headed by the Deputy Commissioner is supposed to ensure strict discipline in the distribution network. In reality, this has become a cause of instability and rent seeking.

Imports of phosphate and potassium fertilizer are still the playing field for private dealers. Dealers are organized into a politically powerful association. This association can potentially render the market into an oligopolistic structure, resulting in prices higher than the price that would prevail under a competitive market.

There are frequent complaints about untimely and inadequate availability of fertilizer in many areas of Bangladesh. Moreover, the fertilizer business is bedeviled with a lot of problems. These included:

- Deficiency in supply of fertilizers;
- Price variations across different geographical areas;
- Wastage due to poor and inadequate storage facilities;
- Subsidy diverted to unintended beneficiaries;
- Fertilizers sold above government approved prices;
- Inadequate supply of fertilizers by quotas allocated to dealers in various districts;
- Interference with the distribution mechanism by well-connected people, political heavyweights, and personnel entrusted with fertilizer sales;
- Same fertilizer type for all farmers irrespective of crop grown and soil type;
- Inaccurate assessment of the demand for fertilizer;
- Knowledge gap of the farmers;
- Relatively high price of fertilizer;
- High transportation cost;
- Adulterated fertilizer;
- Faulty lifting procedure of fertilizer;
- Frequent change of distribution system; and
- Smuggling and black marketing.

The major reasons behind these problems are (i) lack of proper management and (ii) surveillance in fertilizer marketing and distribution system. The overall problems are:

- Unnecessary delay in fertilizer procurement in right time and right quantity;
- Delays in distribution due to poor transport facilities;
- Artificial crisis created by the private importers and dealers to reap supernormal profit;
- Subsidized prices are usually below the market-clearing price hence encouraging traders to make enormous profits by buying low and selling exorbitantly;
- Quantity demanded does not match quantity supplied, putting severe pressure on price to increase;
- Inadequate and weak provisions to prosecute guilty officials and traders found to have illegally sold fertilizers by diverting it to middlemen or highest bidders;
- Widespread availability of the ‘illegal’ fertilizer in the market, at illegal prices without police and legal prosecution;
- Government monopoly of urea fertilizer production; and
- Politicization of the procurement and distribution process.

Over the years, repeated changes in the fertilizer distribution and marketing system along with the policy mistakes made by the government have stamped out the role of stakeholders in fertilizer trade in Bangladesh. It was observed that the method of selling fertilizers differed across districts and even across upazilas within districts. The tools applied including cards, slips, farmers’ lists or priority lists provided by local administration. In some districts fertilizers were sold once a week only and the farmers had to queue up for receiving their allocations and many farmers reported that, despite losing several days of work, they failed to get any fertilizer and had to buy fertilizer at high prices from private sources. Civil

administrators such as the Deputy Commissioners reported that they spend over a half of their work time in fertilizer distribution to the determent of their other normal activities.

Before the last interim government of 2007, fertilizers were sold and distributed by some 4500 dealers registered with the Bangladesh Chemical Industries Corporation (BCIC). But in order to make the fertilizer distribution system easier and fruitful, the interim government (2007) decided to appoint some sub-dealers all over the country. Accordingly, each dealer appointed three sub-dealers to sell fertilizers at the union level. The government also introduced the slip system and allotment slips were issued to the farmers by the chairman, members and SAAOs in their respective unions. The farmers had to show the slips to the dealers. In this system some farmers managed to get more fertilizers by collecting more slips and some others were deprived of getting required amount of fertilizers making the distribution more blemished and discriminatory. This aroused indignation to majority farmers and as a result, the present government has invalidated the system.

The new government sworn in 6 January 2009, introduced a modified system (in Boro 2009) where SAAOs conducted household surveys and prepared 'Farmers' Register' with data of each household, their cultivating crops and areas by season. Moreover, each household has been provided with a printed 'Fertilizer Distribution Card' (Annex 1.9) with records of their crops and cultivation area by season. Fertilizer distribution was made on the basis of information recorded and recommendations of the SAAOs. On the day of fertilizer distribution each farmer was obliged to go dealers' shops where SAAO checks into the 'Fertilizer Distribution Card' and farmer's 'Fertilizer Distribution Register (Annex 1.10) lying with the dealer and gives allotment of fertilizers to the farmers on the spot. Under these arrangements, farmers had no opportunity to purchase fertilizer in excess of their requirements and to sale of fertilizer outside the union was prohibited.

Undeniably, this mechanism greatly facilitated the availability of fertilizer to all farmers at prices fixed up by the government. The farmers have still expressed their aversion to the system because it had some negative impact on two major grounds: (a) highly time-consuming process and (b) farmers had constrained access to credit. Farmers, usually prefers to purchase fertilizers from the open market. In this regard, the government must take prudent policy decisions to strongly monitor the market so that fraudulent dealers and private importers cannot manipulate fertilizer prices.

SAAOs are extension personnel to be assigned only for extension services. But, as mentioned above, under the existing system, they have been involved in fertilizer distribution activities which became a matter of resentment. In the opinion of SAAOs, importers (BCIC, BADC and PSI) are basically responsible to make their imported fertilizers available at the doorsteps of farmers at the right time and at predetermined prices. The importers should also be responsible to the government for the quality of fertilizers imported by them.

Mukarram *et al.*, 2010 analyzed that due to controlled sale of fertilizers, all dealers could not sell their previous consignment, and as a result they had to forgo some of their current allotments. As a consequence, at the end of Boro 2009, it was observed that a huge quantity of imported non-urea fertilizers remained unsold in the country.

By mid-February 2009, government announced free sale of fertilizers in the market and consequently the fertilizer distribution through card system was made void.

4.9 Sources and Channels of Fertilizer Distribution

Generally, farmers collect fertilizers from three different sources

- BCIC appointed fertilizer dealers and their representative (sub-dealer) shops
- BADC dealers shops
- Local fertilizer retailer's shops

On the other hand, dealers lift fertilizer from BCIC, BADC and Private Sector Importers (PSI) on the basis of allotment made by the National Fertilizer Distribution Committee (NFDC). Dealers collect their allotted fertilizer from different sources e.g., import points, BCIC fertilizer factories and buffer godown and BADC godown (Annex 1.11).

The distribution channels for both urea and non-urea fertilizers have close resemblance. The BCIC dealers who lift urea fertilizer from factory gate and buffer godown also procure TSP from factory gate and importers' warehouses. To the contrary, the BADC dealers collect non-urea fertilizers from BADC godown only. The farmers can buy fertilizer both from dealers (union level) and retailer (ward/village level) shops[40]. The prudent policies regarding fertilizer distribution as pursued by BCIC and BADC produced an inevitable result. Considering the implications of those policies for stable agricultural production and food security various efforts have been made to designed an effective distribution system.

The main distribution channels of urea and non-urea fertilizers are depicted in the figures below.

BCIC dealers lift urea fertilizer from the following points:

a. Chittagong Urea Factory, Chittagong.
b. Ashugonj Fertilizer & Chemical Company Ltd.
c. Ghorashal Urea Fertilizer Factory, Narshindhi
d. Mohendranagar BCIC Buffer godown, and
e. Private Sector Importers (PSI) of Noapara and Magura

Non-urea fertilizers (e.g., TSP, DAP and SSP) from:

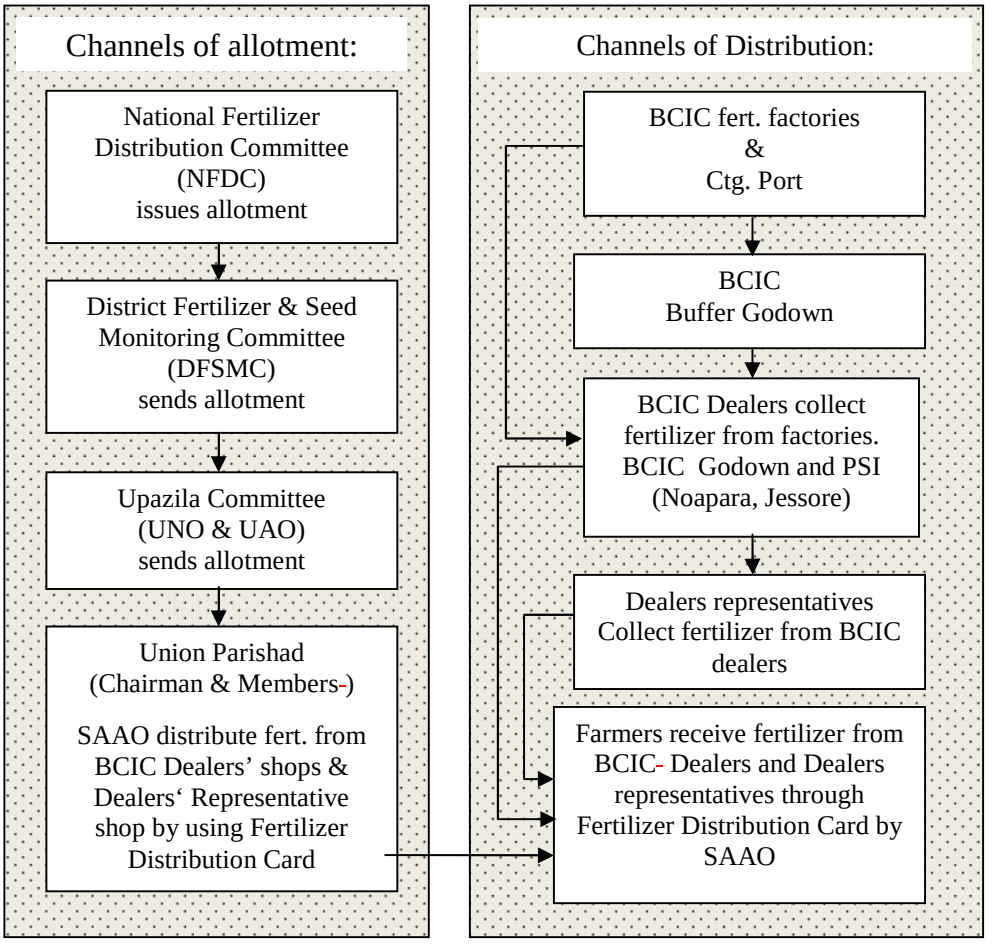
a. TSP complex, Chittagong.
b. DAP in little quantity is collected from DAP factory, Chittagong,
c. Chittagong Port and
d. BADC godown, imported by BADC.

According to regulation, PSI must sell their imported fertilizers to the BCIC dealers. The dealers (BCIC) also receive the PSIs part of allotments that they will get from the respective PSIs.

The dealers, however, prefer to receive the supply from the nearest BCIC buffer godown instead of directly from the factories or import points. This will minimize the time and transportation cost.

[40] Constraints of Farmer's Access to Fertilizer For Food Production, NFPCSP-FAO Project CF 3/08; M. Jahiruddin, MR. Islam and MA. Momen Miah, BAU, Mymenshigh.

Figure 4.4: Distribution Channels of fertilizers produced and imported by BCIC[41]



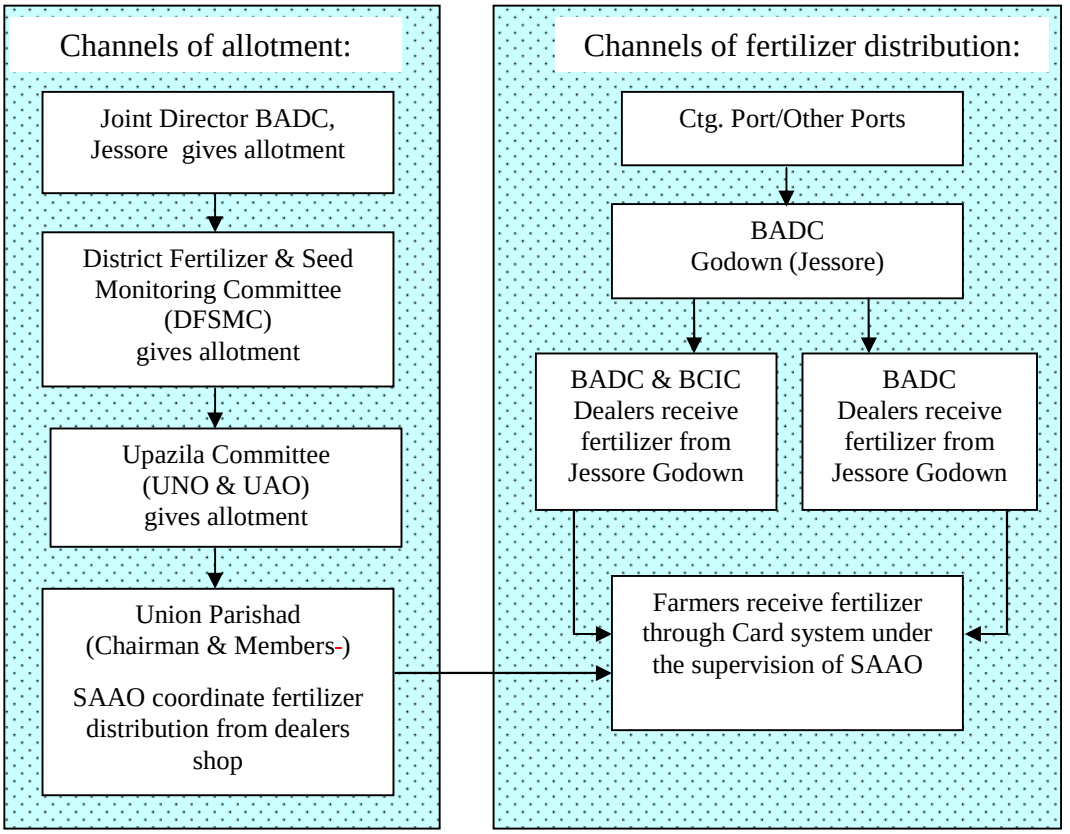
4.9.1 Channels of BADC Fertilizer Distribution

Usually, the Joint Director, BADC (Jessore) allocates imported fertilizers to the Deputy Commissioner with a copy to Director, Department of Agricultural Extension (DDAE). Then DDAE allot fertilizers to different Upzilas with an approval from DC and send copies to UNO and UAO. The Upazila Committee allot these fertilizers to dealers with a copy to Union Parishad (UP). At the lowest tier there is Union Parishad and the SAAO distributes fertilizers from dealers' shop using 'Fertilizer Distribution Card'. In this distribution mechanism, there is a direct nexus between BADC and the district levels instead of Upazila. There is lack of proper coordination between BADC and Upazila Agriculture officer (UAO).

BADC dealers procure non-urea fertilizers from the BADC godown imported by BADC. They have also demanded allotment of urea in addition to TSP and MoP. Otherwise, urea buyers coming for urea goes away and never come back for only TSP and MoP.

[41] Distribution channels of BCIC, BADC and PSI shown in Figures 4.6, 4.7,4.8 and 4.9 are drawn from study by Hossain M. Mukarram: "Fertilizer Marketing and Distribution System, its Impact on Food Grain Production and Household Food Security of the Resource Poor Farmers in Selected Areas of Bangladesh" (NFPCSP project CF 4/08). The authors are greatly indebted to him for permitting to use the distribution channels in the study. .

Figure 4.5: Distribution Channels of BADC imported fertilizers



4.9.2 PSI Fertilizer Distribution Channels

National Fertilizer Distribution Coordination Committee (NFDCC) (Annex 1.12) usually issues allotment for non-urea imported fertilizers which the private sector importers are supposed to sell/distribute through the BCIC dealers. But, virtually they sell these to different agents. Moreover, it is alleged that PSI also gets supply from different hidden sources. To maintain control over fertilizer market sometime dealers sell fertilizers even at prices lower than those fixed by the government. In this case, some dishonest importers refill the empty sacks of original fertilizers with low grade fertilizers. Thus, the importers in the private sector retain their control in the fertilizer market and as a result it remains effervescent round the year.

Figure 4.6: Distribution Channels of PSI imported fertilizers

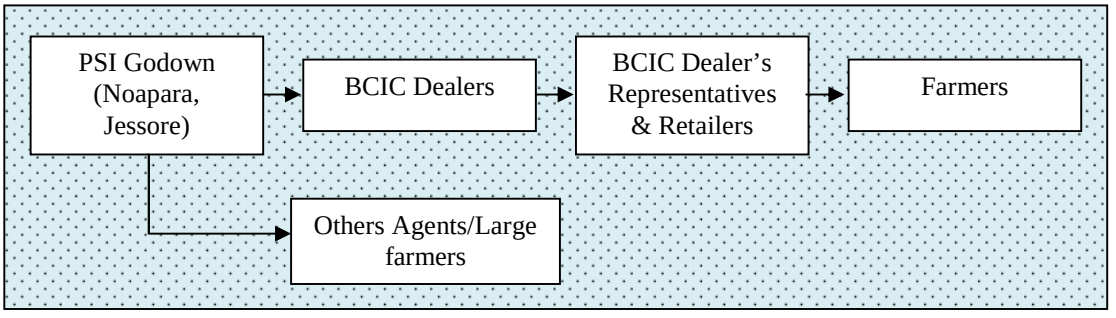
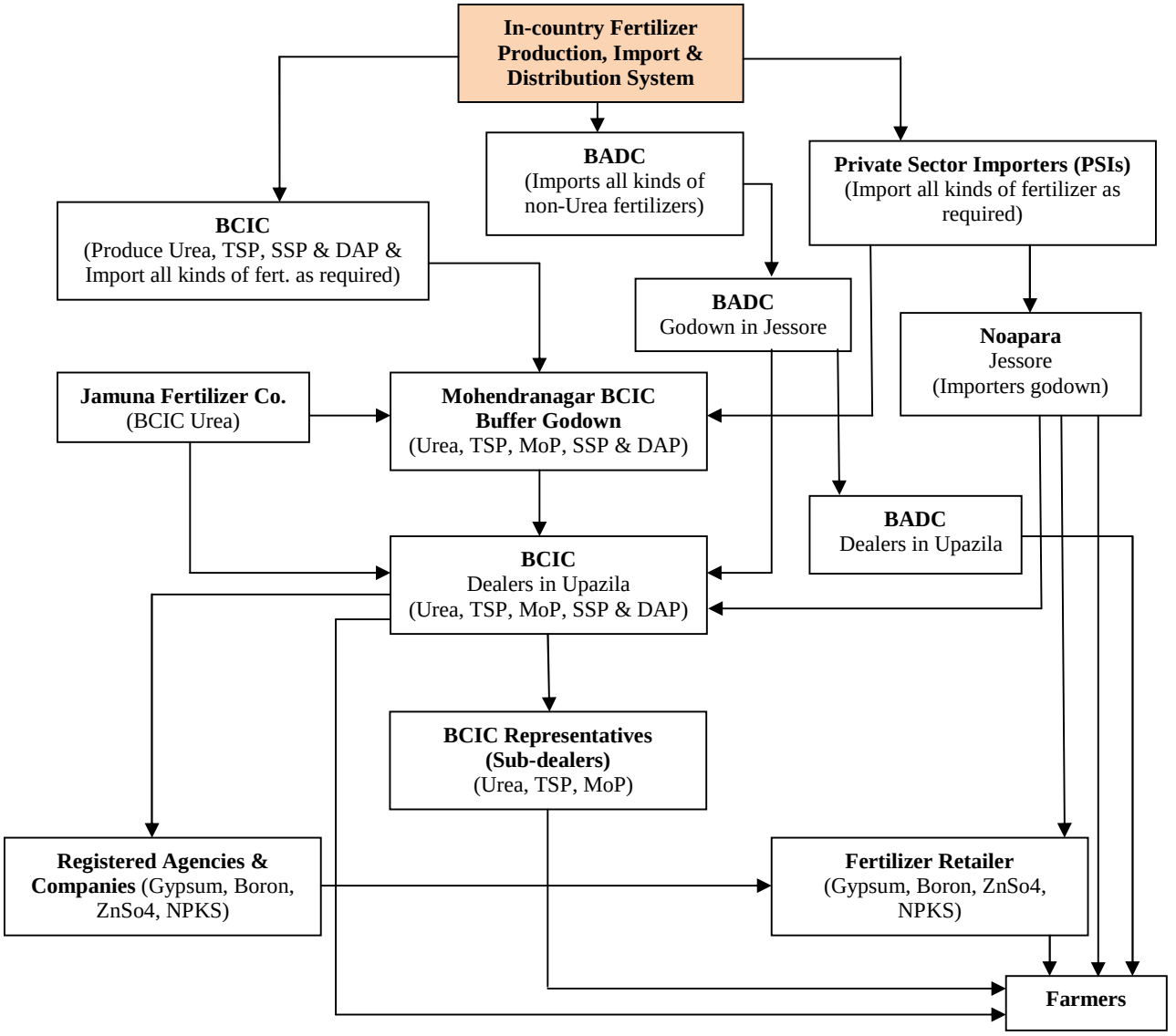


Figure 4.7: Fertilizer Distribution Channels



4.10 Delivery System for Urea

From an annual perspective, Bangladesh appears to have sufficient productive capacity to meet the national demand for urea. But there are difficulties in effective and efficient marketing of urea. A major manifestation of these difficulties occurred during the 1994 -1995 "urea crisis" when actual shortages occurred in certain locations while paradoxically there were substantial stores in godowns and in the "pipeline". A host of factors serve as constraints on the system to deliver urea in the right place, at the right time and at the right price.

4.10.1 Sources of Constraints on Urea Delivery

Constraints on the delivery system for urea arise from several sources as are discussed below:

1. **Characteristics of Urea as a Fertilizer.** The intensive management requirements of urea and the product's attendant handling and storage characteristics tend to create

"spikes" in demand or, conversely, narrow windows of opportunity for efficient and effective use.

2. **Nature of Urea Use in Bangladesh.** Available data indicates slightly over 50% of the retail purchase of urea is in loose form. The delivery system is constrained to handling 50 kg bags to the retail stage of the distribution channel.
3. **Plant Location.** Production facilities are highly concentrated on the Eastern side of the country, yet key consumption areas are located in Western Bangladesh. The vagaries of river transportation in Bangladesh significantly constrain the system to adequately deliver urea to the domestic market.
4. **Bagging and Handling constraints.** The domestic urea market is a 100% bagged market. The lag between bulk availability, bagged availability, and market delivery is severely constrained at the production facility – distribution system interface.
5. **Lack of a Commercial Orientation by BCIC.** BCIC is responsible for fertilizer production but and not for marketing. BCIC's operating practices on placement of orders, hours open for business and allowing shipments, etc. are bureaucratic and of a command and control mentality definitely not conducive to the ordinary flow of business and as such limits competition.

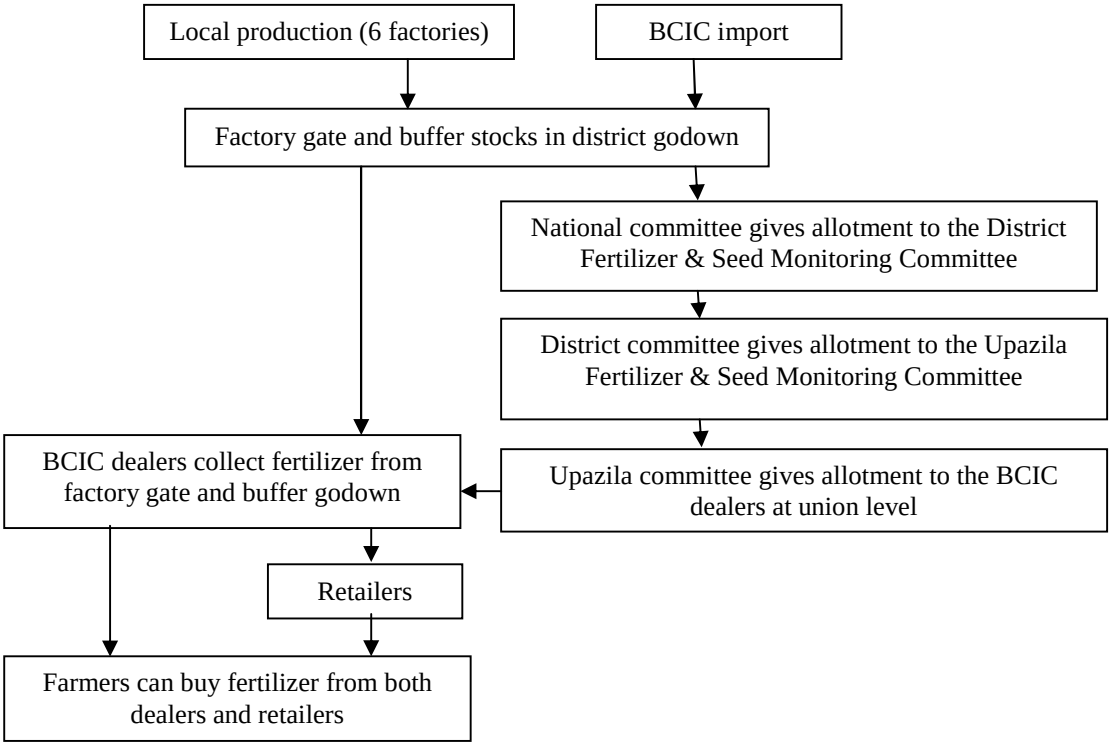
4.10.2 Summary and Conclusions

There are a number of constraints limiting the ability of the system to deliver urea to the domestic market. There is a definite need to conduct a review of factors constraining delivery to distribution system including a real-time analysis of the logistical problems, and identity alternatives for removing these constraints. It is expected some constraints can be removed by adjusting operational procedures, some will require added investment in bagging, handling and storage and some will require rationalization of transportation by appropriate agencies and ministries (especially the rail system).

4.10.3 Urea Fertilizer Distribution

Urea fertilizer distribution system is shown by a flowchart (Figure 4.8). The production, import and distribution of urea are still in the control of public sector. The BCIC appointed dealers at union level, with the allotment issued by the Upazila Fertilizer and Seed Monitoring Committee, procure urea from factory gate and buffer godown. Fair recently (November 2009), provisions have been made to be appointing at ward/village levels in each union to make fertilizers readily available to the farmers. So, the farmers can purchase urea from both dealers and retailers. The Market Monitoring Information System (MMIS) under the Ministry of Agriculture (MoA) collect and update fertilizer distribution data.

Figure 4.8: Distribution and marketing flowchart for urea fertilizer[42]

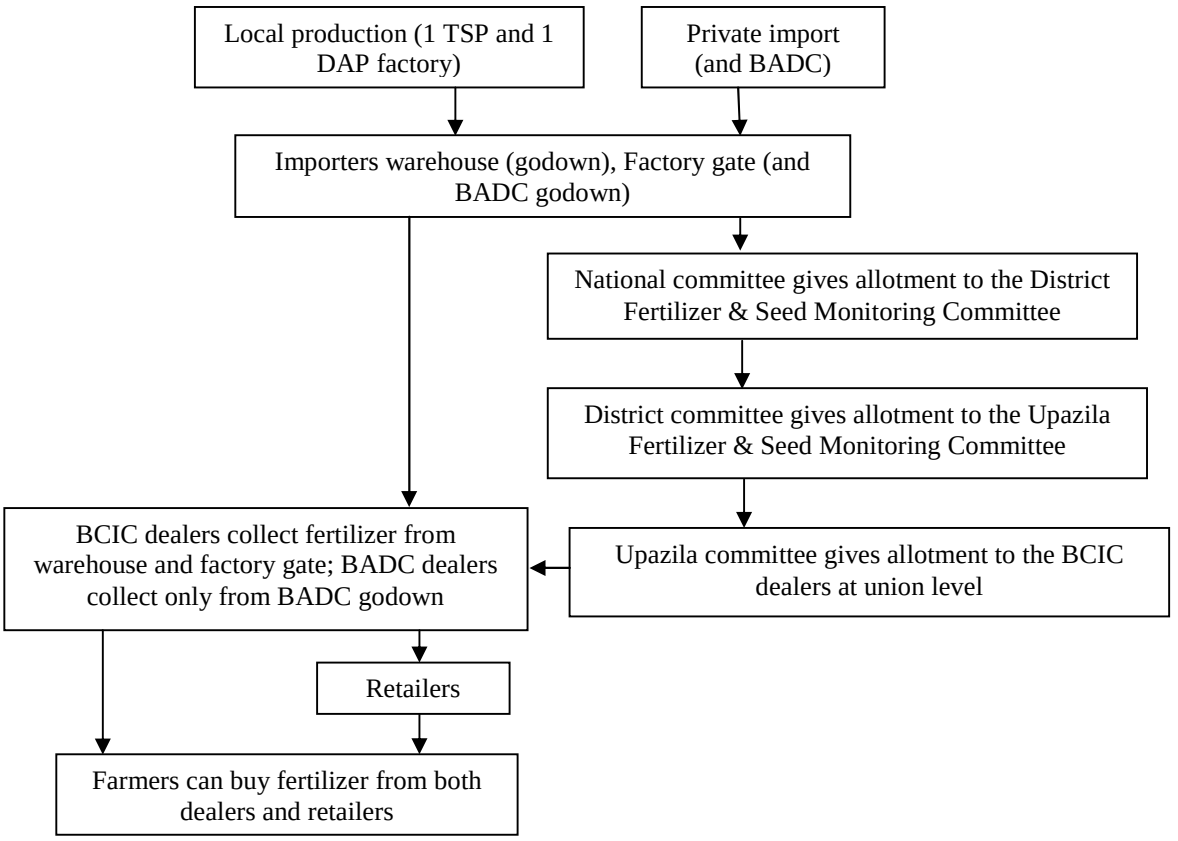


4.10.4 Non-urea Fertilizer Distribution System

The distribution/marketing system of non-urea (TSP, DAP and MoP) fertilizers is depicted in Figure:4.9. These fertilizers are mainly and largely imported by private sector and a small portion by BADC. Unlike urea, fertilizer which is dealt by the Ministry of Industries, MoA deals with non-urea fertilizers. Distribution channels in many respects are quite alike to that of urea. The same BCIC dealers also lift out non-urea fertilizers from factory gate (Chittagong TSP Complex Ltd. and Chittagong DAP Fertilizer Co. Ltd) and importers warehouses. The warehouses are located at Chittagong, Narayanganj, Noapara (Jessore) and Baghabari (Sirajganj). There is a limited number of BADC appointed dealers across the country who collect non-urea fertilizers exclusively from BADC godown. Farmers are allowed to buy non-urea fertilizers from BCIC and BADC dealers and retailers.

[42] Marketing flow charts shown in Figures 4.10 and 4.11 are drawn from Jahiruddin *et.al.* "Constraints of Farmers' Access to Fertilizer for Food Production", NFPCSP, Final Report CF # 3/08, May 2010.

Figure 4.9: Distribution and marketing flowchart of non-urea fertilizers (TSP, MoP and DAP)



4.11 Streams of Fertilizer Marketing

Though all are not panegyric, many fertilizer policies relating to distribution, marketing, pricing have been adopted by the government over the years. However, fertilizer marketing in Bangladesh revolved around mainly two streams.

Since, 1995, immediately prior to the dealership system, the government introduced the system of public intervention stock or buffer stock mainly in the North-west and parts of South-west. The rationale behind this decision was to ensure adequate availability of urea in these area where it is difficult, at times impossible to transport urea during dry season mainly due to inability of the Railway to ensure ferry crossing because of shallow water level. An additional reason for buffer stock centre is that many of the districts in the North-west are remote.

The concept of buffer stock was developed at least 20 years back. In 1990, two committee appointed by the government recommended that buffer stock of fertilizer be maintained. The Low Cost Intervention Study (1990) of FDI-II also made the same recommendation. However, these remained dysfunctional.

In that year, BCIC established and operated buffer stock involving 15 locations. The quantity sold was about 100,000 MT. In 1996 BCIC increased the number of buffer stock centres to 29 and built about 500,000 MT of buffer stock of urea in 21 districts. Most of the buffer stock centres were located in north and southern district. The sale price of urea in BCIC factory gate and sale price of urea in buffer stock is fixed by the government. The present buffer stock sale price was fixed in July 1997 at Tk. 265/- per kg bag that more or less covers BCICs cost of distribution. Surveys at different times corroborate that adequate availability of urea

specially, during the Rabi-Boro peak season ensure urea price to remain normal and within the purchasing capacity of the farmers.

The urea maintained in the buffer stock is normally offered for sale during January to March which is historically known as the highest peak period of demand mainly for the Boro crop. During this period about 52% of the annual demand of urea is consumed. To meet this demand, ex-factory sales volume needs to be maintained at a minimum of 11,000 MT per day. From 1996, BCIC has been more or less maintaining this level of urea sale. Per contra, unforeseen factory shut-down may also lead to a disruption in supply and further on to a crisis. Other factors that contribute to this are:

- Transport strike;
- Disruption in railway ferry crossing;
- Congestion at Aricha ghat;
- Disruption in gas supply causing factory shut down; and
- Political disturbances in the form of country-wide or even local strike or hartals.

In such situation as mentioned above, BCIC buffer stock can, to the extent possible, meet the demand for urea fertilizer. The other stream is the BCICs appointed dealers who now deal with urea as well as TSP and SSP, although in practice some of them could be dealing in other products.

After the introduction of dealership network up to thana level and buffer stock system through BCIC in late 1995 and early 1996, fertilizer market has been behaving nicely and also functioning very smoothly and efficiently.

4.12 Conclusion

The FDI project served as fulcrum for achieving the goal of ready availability of all the right fertilizers at the right time and place along with their judicial use. The privatization of the fertilizer market in Bangladesh marks a quantum leap forward in the agricultural emancipation of this country.

However, the task of streamlining the workings of this newly privatized market remains an ongoing accomplishment for the government. Barriers that distort market forces such as price setting of domestic fertilizers, the supply of raw materials to trade, allocation of foreign exchange to import fertilizers, lengthy import procedures, inadequate port, warehouse and transportation facilities still exist. Localized shortages and price fluctuations that occur at critical times of high fertilizer demand are a common feature in Bangladesh. It was necessary for government involvement in fertilizer procurement and distribution to ensure fairness of distribution in a time of perceived fertilizer shortages. Ensuring ‘right quantity’ of fertilizers ‘at the right time, at the right place’ is not an option, but a necessity for Bangladesh.

Over the years, government has tried a host of policies which are not without flaws. The method of selling fertilizers varies across districts and even across upazilas within districts. The tools applied including slips, cards, farmers’ lists or priority lists provided by local administration. In some districts, fertilizers were only sold once a week and farmers had to queue for their allocation and many farmers reported that, despite losing several days of work, they failed to get any fertilizer and had to buy at high prices from private sources. Civil

administrators such as District Commissioners reported spending over half their work in fertilizer distribution to the determent of their normal activities[43].

Moreover, the extension service is very heavily involved in the administration of fertilizer distribution and the administration of the fertilizer subsidy schemes and this takes them away from their normal work of providing farmers with technical advice. They should be allowed to perform their responsibilities in dissemination of knowledge of modern crop technology in achieving the objective of providing farmers with access to the 'right fertilizers' in the 'right quantity' at the 'right time'.

4.13 Recommendations

'Fertilizers delayed are basically fertilizers denied' (IFDC 2006). Hence, the choreography of fertilizer marketing and distribution policies in Bangladesh should be tuned properly so that it sounds timely and in an effective manner. The government should develop a mechanism to monitor fertilizer market. A special unit, relatively autonomous, lean but smart, should be established for such monitoring. Such a unit would be expected to.

- Design a rational fertilizer pricing policy;
- Monitor fertilizer price, supply and demand situations in the market;
- Keep information on market behaviour at import levels and on distribution network;
- Design measures that can promote market competition;
- Monitor practices of delivery of fertilizers at factory gates (for urea) and world prices, supply etc. on fertilizers;
- Select dealers in a candid and non-discriminatory way;
- Strengthen market information and monitoring;
- Ensure price stability through maintenance of buffer stock;
- Develop and implement a training program for dealer and sub-dealers;
- Coordinate fertilizer production, distribution and marketing by regular monitoring;
- Supply and availability issues of fertilizer to be clearly identified and properly addressed;
- Continue applying principles of market forces ;
- Guide quality legislation;
- Improve fertilizer distribution system. Fertilizers are to be supplied to dealers from the nearest buffer stocks instead of different plants. It can reduce shipment time and transportation cost of fertilizer;

For efficient marketing and distribution of fertilizers 'at right quantity', 'at right time' and 'at right place' some further recommendations can be made:

- Involvement of Agriculture Extension workers needs to be lessened to allow them to give attention to the dissemination of technology information. SAAOs should be released from fertilizer marketing activities.
- Smuggling, black marketing and syndication of fertilizer need to be stopped through strong monitoring.
- Number of dealers in each upazila should be increased.

[43] FAO Global Information and Early Warning System on Food and Agriculture World Food Programme Special Report FAO/WFP Crop and Food Supply Assessment Mission to Bangladesh 28 August, 2008, P. 9-11.

- Farmers are often deceived of the quality and prices of fertilizers especially regarding non-urea fertilizers. Hence, regular monitoring and effective legal measures will be helpful in addressing this issue.
- Inspect markets for detection of adulteration of fertilizers. High adulteration for mixed fertilizer (NPK) must be controlled and unscrupulous traders must be punished.
- Free market system of distribution should continue as earlier.
- Unbiased, continuous factual and timely Monitoring and Evaluation (ME) combined with a true Management Information System (MIS) is competent to provide accurate reference data which can be connected to management decision making targeted towards assuring fertilizer products to the rural communities and to farmers in a timely and cost-effective manner.

In this regard further recommendations about the expected role of government.

Role of Government

- Government should provide the enabling environment, for example, construction and maintenance of farm/feeder roads and the railways.
- Government should establish an Agency to be responsible for
  - Quality control
  - Collection and dissemination of market information on fertilizer price, availability, location, types and trends, etc
  - Payment of subsidy
- Government should at the beginning of each year establish quotas on the quantity of fertilizer it is willing to subsidize
- Government should use tax and other incentives to encourage the establishment of private sector fertilizer plants across the nation so as to enable the country to become self-sufficient in fertilizer production
- Government should streamline and shorten port- clearing processes to facilitate the clearing of fertilizer at the shortest possible time
- An effort should be made for a phased reduction of fertilizer imports as domestic fertilizer production takes-off.

4.14 Future Research Areas

The operations of the fertilizer market in Bangladesh are blemished with frequent complaints. These complaints should be assessed properly in terms of their credence, causes, and extent exists.

The government does not have an effective monitoring and regulatory mechanism, except permanent or temporary committees. This is an area which warrants a comprehensive evaluation to arrive at sets of guiding principles to lead the market towards a competitive structure.

From the national perspective, complete privatization of fertilizer trade till date should be thoroughly examined along with its impacts and suggest measures for further improvement of fertilizer sector.

CHAPTER V
PROFILE OF RESPONDENTS

5.1 Introduction

Household is the smallest unit of social institutions. Almost all the socio-economic activities are being performed around this unit. It is defined as a dwelling unit where one or more persons live and eat together under a common cooking arrangement. Matrimonial or blood-related relations exist among most of the persons who reside in the dwelling.

5.2 Demographic Characteristics

This chapter deals with various demographic indicators of the sampled farm household such as household size, age distribution by divisions and categories of farmers, sex ratio, dependency ratio, education status by different divisions and farm class, occupation of household members, profile of household heads, housing and electrification status of farm household.

5.2.1 Household Size

In order to obtain an idea about the sampled average household (HH) size, information about the number of household members have been gathered in the survey. The findings reveal that an average household comprises of 5.5 members (Figure 5.1), which is slightly bigger than the national average (4.9 members). According to the government statistics average number of household members in Dhaka, Chittagong, Rajshahi, Khulna, Barisal and Sylhet division are respectively 4.7, 5.4, 4.5, 4.7, 5.0 and 5.7 (source: Statistical Year Book of Bangladesh 2008) which is slightly smaller as compared to survey findings. It reveals that the household size in Sylhet and Chittagong division is 6.4 and 6.0 which is relatively bigger than other divisions. On an average household member in division of Dhaka, Rajshahi, Khulna, and Barisal are correspondingly 5.5, 5.1, 5.0 and 5.3 (Annex-2 Table 5.1).

Figure 5.1: Average household size by division

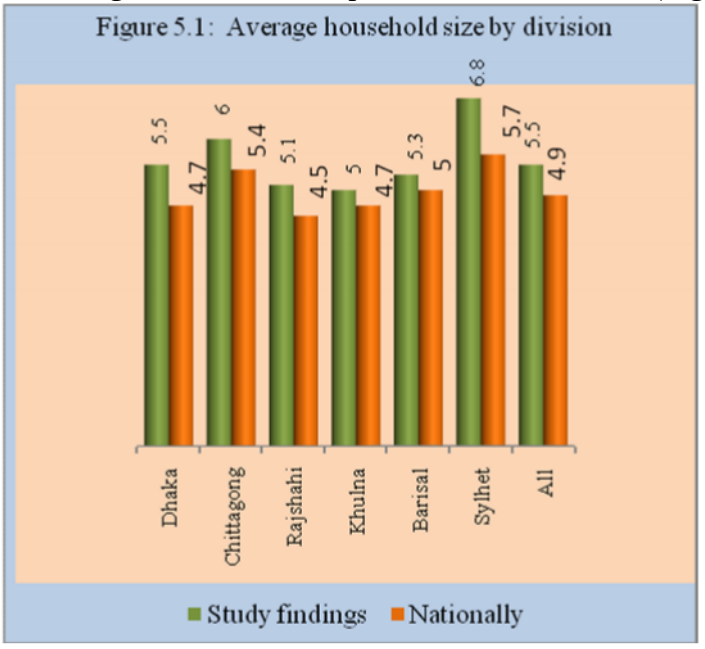


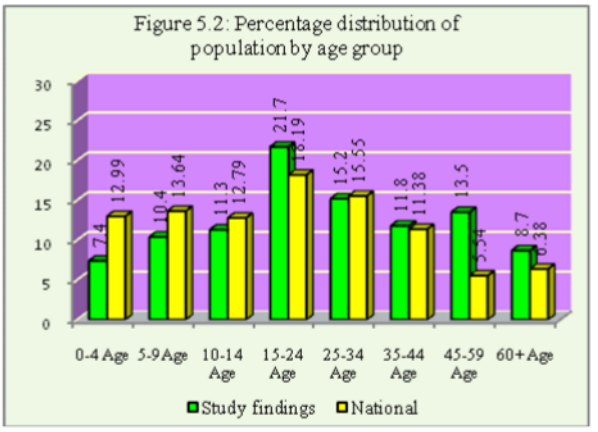
Table 5.1: Household size by farm class

Farm class	Household Size	N (member)	N (household)
Landless	5.5	3218	585
Marginal	5.2	2768	536
Small	5.4	1527	282
Medium	5.9	2147	365
Large	6.5	448	69

Among the five category of farmers the highest number of members were found in the category of large farmers (6.5) followed by medium (5.9) and landless farmers (5.5). On the other hand, the smallest size of household belonged to marginal farmers (5.2).

5.2.2 Age Structure in Different Divisions

Analysis of the age structure shows that more than half of the sampled farm household population is young, which is congruous with the overall population of Bangladesh. Thus, about 51% of the total population in farm household under survey is below 24 years of age which is similar to that of national average. About 9% of population belongs to age group above 60, years and while nationally in the same age group it is about 6.4%.



The survey reveals that in all divisions highest share of population (22%) belongs to 15-24 age group. Among the six divisions, Barisal (20%) and Chittagong (24%) have the lowest and highest percentage of population in the same age bracket (Annex Table 5.1). Second highest percentage of population is found in the age group 25-34. In this group the highest numbered household members was found in Sylhet division (17.3%) followed by Khulna (16.4%) and Rajshahi division (16.3%).

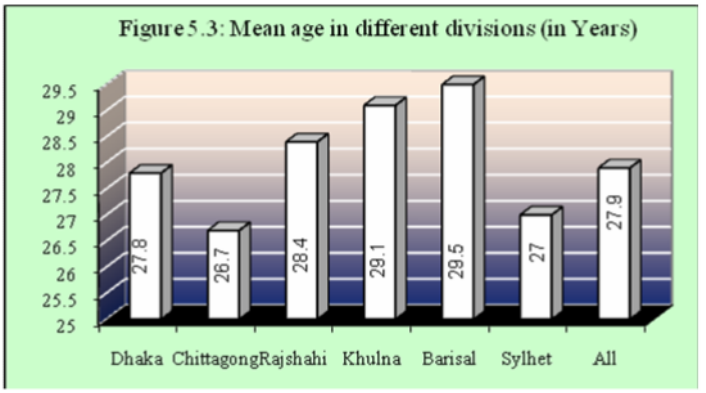
The percentage of population in the age group of 45 - 59 is also significantly high (13.5%). Among all divisions Dhaka has the highest percentage of population (14.4%) in this age bracket followed by Khulna (14%), Rajshahi (13.8%) and Chittagong division (13.4%).

The lowest proportion of population (7.4%) are children of 0-4 age. The percentage of children in this age group is relatively higher in Sylhet division (9.4%).

5.2.3 Age Structure of Different Farm Class

An analysis of age distribution of different farm class shows that landless have relatively higher population below 15 years of age. Percentage of children in 0-4 years of age is highest among marginal farmers (8.1%) and very close to landless farmers (7.9%). In the age group 5-9 landless have the highest (12.6%) while the large farm class has the lowest percentage of population (6.5%) in this age category. The highest and lowest percentage scenario in the age group of 10-14 is similar to age group of 5- 9.

5.2.4 Mean Age



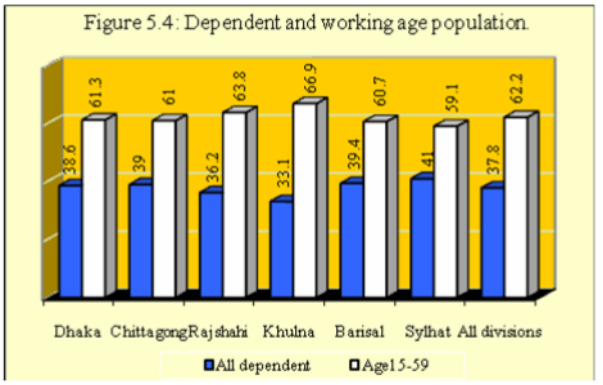
Analysis of mean age shows that the mean age in all divisions is 27.9 years. It also reveals that among 6 divisions the farm household mean age of farm household in Barisal and Chittagong are 29.5 and 26.7 years which are respectively the highest and the lowest mean of age. Mean age in other 4 divisions are 27.8, 28.4, 29.1, and 27.0 years respectively in Dhaka, Rajshahi, Khulna and Sylhet divisions.

Table 5.2: Mean age of male-female household members

Divisions	Mean age	
	Male	Female
Dhaka	28.2	27.3
Chittagong	27.6	25.7
Rajshahi	28.8	27.8
Khulna	29.5	28.7
Barisal	30.4	28.5
Sylhet	27.8	26.1
All	28.5	27.3
N	5403	4705

Gender-wise analysis indicates that mean age of male and female population are respectively 28.5 and 27.3 years. The highest mean age among male members is 30.4 years in Barisal division and the lowest 27.6 years in Chittagong division. On the contrary, in all the division mean age of female population are relatively lower than male. Among the female members, the highest mean age is found in Khulna division (28.7 years) and the lowest in Chittagong division (25.7 years).

5.2.5 Dependency Ratio



Dependency ratio refers to ratio of dependent population (population aged 0-14 years and 60 years and over) to the working age population (population aged 15-59). In the study area the dependency ratio of farm house holds of all divisions is estimated 60.7 which is lower than national 83. Analysis shows that dependency ratio in Khulna division is about 49.5 which is lower than other divisions. In Sylhet division dependency ratio is highest among all the divisions.

Table 5.3: Dependency ratio in different divisions

Divisions	Dependency ratio
Dhaka	62.96
Chittagong	63.93
Rajshahi	56.73
Khulna	49.47
Barisal	64.9
Sylhet	69.37
All Divisions	60.77

Table 5.4: Dependency ratio of different farms

Category	**Dependency ratio**
Landless	69.66
Marginal	60.00
Small	57.97
Medium	53.13
Large	50.98
All farms	60.77

Above Table (5.4) shows that dependency ratio is the highest among landless (69.66) followed by marginal farmers (60). Large farmers have the lowest dependency ratio (50.98) among all farm class.

5.3 Education

Education status is considered as one of the prime component of human capital. In this study educational attainment of farm household has been categorized by six different levels of education: Primary Incomplete, Primary completed, Secondary incomplete, Secondary completed, above secondary and No education. Analysis shows that around 20 percent members of farm households in all divisions have no education. The study also reveals that landless farm household members have the highest percentage of no education (24.9%); followed by marginal (22.4 %), small (15.5 %) and medium farm household members (14.9%). Large farm category has the lowest percentage of no education (12.1 %). Status of 'incomplete primary education' is similar to the category of 'no education'. Here the highest percentage of primary incomplete was found among members of landless farm household (26.4%); followed by marginal (21.8 %), small (19.9 %) and medium class of farmers (16.5%).

Table 5.5: Highest class passed by household members 5+ years of age (in percentage)

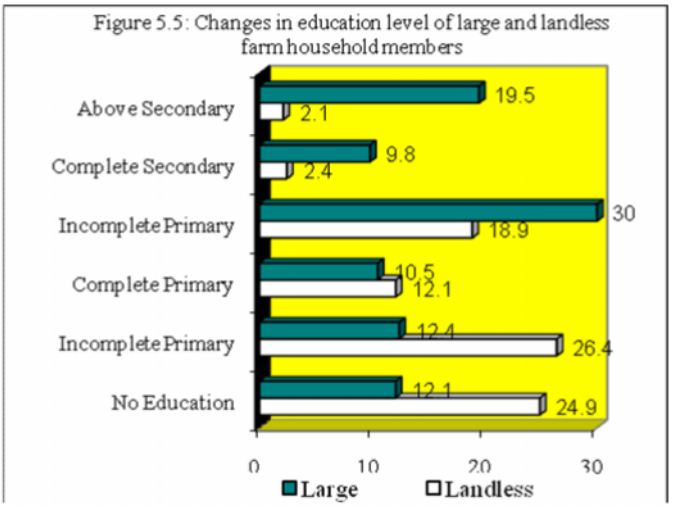
Type of farmers	Different level of education									
	No education	Incomplete primary	Complete primary	Incomplete secondary	Complete secondary	Above secondary	Non-formal education	Not referred	All	Average years of schooling
Landless	24.9	26.4	12.1	18.9	2.4	2.1	2.2	11.0	100.0	3.7
Marginal	22.4	21.8	13.6	23.4	4.8	5.2	1.8	7.0	100.0	4.6
Small	15.5	19.9	13.5	25.2	7.3	9.8	1.6	7.2	100.0	5.6
Medium	14.9	16.5	11.7	26.7	9.1	13.4	2.3	5.6	100.0	6.2
Large	12.1	12.4	10.5	30.0	9.8	19.5	1.4	4.3	100.0	7.1
All farmers	20.1	21.4	12.6	23.2	5.6	7.3	2.0	7.9	100.0	5.0
N	1878	2004	1177	2173	522	684	187	736	9361	8438

Note: Average years of schooling was calculated including categories of 'no education', 'Primary Incomplete', 'Primary completed', 'Secondary Incomplete', 'Secondary Completed' and 'Above secondary'.

It is found that 12.6% of all household members completed primary level of education. Completion of primary education is highest among marginal (13.6 %) farmers. lLarge farmers (10%) have lowest percentage of complete primary education. This is 2 percent lower than compared to all types of farm households.

The percentage of incomplete secondary (23.2%) is the highest among six categories of education level. A major decline in the percentage is visible from the category of incomplete secondary to complete secondary (23.24 to 5.67).

The percentage of farm household members those who have completed secondary education is highest among the large farmers (9.8%) followed by medium (9.1 %) and small farmers (7.3%); the rate is low among landless farmers (2.4 %). Analysis shows a sharp contrast among those categories at above secondary education level. Only 2.1% landless farmers have attained this level and it is the lowest among all class of farmers; the percentage is around 10 times higher in case of large farmers (19.5 %).



Average years of schooling among all categories of farmers is up to class 5. The average is lowest among landless farmers (class 4) followed by marginal (class 4.6) and small farmers (class 5). The highest average years of schooling is observed among large farmers (class 7).

5.4 Occupation

A total thirty-seven different types of occupation in line with the national population census of Bangladesh have been used to ascertain the occupational status of farm household members in sample areas. For each member of the household both primary and secondary occupation have been considered.

Table 5.6: Percentage of household members in primary and secondary occupations

Occupation	Primary Occupation						Secondary occupation					
	Landless	Marginal	Small	Medium	Large	All	Landless	Marginal	Small	Medium	Large	All
Farmer/cultivator	22.8	23.9	24.2	23.9	23.2	23.6	2.3	2.3	1.8	2.6	2.0	2.3
Housewife/ Homemaker	23.0	25.5	25.6	24.6	25.2	24.5	0.1	0.2	0.3	0.2	0.2	0.2
Agri. Labourer	0.7	0.4	0.1	0.2	0.2	0.4	2.6	1.2	1.1	0.4		1.4
Non-agri. Labourer	1.1	0.5	0.2	0.1		0.5	1.6	0.5	0.6			0.7
Salaried Job	2.4	3.2	3.9	2.8	3.8	3.0	0.0	0.6	0.1	0.3	0.4	0.3
Business	0.7	1.4	1.4	2.1	0.9	1.3	1.4	1.9	1.8	2.1	1.8	1.8
Student	23.6	21.9	24.7	23.9	25.0	23.4		0.0	0.2	0.1		0.1
Unemployed	3.0	2.0	1.2	1.7	0.9	2.1						
Others	9.3	8.9	7.9	9.6	10.7	9.1	4.0	4.8	3.9	3.0	3.3	4.0
No secondary occupation								72.0	74.4	78.3	78.8	81.3
Not applicable								15.9	14.2	11.8	12.5	10.9
N	3218	2768	1527	2147	448	10108	3218	2768	1527	2147	448	10108

In the survey areas, about one-fourth (24%) of all farm household members are engaged in farming. This is similar to percentage of homemakers among household members (24%). 23% are students and 12% are children. A relatively smaller number of unemployed (2.1%) members was found in the study area.

A large number of household members (81%) do not have secondary occupation. Only 2% farm household members reported farming as their secondary occupation.

5.5 Household Head Profile

5.5.1 Age

Age of household head started from the age 15 years and it ranged up to age group of above 60 years. The highest (39%) percentage of household head belongs to the age group 45-59 years. Second highest (23%) being in the age of 60 years and above. Analysis shows that the highest number of household head in the age group of 45-59 belongs to large farmers (42%), next is the medium group of farmers (41%). In the age group 60 and above, about 34.8% household heads are large farmer which is greater than other farm household categories. No household head among large farmers within the age group 15-24 years was found in the survey.

Table 5.7: Percentage distribution of age of household head

Farm class	Age group							
	15-24	25-34	35-44	45-59	60+	Total	Mean Age (years)	N
Landless	2.1	16.6	22.4	38.6	20.3	100	46.9	585
Marginal	2.1	13.2	27.1	36.8	20.9	100	46.7	536
Small	1.1	12.8	21.3	40.4	24.5	100	48.9	282
Medium	2.5	8.2	17.8	41.6	29.9	100	50.8	365
Large		8.7	14.5	42.0	34.8	100	52.3	69
All	1.9	13.1	22.4	39.1	23.6	100	48.1	1837
N	35	240	411	718	433	1837		

5.5.2 Sex

Sharp contrast was found regarding sex classification of household heads. About 98% of household head are male and 2% are female. The highest percentage of male household head were found in Rajshahi division (99.6%) followed by Dhaka division (99.1%). The highest number of female headed household was observed in Chittagong division (4%).

Table 5.8: Sex-wise percentage distribution of household head in different divisions

Division	**Sex**			
	Male	**Female**	**Total**	**N**
Dhaka	99.1	0.9	100.0	445
Chittagong	96.1	3.9	100.0	363
Rajshahi	99.6	0.4	100.0	461
Khulna	97.5	2.5	100.0	242
Barisal	97.6	2.4	100.0	165
Sylhat	98.1	1.9	100.0	161
All	98.2	1.8	100.0	1837

Table 5.9: Sex-wise percentage distribution of household head in different farm class

Farm class	**Sex**			
	Male	**Female**	**Total**	**N**
Landless	98.1	1.9	100.0	585
Marginal	98.5	1.5	100.0	536
Small	99.3	0.7	100.0	282
Medium	98.1	1.9	100.0	365
Large	92.8	7.2	100.0	69
All	98.2	1.8	100.0	1837

Sex-wise percentage distribution of household head (by different types of farms) shows that highest percentage of male headed household belongs to small category of farmers (99%). The highest percentage (7%) of female headed household is under large category of farmers.

5.5.3 Education

About 28% of farm households' head do not have any education. The percentage of having no education is highest among landless farmers (40%), next being marginal farmers which is about 10 percentage points lower than landless farmers. The rate of having no education was found lowest among large farmers.

It is noticed that the rate of incomplete primary and secondary education is about 15% and 18% respectively among all farm household head. The rate of completion of secondary education (7.4%) and education above secondary (7%) is relatively low among all farm household heads. Above secondary education the difference is too high between large (22%) and landless (2%) farmers (Table 5.11), which reflects a positive correlation between land poverty and education poverty.

Table 5.10: Highest class passed by household head (in%)

Type of farmers	Different stage of education									
	No education	Incomplete primary	Complete primary	Incomplete secondary	Complete secondary	Above secondary	Non-formal education	Not referred	All	Average years of schooling
Landless	39.8	17.3	9.1	10.6	2.9	1.7	1.0	17.6	100.0	2.6
Marginal	30.2	16.0	16.0	17.5	6.3	4.1		9.7	100.0	3.8
Small	19.9	12.4	12.4	25.9	11.3	8.5		9.6	100.0	5.2
Medium	17.5	12.9	12.9	21.6	12.3	15.1	1.1	6.6	100.0	6.3
Large	10.1	7.2	13.0	29.0	11.6	21.7	1.4	5.8	100.0	7.7
All farmers	28.4	14.9	12.5	17.9	7.4	6.9	0.6	11.4	100.0	4.3
N	522	274	230	328	136	126	11	210	1837	-

Note: Average years of schooling was calculated including categories of 'no education', 'Primary Incomplete', 'Primary completed', 'Secondary Incomplete', 'Secondary Completed' and 'Above secondary'.

The average years of schooling of household head is relatively low (4). It is the highest among large farm household head (8) and lowest among landless farmers (2.6). On average, marginal and small farmers have education respectively up to class 4 and class 5.

5.5.4 Occupation (primary/secondary)

About 90% household heads were found engaged in farming. The percentage of household head engaged in farming as primary occupation is relatively low among large farmers (83%) as compared to landless (92%) and marginal farmers (93%). The study reveals that percentage of household heads primarily engaged in business is very low among all categories (1.6%).

Table 5.11: Percentage of household heads in primary and secondary occupation

Occupation	Primary Occupation						Secondary occupation					
	Landless	Marginal	Small	Medium	Large	All	Landless	Marginal	Small	Medium	Large	All
Farmer/ cultivator	91.8	92.9	89.4	87.1	82.6	90.5	6.2	5.8	7.4	7.9	7.2	6.6
Housewife/ Homemaker	1.0	0.7	0.4	1.4	4.3	1.0	0.3	0.6	0.7			0.4
Agri. Laborer	0.2					0.1	10.6	3.7	2.5	0.5		5.0
Non-agri. Laborer	0.3	0.2				0.2	6.7	1.9	1.8			2.9
Salaried Job		0.4	2.1	1.6	1.4	0.8	0.2	2.1	0.7	1.4	1.4	1.1
Business	0.5	1.9	3.2	1.9		1.6	7.4	7.8	7.8	8.2	11.6	7.9
Student		0.2				0.1				0.3		0.1
Unemployed												
Children												
Old age people and Disable												
Others	6.2	3.7	5.0	7.9	11.6	5.8	19.0	19.2	14.5	11.5	11.6	16.6
No secondary occupation							49.7	59.0	64.5	70.1	68.1	59.4
Total	100.0	100.0	100.0	100.0	100.0	100.0						
N	585	536	282	365	69	1837	585	536	282	365	69	1837

Analysis shows that 59% household heads do not have any secondary occupation. Only 7% household heads reported farming as their secondary occupation. Business as secondary occupation is about one percent higher than farming.

5.6 Housing Status

5.6.1 Construction Material: Roof of Main House

Along with other indicators, construction material of roof of main house has been considered to assess the housing status. It is to note that in case of more than one type of roof material in the same house only the main material has been considered for the analysis.

Table 5.12: HH reported main construction material of roof of main house (in %)

Construction material	**Type of farmers**					
	Landless	**Marginal**	**Small**	**Medium**	**Large**	**All**
Tin	91.8	91.4	90.4	86.0	84.1	90.0
Tally	2.4	2.4	1.1	1.1		1.9
Golpata/Chon/Jute stick/ leaves	5.3	4.3	3.2	4.7		4.4
Bamboo/polythene		0.6	0.4	0.3		0.3
Concrete	0.5	1.3	5.0	7.9	15.9	3.5
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	585	536	282	365	69	1837

Most of the farmers (90%) stay under tin shaded roof. Among the farmers using ‘tin’ as roof material, the landless farmers (92%) are highest in percentage followed by marginal (91%) and small farmers (90%). About 3% farmers were found using concrete as roof material of

main dwelling house. The percentage of farmers using concrete as roof material is significantly high among large farmers (16%) which is almost 30 times higher than the use of concrete as roof material of landless farmers (only 0.5%).

5.6.2 Construction Material: Wall of Main House

Analysis reflects that 50% farmers used tin as wall material of main dwelling house, the rate (of using tin wall) is the highest among marginal (55%) and lowest among medium farmers (39%). The use of brick wall in main dwelling house is noticeable. Among all farmers (17.6%), a good number of large farmers (38%) have constructed brick wall.

Table 5.13: HH reported main construction material of wall of main house (in %)

Construction material	**Type of farmers**					
	Landless	Marginal	Small	Medium	Large	All
Tin	52.3	55.0	51.4	38.9	39.1	49.8
Bamboo/Wood	10.8	9.1	8.5	10.4	11.6	9.9
Mud	13.2	12.9	16.0	10.4	7.2	12.7
Straw/Jute stick/Leaves/ Golpata/Chon	16.6	10.1	3.9	4.9	4.3	10.0
Brick	7.2	12.9	20.2	35.3	37.7	17.6
Total	100.0	100.0	100.0	100.0	100.0	100.0
N	585	536	282	365	69	1837

5.6.3 Construction Material: Floor of Main House

Analysis shows that most of the farmers have used mud or sand on floor of their dwelling house (84%). About 14% farmers have concrete or brick on their house floor. Percentage of concrete or brick built floor is the highest among large farmers (39%), which is significantly higher than other farmers. Very few landless farmers have concrete or brick on the floor of their main dwelling house (5%).

Table 5.14: HH reported main construction material of floor of main house (in%)

Construction material	Type of farmers					
	Landless	Marginal	Small	Medium	Large	All
Mud /Sand	93.5	86.8	82.3	72.3	58.0	84.3
Wood/Bamboo	1.2	1.5	1.8	2.2	2.9	1.6
Concrete/ brick	5.3	11.8	16.0	25.5	39.1	14.1
Total	100.0	100.0	100.0	100.0	100.0	100.0

5.6.4 Electrification Status

Electrification status shows that about 54% farmers have electricity in their house. It is to be mentioned that electrification status depends on whether the area is electrified. Here we noticed that within the same area different category of farmers have different status of having electricity. Among different type of farmers the highest rate of electrified house belongs to large farmers (65%) followed by medium (61%) and small farmers (60%). Among landless farmers (44%) have electrified house

CHAPTER VI
LAND OWNERSHIP AND CROP SHIFTING PATTERN

6.1 Introduction

One of the objectives of the study was to investigate if farmers are concentrating on crops which have lesser significance in terms of food security than rice or wheat; on the same time there is a growing concern that farmers are moving away to crops which uses less inorganic fertilizer because of untimely availability. To study these issues crop shifting pattern is analyzed in this chapter.

6.2 Land Ownership Pattern

In order to have an idea about land ownership pattern relevant data and information has been gathered during the survey. The findings reveal that farmers having more land are relatively less engaged in cultivation.

According to official source, percentage of landless farmer is 60.5%, marginal farmer is 12.4%, small is 17.6%, medium is 8.7% and large is 1.6%[source: HIES 2005]. While the study reveals that about 31.8% farmers are landless, and 29.2% are marginal. Percentage of medium farmer having ownership of land is about 20% which is 5 percent higher than small farmers 15.4%. Large farmers belong the smallest percentage of land ownership (about 4%).

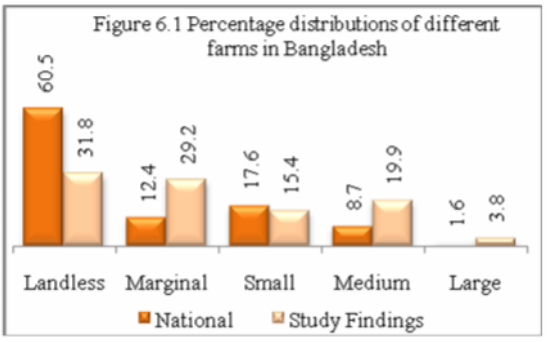
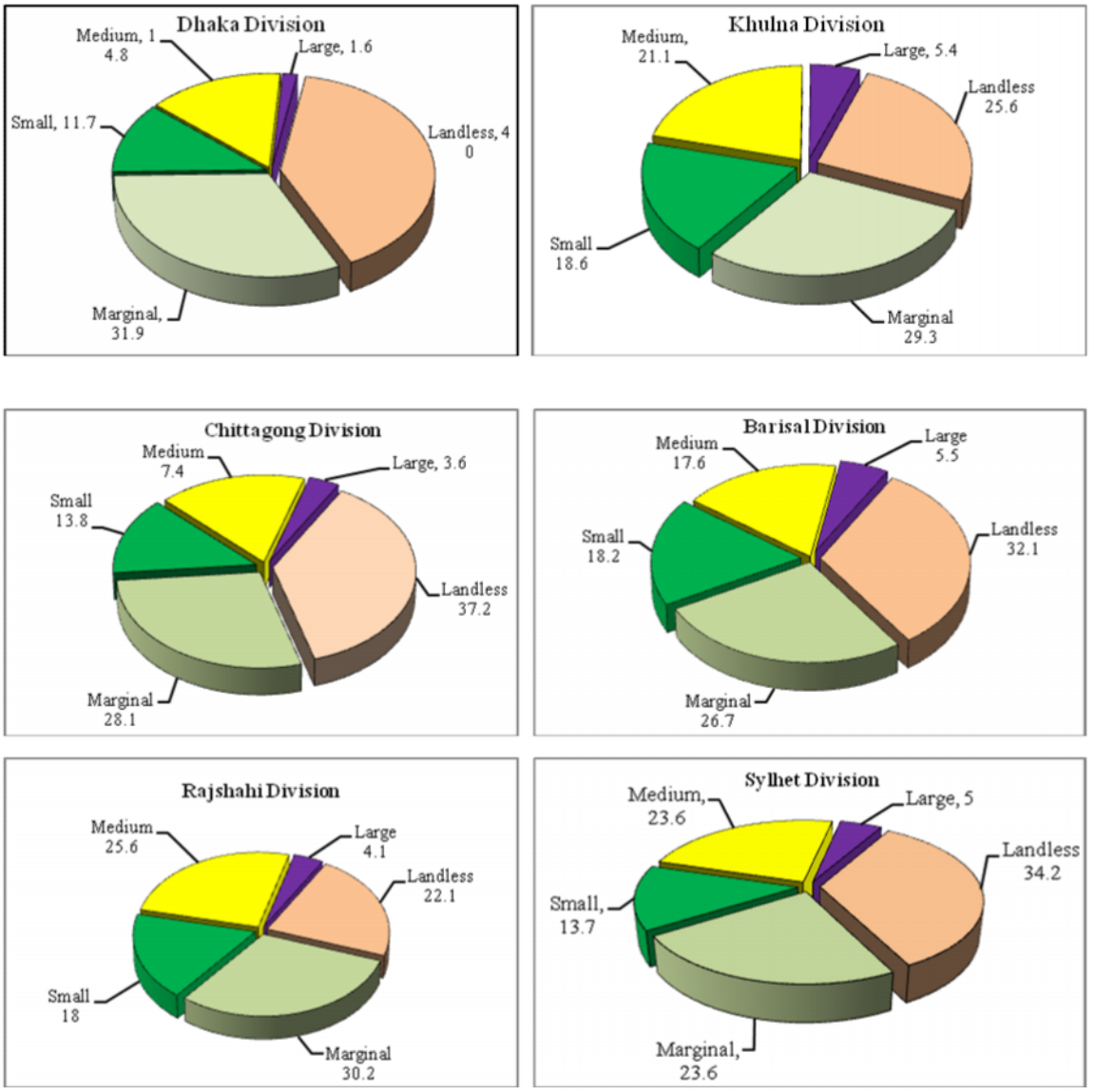


Figure 6.1 Percentage distributions of different farms in Bangladesh

In different divisions percentage distribution of farmers possessing land has similarity. In Dhaka division, the highest number of farmers were found in the category of landless (40%) followed by marginal (32%), Medium (15%) and small (12%). Only 1.6% farmers are large farmers.

In Chittagong division number of landless farmer is more than one-third of all farmers (about 37%), which is also the highest among five category of farmers. Marginal farmers also have significant percentage (28%). In descending order in terms of land ownership, third position belongs to the medium farmers (17.4%) followed by small farmers (about14%). In Chittagong division large farmers have the smallest percentage (3.6%).

Figure 6.2: Land ownership pattern in different divisions



It is observed from the study that in Rajshahi division marginal farmers (30%) are in highest position of land ownership followed by medium (25.6%), landless (22%) and small farmers (18%). Percentage of large farmers is the smallest among all farm categories (4%).

Analysis shows that in Khulna division percentage of marginal farmers are higher (29.3%), than other farm groups. The percentage of landless farmer are also higher (25.6%). Whereas the percentage of large farmers is the smallest (5.4%).

It is found that in Barisal Division landless farmers (32.2%) are highest in number among all farm class followed by marginal (about 27%) and small farmers (18.2%). Position of medium farmers (18.2%) is only one percent lower than small farm (17.6%) but 12 percent higher than category of large farmers.

About 34% of farmers in Sylhet division are landless, which is also the highest number among all farm groups. Percentage of, both marginal and medium farming class in this division belongs the second position (23.6%). Only 5% farmers were found in large group.

6.3 Nature of Crop Shifting

Fertilizer plays an important role behind crop cultivation. On the other hand farmers are independent to cultivate crops. Here question remaining “does availability of fertilizer is playing role to change farmer’s practice on cropping? To address this issue an attempt is made to obtain an assessment of the pattern of crop shifting and accordingly farmers were asked about the name and acreage of crops they have cultivated at present and five years ago.

6.3.1 Land use in Cropping

Farmers were asked about amount of land they used for each crop at present and five years before the survey. Analysis of data reveals that land use for Aus reduced a little but land use for Aman is almost close to previous period and in case of Boro land use increased to higher amount. The study finds that on an average 29.12 decimals of land was used for Aus which have decreased to 23.04 decimals. In the case of Aman it was 141.14 decimals previously and now it stands at 144.91 decimals. In the case of Boro it was 110.6 decimals earlier and now it has increased to 131.44 decimals. These figures have similarity to national data (see annex table 6.3). Qualitative data also reflects similar picture (box 6.1), where farmers explained their interest to produce boro.

Recall data may have some biases therefore we also analyze official data about cropping pattern. National data reflects that total amount of land use for different variety of paddy has increased from 9278.70 thousand hectare to 10529.09 thousand hectare within 1971-72 to 2005-6. Among different crops land use is the highest on different types of paddy. Among different variety of paddy it was noticed that land use on the variety of Aus has decreased from 3001.60 thousand hectare to 1034.27 thousand hectare within the same period of time (from 1971-72 to 2005-06). Estimates from official data shows that by 2007-08 it (total land use for Aus) has reduced to 9186.38 thousand hectares. It is to note that Aus was one of our main crop once even in the year of 1971-72 land use for this variety was more than 2100 thousand hectare than that of Boro. Although Aus does not require heavy inputs like fertilizer, it is highly dependent on weather factors and its productivity is lower which has made it less popular among farmers.

Table 6.1: Amount of land use for major three variety of paddy in the national data

(In thousand hectare)

Year	Aus	Aman	Boro	Total Rice
1	2	3	4	5
1971-72	3001.60	5410.70	866.40	9278.70
1972-73	2930.00	5713.80	1002.60	9646.40
1973-74	3107.90	5718.70	1222.70	10049.30
1974-75	3179.10	5449.90	1161.20	9790.20
1975-76	3419.90	5759.90	1147.90	10327.70
1976-77	3217.10	5806.40	854.20	9877.70
1977-78	3161.70	5771.20	1093.70	10026.60
1978-79	3234.60	5805.10	1071.80	10111.50
1979-80	3036.30	5972.70	1148.40	10157.40
1980-81	3111.20	6035.80	1160.00	10307.00
1981-82	3145.60	6010.30	1301.70	10457.60
1982-83	3158.10	5993.00	1432.80	10583.90
1983-84	3138.70	6006.70	1401.20	10546.60
1984-85	2937.60	5710.20	1574.40	10222.20
1985-86	2844.90	6018.90	1533.20	10397.00
1986-87	2903.60	6052.40	1651.70	10607.70
1987-88	2788.30	5590.40	1942.60	10321.30
1988-89	2683.46	5100.80	2438.30	10222.56
1989-90	2255.00	5702.50	2453.60	10411.10
1990-91	2107.30	5775.30	2547.90	10430.50
1991-92	1915.90	5692.30	2634.90	10243.10
1992-93	1735.10	5843.70	2598.90	10177.70
1993-94	1649.40	5843.30	2580.80	10073.50
1994-95	1663.75	5594.17	2663.54	9921.46
1995-96	1541.85	5646.40	2753.57	9941.82
1996-97	1592.29	5802.49	2782.59	10177.37
1997-98	1565.88	5808.45	2888.56	10262.89
1998-99	1424.26	5165.50	3526.67	10116.43
1999-00	1351.32	5704.87	3651.89	10708.08
2000-01	1325.23	5709.96	3761.84	10797.03
2001-02	1242.18	5647.22	3771.34	10660.74
2002-03	1243.72	5682.11	3844.84	10770.67
2003-04	1202.58	5677.61	3943.50	10823.69
2004-05	1024.68	5279.92	4063.79	10368.39
2005-06	1034.27	5429.01	4065.81	10529.09

Source: Bangladesh Bureau of Statistics (BBS)

Box 6.1: Change of crop in a locality

The study team talked to Mr. Bachhu Miah (65) a small farmer of village *Paniarup* under *Kainpur* union of *Kosb*a upazila, under Brammanbaria district. He had been farming for more then 40 years. Bachhu Mia explained that crop cultivation in his area has evolved in he last decades from various crops and vegetables to rice. 25 years earlier he himself cultivated crops and vegetables like *masur dal, Khesari, maskolie*, jute, potato, chilly, wheat etc ,which require less fertilizer then rice which is the only crop is cultivates now. He mentioned that in Paniarup crops grows twice a year and 'Boro' paddy, which requires more fertilizer is getting very popular among farmers for its high productivity and lower riskiness. This is why overall fertilizer demand has increased in Paniarup. He also felt that the quality of fertilizer had deteriorated in such way that farmers need to apply more fertilizer. As a result of this, the overall use and real demand of fertilizer increased.

National data shows that land use for Aman has remained similar over time. In the year of 1971-72 total land used for Aman production was 5410.70 thousand hectare and in 2005-6 it was 5429.01 thousand hectare which indicates that its popularity among farmers has not decreased like Aus.

From national data we notice that land use for the variety of Boro increased significantly over the last decades. in 1971/72, total land use for Boro was 866.40 thousand hectare which increased to 1301.70 thousand hectare by 1981-82. This increased to 2634.90 thousand hectare in the next ten years and again to 3771.34 thousand hectare in the next ten years. By 2007-08, this number had reached 4607.71 thousand hectares (estimated from official data). Although Boro requires more inorganic fertilizer and other inputs, farmers are concentrating this crop because of its high productivity. From this data (as well as from our survey findings), we see that farmers are not shifting from certain crops due to its high use or high demand of fertilizer, here farmers are mostly considering high productivity of crop.

The study shows that average amount of land under potato cultivation increased from 4.40 decimal to 5.62 decimal during five years. It is to note that the year before the survey selling price of potato was higher which attracted farmers to cultivate potato. Survey data also provides support for the statement. National data shows that land use for potato cultivation was 74.0 thousand hectare in 1971-71 which increased to 107.6 thousand hectare in 1981-82, in 1991-92 it increased to 127.9 thousand hectare and finally in 2005-6 it increased to 301.2 thousand hectare. This shows increasing trend of potato cultivation.

Farmers recall data shows that average land use for jute cultivation has increased from 3.79 decimal to 4.37 decimal. Only cultivation increased from 3.28 decimal to 5.04 decimal by landless farmers[44]. National data shows that total land use for jute was 678.2 thousand hectare in 1971-72 which increased to 571.3 thousand hectare in 1981-82 but in 2001-02 it decreased to 448.2 thousand hectare and in 2005-6 it decreased to 399.0 thousand hectare.

Survey data shows that average amount of land use for maize increased from 0.65 decimal to 2.13 decimal. Official data also reflects increasing land use on maize cultivation (Annex 2, table 6.3).

6.3.2 Shift from Certain Crops

In our survey, only 7.13% farmers were found not to cultivate the same crop they cultivated five years ago. Among these farmers the highest percentage of cases of shift observed was in the case of Aman (64.9%) followed by Boro (55%)(72 farmers), Aus (19.1%), Potato (19.1%), Mustard (13.7%), different oilseeds (11.5%), Maize (10.7%) and Jute (9.2%). About 64.9% farmers reported less profitability and 14.5% natural factors behind their shift from Aman.

It is found that a total number of 21 of landless farmers have changed cultivation of crop type. Among those landless farmers 57% are not cultivating Aman, 47.6% shifted from Boro, 19% from Jute, 19% from different oil seeds, 14.3% from Aus, 14.3% from Tobacco, 14.3% from Maize. Therefore, the highest cases of shifts in the landless category is actually from Aman, the second highest is Boro.

[44] Note: In Bangladesh share cropping and cultivation on rented land is a normal practice since long time. Thus and so in most of the case landless, marginal and small farmers cultivates on other farmers land.

In the category of marginal farmers only 37 were found to shift their crop type they cultivated five years ago. Among these cases of crop shifts 62.2% farmers shifted themselves from Aman, 59.5% from Boro, about 19% from both Aus and mustard, about 11% from Chilly. Here again shifts from Aman overtake the number of cases of shifts from Boro or other crops.

In the survey 29 farmers in the category of small farmers shifted their crop type. Among them around 83% changed crop from Aman, 65.5% Boro, 27.6% changed potato, 17.2% Mug (pulse), 13.8% Mustard, 13.8% Maize and 10.3% Aus they cultivated five years before. Therefore shift from Aman is a more common case.

Number of medium farmers changed their crop are relatively high among other farm class (40). Of them 57.5% shifted from Aman, 50% from Boro, 25% from Aus, 22.5% from Potato, 15% from different type of pulse, 15% from mustard, 15% from different type of oilseeds and 10% from tobacco.[Annex 2, Table 6.4(a), 6.4(b)]

6.4 Conclusion

The study reveals that paddy production has retained the highest position among all crops. Boro requires high amount of inorganic fertilizer but the total amount of land use for Boro has been increasing for the last four decades. It indicates that farmers are not shifting from crops just because of high price or high demand for fertilizer. The incidence of shift from previous crops is rather small (131 out of 1837), which implies some stability in the choice of crops among farmers.

CHAPTER VII
AGRICULTURAL CREDIT

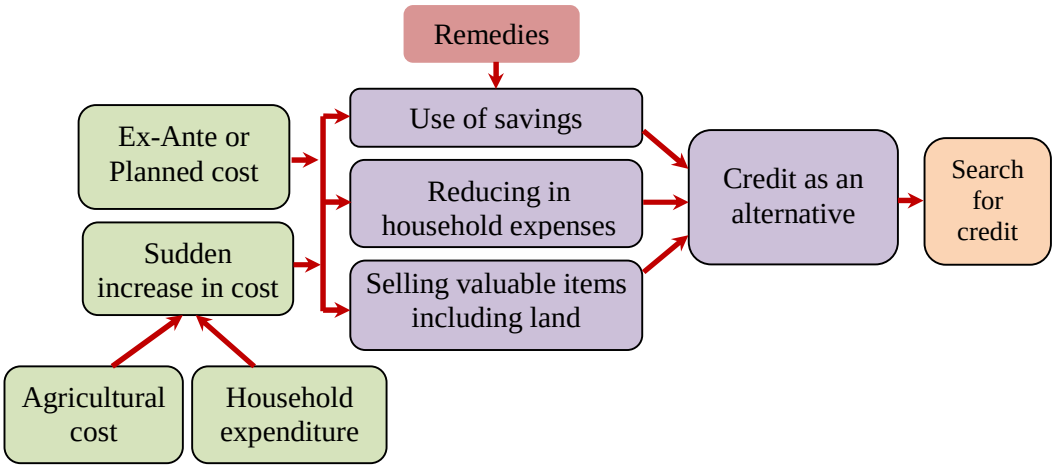
7.1 Introduction

For smooth functioning of economic activities even and anon farmers need to borrow money from different sources. Behind the choice of these source various factors like social aspect, access to various sources, long term relationship, tradition as well as reliability play vital role. In Bangladesh, farmers usually collect credit from institutional sectors like banks, NGOs and informal sectors like traditional money lenders known as *Mohajons*, influential rich persons, local organizations (known as *Samiti*), neighbours and relatives.

Farmers may need credit for various reasons but question remains whether credit collection has any relation with fertilizer collection, its price or time of its collection. So, various aspects were analyzed in this chapter to find out relation between credit and fertilizer.

7.2 Credit Scenario

Figure 7.1: Flow chart showing the reasons for credit.



Although, large numbers of farmers were not asked directly about reasons behind credit, some qualitative interview was arranged to develop an idea in this aspect. In most cases farmers have an idea of possible costs before starting cultivation. Sometimes, overall costs may suddenly increase because of the increase in other agricultural costs or household needs. In both cases, generally farmers use their savings, in some cases they try to reduce household expenses. In such instances farmers sell different valuable household items or even land property. When farmers face any liquidity problem they search for credit.

7.3 Sources of Credit

The study reveals that around 38% of all farmers have taken credit for agricultural activities. In terms of household numbers, credit collection is highest among landless farmers (265 households) followed by marginal, medium, small and large.

The study shows that farmers' credit collection from their relatives and neighbours (30.4%) is significantly high followed by sources like NGOs (about 28%), Krishi bank (17%), local mohajon (6.6%), government bank (5.6%) and local samiti (5%). Credit collection from private banks and influential rich person is not very high in terms of percentage (only 2.6% and 2.4%) [see Figure 7.2].

Significant number of landless farmers collected credit from their friends and relatives (36.6%) next being different NGOs (32.1%). Only 3.4% landless farmers collected credit from government banks which shows how government banks have a greater scope to expand their services in this sector. Qualitative data shows some time and less farmers face difficulties from informal credit sources (example on box 7.1 and 7.2).

Box 7.1: Credit from Mohajon/Aratdar is difficult

In Zikhorgacha upazila of Jessore district, it was found that needy farmers take loans especially from market *Arotdars* who deals with paddy and jute. Here the condition is such that, after cultivation, the farmer is to sell the total crop output to the Arotdar/Businessman. These Arotdars have a network in local markets and if the farmer tries to sell his crops somewhere else then the Aratdar may promptly find out. In that case farmers have no option to sell it elsewhere. At the time of procurement, farmers are paid 40 to 50 taka less for every *maund* of crop. This procurement price was fixed when the credit was given. Aratdars control the procurement by fixing the price so that farmers can not gain any economic strength. In reality, farmers are unable to pay back the total amount of credit they take and are obliged to take credit from the same Aratdar in the next season.

In the category of marginal farmers the highest amount of credit is taken from NGOs (31.4%). Credit from relatives and neighbours is about one percentage point less than NGOs (30%). Marginal farmers collected (15%) credit from Krishi bank. The percentage of marginal farmers (5.8%) collected credit from government banks is relatively smaller.

Like landless and marginal, small farmers have taken the highest amount of agricultural credit from relatives and neighbours (28.4%). Percentage of credit from NGOs is (27.4%). Among other sources, small farmers' credit is relatively high from Krishi bank (21.1%) and mohajons (10.5%). Only 5.3% small farmers were able to collect agricultural credit from government banks.

Box 7.2: Crop as an alternative to interest

In *Pathar ghata* upazila under Borguna district, a large amount of credit was taken by landless farmers from *Mohajon*. *Mohajons* give credit for 6 months. Most of the farmers of *Pathar ghata* had to collect credit to cultivate *Boro* in the Bengali month of *Agrahayon* (15th November- 15th December) and return it in the month of *Choitro* (March-April) . Farmers reported that for Tk. 1000 taken as credit from *Mohajon* for six months, they had to pay Tk 1000 plus one *Maund* of paddy (which costs Tk 450 in that season) as interest paid by kind.

Medium and large farmers' credit scenario is different from other farm categories. About 40% medium and 58.3% large farmers have collected credit from Krishi Bank. Credit from NGOs is relatively low among medium and large farmers (13.6% medium and 12.5% large) (Annex 2, table 7.1)

Figure 7.2: Agricultural credit from different sources (in%)

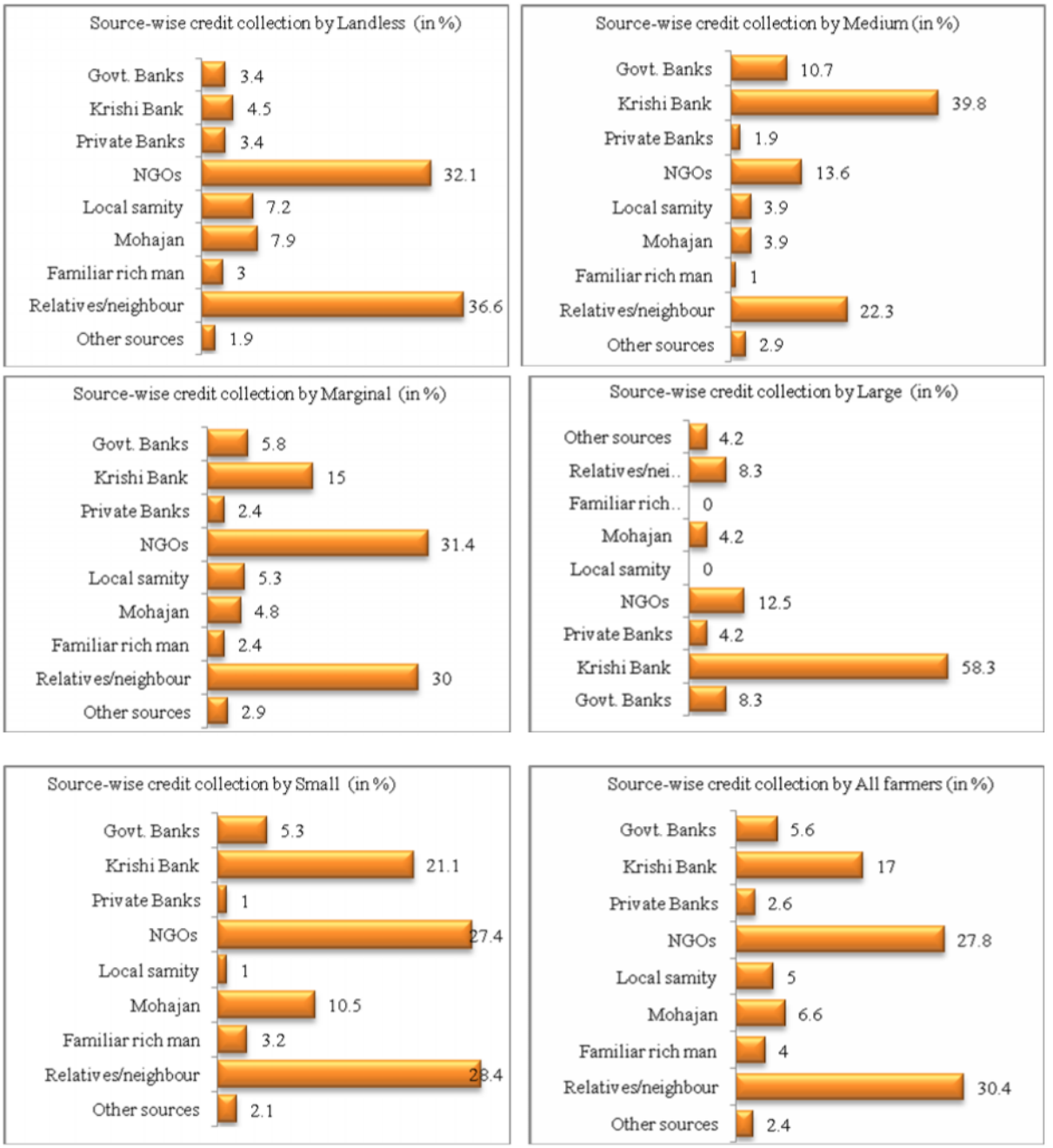


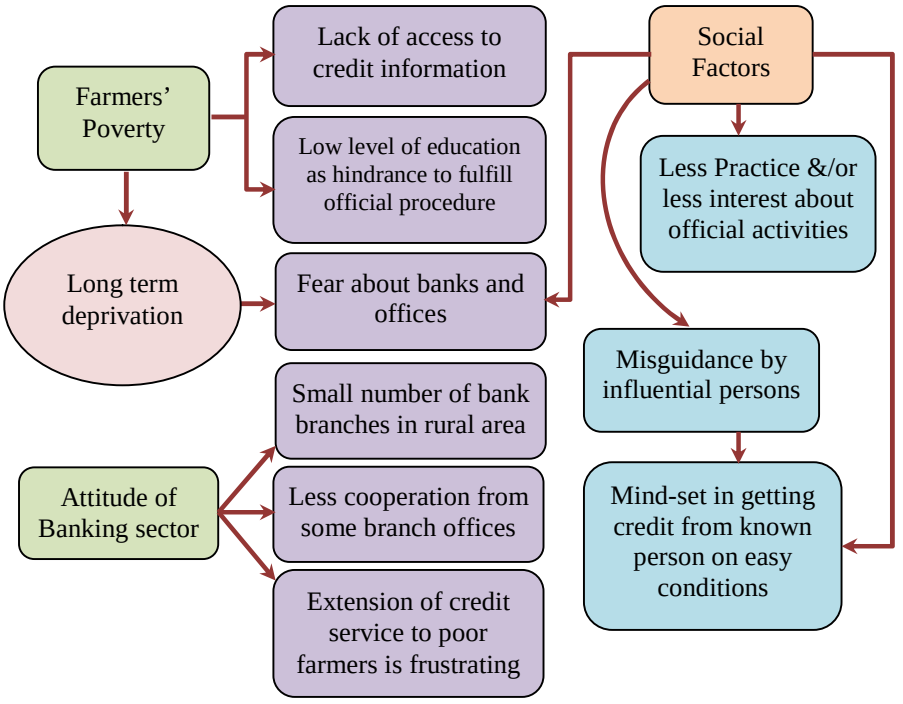
Table 7.1 Credit from formal and informal sources

Source of credit	Formal		Informal				All		Total
	All banks	NGO	Local samiti	Mohajon	Influential rich men	Relatives/neigh-bour/ others	All formal	All informal	
Land less	11.3	32.1	7.2	7.9	3.0	38.5	43.4	56.6	100
Marginal	23.2	31.4	5.3	4.8	2.4	32.9	54.6	45.4	100
Small	27.4	27.4	1.1	10.5	3.2	30.5	54.7	45.3	100
Medium	52.4	13.6	3.9	3.9	1.0	25.2	66.0	34.0	100
Large	70.8	12.5		4.2		12.5	83.3	16.7	100
All	25.2	27.8	5.0	6.6	2.4	32.9	53.1	46.9	100
N (incidence)	175	193	35	46	17	228	403	291	694

Note: Here government banks, private banks, Krishi bank and NGOs are considered as formal and others are considered as informal sources of credit.

Overall data shows that as more than half of landless farmers (56.6%) collected agricultural credit from informal sources. 45.4% marginal and 45.3% small farmers have taken credit from informal sources. On the other hand, 66% medium farmers and significant number of large farmers (83.3%) collected credit from the formal sectors. This reflects that large farmers have a great access to formal credit institution.

Figure 7.3: Reasons behind poor farmers' less access to banking sector and credit facilities.



Box 7.3: Development on banking process

It is to note that the idea regarding poor farmers was developed by interview collection on October 2009, thus response about latest banking procedure applied by all government banks by targeting poor farmers was not possible to learn.

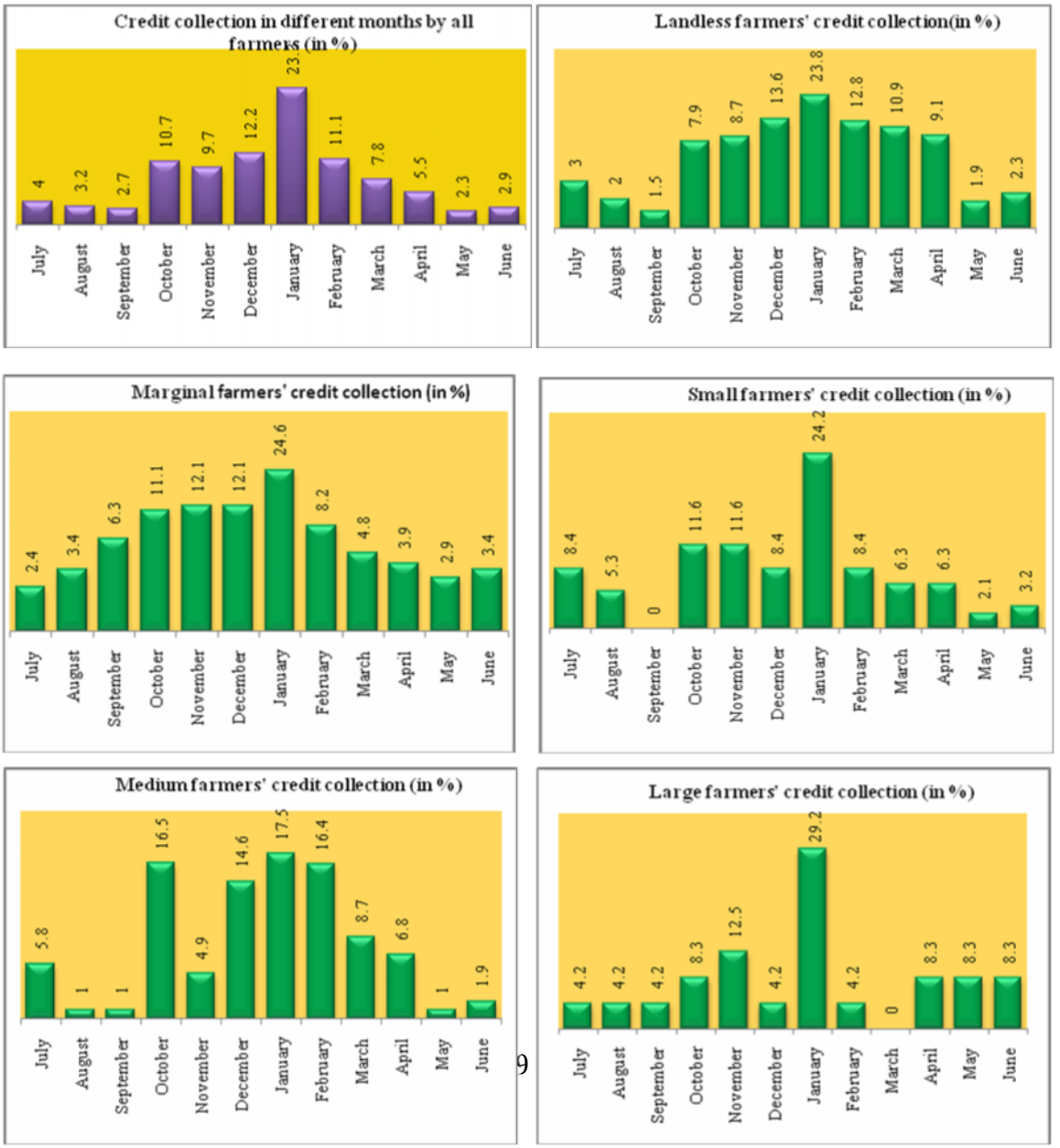
The study team did not directly ask poor farmers about the reasons behind their lower access to formal credit. However, from various qualitative interviews, a number of reasons regarding this issue were identified. These were: lower awareness and lack of knowledge about formal sources of credit, low education level of poor farmers as a barrier to fulfill official procedure (see Figure 7.3). At the same time fear of harassment was also developed among a lot of poor farmers. Besides, discouragement and misguidance by local people, especially by influential people, lower acquaintance with official activities also play some role. Sometimes, poor farmers think that it is easier to take credit from known person like friends, relatives and neighbours. Moreover, the number of branches of different banks in rural areas is small compared to NGOs. Previously, the banking sector had not been developed by targeting poor farmers. Currently (after end of survey) Bangladesh bank is taking different steps with special attention to poor farmers but the result was not learned by on the study (see Box 7.3). A conception prevails among poor people that they are neglected by most of the sectors in the society.

7.4 Month/Season of Credit Collection

Farmers were asked about name of the month when they collected credit. The highest credit collection was in the season of *Boro* cultivation. Survey data shows that agricultural credit by all farmers increased from 2.7% to 10.7% between September and October. In November it remained close to the previous month's credit (9.7%). In December, it increased to 12.2% and in January to a significant 23.3%. The proportion of farmers collecting credit in February, the period after *Boro* cultivation season, is also high: 11.1%.

A similar credit collection pattern has been found among all categories of farmers. It is to note that a sharp increase in credit-taking by landless farmers takes place from October and continues up to the month of March. In the month of January the highest number of landless farmers (23.8%) collected credit for cultivation. In taking credit, the marginal farmers shared similarities with landless farmers. In the study area, credit collection during August to September improved from 3.4% to 6.3% which again jumped to 11.1% in October to marginal farmers. In November percentage of marginal farmers' collecting credit increased again up to 12.1% and remained the same in next month. In January their credit collection became double and reached to 24.6%.

Figure 7.4: Month-wise credit taken by different categories of farmers



All farmers did not report anything about their collection of credit for cultivation in August but 11.6% of the same category of farmers collected credit at the inception of Boro season in September and it remained the same in November. In December, 8.4% small farmers collected credit for cultivation which increased significantly in January (24.2%). In February credit taken by small farmers' decline to 8.4% and continue to decline in the next months.

There was a sharp rise in collection of credit by medium farmers: from 1% to 16.5% in September to October. The study reveals that 14.6% medium farmers collected agricultural credit in December and in January it improved to 17.5%. The study also shows that at the last stage of Boro season (in February) large number of medium farmers (16.5%) collected agricultural credit.

Like other farm categories, credit was collected at increasing rate by large farmers during the Boro season. The percentage of credit collection by this farmers' group increased from 8.3% to 12.5% during October to November. Another rise was found from 4.2% to 29.2% in December to January (Annex 2, Table 7.2).

The overall credit scenario indicates that farmers need economic support from the month of October. The demand for credit continues for the next four months. However, the highest demand for financial support is in January[45]. In these circumstances, government banks should extend their banking services to farmers on easy terms and conditions during the month of October to late February.

7.5 Credit for Different Crops

Farmers in the study area were asked about the crop for which they had collected credit. It was found that significant number of farmers had collected credit to cultivate Boro (66.4%). This corroborates the scenario found for the main months of credit collection (section 10.6.2). Next to Boro, farmers' credit collection is highest for Aman paddy (about 12%) followed by Aus (6.6%), potato (5.3%), jute (5%), tobacco (2%), maize (1.7%) and different variety of pigeon –pea or pulse (1.6%).

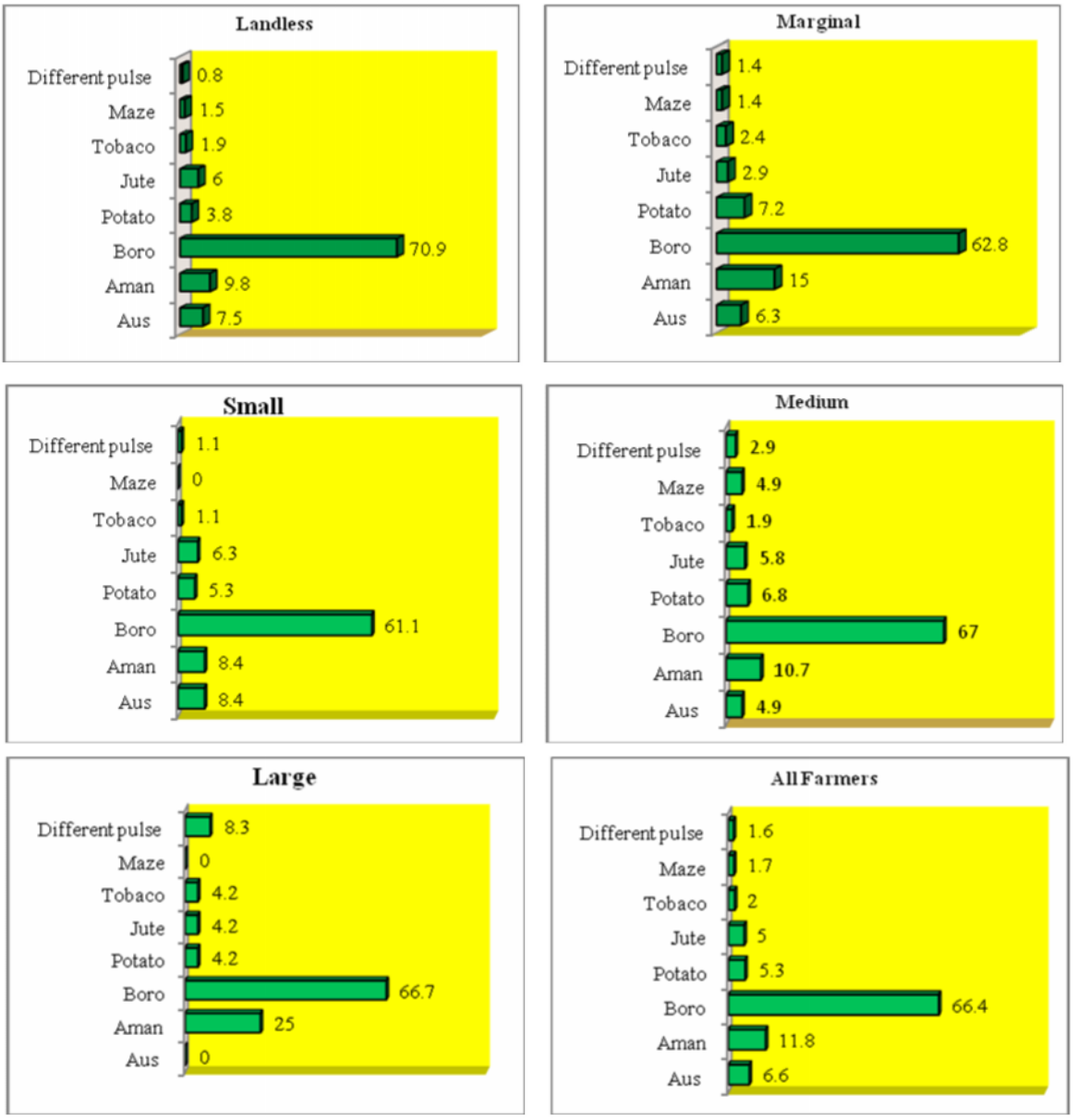
Analysis shows that quite a large number of landless farmers collected agricultural credit to cultivate Boro (about 71%). Collection of credit for Aman is in the second position but less than one-seventh (9.8%) as compared to the number of landless farmers collecting credit for Boro. On the other hand, about 2% less number of landless farmers collected credit for Aus (7.5%). To cultivate jute, 6% farmers of the same category collected agricultural credit.

The highest proportion of marginal farmers (62.8%) collected credit for Boro followed by Aman (15%), potato (7.2%), Aus (6.3%) and jute (2.9%).

The survey indicates that 61.1% small farmers collected credit for Boro cultivation. For both Aus and Aman, the same proportion of small farmers (8.4%) collected agricultural credit. Farmers' credit collection to cultivate jute is about two percentage point lower than for Aus or Aman. About 5.3% potato cultivators from small farm category collected agricultural credit.

[45] Note: The reason for highest credit collection in January was not learned in this study but new study regarding this issue may give its answer.

Figure 7.5: Crop-wise credit collection by different types of farmers (in%)



A significant number of medium farmers collected credit for Boro cultivation (67%). 10.7% of farmers of the same category had to collect credit for Aman. For cultivation of both jute and potato number of medium farmers (5.8%) collected credit was same.

It is reported that a highly mentionable number of large farmers (66.7%) collected credit for Boro cultivation.

From the above discussion it is clear that a large number of farmers of all categories were in need of credit for Boro. A big number of farmers also collected credit to produce other variety of paddy, jute and tobacco (Annex 2, Table7.3).

7.6 Use of Credit

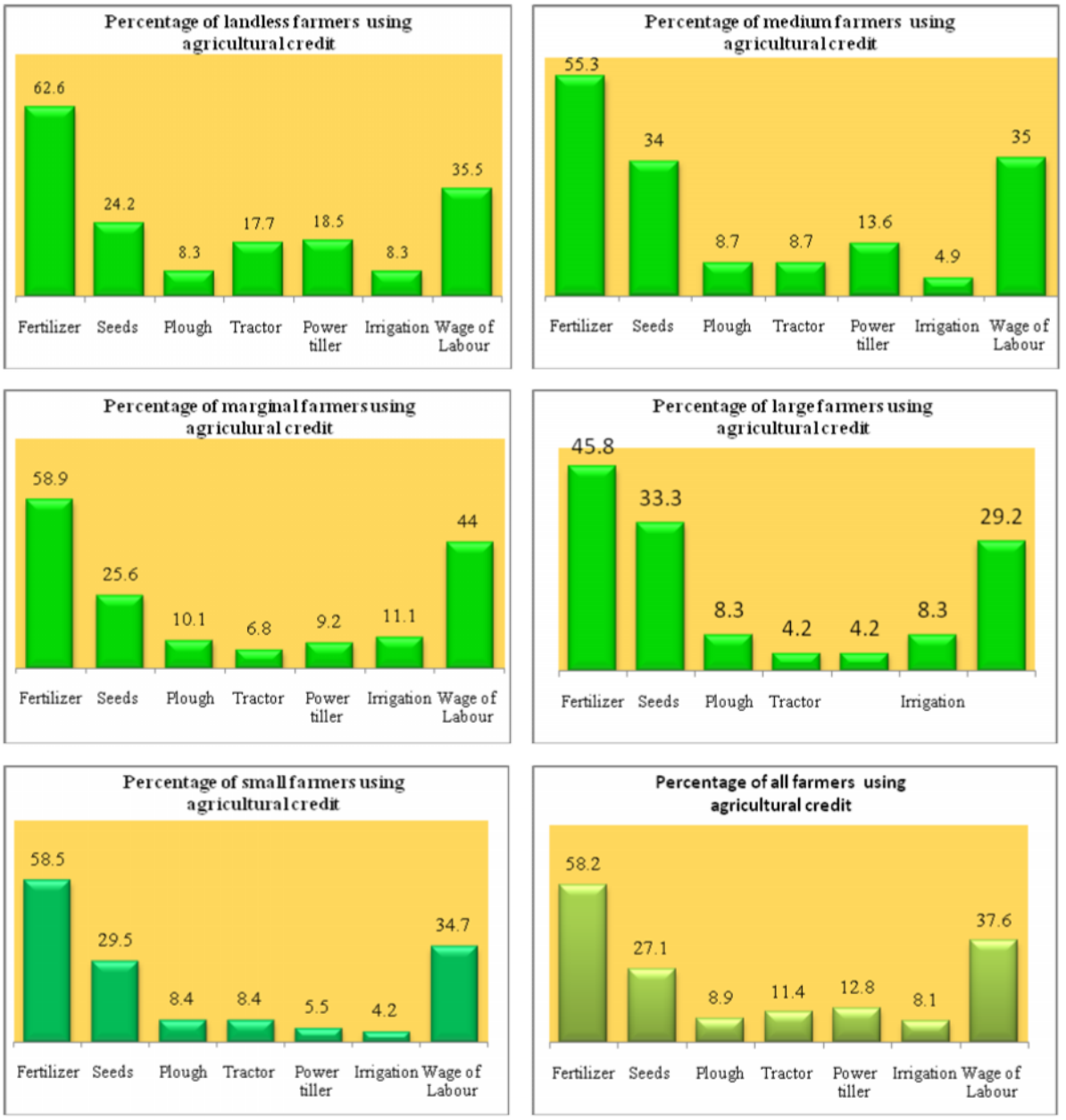
This section deals about the use of agricultural credit for different agricultural inputs. Accordingly, the study shows that 58.2% of farmers used credit to procure fertilizers. 37.6% of farmers have used credit to pay wage of labourers and 27.1% farmers to procure seeds. Power tiller cost was paid by 12.8% farmers' who collected credit and 11.4% farmers used credit for the use of tractor.

The majority farmers of all categories used credit to procure fertilizer. Among them 62.6% landless, 58.9% marginal, 55.3% medium, 50.5% small and 45.8% large farmers purchased fertilizer using credit they borrowed from different source.

A large number of farmers paid wage of agricultural labor from the support of this system of credit. Wage payment by credit support was found higher among marginal farmers (44%) followed by landless (35.5%), medium (35%) and small (34.7%). Relatively small number of large farmers (29.2%) paid agricultural wage by credit.

Except medium farmers, gradual change (from landless to large farm group) is clearly seen regarding the payment of power tiller service scenario by credit money. Among five farm categories number of landless is the highest (18.5%) in using credit for power tiller followed by marginal (9.2%) and small (6.3%). Percentage of large farmers is the lowest (4.2%) in the use of agricultural credit for power tiller cost. (Annex 2, Table 7.4)

Figure 7.6: Percentage of different farmers using of agricultural credit



7.7 Conclusion

From the discussion it is evident that largest number of farmers borrowed credit to procure fertilizers who may not need it if fertilizer's price was lesser. Here procurement price of fertilizer is to be reduced. Credit is also needed to pay wage. Credit service at a cheaper price on easy terms and conditions for use of modern technology by all types of farmers agricultural should be expanded up to grass root level.

CHAPTER VIII
YIELD SCENARIO

8.1 Introduction

Farmers from their experiences developed knowledge about different agricultural inputs and its impact on yield. Thus they can explain the yield shortage due to untimely availability of fertilizers, and which is also one of the objectives of the study to address. This chapter focused on actual and expected yield of different crop prduced in the study area and factors responsible behind the shortage.

8.2 Yield of Crop

During the survey, farmers were asked about actual and expected maximum of yield if, on that same amount of land they could avail all the inputs (e.g favorable natural conditions, sufficient irrigation, timely and adequate supply of fertilizers, etc.) required for successful cropping.

The study reveals that on an average the yield of Aus turned out to be 659 kg for every 100 decimal of land. But, farmers under the conditions spelled out above would expect an average yield of 722 kg. In terms of different categories of farmers, the yield of Aus was relatively higher for landless, marginal and small farmers (664 kg, 662 kg and 683 kg respectively). They could yield higher amount of Aus compared to the medium and large farmers.

Regarding Aman, it can be said that, the farmers obtained 770 kg yield of this paddy variety per every 100 decimal of land. This amount is 4 kg less than the official estimation and 48 kg less than farmers' expectation. In the case of Boro, the yield was 1,554 kg in every 100 decimal of land. This is 6 kg less than national estimation while the farmers' expected yield was 1,613 kg on the same amount of land. The study finds that per acre yield of Boro was the highest for small farmers, while the large farmers yield the lowest amount among all categories of farmers.

Official data shows, in 2003-4, the total yield of Aus was 18,31,840 metric tons which decreased to 15,00,470 metric tons in 2004-05. Although the total yield of Aus increased in 2005-06, it reduced to 15,12,325 metric tons in 2006-07 and finally in 2007-08 it reduced further to 15,06,852 metric tons. This overall scenario indicates a downward trend of Aus yield in recent years (Agricultural Yearbook 2008).

From national statistics, we observed that total yield of Aman was 115,20,590 metric tons in 2003-04 which reduced to 98,19,617 metric tons in 2004-05. But in 2005-06 the yield increased to 108,10,076 metric tons with a further increase to 108,40,870 metric tons in 2006-07. However, in 2007-08, the total yield again reduced to 96,62,191 metric tons. In recent years although there are some increase and decrease in the yield of Aman, its total yields was always 6 to 7 times higher than yield of Aus.

According to national statistics in 2003-04 the total yield of Boro was 128,37,230 metric tons which was around seven times higher than yield of Aus in the same year. In 2004-05, the total yield of Boro increased to 138,37,060 metric tons which was nine times higher than Aus and 1.4 times higher than Aman yield. In 2005-06, the total yield of Boro was 139,75,317 metric tons which increased significantly to 149,65,055 metric tons in 2006-07 and 177,61,751 metric tons in 2007-08. It shows that in recent years total yield of Boro is increasing and it has become the major paddy variety in the country.

Moreover, it was found that in 2007-08 yield of wheat was 879 kg per 100 decimal of land whereas farmers' expected amount was 921 kg and official estimation of actual yield was 881 kg on the same amount of land.

The data from official sources shows an increasing trend of potato yield in recent years. Thus, In 2007-08, potato yield in every 100 decimal of land was 6,648 kg while the present study finds 6,690 kg of actual yield. On the contrary, farmers' expected yield was 6,726 kg. Landless farmers were able to yield the highest amount of potato (7,400 kg on every 100 decimal of land) among all farm groups.

The study also finds significant yield in maize cultivation. On every 100 decimal of land, actual yield of maize was 2,439 kg which is 57 kg less than farmers' expectation. Official records shows that in 2007-08 yield of maize was 2,446 kg on the same amount of land.

8.3 Perception on Yield Shortage

During the period of survey, farmers were asked about their actual and expected yield of crop, and the reasons for gap between the two[46]. Thus, in 2007-08, the perceived average shortage of Aus paddy was found 63 kg per every100 decimal of land while on the basis of national statistics the shortage was estimated to be 41kg of yield. Farmers perceived that they could yield an additional 18 kg if sufficient amount of fertilizers could be used by them. Again, 16 kg of more Aus paddy could be obtained provided that they have fertilizer on time. Their perception also shows that on the same amount of land yield was 6 kg less because of the use of less amount of inputs due to high cost and yield was 20 kg less due to various natural calamities. Among different farm groups, yield shortage of Aus was high among the landless and the marginal farmers (74 kg and 86 kg respectively per every100 decimal of land). Moreover, of all farm categories, landless and large farmers were the most and least affected respectively due to untimely availability of fertilizer assuming that large farmers were able to collect fertilizer on time.

The study also finds that for various reasons the average shortage of Aman yield is 48 kg on every 100 decimal of land. Farmers perceived that on the same amount of land 14 kg more of Aman could be produced if they could get fertilizer on time.

It has been observed that, the Boro yield was 59 kg less due to various reasons. Yield of this paddy variety have been 13 kg less on every 100 decimal of land due to untimely availability of fertilizer.

[46] In some cases, multiple reasons were given for less yield of crop but in the process of estimation, the prime reason was calculated. It is to be mentioned that the information provided by farmers is their own perception and so more scientific test may give real reason for shortage of yield.

Estimates based on the analysis of survey data shows that every year nationally 358,961 metric tons of paddy- 36,320 metric tons of Aus, 174,636 metric tons of Aman, and 148,005 metric tons of Boro paddy could be produced more if fertilizers were made available to all farmers on time. It is to note that during two years of caretaker government (from January 2007 to December 2008) farmers were oblized to show their land related documents in collecting fertilizers, and in that process farmers had to loss some of their valuable days.

According to national statistics, in 2003-04, the total yield shortage of Aus variety was 31,780 metric tons while this shortage was 43,880 metric tons and 15,610 metric tons for Aman and Boro respectively. In 2004-05, the total yield shortage increased to more than 4 times (1,50,590 metric tons) for Aus; yield shortage for Aman and Boro was also higher than the previous year. In 2006-07, yield shortage of Aman was 11,601 metric tons. In 2007-08, the total shortage of Aus yield was 94,164 metric tons and in case of Aman it was 2,30,681 metric tons. These yield shortage was due to natural calamities, especially due to flood, excessive rainfall and flash flood. It indicates that every year large amount of crops are lost due to unfavourable natural conditions.

Regarding wheat, total amount (perceived) of yield shortage was 42 kg on every 100 decimal of land whereas 9 kg of this shortage was due to untimely availability of fertilizers and 6 kg shortage was due to use of adulterated fertilizers. Analysis also shows that nationally, 8,622 metric tons more wheat could have been produced every year if fertilizers were distributed to all wheat cultivators on time.

Analysis shows that due to different reasons on every 100 decimal of land an average of 57 kg maize has been produced less of which 9 kg was due to untimely availability of fertilizers. In case of mustard, average shortage of yield on every 100 decimal of land was 59 kg for various reasons-- here 14 kg yield was less due to untimely availability of fertilizers (Annex 2, Table 8.4).

8.4 Conclusion

From the overall discussion, it can said that on an average an additional 16 kg of Aus, 14 kg of Aman and 13 kg of Boro could be produced for every 100 decimal of land if fertilizers would have been distributed to farmers on time. At the same time, it was noticed that a high amount of yield shortage occured due to natural calamities. In this regard, high quality weather forecasting system can play a vital positive role to reduce yield shortage.

CHAPTER IX

PATTERN OF FERTILIZER USE AND DEMAND ESTIMATION

In this chapter, we mainly focus on the pattern of the fertilizer use across the farm households in our sample and the corresponding estimation of fertilizer demand. We start with different pattern of use and we then move on to the estimation part.

9.1 Pattern of Fertilizer Use

The pattern of fertilizer use has different aspects. These varied aspects have been analyzed by relating fertilizer use with different characteristics of farms household.

9.2 Broad Categories of Fertilizer Use

Table 9.1 shows overall use of different fertilizers by the households and here urea accounts for the majority of the total households; almost all the households use this particular fertilizer either solely or in combinations. From the overall perspective, TSP and MoP also have a notably substantial usage. However, other fertilizers including DAP and Zinc are used by a mere portion compared to the aforementioned three.

Table 9.1: Overall fertilizer use

Fertilizer	No. of HH	% of Total HH
Urea	1827	99.5
TSP	1634	88.9
MoP	1503	81.8
DAP	159	8.7
Zinc	121	6.6
Other	221	12

9.3 Combination of Fertilizer in Use

Table 9.2 shows the percentage of the total number of households, covered by the survey, using different combinations of the fertilizers for the production of their crops. It is evident from the data that urea-TSP-MoP is the most used fertilizer combination and the usages of other combinations are significantly lower compared to this. More than half of the households use this fertilizer mix. The next two highest used combinations are that of urea-TSP and urea-TSP-MoP-Other in that order, which are used by about 8 and 9 percent of the total households respectively. Urea, without being combined with any other fertilizers, is used by only 6 percent of the households. Conversely, other fertilizer mixes are used by a tiny fraction of total households.

Table 9.2: Use of fertilizer in different combinations

Fertilizer combination	No. of HH	% of Total HH
Urea TSP MoP	1040	56.7
Urea TSP	168	9.2
Urea TSP MoP Other	149	8.1
Urea	119	6.5
Urea TSP MoP DAP	81	4.4
Urea TSP MoP Zinc	73	4.0
Urea MoP	34	1.9
Urea Urea_ball TSP MoP	28	1.5
Urea TSP MoP DAP Other	23	1.3
Urea TSP MoP DAP Zinc	20	1.1
Urea TSP MoP Zinc Other	16	0.9
Urea TSP Other	7	0.4
Other	67	3.6
Total	1833	100

9.4 Regional Distribution of Fertilizer

Now we analyze the division wise distribution of the total amount of these four types of fertilizers used by the households in Table 9.3. There is not much difference in pattern of fertilizer use across division. The use of urea and TSP captures more than 60 percent of fertilizer use in most divisions. Urea use ranges from 30 to 35% in all divisions except Sylhet where urea use is close to 50%. On the other hand, TSP and MoP use is quite low in Sylhet as compared to other divisions. DAP use is almost non-existent in Chittagong and Barisal division.

Table 9.3: Division-wise Fertilizer Use

Division	Urea		TSP		MOP		DAP		Total	
	N	%	N	%	N	%	N	%	N	%
Dhaka	445	35.1	406	32.0	389	30.7	28	2.2	1268	100.0
Chittagong	360	37.2	334	34.5	270	27.9	3	0.3	967	100.0
Rajshahi	458	33.8	314	30.4	407	30.0	79	5.8	1357	100.0
Khulna	239	32.2	232	31.2	228	30.7	44	5.9	743	100.0
Barisal	165	36.0	156	34.1	137	29.9	0	0.0	458	100.0
Sylhet	160	48.5	93	28.2	72	21.8	5	1.5	330	100.0

9.5 Fertilizer Use Based on Land-Ownership

Table 9.4 presents the distribution of fertilizer among households from the perspective of land-ownership patterns of the households. It is quite apparent that use of urea, TSP and MoP is very similar among all categories of land-holdings and nearly one-third each of total fertilizer users in each category. In the case of DAP use, there is a discernible pattern that comparatively larger land-holdings use more DAP compared to smaller land-owners. It might be related to pricing and availability issue that affect small land-owners than the large land owners.

Table 9.4: Land-ownership and Fertilizer Use

Types of land ownership	Urea		TSP		MOP		DAP		Total	
	N	%	N	%	N	%	N	%	N	%
Landless	580	36.7	513	32.5	459	29.1	27	1.7	1579	100.0
Marginal	534	35.1	487	32.0	447	29.4	53	3.5	1521	100.0
Small	282	35.2	250	31.2	234	29.2	35	4.4	801	100.0
Medium	362	35.3	322	31.4	306	29.9	35	3.4	1025	100.0
Large	69	35.0	62	31.5	57	28.9	9	4.6	197	100.0

9.6 Source of Fertilizer

Generally all these fertilizers are purchased from the dealers of the respective unions. Table 9.5 shows this principal source along with the other sources that the households purchase the fertilizers from. Although urea is strictly to be sold by the dealers of the own unions only, yet more than 17% of it is put on the open market. Nearly 40% of DAP is supplied in the market, and of TSP and MoP, the amount is above 25% for each.

Table 9.5: Source of Fertilizer

Source	Type of fertilizer			
	Urea	TSP	MOP	DAP
Dealer of own union	75.2	67.1	67.8	58.1
Dealer of the nearest union	6.4	4.8	4.2	2.9
Influential persons	0.6	0.9	1.2	1.2
Open market	17.8	27.2	26.7	37.8

9.7 Estimation of Fertilizer Demand

One of the major objectives of this study is to estimate the fertilizer demand from the farm household level. In the following, the results are presented and interpreted to describe fertilizer demand scenario in Bangladesh in both aggregate level and individual categories.

In the following Table 9.6, we start with urea demand. In the second column we have the division wise distribution of the household which requires urea. In the third column we have division wise average urea requirement. In the next column, we have number of agricultural farm households measured in the agricultural census (BBS, 2008). From this information, household weight is calculated and thus we arrive at the estimated total urea requirement in each division. The maximum urea requirement is in the Rajshahi division and the lowest demand is in Sylhet division. The total urea requirement boils down to about 45 million MT, annually.

Table 9.6: Demand for urea across division

Division	**Sample household**	**Average urea requirement (Kg)**	**Census Household**	**Weight**	**Total urea requirement (Kg)**
Dhaka	445	245.7	4,060,000	9123.596	997,542.0
Chittagong	360	251.3	2,449,000	6802.778	615,433.7
Rajshahi	458	377.2	4,273,000	9329.694	1,611,775.6
Khulna	239	397.8	2,027,000	8481.172	806,340.6
Barisal	165	196.4	1,126,000	6824.242	221,146.4
Sylhet	160	297.1	782,000	4887.5	232,332.2
Total	**1827**	**299.9**	**14,717,000**	**-**	**4,484,570.5**

In the same manner, rest of the fertilizer categories has been calculated and the results are given in Table 9.7, Table 9.8 and Table 9.9. In all the tables, we observe the same feature as we have seen in the case of urea. Rajshahi division requires the highest amount of fertilizer and on the other hand Sylhet requires the least amount of fertilizer.

Table 9.7: Demand for TSP across division

Division	**Sample household**	**Average TSP requirement (Kg)**	**Census household**	**Weight**	**Total TSP requirement (Kg)**
Dhaka	406	98.1	4,060,000	10000	398,286.00
Chittagong	334	125.9	2,449,000	7332.335	308,329.10
Rajshahi	413	171.5	4,273,000	10346.25	732,819.50
Khulna	232	184	2,027,000	8737.069	372,968.00
Barisal	156	110.4	1,126,000	7217.949	124,310.40
Sylhet	93	70	782,000	8408.602	54,740.00
Total	**1634**	**132**	**14714000**	**-**	**1,991,453.00**

Table 9.8: Demand for MoP across division

Division	Sample household	Average MoP requirement (Kg)	Census household	Weight	Total MoP requirement (Kg)
Dhaka	389	51.8	4,060,000	10437.02	210,308.0
Chittagong	270	52.9	2449,000	9070.37	129,552.1
Rajshahi	407	125.4	4,273,000	10498.77	535,834.2
Khulna	228	154.1	2,027,000	8890.351	312,360.7
Barisal	137	52.1	1,126,000	8218.978	58,664.6
Sylhet	72	19.5	782,000	10861.11	15,249.0
Total	**1503**	**81.2**	**1,4717,000**		**1,261,968.6**

Table 9.9: Demand for DAP across division

Division	Sample household	Average DAP requirement (Kg)	Census household	Weight	Total DAP requirement (Kg)
Dhaka	28	8.5	4,060,000	145,000	34,510.00
Chittagong	3	3.8	2,449,000	816,333.3	9,306.20
Rajshahi	79	50.8	4,273,000	54,088.61	317,068.40
Khulna	44	33.9	2,027,000	46,068.18	68,715.30
Barisal	0	0	1,126,000	0	-
Sylhet	5	0.8	782,000	156,400	625.60
Total	**159**	**20.2**	**14,717,000**	**-**	**330,225.50**

In the following Table 9.10, we have the official estimates of fertilizer requirement by BCIC in 2008-09 seasons. We find that the estimates from the household level data are much higher compared to the official estimates. It warrants a closer look into the way how official requirement of fertilizer is collected.

Table 9.10: Official estimates of Fertilizer Requirement

Division	Urea	TSP	MoP	DAP
Dhaka	732,000	104,935	88,880	42,073
Chittagong	328,000	58,350	40,130	9,365
Rajshahi	1,055,600	163,705	147,820	87,740
Khulna	402,300	69,015	56,200	38,740
Barisal	115,600	23,910	12,040	6,850
Sylhet	75,000	10,092	6,830	2,242
Total	**2,700,000**	**430,007**	**351,900**	**187,010**

CHAPTER X
ANALYSIS OF FERTILIZER DEFICIT

10.1 Description of Fertilizer Deficit

10.1.1 Deficit Based on Fertilizer Category

Table 11.1 gives the deficit structure of each type of the fertilizers. None of the fertilizers can meet more than 40% of household requirements. The most acute shortage is observed in the DAP category where around 85% of households do not get the required amount of fertilizer. Even though urea users are the least deficit prone, still around 60% of households are suffering from fertilizer deficit. The fact that urea is the most crucial for agricultural production, this large scale deficit actually paints an alarming picture regarding fertilizer distribution management.

Table 10.1: Fertilizer category and deficit

Fertilizers	Fertilizer deficit		
	No of user HH	No. of HH in deficit	% of user HH in deficit
Urea	1827	1117	61.1
TSP	1634	1236	75.6
MoP	1503	1028	68.4
DAP	159	135	84.9
Total	1837	1422	77.4

10.1.2 Regional Distribution of Fertilizer Deficit

We observe a different scenario when we analyze the fertilizer deficit according to its division-wise distribution. Except Rajshahi and Sylhet, more than 70% of users suffer from TSP deficit. TSP crisis is the most acute in Dhaka and farmers in Sylhet suffer from the least amount of deficit. On the other hand, in Barisal division, a farmer is likely to suffer most from urea deficit than in other divisions. In the case of both MoP and DAP, deficit is most observed in Khulna division. Overall, Rajshahi division enjoys lesser probability of fertilizer deficit in all categories and on the other hand, Dhaka division is in greater risk of deficit compared to other divisions.

Table 10.2: Division-wise fertilizer deficit

Division	**Urea**		**TSP**		**MoP**		**DAP**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Dhaka	277	62.2	342	76.9	292	65.6	22	4.9	445	100
Chittagong	239	65.8	271	74.7	194	53.4	6	1.7	363	100
Rajshahi	240	52.1	238	51.6	222	48.2	37	8.0	461	100
Khulna	138	57.0	187	77.3	176	72.7	64	26.4	242	100
Barisal	120	72.7	116	70.3	103	62.4	4	2.4	165	100
Sylhet	103	64.0	82	50.9	41	25.5	2	1.2	161	100
Total	**1117**		**1236**		**1028**		**135**		**1837**	

10.1.3 Relationship Between Land-Ownership and Fertilizer Deficit

Across all categories we observe that as the land size is increasing, the percentage of farmers who experience fertilizer deficit is decreasing. This is observed in all categories except DAP where we see among the medium land holding households, the deficit is much larger compared to other categories. The observation that higher land-holding leads to lesser fertilizer deficit give credence to the belief that land-holding gives social power and influence in an agrarian economy like Bangladesh which makes it easier for those households to avail fertilizer compared to other households.

Table 10.3: Land-ownership and fertilizer deficit

Farm Class	Urea		TSP		MoP		DAP		Total	
	N	%	N	%	N	%	N	%	N	%
Landless	360	61.5	406	69.4	337	57.6	22	4.9	585	100.0
Marginal	350	65.3	393	73.3	324	60.4	6	1.7	536	100.0
Small	166	58.9	178	63.1	157	55.7	37	8.0	282	100.0
Medium	201	55.1	223	61.1	179	49.0	64	26.4	365	100.0
Large	40	58.0	36	52.2	31	44.9	4	2.4	69	100.0
Total	1117	61	1236	67.3	1028	56	135	7.3	1837	100.0

10.1.4 Reasons for Fertilizer Deficit

The reasons behind the huge deficit of the fertilizers have been explored in Table 10.4. It specifies a few main causes as high price of fertilizers, lack of availability on time, transportation problem and so forth. In general, the major cause of deficit is the high price of the fertilizers. High price of of fertilizer price is the reason for fertlizer deficit for mor than half of DAP users and above 60% and 70% percent of M**o**P and TSP users. For urea, around 36% of the deficit is due to the high price. But if the other two reasons, timely availability and inadequate supply are combined, they together exceed the effect of high price on fertilizer deficit and account for nearly 50%of the total urea deficit. Financial problems also somewhat cause the deficit in all four types of the fertilizers. Above 16% of the shortfall in urea and DAP as well as 20% shortfall in TSP and M**o**P are instigated by the financial problems.[47]

Table 10.4: Reasons for fertilizer deficit[48]

Reasons	Urea		TSP		MoP		DAP	
	No.	%	No.	%	No.	%	No.	%
High price	711	35.8	1036	70.5	1089	64.9	363	58.4
Timely unavailability	383	19.3	56	3.8	91	5.4	58	9.3
Inadequate supply	543	27.3	53	3.6	129	7.7	91	14.6
Transport problem	3	0.2	2	0.1	2	0.1	1	0.2
Financial problem	320	16.1	312	21.2	358	21.3	107	17.2
Others	22	1.1	8	0.5	9	0.5	2	0.3

10.2 Determinants of Fertilizer Deficit

10.2.1 Describing the Determinants

Table 10.5 gives the summary statistics of the variables which have been identified as determinants of fertilizer deficit. Average age of the household head is near fifty, average education of household head is around six years which reflects the fact of lower human capital associated with farm household. On the average, these farm household possess around 170 decimal of land. Among the landholding categories, around 29% is landless, 15% with small amount of land, 20% with medium-sized farm and the rest are large farm households. Fertilizer sources from which these farmers collected their fertilizer are on the average two and a half kilometer away. The divisional dummies basically show the regional distribution of the households.[49]

[47] Financial problem refers to adverse pecuniary condition of a household.
[48] A fertilizer user might mention multiple reason for fertilizer deficit. As a result, no. of users reporting reasons for fertilizer deficit might exceed the number of actual fertilizer users resulting is total percentage exceeding more than 100%.
[49] Rational behind the choice of these variables has been discussed in section 10.2.2

Table 10.5: Summary statistics of the determinants

Name of the variable	Mean	S.D.
Age of household head	48.02	12.88
Education of household head	6.27	5.86
Household size	5.50	1.93
Amount of agricultural land owned	169.45	312.89
Marginal	0.29	0.45
Small	0.15	0.36
Medium	0.20	0.40
Large	0.04	0.19
Distance: Fertilizer sources	2.33	2.33
Dhaka	0.24	0.43
Chittagong	0.20	0.40
Rajshahi	0.25	0.43
Khulna	0.13	0.34
Barisal	0.09	0.29
Sylhet	0.09	0.28
Observations	1825	-

10.2.2 Determinants of Total Fertilizer Deficit

The age of the household head, even though it has a statistically significant impact and expected sign, does not have a strong impact on the probability of fertilizer deficit.[50] The aging of household head might reflect the difficulty an aging person face in collecting fertilizer which is run by the government machineries, waiting in line for hours, dealing with all the hassles. Therefore we would expect, higher the ages, higher the probability of household being in deficit. This is reflected by the sign of the coefficient but the effect is miniscule. This might be due to household head is delegating the duty of collection to younger members of the household.

The education of household head, even though statistically significant at 10% level of significance, also do not have any meaningful impact on the probability of fertilizer deficit. Education signals better human capital of the farmer but the availability of fertilizer is not affected by it. In the same manner, household size also does not have any significant impact, both statistically and in terms of magnitude, on the probability of fertilizer deficit.

The amount of agricultural land has the expected sign and is statistically significant at 10% level of significance. We expect the large farmers to face lesser probability of fertilizer deficit. This is because farmers with large land holdings typically has political and social influence in the society and this is reflected in the results.

The effect of land ownership is even more evident when we categorize the land ownership. It shows that larger land ownership leads to lower probability of fertilizer deficit even though some of the land category effects are statistically insignificant. Only medium sized landowners display statistically significant impact of around 7% less probability of being in fertilizer deficit compared to landless.

[50] The dependent variable is a binary variable indicating the household is in fertilizer deficit when the value is equal to one.

Table 10.6: Determinants of total fertilizer deficit

Indicators	Probit	Marginal effect
Age of household head	0.006* (0.039)	0.002* (0.039)
Education of household head	0.011+ (0.075)	0.003+ (0.074)
Household size	0.032+ (0.091)	0.009+ (0.091)
Amount of agricultural land owned	-0.000+ (0.077)	-0.000+ (0.077)
Marginal (d)	0.202* (0.026)	0.057* (0.021)
Small (d)	-0.066 (0.539)	-0.019 (0.546)
Medium (d)	-0.215* (0.047)	-0.065+ (0.058)
Large (d)	-0.220 (0.380)	-0.068 (0.412)
Distance: Fertilizer source	0.015 (0.372)	0.004 (0.372)
Chittagong (d)	0.007 (0.953)	0.002 (0.953)
Rajshahi (d)	-0.683** (0.000)	-0.221** (0.000)
Khulna (d)	-0.071 (0.560)	-0.021 (0.568)
Barisal (d)	-0.053 (0.704)	-0.016 (0.708)
Sylhet (d)	-0.318* (0.019)	-0.101* (0.030)
Observations	1825	1825
Pseudo R^2	0.069	0.069

Marginal effects; p-values in parentheses
(d) for discrete change of dummy variable from 0 to 1
*+ p<0.10, * p<0.05, ** p<0.01*
Source: Agricultural Farm Household Survey (2009), MSUK

As the distance from the source of fertilizer increases, we expect the probability of being in deficit increases and the coefficient reflects the expected sign. But the effect is again not very strong in the case of the deficit of total collection of fertilizer and it is also not statistically significant. In the case of regional division, the base is the Dhaka division. Negative signs of most of the division coefficients reflect the fact that most of the divisions have less likelihood of having fertilizer deficit compared to Dhaka. Only division that shows higher likelihood of facing fertilizer deficit is Chittagong but the effect is not statistically significant. This puts Dhaka in the category of division which has the most likelihood of experiencing fertilizer deficit. Results show that Rajshahi is 22% less likely to face fertilizer deficit compared to Dhaka. Sylhet is the only other division which has statistically significant coefficient showing that this division is about 10% less likely to experience fertilizer deficit compared to Dhaka.

10.2.3 Determinants of Urea Deficit

After over viewing the total fertilizer deficit scenario we investigate the individual fertilizer items. We start with the one which has the most users, that is urea. Like the aggregate fertilizer situation, we do not find any significant impact of household characteristics on the probability of urea deficit. Age and education of household head has impact which is statistically significant but the magnitude of the coefficients is negligible. Household size and ownership of agricultural land shows expected signs but again shows negligible impact on fertilizer deficit.

Land holding shows some unexpected findings in the case of probability of urea deficit. Farmers who are marginally landless actually have higher probability than landless farmers of being in fertilizer deficit. This might be due to the case that those who are marginally landless they possess significantly less amount of land whereas the landless farmers lease in land which might be significantly higher than the marginally landless farmers. We have consistently observed that higher land holding invariably leads to lesser probability of

fertilizer deficit. We also observe inconsistent results in other land categories but the effects are not statistically significant.

Table 10.7: Determinants of Urea Deficit

Indicators	Probit	Marginal effect
Age of household head	0.006** (0.009)	0.002** (0.009)
Education of household head	0.018** (0.001)	0.007** (0.001)
Household size	-0.008 (0.649)	-0.003 (0.649)
Amount of agricultural land owned	-0.000+ (0.071)	-0.000+ (0.071)
Marginal (d)	0.136+ (0.085)	0.052+ (0.082)
Small (d)	-0.026 (0.788)	-0.010 (0.789)
Medium (d)	-0.087 (0.388)	-0.034 (0.391)
Large (d)	0.133 (0.579)	0.050 (0.570)
p_urea	-0.005 (0.207)	-0.002 (0.207)
Distance: Fertilizer source	0.005 (0.671)	0.002 (0.671)
Chittagong (d)	0.173+ (0.068)	0.065+ (0.062)
Rajshahi (d)	-0.197* (0.024)	-0.077* (0.025)
Khulna (d)	-0.070 (0.509)	-0.027 (0.511)
Barisal (d)	0.309* (0.012)	0.133** (0.007)
Sylhet (d)	0.124 (0.314)	0.047 (0.306)
Observations	1808	1808
Pseudo R^2	0.025	0.025

Marginal effects; p-values in parentheses
(d) for discrete change of dummy variable from 0 to 1
*+ p<0.10, * p<0.05, ** p<0.01*
Source: Agricultural Farm Household Survey (2009), MSUK

Even though urea price is fixed by government, we have found significant variation in the case of price. It is reflected also in the coefficient of marginal effect which display negative sign. This implies that those households which face higher prices face lesser probability of urea deficit. This conforms with the market based argument that price adjusts higher or lower to allocate the good to its intended customer. Price reflects its scarcity value and those who are willing to pay higher prices receive the fertilizer and suffer from less fertilizer deficit. But the coefficient is not statistically significant even at 15% level of significance. Therefore, we cannot hope to make strong policy recommendation based on this finding.

Distance to the nearest fertilizer source is also showing positive marginal effect on the probability of falling into urea shortage albeit it is not statistically significant.

In terms of regional distribution of urea deficit, Barisal division is the most vulnerable. A farming household in Barisal is more than 11% likely to suffer from urea shortage than the base division which is Dhaka. On the other hand, Chittagong division suffers from the least likelihood of urea shortage. The probability of urea shortage is about 8 percent lower in Rajshahi compared to Dhaka.

10.2.4 Determinants of TSP Deficit

Determinants of likelihood of TSP deficit in the case of farm household is not much different from the case of aggregate fertilizer deficit and urea deficit. Age, education, household size, land ownership all are showing the similar pattern. Some of the aspects are different though. Large farm holdings possess significantly much lesser prospect (13%) of TSP deficit than landless farm holdings. They are also 8% less likely to fall into the deficit compared to medium large farm holdings. This is not surprising considering the fact that price of TSP is

positively affecting the likelihood of falling into deficit and it is statistically highly significant. Since price of TSP has been much higher compared to other fertilizers, along with other supply bottlenecks, it might have affected the affordability of farmers. But the magnitude of the coefficient is very small rendering it as an insignificant factor of this type of fertilizer deficit.

Distance from the nearest source of fertilizer is displaying as usual the negative coefficient and as in the case of urea, the effect is negligible.

Table 10.8: Determinants of TSP Deficit

Indicators	Probit	Marginal effect
Age of household head	0.006* (0.028)	0.002** (0.028)
Education of household head	0.010 (0.121)	0.003 (0.121)
Household size	0.014 (0.474)	0.005 (0.474)
Amount of agricultural land owned	-0.000 (0.549)	-0.000 (0.549)
Marginal (d)	0.252** (0.007)	0.083** (0.005)
Small (d)	-0.052 (0.637)	-0.018 (0.640)
Medium (d)	-0.163 (0.150)	-0.057 (0.159)
Large (d)	-0.358 (0.162)	-0.131 (0.186)
p_tsp	0.009** (0.000)	0.003** (0.000)
Distance: Fertilizer source	-0.009 (0.602)	-0.003 (0.602)
Chittagong (d)	0.074 (0.520)	0.025 (0.0514)
Rajshahi (d)	-0.559** (0.000)	-0.200** (0.000)
Khulna (d)	0.021 (0.865)	0.007 (0.865)
Barisal (d)	-0.032 (0.819)	-0.011 (0.820)
Sylhet (d)	-0.203 (0.190)	-0.072 (0.208)
Observations	1543	1543
Pseudo R^2	0.071	0.071

Marginal effects; p-values in parentheses
(d) for discrete change of dummy variable from 0 to 1
*+ p<0.10, * p<0.05, ** p<0.01*
Source: Agricultural Farm Household Survey (2009), MSUK

In terms of the regional distribution, a farm household is the least likely to experience TSP deficit in Rajshahi compared to any other division. A farmer in Rajshahi is 20% less likely to experience TSP deficit compared to Dhaka division. Farmers in Sylhet division is also comparatively less vulnerable than other divisions. A farmer in Sylhet division is 7% less likely to experience TSP deficit compared to a farmer in Dhaka division.

10.2.5 Determinants of MoP Deficit

Most of the household characteristics follow the same pattern as urea and TSP. Age and education of household head seem to have statistically significant impact of MoP deficit but the effect is not strong enough to be a concern. Marginal land owners, just like other farm category, are the most vulnerable to fertilizer deficit. Surprisingly, large land owners are also facing higher likelihood of facing fertilizer crisis. It might be due to the fact that like TSP, MoP is also an expensive fertilizer which affects the affordability of the farmers who need it in large quantities. This fact is supported by the positive marginal effect displayed by the coefficient of price. Distance coefficient is displaying its usual negative relationship with the probability of fertilizer deficit even though the effect is not statistically significant.

In terms of regional distribution, Sylhet is the worst in the case of vulnerability to deficit. A farmer in Sylhet division is more than 11% likely to be in deficit of MoP compared to a farmer in Dhaka division. On the other hand, like other fertilizer categories, a farmer in Rajshahi is least vulnerable because a farm household is about 12% less likely to be in deficit compared to a farm household in Dhaka division.

Table 10.9: Determinants of MoP deficit

Indicators	Probit	Marginal effect
Age of household head	0.006* (0.049)	0.002* (0.049)
Education of household head	0.014* (0.049)	0.005* (0.048)
Household size	-0.003 (0.903)	-0.001 (0.903)
Amount of agricultural land owned	-0.001*(0.033)	-0.000* (0.033)
Marginal (d)	0.100 (0.318)	0.037 (0.314)
Small (d)	-0.009 (0.942)	-0.003 (0.942)
Medium (d)	-0.112 (0.468)	-0.042 (0.472)
Large (d)	0.303 (0.445)	0.105 (0.407)
p_mop	0.001 (0.291)	0.001 (0.291)
Distance: Fertilizer source	-0.003 (0.849)	-0.001 (0.849)
Chittagong (d)	-0.091 (0.445)	-0.034 (0.450)
Rajshahi (d)	-0.308** (0.002)	-0.116** (0.003)
Khulna (d)	0.183 (0.132)	0.066 (0.120)
Barisal (d)	0.060 (0.674)	0.022 (0.671)
Sylhet (d)	0.346 (0.133)	0.118+ (0.097)
Observations	1298	1298
Pseudo R^2	0.037	0.037

Marginal effects; p-values in parentheses
(d) for discrete change of dummy variable from 0 to 1
*+ p<0.10, * p<0.05, ** p<0.01*
Source: Agricultural Farm Household Survey (2009), MSUK

10.2.6 Determinants of DAP Deficit

In the case of DAP, quite surprising result is found in the case of land holing. It is found that farmers with larger land holdings are likely to suffer more from DAP deficit than farmers with less land holding. This is counterintuitive and not consistent with the pattern we have observed in the case of other types of fertilizers. Further details such as information on the distribution channel, allocation mechanism etc are needed to delve into the explanation of this inconsistency.

Table 10.10: Determinants of DAP Deficit

Indicator	**Probit**	**Marginal Effect**
Age of household head	0.002 (0.796)	0.001 (0.796)
Education household head	0.002 (0.906)	0.001 (0.906)
Household size	-0.033 (0.455)	-0.011 (0.455)
Amount of Agricultural land owned	-0.001+ (0.080)	-0.000+ (0.080)
Marginal (d)	0.271 (0.197)	0.097 (0.205)
Small (d)	0.355 (0.161)	0.130 (0.176)
Medium (d)	0.491+ (0.090)	0.181 (0.100)
Large (d)	1.507+ (0.051)	0.542** (0.007)
p_dap	0.005** (0.000)	0.002** (0.000)
Distance: Fertilizer sources	0.003 (0.943)	0.001 (0.943)
Chittagong (d)	-0.490 (0.233)	-0.149 (0.152)
Rajshahi (d)	-0.211 (0.358)	-0.073) (0.351)
Khulna	0.182 (0.438)	0.064 (0.443)
Barisal (d)	-0.172 (0.676)	-0.057 (0.661)
Sylhet (d)	2.403 (0.179)	0.672** (0.000)
Observation	342	342
Pseudo R^2	0.082	0.082

Marginal effects; p-values in parentheses
(d) for discrete change of dummy variable from 0 to 1
*+ p<0.10, * p<0.05, ** p<0.01*
Source: Agricultural Farm Household Survey (2009), MSUK

In terms of regional distribution, Sylhet suffers severely from the danger of falling into DAP deficit. A farmer in Sylhet is 67% more likely to suffer DAP deficit compared to a farmer in Dhaka division which is by far the greatest likelihood of deficit. On the other hand, a farmer in Chittagong division has the least likelihood of facing DAP deficit since the probability is about 15% lower than a farmer in Dhaka division.

CHAPTER XI
DISCUSSION ON FERTILIZER SUBSIDY

In this chapter we discuss issues related to subsidy on inorganic fertilizer. We examine evidences from the survey data to help clarify some points on the issue. Finally we put forth a new scheme on the basis of our discussion.

11.1 Fertilizer Subsidy Debate

11.1.1 Background of Input Subsidy and Debates on the Current Universal Coverage System

We first begin our discussion on fertilizer subsidy by concentrating on the rationale for it. Subsidy is an instrument in the hand of the government to encourage certain sectors or activities which the government views as *important*, and also which in the absence of subsidy could be facing difficulties of operating on its own.

Agricultural production particularly food grain production is often the recipient of government support. The importance of food grain production arises from the food security requirement of the population, considered one of its most fundamental requirements. An economy has two options for meeting this requirement. Either the economy may opt for trying to achieve sufficiency in food grain production. Or, the economy may opt for producing other products and rely on international trade for importing the required amount of food grain. In practice, governments in developing countries pursue a policy which is somewhere in between these two extreme options. Commonly governments in developing countries try to achieve sufficiency in production of food grain, whereas they also depend on imports to meet any shortfalls in its production. The successive governments of Bangladesh have also followed this common strategy where the stated objective has been to achieve *food grain self sufficiency*; this is in practice being supplemented by importing the shortfall amount from the world food grain market (and encouraging private importers to import it). Since this is an economy with a large population within a small geographical space, and has been traditionally an agricultural one, it is therefore expected that the government would follow this strategy with regards to food security. The traditional strength of the economy has been its agricultural sector. It is thus understandable that the government would depend on this sector, to try to secure its population, particularly the poorer segment of it, from occasional price and output volatilities in the world market.

We can summarize by stating that the traditional response of the successive governments of Bangladesh regarding food security lies in pursuing two (interconnected) policies-- one is trying to achieve *food grain self sufficiency*, and the other is trying to *minimize dependence on foreign imports* for basic food grain (in this particular case, most importantly rice, and to some extent, wheat). The first set of objective also matches with the requirement of a vibrant rural economy. A robust rural economy base is considered important since this will give further boosts for expansion of non-agricultural sectors by offering a large domestic market for their products. Matching with the first set of objectives, the second set implies less dependence on foreign supplies for food grain. The practical significance of the second set of objectives was evident during 2007-08 when the world rice market exhibited very steep price increases and a number of major rice exporters decided to shut down their exports of rice in

order to protect food security concerns of their respective populace. The rice importing countries found it extremely difficult to purchase rice in the world market even when they were willing to offer extra cash for it.

Once we understand the relevance of the *food grain self sufficiency* objective of the government, the next point to consider is what type of strategies is required to meet this objective. We can ask the question slightly differently, should the government intervene in the food grain market, or leave the market operate on its own? If the government does not intervene, it will not have much control over outcomes in the market. On the other hand, a wrong intervention may cause severe damage to the supply chain and to the incentives for suppliers. If the government pursues a *no intervention* policy, the market will be allowed to operate like any other private market, where price and output are expected to fluctuate. In fact a private market (without government intervention) is expected to have price and output fluctuations, and these are considered common *correction devices* whereby suppliers get information of expected profits and adjust their supply decisions accordingly. We understand that price fluctuations actually help a market by signaling to the agents whether the resources (land, labor, capital, entrepreneurial skills, etc.) being utilized in this market are in the correct amount, or resources need to be shifted to some other sector(s) for a better utilization. Price fluctuations in a market may actually promote efficiency in resource uses in the medium and the long term, even though these may be painful in the short term.

Now we consider the case of the food grain market, particularly that of rice. This is a major market operating mostly on its own, and the government does not get involved too heavily in this. Yet, on behalf of the population, the government keeps some degree of control in the food grain market, and there are three types of devices employed for this. One is *output price stabilization* measures, where government wants to give some encouragement to growers in the form of offering them a *procurement price* (generally set at slightly higher than the ongoing market price and taking into consideration the cost of producing the food grain). Another component of price stabilization measures is *open market sales* where government agencies, if situation arises, openly sale food grain in the market at prices lower than the ongoing market price, so that market prices, do not decrease, at least do not increase any further. A third type of intervention in the food grain market is the *public food grain distribution system*, whereby government tries to provide food grain to some poor and vulnerable groups of the society, by programs such as VGD, VGF, etc. All three devices mentioned above function with the help of a *buffer stock of food grain* kept by the government, replenished by the procurement drives of domestic food grain and imports of food grains by the government agencies for the buffer stock. Thus government runs an elaborate system of buffer stocks (public storage of food grain), distribution networks, public imports, open market sales, etc. to have some measure of control in the food grain market. This public involvement component runs side by side the large private sector component in this market. Even though this public component is typically small, in the range of below 10% of the total market, still this provides some price signals in the market. One way this signal is sent to the market is by the government declaring the procurement price of food grain. In a situation where private market players have a notion that the government has a large stock at hand, and is ready to offload some amount of it any time, private firms may not want to hold on to their own storage of food grain for long since they may think that any time there is a price increase the government may offload some of it and bring stability in prices. Therefore the government involvement actually brings in two results in the market, one is this works as an instrument for stabilizing prices and at the same time this works as an instrument of

reducing cases of extreme deprivation and hunger (through social security programs such VGD, VGF, etc.).

The other major area of government intervention in the food grain market is in the form of *input subsidy*. Input subsidy is provided in order to provide encouragements to the growers to grow more food grain. This input subsidy is provided on the basis of the assumption that, otherwise in the absence of input subsidy, growers may find it difficult to match their profitability calculations, and may opt for pursuing some other lines of production and may move away from food grain production. The basic idea behind this *input subsidy* is that this will encourage growers to grow large enough amount of food grain, so that they send enough marketed surpluses in the market, after meeting their own household food security requirements. This *input subsidy* is expected to give marginal farmers incentives to continue production of food grain, to meet their own household food security requirement and to send the surplus (if any) to the market. Again this *subsidy* is expected to provide encouragements to large farmers to produce more food grain, so that they send a large marketed surplus in the market. The logic is that, input subsidy is expected to increase food grain production (i.e., subsidy on irrigation, fuel or fertilizer), and a segment of this larger production will reach the market in the form of marketed surplus, which will keep market prices low and at the same time, replace requirement of import of the same amount from the world food grain market.

The *input subsidy* can play an additional role in the form of this being some form of *welfare improving* or *social welfare devices* for a number of vulnerable segments of the society, such as the landless and the marginal farmers. It is commonly accepted that the landless and the marginal farmers are economically deprived and often they may not have the means to purchase the necessary amount of modern inputs to pursue crop production. It is also commonly acknowledged that the poorer farmers often do not have much access to credit facilities since they do not have collateral or access to publicly available banking facilities since the later is often dominated by the larger farmers. Without input subsidy being offered to them, the poorer farmers may opt for less than optimal amount of inputs and thus have lower amount of crop production, thereby will have lower incomes on a continuous basis.

The issue of vulnerability of poorer farmers (not all farmers) brings in a twist in the discussion of *input subsidy*. It is commonly accepted that poorer farmers face lack of cash flows at the specific time of input purchase and at the same time they do face lack of credit access to purchase this input. This may not be the case for the richer (in other words the larger) farmers. They may not have this much binding constraints in the form of lack of cash flows or credit access. Now the question is, if the finance or credit constraints are *binding* for poorer farmers but these constraints are found to be mostly *nonbinding* for richer farmers-- is it required that we provide a *universal input subsidy scheme* for both groups (poorer and richer farmers)? It is entirely possible that a complete withdrawal of input subsidy may severely hurt the incentives of poorer farmers, while this may leave the incentives of richer farmers largely unaffected. One can also argue that in the current *universal coverage of input subsidy scheme*, it is the large farmers who are mostly getting the benefits since they also require larger amounts of input while the more needy (in terms of poverty reduction and social welfare considerations) poorer farmers are only being able to obtain a tiny amount of the grand total of input subsidy, since their input requirement itself is smaller. One can argue that an *universal coverage of input subsidy* is actually a drain of valuable government fiscal resources since the major beneficiaries of this is by the very design of the program the richer farmers who actually face nonbinding cash or credit constraints in their demand for inputs.

One alternative to the currently practiced *universal coverage of input subsidy* could be a scheme of *selective, targeted input subsidy policy* where the later specifically targets only the

poorer segments of the farmer community while this will require the richer farmers pay the market price for inputs (or administratively set cost recovery price), not a subsidized price. The benefit of a targeted subsidy policy is better targeting in terms of maintaining incentives for crop production and at the same time improving the socioeconomic status of the poorer segments of the farmer community and saving them from high interest rate charges in the informal credit markets. The second benefit of targeted input subsidy scheme is a reduced budgetary expense on input subsidy while being able to target more effectively more vulnerable sub-groups of farmers. The assumption behind this selective targeting scheme is that withdrawal of input subsidy does not severely impact on incentives of large farmers to produce crops and they may not react by withdrawing themselves from crop production although this entails higher cost for them in terms of paying the market prices for inputs rather than the subsidized prices. In order to make the transition to selective targeting scheme less problematic for the large farmers, we propose some alternative devices rather than subsidy scheme to be targeted for the large farmers, i.e. ensuring availability of agricultural credit.

The cost of *targeted scheme* is that this requires a large, sophisticated data base of farmers and their landholding status all over the country and regular updating of this database, this obviously is an expensive arrangement. An additional cost is that the *targeted scheme* will require expenses on more controls over the input distribution process so that petty corruption is kept at a minimum. One issue that may arise is that under this proposed scheme, poor farmers receive the fertilizer amount at a subsidized rate and they may in turn sell it to the rich farmers for a price in between the subsidized price (set for poorer farmers) and the cost recovery price (set for larger farmers). Some bargaining solution of this form may be unavoidable, since some poorer farmers may still have such acute cash and credit constraints that they may take this option for meeting some other requirement of the household rather than applying fertilizer for crop production. The decision of the poorer farmers whether to apply fertilizer to crop or to sell it to richer farmers for some extra price is ultimately the farmers' personal decision. The government would not have much to do about it since through Coasian bargain of this form the fertilizer is actually reaching the farmer who has more usefulness out of this. On the other hand since we are considering cases of fertilizer for some critically important crops such as *boro*, we may not observe too many of these kinds of instances.

Therefore we can summarize that the benefit side of targeted subsidy instead of the currently practiced universal subsidy is reduced fiscal burden and more focused on utilization of input subsidy amount in terms of social welfare considerations and reduction of burden of cash and credit constrains of sub-groups of farmers. If this benefit outweighs cost of a large database (installation, maintenance and updating) and a larger resource to reduce corrupt practices likely to occur within the distribution channel, one can actually argue for *targeted input subsidy schemes*.

11.1.2 Rationale for Input Subsidy

Now we further examine the rationale for *input subsidy*. It is a common policy making dilemma throughout the developing countries that, policy makers need, on the one hand, to keep food prices low so that food is accessible to all, particularly the lower income segments of the society, and on the other hand, to keep prices of food grain high enough to ensure sufficient incentives for farmers to grow more food grain. This is a policy making dilemma which is not easily solved. It has a distinct rural-urban dichotomy in it-- the rural sector is the

producer and the urban sector is the consumer end. At the same time, this issue is politically sensitive, since the urban poor and the middle class are the most vocal politically conscious segments of the society, whereas a large rural farmer group is keen on the happenings in this sector. The governments of the developing countries are often required to satisfy both of these groups, which is not an easy task.

The policy mix that is commonly followed is two-pronged, one is *input subsidization* policies (particularly, subsidy on fertilizers and irrigation), and the other is *output price stabilization* strategies (particularly, domestic procurement, open market sales and food imports by public organizations) (BIDS Policy Brief, 2009). The policy of input subsidization is to keep cost of production low for the food grain growers, so that they do not get discouraged from growing food grain due to credit and liquidity constraints and otherwise high prices of inputs. At the same time, the government keeps a buffer stock of food grain by procurement from the domestic market and also by importing it from exporters in the world market. The government buffer stock of food grain is utilized for regular social safety net programs and open market sales operations.

The fundamental issue to discuss is *why fertilizer subsidy is required in the first place*? Why is it that governments need to intervene in the food grain market in the form of fertilizer subsidy? This query follows a follow-up question, even if we agree that fertilizer subsidy is required, this would be up to what extent? Should the subsidy be applicable for all farmers? Or should it be selectively targeted to some category of farmers, such as the more vulnerable and weaker segment of the farmer population?

The background of fertilizer subsidy in Bangladesh is the "Green Revolution" in the 1960s when food grain production was revolutionized in the form of new generation of seeds, use of chemical fertilizer, irrigation practices etc. Since the independence of the country, rice production has increased three fold whereas population has increased two fold, thus have increased per capita availability of rice in the country. During the early stage of use of chemical fertilizer, the government regularly controlled this market and provided subsidies in the form of artificially low prices of some important fertilizers. This was carried out with a view to encourage use of chemical fertilizer which was mostly unfamiliar to farmers during the early stage of the "Green Revolution". Later on this argument for subsidies for fertilizer lost its credibility since by this time farmers have become well familiar with different categories of fertilizers and their implications. Currently chemical fertilizer is subsidized principally due to two categories of reasoning: *economic* and *political*.

The economic reasoning for fertilizer subsidy can be described as follows. The subsidy is provided to farmers in the form of cheaper agricultural inputs. This in turn leads to a higher demand for that input, and thus a greater use of those inputs. This leads to a higher production of food grain, some part of this higher production translates into an increased supply in the domestic food grain market. This keeps the prices of food grain at a low price in the domestic market. This in turn results in higher food security and a position of closer to self-sufficiency in food grain production, the latter one resulting in less vulnerability to risks of facing high prices of imports in the world market.

On the contrary, economic reasoning for not providing subsidy for fertilizer:

- Subsidy is an "*inefficient*" allocation of resource in the sense that farmers pay for fertilizer a lower price compared to the world price of fertilizer, thereby has more incentive to use too much of fertilizer (see Osmani and Quasem, 1990).

Yet the counterargument to the second line of argument is:

- With market imperfections such as low access to credit as well as liquidity constraints, farmers already face "*inefficiency*" in allocation of resources, find it difficult to finance fertilizer purchases, and therefore without "*subsidy*" would be using suboptimal amount of fertilizers. Therefore "*subsidy*" is not necessarily introducing "*inefficiency*" in an "*efficient*" world, but may be considered as a "*correcting device*" to address issues of imperfections in the developing country agricultural sector (op. cit.)

There are some political reasoning for providing subsidy for fertilizer, these are:

- Requirement of a democratically elected government to meet election pledges for "cheap rice".
- Since Bangladeshi households are, on the average, net buyers of rice, it may be politically costly for the government not to be able to keep rice prices low.

Thus the subsidy literature has two strands of arguments. One is that subsidy for fertilizer keeps prices of fertilizers artificially low as compared to the world price of fertilizers, thus creating an incentive for farmers to use more-than-optimal amount of fertilizers, and this creates inefficiency in the allocation of resources. One can bolster this argument by further adding that farmers actually receive fertilizer subsidy in two stages; one is at the stage of production of fertilizer itself, since the natural gas used to manufacture urea is sold to the five fertilizer factories at a subsidized rate, and the other is the ex-factory price of urea fertilizer dealers need to pay is lower than the cost of production of one unit of urea.

The other argument is that, as it is mentioned earlier, *subsidy* is a form of correcting device for existing market imperfections in the food grain production sector.

Since we have collected primary data by directly interviewing of farmers (including their costs and returns, pricing, fertilizer use information), we can examine actual field level data of the farmers and try to understand their vulnerabilities to low prices, low returns, low availability of credit, etc. particularly for the landless and the marginal farmers, and assess how critical it is for them to have low fertilizer prices. This is the analytical approach that has been followed in this study. We depend on two sets of information, one is a rich collection of cost, return, fertilizer use information set of farmers classified by land class category and by regions; and the other is the farmers' willingness-to-pay (WTP) for fertilizer information.

We ask the household how much they are willing to pay for a unit of fertilizer to be able to avoid occasional difficulties in obtaining fertilizers and getting this fertilizer in the market (assuming no speculative situation would be there in the free market of fertilizers). We investigate determinants of responses of one offering to pay more than the administratively set prices; this provides insights into farmers' willingness-to-pay for unit of fertilizer.

11.2 Examination of Survey Data

11.2.1 Household Background Information

Respondent farmers are classified into five categories, according to the amount of land the farmer household possesses: the *landless* category (up to 0.5 acres of land), the *marginal* (in between 0.5 and 1.49 acres), the *small* farmers (1.5 to 2.49 acres), the *medium* categories (2.50 to 7.49 acres), and the *large* one (with land above 7.5 acres).

The *household dependency ratio* varies across land class categories-- the landless category has a higher dependency ratio (about 70%), this gradually reduces to 51% in the case of the large farmers. This indicates that within the landless category, greater emphasis is on the returns of occupations of the few working age males and females (see Table 5.6).

Outside of agriculture or petty trade, an opportunity for any formal sector job is strictly limited for landless farmers. This is because they have a low level of formal education (see Table 5.8).

11.2.2 Household Sources of Income and Assets Information

We can examine patterns of income sources of survey respondents to find out differences among farmer class categories. In the questionnaire the respondents were asked whether their households receive income from particular sources, the responses being simple “yes” or “no” answers (see Table 11.1). Households have a large portfolio of earning sources for income generation. In matching with a low asset base, the landless farmer households have small scope for earning income from sources such as leasing out of land, ponds, salaried jobs, etc. The reported percentage of households with transfer earnings from social security benefits are higher among landless households and a large number of them have to depend on agricultural or non-agricultural labor market earnings, indicative of their vulnerable socio-economic conditions.

Table 11.1: Reported source of income by farm class (in %)

Source of income	Type of farmers					
	Landless	Marginal	Small	Medium	Large	All
Agriculture crops	99.1	99.3	99.6	100.0	98.6	99.4
Vegetable gardening at homestead	12.1	19.8	21.6	26.8	31.9	19.5
Fruits produced at homestead	12.8	25.7	25.9	34.5	44.9	24.1
Trees/Nurseries	22.4	29.9	29.8	36.2	43.5	29.2
Poultry raising	72.6	70.1	66.0	57.0	56.5	67.2
Livestock rearing	47.9	58.0	51.8	58.4	55.1	53.8
Fish cultivation/catching	22.2	29.1	34.8	40.0	53.6	30.9
Agri. labour	35.7	22.2	20.9	9.9	7.2	23.3
Non-agri. labour	25.6	13.4	8.2	5.5	1.4	14.5
Grocery	3.1	3.2	3.5	2.5	4.3	3.1
Business	23.1	27.6	27.0	34.0	34.8	27.6
Leased out agri.land/land/pond	3.4	5.8	6.4	15.1	37.7	8.2
Rent: House/shop	1.5	1.3	2.8	2.7	5.8	2.1
Salaried job	8.7	14.9	16.3	15.3	18.8	13.4
Transport van/rickshaw/boat/motor bike/ cycle	7.7	5.6	2.8	2.2	1.4	5.0
Cottage industry/ handicrafts(run by family)	0.7	1.3	1.8	1.1	1.4	1.1
Remittance from foreign/ home	5.0	6.2	9.9	7.9	11.6	6.9
Gifts	3.2	6.9	4.3	4.1	11.6	5.0
Gratuity/pension	1.0	1.5	1.8	2.5	4.3	1.7
Social security	10.8	4.3	3.2	3.3	5.8	6.0
Others	2.1	1.1	2.5	2.2	2.9	1.9
N	585	536	282	365	69	1837

Land ownership is highly skewed towards the direction of large landowners. Smaller categories of farmers accordingly have lesser scope for earnings from a number of income-generating sources, i.e., scope for commercial fisheries or tree planting (Table 11.2 and 11.3).

Table 11.2: Average amount of land by different class of farm households (in decimal)

Type of Land	Type of farmers					
	Landless	Marginal	Small	Medium	Large	All
Homestead land	9.1	12.2	13.7	18.7	27.0	13.3
Agriculture land	9.2	83.2	169.4	356.5	1203.5	169.3
Pond/ditch	1.3	4.1	8.2	11.0	24.8	6.0
Waste land	0.2	0.9	1.7	5.5	34.9	3.0
Garden/nursery	1.7	5.9	11.1	32.3	80.9	13.4
Other land	0.1	0.0	1.5	1.4	0.0	0.5
Total amount of land of the household	21.6	106.4	205.7	425.3	1371.1	205.5
N	585	536	282	365	69	1837

Table 11.3: Reported percentage of farmers having different type of land by farm class

Type of Land	Type of farmers					
	Landless	Marginal	Small	Medium	Large	All
Homestead land under ownership	97.9	99.6	100.0	99.7	100.0	99.2
Agriculture land under ownership	36.4	97.6	99.6	99.2	100.0	78.8
Amount of pond/ditch	21.4	35.3	47.5	51.2	63.8	37.0
Waste land under ownership	4.1	8.6	9.9	12.1	18.8	8.4
Garden/nursery under ownership	18.3	34.7	41.1	49.9	59.4	34.4
Other land under ownership	2.1	1.3	2.8	1.9	1.4	1.9
N	585	536	282	365	69	1837

Households have reported their asset information in the survey; here we consider only the non-durable agricultural equipments (Table 11.4). The differences in the farmer class's average asset holding have been found to be statistically significant for items such as power tiller, plough, deep tube well, shallow tube well, etc. (we have conducted the ANOVA tests for this).We can infer unlike the large farmers, the smaller categories of farmers have to go to the rental market for use of these equipments when there is a need for it. Therefore this lack of ownership of agricultural equipments makes smaller category farmers dependent on the rental market, and thus they have a need for ready cash or credit to offer in the rental market.

Table 11.4: Farm Household Non-durable Asset Holding by Farmer Classifications (Agricultural Equipment)

Type of assets	Type of farmers				
	Landless	Marginal	Small	Medium	Large
Power tiller (One way ANOVA test result: F value= 36.11*** and Reject the null of equal means (p=0.00)) *average number per farm household* *p-value for null of mean difference equals 0*	0.01	0.04 *0.53*	0.05 *0.33*	0.10*** *0.00*	0.32*** *0.00*
Plough (One way ANOVA test result: F value= 12.29*** and Reject the null of equal means (p=0.00)) *average number per farm household* *p-value for null of mean difference equals 0*	0.21	0.28 *0.40*	0.33* *0.07*	0.46*** *0.00*	0.45** *0.03*
Deep Tube Well (One way ANOVA test result: F-Value= 13.19*** and Reject the null of equal means (p=0.00)) *average number per farm household* *p-value for null of mean difference equals 0*	0.01	0.02 *0.94*	0.06** *0.05*	0.09*** *0.00*	0.13*** *0.00*
Shallow Tube Well (One way ANOVA test result: F value= 43.59*** and Reject the null of equal means (p=0.00)) *average number per farm household* *p-value for null of mean difference equals 0*	0.08	0.17** *0.03*	0.29*** *0.00*	0.42*** *0.00*	0.64*** *0.00*
Low Lift Pump (One way ANOVA test result: F value= 0.46 and Not reject the null of equal means (p=0.77)) *average number per farm household* *p-value for null of mean difference equals 0*	0.00	0.01 *0.88*	0.01 *0.99*	0.01 *0.96*	0.01 *0.92*
Irrigation Motor (One way ANOVA test result: F value= 1.22 and Not reject the null of equal means (p=0.30)) *average number per farm household* *p-value for null of mean difference equals 0*	0.00	0.01 *0.96*	0.00 *1.00*	0.01 *0.39*	0.00 *1.00*
Traditional Irrigation Equipment (One way ANOVA test result: F value= 0.78 and Not reject the null of equal means (p=0.54)) *average number per farm household* *p-value for null of mean difference equals 0*	0.03	0.05 *0.90*	0.05 *0.92*	0.03 *0.99*	0.07 *0.89*
Tractor (One way ANOVA test result: F value= 1.56 and Not reject the null of equal means (p=0.19))					

average number per farm household	0.01	0.00	0.02	0.00	0.00
p-value for null of mean difference equals 0		*0.99*	*0.48*	*0.99*	*0.99*
Drum Seeder (One way ANOVA test result: F value= 1.11 and Not reject the null of equal means (p=0.35))					
average number per farm household	0.03	0.03	0.01	0.01	0.01
p-value for null of mean difference equals 0		*0.99*	*0.75*	*0.53*	*0.96*
Thresher Machine (One way ANOVA test result: F value= 2.43* and Not reject the null of equal means (p=0.05))					
average number per farm household	0.06	0.07	0.04	0.08	0.13
p-value for null of mean difference equals 0		*0.99*	*0.76*	*0.85*	*0.37*
Spray (One way ANOVA test result: F value= 2.79** and Reject the null of equal means (p=0.03))					
average number per farm household	0.19	0.19	0.27	0.26	0.29
p-value for null of mean difference equals 0		*1.00*	*0.25*	*0.34*	*0.63*
Dhenki (One way ANOVA test result: F value= 0.89 and Not reject the null of equal means (p=0.92))					
average number per farm household	0.31	0.29	0.33	0.35	0.38
p-value for null of mean difference equals 0		*0.99*	*0.99*	*0.87*	*0.91*

Note:

1. *p-value for null of mean difference equals zero exhibits whether the difference between the population mean of the "landless" farmer category and the category in question statisticallysignificantly differs from the value of zero (Scheffe multiple-comparison test).*
2. **** implies statistical significance at 1 % level, ** implies statistical significance at 5 % level, and * implies statistical significance at 10% level.*

Farmer households differ in terms of land classification with respect to their ownership of other categories of household non-durable items as well. Table 11.5 lists percentages of households reported to own other non-durable assets. As expected small categories of farmers lack ownership over large majority of these items. We can infer that smaller households are more vulnerable to adverse shocks in agricultural incomes as such that they do not own many non-durable items to fall back upon, compared to the larger farmers.

Table 11.5: Household reported of different items by farm class (in %)

Type of assets	Type of farmers					
	Landless	Marginal	Small	Medium	Large	All
Cane crushing machine	0.68	0.19	-	0.27	-	0.33
Ladder	37.09	52.61	58.87	67.40	76.81	52.48
Spade	91.45	96.08	94.68	98.63	94.20	94.83
Sickle	97.44	97.39	96.10	93.97	97.10	96.52
Shovel	64.10	79.85	82.98	83.01	82.61	76.05
Axe	47.69	59.89	65.25	66.58	79.71	58.90
Poultry cage	62.91	61.94	64.18	61.10	59.42	62.33
Boat (tradition/engine driven)	4.62	4.10	5.67	6.58	8.70	5.17
Fishing net	34.87	41.98	41.13	42.19	57.97	40.23

Bullock cart	1.03	1.12	2.84	3.29	5.80	1.96
Rickshaw/van	7.18	5.22	4.96	2.19	5.80	5.23
Motor cycle	1.71	3.36	4.61	12.60	20.29	5.50
Bicycle	27.52	36.38	43.26	47.12	57.97	37.56
Sewing machine	3.93	6.53	7.80	5.75	7.25	5.77
Mobile phone	48.89	62.31	71.28	78.90	89.86	63.75
TV	21.37	31.16	41.13	46.30	60.87	33.70
Radio	5.64	5.60	11.35	9.32	17.39	7.68
Cassette player	4.27	4.29	4.26	6.58	8.70	4.90
VCP/VCR/VCD	3.25	3.73	6.38	7.40	10.14	4.95
Camera	0.68	1.49	1.42	3.29	5.80	1.74
Tubewell	61.37	74.07	71.28	78.36	71.01	70.33
Furniture	96.92	96.83	95.04	93.70	98.55	96.03
Utensil	94.53	96.64	96.10	93.70	95.65	95.26
Wrist watch	29.23	37.87	33.69	38.08	55.07	35.17
Manual weave	0.34	-	0.35	0.55	-	0.27
Car battery	0.34	0.93	0.35	0.82	-	0.60
Gold ornament	67.52	77.43	79.79	83.29	85.51	76.10
Silver ornament	39.49	47.01	45.74	51.23	57.97	45.67
Trees/Bamboo	65.98	77.05	70.21	71.23	69.57	71.04
Shop	0.17	-	-	-	-	0.05
Fan	1.37	1.68	1.06	0.27	-	1.14
Freeze	-	-	0.35		-	0.05
N	**585**	**536**	**282**	**365**	**69**	**1837**

11.2.3 Access to Credit Issue

In Chapter VII, we notice that the poorer farmers have mostly depended on relatives, neighbors and NGOs for access to credit. Their access to formal banking sector is rather limited. On the other hand, the large farmers have easier access to credit from the formal banking sector.

11.2.4 Fertilizer Price Paid and Crop Returns

We examine data on crop production in this sub-section. One interesting finding is that even though there is an official price of fertilizer, not all farmers pay the same price for it. Farmers have reported their actual paid price in their responses, and we notice that different categories of farmers paid different mean prices. For example, in Table 11.6, we find that landless categories of farmers have paid Taka 12.77 per kg of (solid) urea fertilizer on an average, whereas the corresponding money value for the large farmers is slightly lower, it is Taka 12.43 per kg of urea. We note that we can reject the null hypothesis of equal means between groups at 10% level in a one-way ANOVA test framework; on the other hand we do not find statistical significance of differences of mean values of the “landless” category and the other categories.

Table 11.6: Average Urea Fertilizer Prices Paid by Farmer Classification throughout the Survey Year

(in Taka/kg of urea)

Farmer Classification	Number of Observations	Average Urea Price Paid	Standard Deviation	p-value for null hypothesis of difference between population means differs from zero†
Landless	1099	12.77	0.06	
Marginal	1079	12.59	0.07	*0.40*
Small	596	12.67	0.08	*0.93*
Medium	803	12.54	0.08	*0.24*
Large	157	12.43	0.15	*0.48*
One-way ANOVA test result: F value= 2.07* and Reject the null of equal means at 10% level (p= 0.08)				

Note:

1. † the difference of the mean of the "landless" farmer class and the farmer classification in question (Scheffe multiple-comparison test).

Farmers have reported of reasons for not being able to use the required amount of fertilizer, we see the case for urea (Table 11.7). The majority of landless households have reported that their inability to meet fertilizer requirement is financial, either the price was too high or they had money crisis (cash and credit constraints). On the other hand, larger farmer households have not reported financial constraints in such a large number. For larger farmers, the inability to meet fertilizer requirement is mostly an issue related to availability at a point in time. Therefore the issue of fertilizer demand deficit has two aspects to it, for some farmers (mostly the smaller ones) the issue is more of financial in nature, whereas some other farmers (the larger ones) the issue is more of availability, rather than financial.

Table 11.7: Reasons Reported by Farmers for Not Having Adequate Urea Fertilizer (in %)

Reasons for not using adequate urea fertilizer	Type of Farmer Classification					Total
	Landless	Marginal	Small	Medium	Large	
High price	33.15	42.20	38.93	31.58	25.33	36.13
Money crisis	23.12	16.84	13.21	8.68	1.33	15.89
Financial Difficulties Mentioned	*56.27*	*59.04*	*52.14*	*40.26*	*26.67*	*52.02*
Not available at time	17.03	17.38	18.57	25.26	24.00	19.33
Fertilizer was not available	25.63	22.87	27.14	33.42	46.67	27.46
Transportation problem	0.00	0.35	0.00	0.00	0.00	0.11
Availability Issues Mentioned	*42.65*	*40.60*	*45.71*	*58.68*	*70.67*	*46.90*
Others	1.08	0.35	2.14	1.05	2.67	1.08
N	558	564	280	380	75	1857

In Table 11.8, we examine the crop revenue, costs and profits data for aman and boro cultivation. The average profit amount for *aman* cultivation is around Taka 17,000 for

landless category-- the large farmers have made a profit of Taka 1,11,000[51] (the p-value for the null hypothesis of mean difference between the mean profit values of the landless and that of the large equals zero is 0.00, so this is statistically significant at the 1% level). We run a one-way ANOVA test and reject the null hypothesis of equal mean across landholding categories at 1% level of significance, thus there are statistically significant difference among mean profit values across landholding classes. Similarly for *boro* cultivation, we find a figure of economic profit of only around Taka 9,300 for landless category, and Taka 79,000 for large farmers (the difference is statistically significant at the 1% level). We run the same one-way ANOVA test and reject the null hypothesis of equal mean across landholding categories at 1% level of significance, thus there are statistically significant difference among mean profit values across landholding classes. We notice that for landless farmers the profit amount is fairly limited, and thus a small perturbation in the profit amount may induce them to decide to grow some other crops, or in an extreme case, may prompt them to quit farming altogether. We examine one more issue from this record-- that is the average amount of profits per Taka on fertilizer invested. For *aman* cultivation, the landless category of farmers have a rate of TK. 20 profit per Taka on fertilizer invested, and the corresponding number of the large farmers is TK. 104 (the mean difference statistically significantly differs from zero at the 1% level). If we combine the three smaller subgroups of farmers such as landless, marginal and small, we find that the rate of profit per Taka on fertilizer invested is TK. 26 whereas the corresponding number for a combination of subgroups of medium and large is TK. 47 (the mean difference statistically significantly differs from zero at the 5% level). If we examine this profit per Taka on fertilizer for *boro* crop, we do not find statistically significant differences between pairs of the landholding categories. For *boro* cultivation, the average profit amount per Taka on fertilizer invested for combined groups of landless, marginal and small is TK. 17 and the corresponding figure for combined groups of medium and large is TK. 40 (the difference is statistically significant at 1% level).

Table 11.8 illustrates the point that profit amount is statistically significantly different among farmer categories both for the *aman* crop and the *boro* crop. Again the amount of profit per Taka invested on fertilizer (arguably some measure of "returns" from fertilizer) also differs, statistically significantly. Thereby smaller farmers can expect to gain small amount of profits per Taka they invest on fertilizer, whereas for large farmers this "return" from fertilizer is much higher.

Table 11.8: Total Land under Cultivation, Gross Revenue, Total Cost, Profit and Profit Per Taka on Fertilizer Invested in *Aman* and *Boro* cultivation

[51] Cost has been calculated as cost=irrigation expenses + seed expenses + cost for seedlings/plants + expenses for pesticides + transportation cost + plough/power tiller/tractor expenses + land rental + number of male man-days times the daily wage rate for male + number of female man-days times the daily wage rate for females + total fertilizer expenses (this includes both categories of expenses-- paid and family). And, revenue has been calculated as revenue= harvest period market price times the amount of output produced + payment for by-product. Finally the (economic) profit= revenue minus cost.

Indicators	Landless	Marginal	Small	Medium	Large
Aman Cultivation (N=1212)					
Total Land under Cultivation (dec.)	133	136	155	173	243
Total Fertilizer Cost (Taka)	3868	4152	4629	5784	5504
Gross Revenue (Taka)	25398	36800	42592	62793	131762
Total Cost (Taka)	8611	8883	11074	14976	20146
Profit (Taka)	**16787**	**27917**	**31518**	**47817*** **	**111617*** **
(One way ANOVA test result: F value= 17.84*** and Reject the null of equal means (p=0.00))					
p-value for null of mean diff. equals 0†:		0.49	0.36	0.00	0.00
	landless	marginal	small	medium	large
Profit per Taka on Fertilizer Invested (Taka)	20	35	23	36***	104***
(One way ANOVA test result: F value= 22.94*** and Reject the null of equal means (p=0.01))					
p-value for null of mean diff. equals 0†:		*1.00*	*0.25*	*0.00*	*0.00*
	landless, marginal and small			medium and large	
Profit per Taka on Fertilizer Invested (Taka)	26			47**	
(One way ANOVA test result: F value= 4.24** and Reject the null of equal means (p=0.04))					
p-value for null of mean diff. equals 0†:				*0.04*	
Boro Cultivation (N=1403)					
Total Land under Cultivation (dec.)	126	144	145	164	232
Total Fertilizer Cost (Taka)	3854	4575	4605	4863	6854
Gross Revenue (Taka)	19611	20970	32260	49161	107278
Total Cost (Taka)	10278	10781	12810	15933	27915
Profit (Taka)	**9333**	**10189**	**19450*** **	**33228*** **	**79363*** **
(One way ANOVA test result: F value= 76.01*** and Reject the null of equal means (p=0.00))					
p-value for null of mean diff. equals 0†:		0.99	0.00	0.00	0.00
	landless	marginal	small	medium	large
Profit per Taka on Fertilizer Invested (Taka)	19	14	19	40	35
(One way ANOVA test result: F value= 3.03** and Reject the null of equal means (p=0.02))					
p-value for null of mean diff. equals 0†:		*0.98*	*1.00*	*0.12*	*0.91*
	landless, marginal and small			medium and large	
Profit per Taka on Fertilizer Invested (Taka)	17			40***	
(One way ANOVA test result: F value= 11.48*** and Reject the null of equal means (p=0.00))					
p-value for null of mean diff. equals 0†:				*0.00*	

Note:

1. *† the difference of the mean of the "landless" farmer class and the farmer classification in question (Scheffe multiple-comparison test).*
2. ****, ** and * imply statistical significance at the 1% level, 5% level and 10% level, respectively.*

11.2.5 Farmers' Willingness to Pay and Capability to Purchase

In the field survey, one question was asked of the farmers the maximum amount they would be willing to pay for a unit of fertilizer, provided that this fertilizer is supplied in the open

market and be available at the right time and in right quantity. The respondents were requested to consider the question carefully, and take into consideration the current prices of the crops, and their own financial constraints. Some interesting observations were made. The farmers responded in line with their financial condition, and as expected, landless and marginal farmers quoted a low price, while large farmers quoted a distinctly higher price (we have quoted willingness-to-pay prices for five categories for fertilizers-- urea (solid), urea (ball), TSP, MoP and DAP) (Table 11.9). The common pattern observed for all categories of fertilizers is that the willingness-to-pay prices quoted are much lower than the market prices or dealer prices offered at that time period (except for urea (solid) and urea (ball), other prices at dealer shops were in the range of Taka 70 to Taka 90 at that time, but we notice the WTP prices quoted are much lower).

Examining the data from a different angle (see Table 11.10), we find that only 13% of landless farmers are willing to pay a price more than the officially quoted price (in the case of urea (soild)), whereas 26% of large farmers are willing to pay a price more than that cutoff-- overall only 18% of all farmers were willing to pay a price more than the official one.
We run a simple *probit* regression model to examine the determinants of farmers' willingness to pay a sum of money as price compared to the officially quoted price. The probit follows the following form,

Probit framework:

1: Yes (if farmer is willing to pay more than Taka 12 for a unit of urea fertilizer)
0: No (if farmer is not willing to pay more than Taka 12 for a unit of urea fertilizer)

Model:

Pr (y=yes) = f (Cropland, Homestead, Salaried, Remittance, Otherreq, Refertlasty, Chittagong, Rajshahi, Khulna, Barisal, Sylhet)

In Table 11.11 we report only the marginal effects of the probit estimation. We consider that whether a farm household is more likely to quote a higher price compared to the official price, may depend on, among others, how much crop land the farm household has (indicator of strength of income and agricultural requirement), how much homestead land it has (indicator of strength of income), whether the household receives salaried income and remittance earnings (indicator of non-agricultural sources of income), and if there are some other requirements for fertilizer (indicator of other uses). We include one dummy variable for households who received adequate amount of fertilizer at the correct time during the last year (*refertlasty*). We also use division dummies, i.e., dummies for the divisions of Chittagong, Rajshahi, Khulna, Barisal, and Sylhet (the base is the division of Dhaka). In the regression result, we find that the estimated coefficients are mostly as expected. The most important point to notice is that the probability of a farmer household quoting a price more than the official price is found to be closely associated with its' landholding class category (estimated coefficient for the variable land class is positive valued and statistically significant at the 5% level). Also we find the estimated coefficient for the remittance variable to be positive valued and statistically significant at the 5% level. This also clearly depends on whether the household obtained fertilizer at the correct time during the last year, if the answer is negative, the household has been found to be willing-to-pay more. This last point we infer since we find the estimated coefficient for the variable *refertlasty* to be negative valued and statistically significant at the 1% level. We infer that whereas large farmer may actually afford and be willing to pay a higher price for urea fertilizer, the smaller farmers are much more constrained, and mostly their constraint is cash or credit related, not that of availability related (see detailed discussion on credit constraints in Chapter 10). Regional issues also play a role in this willingness-to-pay, with farmers from Chittagong and Barisal willing to pay less

compared to the farmers of Dhaka, whereas farmers from Rajshahi, Khulna and Sylhet are willing to pay more compared to the farmers of Dhaka (the explanation may be linked with their respective experiences with regards to fertilizer collection during recent times).

Table 11.12 reports farmers' responses to the question of whether they have the capability of purchasing the required amount of fertilizer in the on-season time. As expected only 11.32% of landless farmers mentioned that they have capability to purchase fertilizer during the on-season time, whereas the corresponding number for large farmers is 38.10%. The percentage numbers reported in this table may have downward bias since someone may opt for reporting a more humble situation than he actually is in, may be due to inhibition or disinterestedness to release household income information to the interviewer. But even if there is a downward bias in reporting there is no a priori reason to believe that the magnitude of bias would vary as per land classes, so overall this table still provides a picture of capability failure of farmers.

Table 11.13 reports farmers' responses to the query of what course of action they (usually) take in the case of failure to purchase fertilizer during the on-season time. We do not find much of a difference among responses (smaller farmers tend to have greater reliance on NGOs/local associations and lesser reliance on or access to banks, compared to larger farmers).

Table 11.9: Farmers' Willingness to Pay for Unit of Fertilizer (Taka)

Farm class	**Urea (N=1813)**		**Urea (Ball) (N=854)**		**TSP (N=1807)**	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Landless	7.70	0.16	3.89	0.28	17.80	0.48
Marginal	8.23	0.44	4.46	0.27	16.54	0.23
p-value†	*0.99*		*0.99*		*0.98*	
Small	10.02	1.50	7.89**	2.33	21.54	3.68
p-value	*0.72*		*0.02*		*0.57*	
Medium	8.76	0.82	6.69	0.38	18.68	1.92
p-value	*0.97*		*0.18*		*0.99*	
Large	19.09***	11.08	6.04**	0.89	17.56	0.58
p-value	*0.00*		*0.93*		*1.00*	
Farm class	**MoP (N=1789)**		**DAP (N=1345)**			
	Mean	S.D.	Mean	S.D.		
Landless	16.28	0.36	14.97	0.36		
Marginal	15.46	0.40	16.29	0.40		
p-value†	*0.99*		*0.99*			
Small	20.25	5.63	24.9	5.63		
p-value	*0.52*		*0.10*			
Medium	17.42	3.61	20.82	3.61		
p-value	*0.99*		*0.53*			
Large	16.25	0.91	17.98***	0.91		
p-value	*1.00*		*0.99*			

Note:

1. † the difference of the mean of the "landless" farmer class and the farmer classification in question,
2. ***, ** and * imply statistical significance at the 1% level, 5% level and 10% level, respectively.

Table 11.10: Distribution of farmers willing to pay more than Tk. 12 price for urea fertilizer

Land Class	Percentage of Farmers Willing to Pay		Total
	More than TK. 12	Less than TK. 12	
Landless	13.16	86.84	585

Marginal	18.28	81.72	536
Small	19.15	80.85	282
Medium	22.74	77.26	365
Large	26.09	73.91	69
Total	**17.96**	**82.04**	**1837**

Table 11.11: Probit estimation results of farmers' willingness to pay more

Marginal Effects of the Probit (At Mean)					
Dependent Variable: 1 if WTP is more than or equal to TK. 12, 0 if otherwise y=Pr (more) (Predicted Value)=0.14 (at mean)					
Number of Observations=1674, LR Chi-square (11)= 252.57, Prob>Chi-Sq.=0.00					
Pseudo R^2= 0.16					
Variable	***dy/dx***	***Stand. Error***	***Z***	***Pr>|Z|***	***X***
Land Class	0.02**	0.00	2.39	0.02	2.34
Homestead	0.00	0.00	0.86	0.39	13.41
Salaried	0.04	0.03	1.42	0.15	1.86
Remittance	0.12**	0.05	2.67	0.01	1.93
Otherreq	0.01	0.01	1.27	0.20	1.88
Refertlasty	− 0.14***	0.02	-7.33	0.00	1.38
Chittagong	− 0.07**	0.02	-2.66	0.01	0.21
Rajshahi	0.22***	0.03	7.69	0.00	0.25
Khulna	0.03	0.04	0.96	0.34	0.10
Barisal	− 0.16***	0.01	-4.54	0.00	0.09
Sylhet	0.11**	0.04	2.82	0.01	0.09

Note: **** and ** denote statistical significance at the 1% level and the 5% level, respectively.*

Table 11.12: Responses regarding capability at the time of on-season for purchasing fertilizer (in % of farmer class)

	Landless	Marginal	Small	Medium	Large	Total
Always having capability	11.32	12.27	27.47	36.36	38.10	19.96
Sometimes having capability	54.53	54.98	53.48	50.28	47.62	53.42
Often not having capability	25.26	25.10	12.45	10.80	7.94	19.79
Never having full of capability	8.89	7.66	5.86	2.27	6.35	6.67
Had a fall in capability only in the survey year	0	0	0.73	0.57	0.00	0.17
Total	**574**	**522**	**273**	**352**	**63**	**1,784**

Table 11.13: Strategies adopted by farmers who are unable to purchase fertilizer on time during the peak season by their own means (in % of farmer class)

Indicators	Landless	Marginal	Small	Medium	Large	Total
Borrow from relatives/family	61.08	62.91	73.17	70.91	57.63	65.20
Borrow from local samity	2.16	3.28	1.22	3.64	0.00	2.56
Borrow from money lenders	7.39	3.48	3.66	2.73	15.25	4.71
Take loan from ngo/local associations	14.59	11.89	4.47	3.94	1.69	9.77
Take loan from bank	3.96	3.89	3.25	6.06	20.34	4.83
Sell goods or asset	10.81	14.55	14.23	12.73	15.25	12.93
Total	**555**	**488**	**246**	**330**	**59**	**1,678**

11.2.6 Farmer household's poverty statistics

In the survey data we find that the poorer segments of the farmers have a lower asset base, lower returns and lower credit access compared to the richer farmers. We find evidence of vulnerability of the poorer sections of the farmers in the national data as well.

According to the 2005 BBS Household Income and Expenditure Survey, 25.1% of all farm households were below the lower poverty line (by CBN method) and 40.0% of all households were below the upper poverty line. In the 2000 HIES, the corresponding numbers were 34.3% and 48.9% (see Table 11.15). We find that there is a strong association between the poverty headcount rate and household's classification of landholding size (except for the category of 'no land'[52]). The poverty headcount rate is higher for farm households which have lower landholding, and lower for households which have higher landholding. Therefore, the national-level data also reveals that farmers with less land are particularly poverty-stricken. Looking at the CBN poverty headcount in the 2000 and 2005 HIES, we see that households where the principal occupation of the household head is 'agricultural, forestry and fisheries' have one of the most severe rates of poverty (see Table 11.16). Thus, households dependent on agricultural occupations face more severe poverty compared to almost any other profession in the country.

From this discussion of the national data it is evident that the farmers are one of the most poverty-stricken professionals in the country and among the farmers the smallest ones face the most severe form of poverty. Even though there have been remarkable improvements in poverty incidences in between 2000 and 2005, we see that the comparative positions of the farmers vis-à-vis other professionals and poorer farmers vis-à-vis richer farmers has not changed much over time. This way we can argue that a subsidy targeted specifically towards poorer farmers may not only have a *production incentive function*, but this may have a *social welfare improvement function* as well.

Table 11.14 Incidence of Poverty (CBN Method) by Ownership of Land 2005 and 2000

Size of Land Holding (Acres)	Percentage of Population below the Poverty Line					
1. the Lower Poverty Line	**2005**			**2000**		
	National	Rural	Urban	National	Rural	Urban
All Size	**25.1**	**28.6**	**14.6**	**34.3**	**37.9**	**20.0**
No Land	25.2	49.3	17.8	30.4	53.1	20.5
<0.05	39.2	47.8	23.7	43.3	48.8	22.3

[52] The category "no land" includes households who do not have ownership over any land, but they may not be classified into falling below the poverty line. For example we consider the case of tenant families (in towns and villages) who do not have land property but they may be earning from self-employment, business or salaried occupations.

0.05-0.49	28.2	33.3	11.4	40.0	41.7	12.6
0.50-1.49	20.8	22.8	9.1	29.6	30.6	15.4
1.50-2.49	11.2	12.8	2.7	21.9	22.9	1.4
2.50-7.49	7.0	7.7	3.0	11.5	12.4	0.0
7.50+	1.7	2.0	0.0	4.0	4.1	0.0
2. the Upper Poverty Line	**2005**			**2000**		
	National	Rural	Urban	National	Rural	Urban
All Size	**40.0**	**43.8**	**28.4**	**48.9**	**52.3**	**35.2**
No Land	46.3	66.6	40.1	46.6	69.7	36.6
<0.05	56.4	65.7	39.7	57.9	63.0	38.3
0.05-0.49	44.9	50.7	25.7	57.1	59.3	27.3
0.50-1.49	34.3	37.1	17.4	46.2	47.5	27.4
1.50-2.49	22.9	25.6	8.8	34.3	35.4	10.2
2.50-7.49	15.4	17.4	4.2	21.9	22.8	9.1
7.50+	3.1	3.6	0.0	9.5	9.7	0.0

Source: HIES (2005)

Table 11.15 Incidence of Poverty by Main Occupation of Head of Household, 2005 and 2000

Occupation of Head of Household	Percentage of Population below the Poverty Line					
1. the Lower Poverty Line	**2005**			**2000**		
	National	Rural	Urban	National	Rural	Urban
Total	**25.1**	**28.6**	**14.6**	**34.3**	**37.9**	**20**
Professional, Technical, Related	16.1	18.5	11.7	22.2	22.2	15.1
Administration & Management	2.4	12.6	0.0	1.5	0.0	2.0
Clerical & Govt. Executives	29.4	36.6	18.0	34.2	42.6	22.0
Sales Workers	16.7	21.7	9.6	23.0	28.4	14.2
Service Workers	25.3	31.4	16.5	37.3	41.3	30.2
Agri., Forestry & Fisheries	**31.5**	**32.0**	**24.7**	**40.8**	**41.2**	**29.8**
Production, Transport & Related	23.6	30.6	14.2	34.1	40.7	21.6
Head Not Working	17.0	18.5	12.1	25.6	29.7	13.0
2. the Upper Poverty Line	**2005**			**2000**		
	National	Rural	Urban	National	Rural	Urban
Total	**40.0**	**43.8**	**28.4**	**48.9**	**52.0**	**35.2**
Professional, Technical, Related	25.7	28.0	21.7	32.7	35.4	26.7
Administration & Management	9.8	38.4	3.0	8.5	27.9	2.0
Clerical & Govt. Executives	44.1	51.8	32.0	49.2	56.3	38.7
Sales Workers	30.5	36.5	22.2	38.4	47.0	24.4
Service Workers	40.7	48.3	29.7	56.9	57.7	55.6
Agri., Forestry & Fisheries	**48.2**	**48.5**	**44.8**	**55.0**	**55.3**	**47.1**
Production, Transport & Related	42.2	49.2	32.7	47.4	53.6	35.6
Head Not Working	27.5	29.8	20.0	39.9	44.1	27.1

Source: HIES (2005)

11.2.7 Importance of HYV Boro and Fertilizer for Farmers

Now that we have examined our survey data and the national data, we examine one more national level data that is available in the Yearbook of Agricultural Statistics. Here we examine the importance of HYV *boro* in terms of crop yields as compared to other crops and thereby try to understand why government help in successful cropping of *boro* is important for the farmers.

In Table 11.16 we have data on year-wise production, acreage and yield rates of different categories of paddy production. HYV boro crop produces the highest yield per unit of land

with numbers are much higher than those of other paddy categories. HYV *aman* however has a reasonably high yield. The local varieties of *aus* and *aman* do not require much chemical fertilizer, thus the cost of production is lower, but their yield is also lower. On the other hand, the HYV categories particularly that of *boro* crop require a large amount of inputs most importantly the chemical fertilizers. The cost of production overall is therefore higher for boro whereas the yields are much higher likewise. In Table 11.17 we have data for paddy and rice prices, and we notice that *boro* prices are slightly lower than other categories, but this lower price is compensated for by a much higher production record of *boro*. This is the background behind the high popularity of *boro* among the farmers and associated high volume of chemical fertilizers that are required for producing *boro*.

Table 11.16 Areas, Production of Crops and Yield Rates, National Data, 2003-04 to 2005-06

Rice Varieties	**2003-04**			**2004-05**			**2005-06**		
	Area ('000 Acres)	Prod. ('000 M. Tons)	Yield (Kg per Acre)	Area ('000 Acres)	Prod. ('000 M. Tons)	Yield (Kg per Acre)	Area ('000 Acres)	Prod. ('000 M. Tons)	Yield (Kg per Acre)
Aus									
Local	1854	896	483	1418	638	450	1279	664	519
HYV	1117	936	838	1114	862	774	1277	1081	847
Total Aus	2971	1832	617	2532	1500	592	2556	1745	683
Aman									
Broadcast	1542	786	510	1221	458	375	1249	591	473
T. Local	5110	3205	627	4645	2668	574	4275	2714	635
T. HYV	7378	7529	1020	7181	6693	932	7891	7505	951
Toal Aman	14030	11520	821	13047	9819	753	13415	10810	806
Boro									
Local	515	405	786	464	391	843	430	347	807
HYV	9230	12432	**1347**	9578	13446	**1404**	9617	13628	**1417**
Total Boro	9745	12837	**1317**	10042	13837	**1378**	10047	13975	**1391**

Source: BBS, Yearbook of Agricultural Statistics 2006

Table 11.17: Whole Sale Prices of Selected Crops, 2001-02 to 2005-06

Annual Averages (Taka per quintal)

Paddy	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2005-06**
Local Aus	654	726	720	895	871
Local Aman	739	800	773	873	1000
HYV Aman	694	765	780	882	976
Local Boro	688	767	771	915	1005
HYV Boro	**661**	**751**	**794**	**894**	**961**
Pajam Boro	726	795	867	996	1050
Rice					
Local Aus	1216	1337	1300	1548	1575
Local Aman	1259	1345	1291	1468	1803
HYV Aman	1159	1268	1282		
Local Boro	1286	1385	1271	1578	1723
HYV Boro	**1142**	**1278**	**1357**	**1447**	**1564**
Pajam Boro	1466	1573	1654		

Source: BBS, Yearbook of Agricultural Statistics 2006

11.2.8 An Alternative Subsidy Scheme

The universal coverage of fertilizer is simple to administer but this may fail in reaching the ideal twin objectives of an input subsidy policy-- providing *incentives to produce more output* and also playing *a social welfare function*. The universal subsidy policy provides incentives to produce more food grain, but it does not fulfill the other requirement of a social welfare function. The basic problem is that this is distributed irrespective of landownership, income or poverty status; and since large farmers use more chemical fertilizers they enjoy more benefits of this kind of subsidy scheme.

As discussed earlier we may opt for a *selective, targeted subsidy scheme* where subsidy will be provided only for the poorer categories of farmers, such as *landless, marginal* and *the small*, and other farmers such as *the medium* and *the large ones* will pay the market price for chemical fertilizers. This will require two sets of prices, one is the *subsidized prices* for the poorer farmers and the other one is officially calculated *cost-recovery prices* for fertilizers which will be met by the richer farmers. The current dealer system may operate as it is continuing now. Only difference is that the poorer farmers (properly identified with the help of a large database) will pay the *subsidized prices* and the richer farmers (again properly identified with the help of a large database) will pay the *cost-recovery prices*. The new subsidy system will be better targeted (in terms of keeping incentives to produce mostly intact) and poverty-reducing (subsidy payment will directly help the poorer farmer households and secure them from cash and credit requirements to purchase chemical fertilizer).

The large farmers' incentives to produce more food grain would be adversely affected by requiring pay a cost recovery price rather than a subsidized price. We propose that this will be separately dealt with rather than within the input subsidy system. For example the government through the banking system may try to provide more agricultural credits for the farmers, small and large alike. The large farmers would therefore be provided with credit options whereas only the poorer farmers would be provided with subsidized price options.

11.3 Summarizing the Subsidy Discussion

The survey data reveal that there is a large variation among the farmer households. Whereas some farmer households have a large amount of properties and source of earnings available, other households are on the border of financial ruination, and on the margin of leaving agriculture altogether.

There is a strong case of continuing fertilizer subsidy for the landless, marginal and small categories of farmers (at least at the current scale, or if possible enhance it), since these households have been found to be on the borderline of financial constraint and profitability. It would be difficult for a large number of them to continue their food grain production activities at the current scale at least if the subsidy is withdrawn or reduced and price of fertilizer (particularly urea) have been given scope for rising up to a high level.

On the other hand, we can argue that, large farmer households are the ones who can send a large amount of marketed surplus to the market, and therefore their incentives also have to be preserved, otherwise they themselves may opt for some other business rather than investing resources for producing food grain. We propose that large farmers would be provided with more ready agricultural credit through the banking system. The basic policy prescription would be that only small farmers would be provided with subsidized inputs whereas large farmers would be provided with credit facilities.

In summary, if at all there is a requirement that fertilizer subsidy has to be reduced, there has to be a system where at least the landless, the marginal and the small category of farmers get the priority in obtaining benefits from (the remaining) subsidy. So we prescribe for selective subsidy, rather than universal subsidy as it is practiced now.

There may be a counter-argument with respect to *selective subsidy*, such that this kind of subsidy will be difficult to administer in this country (with close kinship, family ties, and the likelihood that the rich may pretend to be "poor" to obtain the subsidy benefits, or the poor themselves may sell the benefits of subsidy to the rich). Some bargaining solutions between some small farmers and some large farmers would be unavoidable. This is because some small farmers may be so acutely cash constrained that they may get the fertilizer at the subsidized price and sell it to the large farmers at a margin. This kind of a situation is unlikely to be widespread since fertilizer at crucial seasons like *boro* cultivation is important enough for small farmers as well.

The proposed targeted subsidy scheme may be implemented in some pilot locations for a thorough examination of the relative merits and demerits of this scheme, before this is implemented replacing the universal subsidy scheme as of now.

From a number of key informant interviews in the border areas, we have found that there is a tendency for fertilizer to be smuggled in or out depending on the comparative prices of fertilizers on both sides of the border. The policy makers would need to take into consideration this issue of comparability of fertilizer prices in the neighboring countries while deciding on the official prices of these.

CHAPTER XII

POLICY RECOMMENDATIONS, DIRECTIONS FOR FURTHER RESEARCH AND CONCLUDING REMARKS

Policy Recommendations

Fertilizer Demand Management

1. Across all categories we observe that as the land is used intensively, the percentage of farmers who experience fertilizer deficit is decreasing. Special emphasis has to be on the subsidy reception of the smaller farmers, so that they do get the benefits of subsidy (in combination of discussions on subsidy, we actually recommend that subsidy is specifically targeted to the smaller farmers).

2. It has been found that a significant portion of farmers have collected fertilizers from the open market which are supposed to be sold completely through the dealers appointed by the government. Therefore, it seems that there is substantial amount of leakage of fertilizer from government machinery for rent-seeking purposes by concerned distribution agents. Remedial steps have to be taken by concerned authority to stem these leakages.

3. Total fertilizer demand or requirement from household level is significantly higher than the official estimates. It has to be investigated whether the fertilizer shortage that often happens is due to this mismatch between farm household level information and the official data. This fertilizer requirement data has been collected from household level and it represents farmers' perception. Therefore, we should interpret the data with caution. However, regardless of the reliability of household level data, these findings indicate that the whole process of estimation of fertilizer requirement has to be thoroughly reviewed.

4. It has been found that significant portion of farming households suffer from deficit in fertilizer in all major categories of fertilizer. If the fertilizer distribution were efficient which reduced this household level deficit, it would have contributed to a significant boost in agricultural production. Therefore supply bottlenecks which are impeding efficient fertilizer distribution has to be removed for increased agricultural production.

5. Regional distribution should also be further investigated. We have found TSP and MoP is quite low in the Sylhet division. It should be investigated whether this low use is due to supply bottlenecks or geographical characteristics. In terms of regional variation, farmers in Dhaka division suffer from higher probability of fertilizer deficit compared to other divisions. Further research and investigation is needed to identify the factors behind this higher risk suffered by farming households in Dhaka.

6. Most farmers are concentrating on a particular mix of fertilizers which is urea, TSP and MoP. Since these three are the most used fertilizers, the availability of these three

should be made the most efficient. Currently the focus is mostly on the urea distribution but TSP and MoP also require major impetus in efficient distribution.

7. Most of the farmers mentioned high price of fertilizer as a major reason that they could not avail the fertilizer. But in the case of urea, more than fifty percent of farmers mentioned timely unavailability and inadequate supply as the major reasons of their fertilizer crisis. Therefore, it should be thoroughly investigated the reasons for distribution inefficiencies that caused unavailability of fertilizer in different channels of administration.

Fertilizer Distribution Management

8. Involvement of Agriculture Extension workers needs to be lessened to allow them to give attention to the dissemination of technology information. SAAOs should be released from fertilizer marketing activities.

9. To improve fertilizer distribution system, fertilizers are to be supplied to dealers from the nearest buffer stocks instead of different plants. It can reduce shipment time and transportation cost of fertilizer;

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10. From a number of key informant interviews in the border areas, we have found that there is a tendency for fertilizer to be smuggled in or out depending on the comparative prices of fertilizers on both sides of the border. The policy makers would need to take into consideration this issue of comparability of fertilizer prices in the neighboring countries while deciding on the official prices of these.

Credit Market

11. A large number of landless, marginal and small farmers do not or cannot collect agricultural credit from the government banks. Here, we would like to recommend expansion of banking branches in rural areas with focus to provide service to these three categories of farmers.

12. The study finds that 38 percent farmers collected credit for agricultural purposes; among them highest numbers of credit collectors are landless followed by marginal, small, medium and large farmers. The study also noticed that credit collection from different banks is the lowest among landless farmers followed by marginal, small, medium and large. From a number of qualitative interviews it was learned that prime reason for landless, marginal and small farmers' less credit collection from formal banks are: lack of awareness and knowledge about formal sources of credit, low education level of poor farmers as a barrier to fulfill official procedures, fear of harassment and discouragement or misguidance by local people, specially by the influential ones. In this circumstance, we would like to recommend less complicated, procedure for accessing formal banking in rural areas to support poor farmers.

13. The study noticed that farmers' credit collection increase from October and remain high up to February (which is the season for *Boro* cultivation) whereas credit collection rises to the peak on the month of January. Hence our recommendation will be to allocate major concentration of different banks agricultural credit activities from October to February.

Fertilizer Subsidy Policy

14. We have examined our survey findings and other national data in order to understand the issue of fertilizer subsidy and the appropriateness of the universal coverage scheme. We have discussed twin objectives of an input subsidy in a developing country such as Bangladesh. One is the objective of promoting production of more food grain, and the other is of social protection of the poor and marginal farmers from binding cash, credit and low asset base constraints with regards to purchase of required amount of chemical fertilizer. We have found that there are indeed cases of financial constraints among poor farmers whereas these constraints are not that acute among large farmers. If subsidy is to address both of the objectives-- not only that it matters how this provides incentives for more production, but also it matters if it gives incentives to people who would find it absolutely difficult to continue operations without it --we may have to reconsider the *universal coverage scheme* as it is being practiced now and select some alternative scheme. We discuss the possible benefits and costs of an alternative *targeted scheme* under which the non-poor farmers pay a cost recovery price and the poor farmers pay a subsidized price. The advantage of this scheme is that this serves both of the objectives of an input subsidy policy. Under this proposed input subsidy policy, only the poorer farmers enjoy the direct benefits of fertilizer subsidy whereas the larger farmers would be reached out with some supplementary initiatives, such as enhanced availability of agricultural credit facilities by the banking system for all classes of farmers.

    We recommend that the Government of Bangladesh may opt for a *selective, targeted subsidy scheme* in place of the *universal coverage of subsidy* that is being practiced now. The current dealer system may continue, but now there will be two sets of prices for the same unit amount of fertilizer specifically allotted for two categories of farmers. The poorer farmers (such as landless, marginal and the small) will be allowed to pay a *subsidized price*, whereas the medium and the large farmers will be charged a *cost recovery price* administratively set by the government.

15. In order to implement the proposed selective subsidy policy a large database of farmers' information throughout the country will be required, and this needs to be regularly updated. An additional requirement will be that each farmer would have to open a bank account through which incentive packages from the government will be transferred.

16. Some additional research will be required for examining different alternative models within this broad framework of *selective subsidy* scheme. It is recommended that this proposed subsidy system is examined in some pilot locations before this is implemented throughout the entire country.

Directions for Further Research

79. **Farmers' cost management practices need to be examined further.** This is a complex issue which may have influence of traditional activities, social structure, and presence of formal or informal financial institutions. There need to be further research on the cost management practices of farmers and suitability of replicating the best practices throughout the country.

80. **Farmers sometimes lose their agricultural land for various reasons (may be for economic, social, political or/and natural reasons).** Why farmers are moving away

from their own land or what measures can be done to stop the process of disposition of farmers -- need to be identified. To do this task detailed studies can be conducted.

81. **A wide variety of traditional norms still exists in rural economy, particularly, in the case of dealing of land (contract on land use especially in case of *Borga*), dealing with middlemen on markets, deals on credit collection, deals of labor wage etc.** These factors sometimes directly sometimes indirectly affects on ultimate gain of agricultural return. To understand the matter in detail new research can be conducted.
82. **The banking sector is changing their terms and conditions targeting poor farmers all over the country.** For sound recommendation in this regard a study can be conducted with larger sample.
83. **Farmers sometimes change their crop cultivation or change the amount of land on cultivation.** There must be economic and non-economic reasons behind this incidence. To identify the causes behind crop shifting detail study need to be conducted.
84. Some more research needs to be conducted on the **application of selective, targeted subsidy policy** as is discussed in this study.

Concluding Remarks

The objective of the study was to understand the nature of the fertilizer shortage that a typical farmer faces almost every season. The fertilizer shortage year after year questions the benefit of managing this crucial input through government administrative machinery. Investigating the history of the fertilizer distribution policy in Bangladesh, the study found that fertilizer distribution switched from market mechanism to government machinery apparently without any rigorous evaluation study of the system. The evolutionary mechanism of fertilizer distribution channel shed important light on the nature of the government policy over the time period.

But to have better understanding of the fertilizer situation we need to have intensive research with focus in particular areas. One area could be the cost benefit analysis of the current fertilizer distribution. The huge subsidy in fertilizer along with leakage and corruption in the government machinery in the fertilizer distribution has a huge cost whereas the magnitude of benefits is clearly arguable. It might be interesting to see whether the same benefits could be accrued to farmers if fertilizer was left to market demand and supply but farmers would have received the benefit while purchasing from the market. There needs to be further research on the mechanism of the current universal fertilizer subsidy scheme. Instead of providing subsidy for all the farmers irrespective of their amount of land holding, the study proposes an alternative subsidy scheme. This alternative scheme consists of a system of fertilizer distribution where larger farmers pay a cost-recovery price for fertilizers whereas only the poorer farmers pay a subsidized price for it. The study also emphasizes on the expansion of agricultural credit facilities for all categories of farmers, thereby large farmers would be able to take credit from banks whereas only small farmers would be provided with subsidy. These are just examples of varied future direction of research that can be pursued based on the groundwork provided by this study.

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Annex 1.1: GOB Intervention in Fertilizer Market, November, 1994 to January, 1995

Date	GOB Action – Impact
November, 1994	Factory lifting quantity (Maximum allowed) reduced from 3,000 MT to 500 MT per distributor – Disrupted delivery schedule of distributors.
November	Factory gate sales on ILC basis stopped – Disrupted delivery schedule of distributors and caused financial difficulty for small distributors.
December	Maximum retail price (MRP) established at TK. 230.00 per bag for urea – Led to confusion in market.
December	Deputy Commissioners (DCs) authorized to receive fertilizers from BCIC factories for distribution and to back list distributors if determined to be manipulating the market – Disrupted delivery schedule of distributors and led to concerns over business stability.
December	TSP sales from GTSP suspended by BCIC in order to establish a 15,000 MT buffer stock at the factory – Disrupted delivery schedule of distributors.
January, 1995	Use of BADC godowns for BCIC to maintain buffer stock authorized – Led to confusion in market of BCIC's intentions concerning buffer stock sale.
January	Urea export deliveries stopped – Late decision but were essential to avoiding an even more severe fertilizer crisis.
January	Factory lifting quantity (maximum allowed) increased from 500 MT to 1,000 MT per distributor in some factories – Favorable decision.
January	Seven distributors arrested as per directive of DC's – Caused fear and confusion in the market.
February	The import of granular SSP banned from April 1, 1995 – Causing concern in market over extent of future GOB intervention. Disrupts marketing planning of distributors.

Source: Adopted from Allgood, 1995 P. 19

Annex 1.2: Upazila Fertilizer and Seed Monitoring Committee (UFSMC) (Old Committee, 2008)

Sl. No.	Members	Position
1	Upazila Nirbahi Officer (UNO)	Chairman
2	Upazila Livestock Officer (ULO)	Member
3	Upazila Fisheries Officer (UFO)	Member
4	Officer-in-Charge (OC) of Police Station	Member
5	BADC Fertilizer/Seed Representative	Member
6	BFA representative	Member
7	Upazila Agriculture Officer	Member-Secretary

Annex 1.3: District Fertilizer and Seed Monitoring Committee, 2008

1.	Deputy Commissioner (DC)	Chairman
2.	Superintendent of Police (SP)	Vice-Chairman
3.	Representative of Joint Forces in the District	Member
4.	District Livestock Officer	Member
5.	District Fisheries Officer	Member
6.	All Upazila Nirbahi Officer under the District	Member
7.	Deputy Director (Seed), BADC	Member
8.	Representative, District Agriculture Marketing Department	Member
9.	Representative, Seed Certification Agency	Member
10.	Representative, District Chamber of Commerce or Trade Organization	Member
11.	BFA Representative	Member
12.	Deputy Director, Agriculture Extension	Member-Secretary

Annex 1.4: District Fertilizer and Seed Monitoring Committee (DFSMC), 2009

•	All Member Parliament of the District	Advisor
1.	Deputy Commissioner (DC)	Chairman
2.	Superintendent of Police (SP)	Member
3.	All Upazila Chairman under the District	Member
4.	All UNO under the District	Member
5.	District Livestock Officer	Member
6.	District Fisheries Officer	Member
7.	Joint Director (Fertilizer) BADC	Member
8.	Deputy Director (Seed), BADC	Member
9.	Representative, District Agriculture Marketing Department	Member
10.	Representative, Seed Certification Agency	Member
11.	Deputy Director, BRDB	Member
12.	District Cooperative Officer	Member
13.	President, District Press Club	Member
14.	Representative, District Chamber of Commerce or Trade Organization	Member
15.	BDR Representative (for Border area)	Member
16.	BFA Representative (02)	Member
17.	Farmer's Representative (02) nominated by the Committee	Member
18.	Deputy Director, Agriculture Extension	Member-Secretary

Annex 1.5: Upazila Fertilizer and Seed Monitoring Committee (UFMC) (from October, 2009)

Sl. No.	Members	Position
1	Local MP	Advisor
2	Upazila Chairman	Advisor
3	Upazila Vice-Chairman (2)	Advisor
4	Upazila Nirbahi Officer (UNO)	Chairman
5	Upazila Fisheries Officer (UFO)	Member
6	Upazila Livestock Officer (ULO)	Member
7	Upazila Rural Development Officer (URDO)	Member
8	Upazila Cooperative Officer (UCO)	Member
9	Officer-in-Charge (OC) of Thana	Member
10	All UP Chairman under Upazila	Member
11	BADC Fertilizer/Seed Representative	Member
12	BFA representative	Member
13	BDR representative (Border area)	Member
14	Farmer representative (nominated by Upazila Council)	Member
15	President, Upazila Press Club	Member
16	Upazila Agriculture Officer	Member-Secretary

Annex 1.6: Retail Fertilizer Seller's ID Card

Stamp size photograph (office seal on the photograph)

Serial No. : Issue Date of the Card :

Name of the retail seller : .....
.....

Father's Name: .....
.....

Block:
.....Village:.....Union:.....

Uapzila: .....
District:.....

Location of shop:
.....

Upazila Agriculture Officer
and
Member Secretary, Upazila Fertilizer and Seed Monitoring Committee

(Conditions follow on the other opposite page)

Conditions:

- This Card is non-transferable
- The Card holder will not be allowed to marketize/store fertilizer from any source except from approved dealer or approved source.
- The authority, in case of violation of fertilizer ordinance/policies/act or order of the authority, shall have the power to cancel this card, including taking of other legal actions.
- The authority preserves the power to cancel this card at any time without showing any reason whatsoever.

Annex 1.7: Dealer's activities evaluation (performance) schedule

District Name..... Month.....

(Amount in Metric Ton)

Name of the Upazila	No. of Dealers	Fertilizers Name	Amount of fertilizer allotted	Amount of fertilizer lifted	Amount of fertilizer arrived at upazila	Amount of fertilizer not lifted	Amount of fertilizer sold	Stock at the end of month	Reasons for not arriving fertilizer	Reasons, if not lifted	Comments
		Urea (Mill)									
		Urea (Buffer)									
		TSP (Private)									
		TSP (BADC)									
		TSP (BCIC)									
		MoP (Private)									
		MoP (BADC)									
		DAP (BCIC)									
		DAP (Private)									
		Urea (Mill)									
		Urea (Buffer)									
		TSP (Private)									
		TSP (BADC)									
		TSP (BCIC)									
		MoP (Private)									
		MoP (BADC)									
		DAP (BCIC)									
		DAP (Private)									

Annex 1.8: Fertilizer factories under Bangladesh Chemical Industries Corporation (BCIC)

SL No.	Enterprise Name	Established	Location	Commercial Production Date	Installed Capacity (MT)	Major Raw Materials	Products	Equivalent 10 3tpy
1.	Chittagong Urea Fertilizer Ltd. (CUFL)	October, 1987	Rangadia Anwara, Chittagong	July, 1988	5,61,000	Natural Gas	Ammonia Urea	
2.	Jamuna Fertilizer Company Ltd. (JFCL)	1991	Tarakandi, Jamalpur	July, 1992	5,61,000	Natural Gas	Ammonia Granular Urea	
3.	Ashuganj Fertilizer & Chemical Co. td. (AFCCL)	1981	Ashuganj, Brahmanbaria	July, 1983	5,28,000	Natural Gas	Ammonia Urea	
4.	Urea Fertilizer Factory Ltd. (UFFL)	1970	Ghorasal, Narsingdhi	September, 1972	4,70,000	Natural Gas	Ammonia Urea	
5.	Natural Gas Fertilizer Factory Ltd. (NGFF)	1960	Fenchuganj, Sylhet	July, 1962	1,06,000 & 12,000	Natural Gas, Sulphur	Urea Ammonium Sulphate	
6.	Polash Urea Fertilizer Factory Ltd. (PUFFL)	December, 1985	Polash, Narshingdhi	July, 1986	(MT) 95,000	Natural Gas	Ammonia Urea	
Phosphatic Fertilizer Plant:								
7.	Triple Super Phosphate Complex Ltd. (TSPCL)	1970	North Potenga, Chittagong	1973	120 TSP 100 SSP	Rock phosphate, phospheric Acid, Rock Sulphur	TSP, SSP gypsom, sulphuric acid, phospheric acid	120 – 35 –
8.	Di-Ammonium Phosphate Fertilizer Company Ltd. (DAPFC)- 1–2	2006 2008 Not operational fully	Rangadia, Anwara, Chittagong Rangadia	2007	800 (Daily) 240 DAP 249.6 DAP	Imported Ammonia & phospheric Acid	DAP	 24093.6 24969.73
9.	Private Entrepreneur Hussain Chemical Fatulla	2005 Not operational yet			150 SSP			52.5 –
10.	Joint Venture Karnaphuli Fertilizer Company Limited (KAFCO)	16 November, 1994	Rangadia, Anowara, Chittagong	April, 1995	Design Capacity: 1725 per day 1500 per day	Stamicarbon Haldor Topsone	Granular Urea, Anhydrous Ammonia	
							Total	697191.1

Source:

1. Hug, Shariful, Fertilizer production and use in Bangladesh, Fertilizer Focus, May 1999 http://www.fadinap.org/Bangladesh/trade.htm,1.19.2010
2. BCIC
3. BanglaPaedia

Annex 1.9: Fertilizer Distribution Card Chemical Fertilizer

Season	Crops	Amount of land (decimal)	Distribution (in kg)			Distribution's signature and date	Signature of salesman
			Urea	TSP/DAP	MoP		
Kharif 1							
Kharif 2							

- Maintain this card carefully
- Use more organic fertilizer in land

Annex 1.10: Fertilizer Distribution Register

Village: .... Ward: .... Union: ....

Sl. No.	Farmer's name and Father's name	Total Arable (decimal)	Amount of land under crops		Fertilizer Demand			Distribution					
			Crops name	Amount of land (acre)	Urea	TSP	MoP	Date	Urea	Date	TSP	Date	MoP
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Name		T. Aman										
			Total										
	Name:		T. Aman										
			Vegetables										
	Father:		Others										
			Total										
	Total =		Aman / Vegetables / Others										

Annex 1.11: Fertilizer Sales Center Under BADC

Dhaka	Mirkadim
	Manikgong
Tangil	Madhupur
Jamalpur	Melandah
Mymemsingh	Sambhuganj
Kishoreganj	Kishoreganj
	Bhairab
Faridpur	Tepakhola
Sylhet	Sylhet, Sadar
	Sayestaganj
Chittagonj	Chittagonj TG
Comilla	Doudkandi
	Brahmanbaria
Noakhali	Feni
Rajshahi	Rajshahi, Sadar
Pabna	Sirajganj
	Ullapara
Bogra	Santahar
	Noagoan
Rangpur	Kalibari
	Syedpur
	Mahendranagar
Dinajpur	Poolhat
	Beergonj
	Birampur
	Shibgong, Thakurgaon
Khulna	Siromoni
Jessore	Jessore, Sadar
	Magura
	Narail
Kushtia	Kushtia, Sadar
Barisal	Barisal, Sadar

Annex 1.12: Composition of National Fertilizer Distribution Coordination Committee (NFDCC)

Sl. No	Committee members
1.	Chairman (by rotation) - Secretary, Ministry of Agriculture, Bangladesh Secretariat, Dhaka. - Secretary, Ministry of Commerce, Bangladesh Secretariat, Dhaka.
2.	Member – Chairman, Bangladesh Chemical Industries Corporation (BCIC)
3.	Member – Chairman, Bangladesh Agricultural Development Corporation (BADC)
4.	Member – Director General, Department of Agriculture Extension (DAE)
5.	Member – Chairman, Bangladesh Fertilizer Association (BFA)
6.	Member – Chairman, FBCCI
7.	Member Secretary – Additional Secretary (Input & Admin), Ministry of Agriculture

Chapter-5

Table 5.1: Percentage distribution of respondents according to age of household members [in different divisions]

Division	Age group											
	0-4	5-9	10-14	15-24	25-34	35-44	45-59	60+	N (member)	Mean	HH Size	N (household)
Dhaka	8.0	10.8	11.5	21.3	13.2	12.4	14.4	8.3	2451	27.8	5.5	445
Chittagong	7.5	11.0	12.3	24.4	14.5	8.7	13.4	8.2	2161	26.7	6.0	363
Rajshahi	7.0	10.2	10.7	20.3	16.3	13.4	13.8	8.3	2365	28.4	5.1	461
Khulna	5.9	8.1	10.3	22.8	16.4	13.7	14.0	8.8	1222	29.1	5.0	242
Barisal	6.4	10.4	10.8	19.9	15.6	13.0	12.2	11.8	879	29.5	5.3	165
Sylhat	9.4	10.9	11.6	20.4	17.3	10.1	11.3	9.1	1030	27.0	6.4	161
All	7.4	10.4	11.3	21.7	15.2	11.8	13.5	8.7	10108	27.9	5.5	1837
N	747	1047	1141	2196	1539	1191	1364	883	10108	10108		1837

Table 5.1a: Percentage distribution of respondents according to age of household members [by farm class]

Farm size	Age group											
	0-4	5-9	10-14	15-24	25-34	35-44	45-59	60+	N (member)	Mean	HH Size	N (household)
Landless	7.9	12.6	13.8	21.7	13.9	11.0	12.4	6.8	3218	25.8	5.5	585
Marginal	8.1	10.1	10.5	20.5	15.5	13.4	13.1	8.8	2768	28.0	5.2	536
Small	6.2	10.3	10.7	20.5	16.0	11.8	15.0	9.5	1527	29.1	5.4	282
Medium	6.8	8.2	9.4	23.3	16.0	11.4	14.6	10.3	2147	29.6	5.9	365
Large	6.3	6.5	9.2	25.9	17.2	9.8	13.4	11.8	448	30.3	6.5	69
All	7.4	10.4	11.3	21.7	15.2	11.8	13.5	8.7	10108	27.9	5.5	1837
N	747	1047	1141	2196	1539	1191	1364	883	10108	10108	1837	

Table 5.2: Percentage distribution of household members according to sex by division

Division	Sex		
	Male	**Female**	**All**
Dhaka	52.7	47.3	100.0
Chittagong	55.2	44.8	100.0
Rajshahi	53.7	46.3	100.0
Khulna	54.0	46.0	100.0
Barisal	51.1	48.9	100.0
Sylhat	52.6	47.4	100.0
All	53.5	46.5	100.0
N	5403	4705	10108

Table 5.3 Highest class passed by household members (5+ years of age)

Type of farmers	Different stage of education										
	No education	Incomplete primary	Complete primary	Incomplete secondary	Complete secondary	Above secondary	Non-formal education	Not referred	All	Average years of schooling	N
Landless	24.9	26.4	12.1	18.9	2.4	2.1	2.2	11.0	100.0	3.2	2965
Marginal	22.4	21.8	13.6	23.4	4.8	5.2	1.8	7.0	100.0	4.2	2543
Small	15.5	19.9	13.5	25.2	7.3	9.8	1.6	7.2	100.0	5.1	1433
Medium	14.9	16.5	11.7	26.7	9.1	13.4	2.3	5.6	100.0	5.7	2000
Large	12.1	12.4	10.5	30.0	9.8	19.5	1.4	4.3	100.0	6.7	420
All farmers	20.1	21.4	12.6	23.2	5.6	7.3	2.0	7.9	100.0	4.5	9361
N	1878	2004	1177	2173	522	684	187	736	9361		

Table 5.4: Highest class passed by household members (5+ years of age) [by farm class in all divisions]

Type of farmers	Different stage of education										
	No education	Incomplete primary	Complete primary	Incomplete secondary	Complete secondary	Above secondary	Non-formal education	Not referred	All	Average years of schooling	**N**
Dhaka division:											
Landless	13.2	29.9	8.9	17.6	2.1	1.5	2.0	24.6	100.0	2.9	885
Marginal	17.7	22.0	12.5	20.5	6.1	4.9	2.5	13.7	100.0	4.0	672
Small	10.2	17.7	16.9	27.6	7.1	5.5	3.9	11.0	100.0	4.9	254
Medium	9.9	15.9	10.9	27.6	11.4	13.7	4.1	6.6	100.0	6.1	395
Large	8.0	14.0	14.0	28.0	12.0	20.0		4.0	100.0	6.8	50
All farmers	13.5	23.4	11.3	21.6	5.7	5.5	2.7	16.2	100.0	4.1	2256
N	305	528	256	487	129	124	61	366	2256		
Chittagong division:											
Landless	34.9	25.9	16.0	15.3	2.2	2.2	2.4	1.0	100.0	3.2	776
Marginal	27.9	23.7	12.1	22.9	5.5	4.0	2.4	1.5	100.0	4.1	545
Small	26.0	25.6	11.7	21.6	4.4	6.2	1.1	3.3	100.0	4.2	273
Medium	25.2	21.0	11.2	27.4	7.3	5.2	1.2	1.5	100.0	4.6	329
Large	22.1	11.7	11.7	31.2	7.8	14.3	1.3		100.0	6.0	77
All farmers	29.7	23.9	13.4	20.9	4.5	4.2	2.0	1.5	100.0	3.9	2000
N	594	478	268	417	89	84	40	30	2000		
Rajshahi division:											
Landless	32.1	18.0	11.6	23.7	2.6	2.4	2.4	7.0	100.0	3.4	455
Marginal	25.5	17.5	13.8	23.3	4.7	8.7	1.7	4.8	100.0	4.5	600
Small	12.0	15.8	12.7	28.0	10.8	14.1	1.4	5.2	100.0	6.1	425
Medium	11.7	14.2	11.4	22.6	11.5	21.4	2.3	4.9	100.0	6.6	607
Large	8.0	9.8	8.9	34.8	11.6	25.0	0.9	0.9	100.0	7.8	112
All farmers	19.6	16.0	12.2	24.7	7.7	12.8	1.9	5.2	100.0	5.4	2199
N	430	351	269	543	169	281	42	114	2199		
Khulna division:											
Landless	26.4	23.6	10.4	28.9	2.9	4.3	1.1	2.5	100.0	4.1	280
Marginal	17.0	18.0	17.0	32.1	5.9	5.6	1.0	3.3	100.0	5.1	305
Small	19.7	18.8	12.4	26.1	5.0	16.1	0.5	1.4	100.0	5.7	218
Medium	15.8	9.7	9.0	36.2	7.2	16.8	2.5	2.9	100.0	6.4	279
Large	7.4	14.7	10.3	29.4	10.3	23.5	2.9	1.5	100.0	7.6	68
All farmers	19.0	17.3	12.2	31.0	5.6	11.0	1.4	2.5	100.0	5.4	1150

Type of farmers	Different stage of education										
	No education	Incomplete primary	Complete primary	Incomplete secondary	Complete secondary	Above secondary	Non-formal education	Not referred	All	Average years of schooling	**N**
N	218	199	140	357	64	127	16	29	1150		
Barisal division:											
Landless	7.5	36.4	12.3	20.6	4.0	2.0	2.4	15.0	100.0	3.9	253
Marginal	10.7	30.7	17.7	25.1	2.8	2.3	1.4	9.3	100.0	4.2	215
Small	6.3	23.6	12.5	26.4	8.3	9.0		13.9	100.0	5.3	144
Medium	7.8	24.2	11.1	28.1	10.5	8.5		9.8	100.0	5.6	153
Large	6.9	15.5	10.3	36.2	10.3	13.8	3.4	3.4	100.0	6.5	58
All farmers	8.1	28.9	13.4	25.3	6.1	5.3	1.3	11.5	100.0	4.7	823
N	67	238	110	208	50	44	11	95	823		
Sylhet division:											
Landless	34.8	25.0	13.6	13.6	1.9	0.9	2.8	7.3	100.0	2.6	316
Marginal	34.5	25.2	11.7	18.9		1.0		8.7	100.0	2.8	206
Small	18.5	23.5	16.8	15.1	4.2	1.7	2.5	17.6	100.0	3.2	119
Medium	20.7	20.3	17.7	22.4	3.0	2.1	2.1	11.8	100.0	3.7	237
Large	21.8	10.9	9.1	14.5	5.5	16.4		21.8	100.0	4.6	55
All farmers	28.3	22.8	14.4	17.3	2.3	2.3	1.8	10.9	100.0	3.1	933
N	264	213	134	161	21	21	17	102	933		

Table 5.5 Percentage of primary and secondary occupations of household members [by farm class in all divisions]

Occupation	Primary Occupation						Secondary occupation					
	Landless	Marginal	Small	Medium	Large	All	Landless	Marginal	Small	Medium	Large	All
Dhaka division												
Farmer/cultivator	21.8	21.1	21.2	20.4	15.4	21.1	2.2	2.9	2.9	3.6	1.9	2.7
Housewife/ Homemaker	21.3	24.7	25.9	23.5	19.2	23.2	0.2	0.3		0.5	1.9	0.3
Agri. Laborer	0.7	0.1	0.4			0.4	3.4	0.5	1.1	0.7		1.8
Non-agri. Laborer	1.6	0.8		0.7		1.0	2.2	0.7				1.1
Salaried Job	2.9	4.3	2.9	4.3	1.9	3.5		0.4				0.1
Business	0.3	1.4	2.2	2.6		1.2	1.1	1.1	1.4	1.9	1.9	1.3
Student	24.5	23.0	25.5	26.1	26.9	24.5						
Unemployed	4.5	2.2	2.5	1.4		2.9						
Children	12.8	12.8	13.3	8.6	7.7	12.0						
Old age people and Disable	0.8	0.3	0.4			0.4						

Occupation	Primary Occupation						Secondary occupation					
	Landless	Marginal	Small	Medium	Large	All	Landless	Marginal	Small	Medium	Large	All
Others	8.9	9.4	5.8	12.4	28.8	9.7	5.6	4.8	4.7	5.5	1.9	5.1
No secondary occupation							67.9	74.3	74.1	77.9	84.6	72.6
Not applicable							17.3	15.1	15.8	10.0	7.7	15.0
N	964	736	278	421	52	2451	964	736	278	421	52	2451
Chittagong division												
Farmer/cultivator	23.6	24.9	27.1	29.1	24.7	25.4	1.3	0.8	1.7	1.7	2.4	1.3
Housewife/ Homemaker	23.2	25.4	24.1	25.4	28.2	24.5	0.1	0.2				0.1
Agri. Laborer	0.6					0.2	1.8	0.7	1.4	0.8		1.2
Non-agri. Laborer	0.5	0.5	0.3			0.4	0.6	0.8	0.3			0.5
Salaried Job	1.4	3.2	2.4	2.8	5.9	2.5		0.3	0.3	0.6		0.2
Business	1.7	1.5	1.4	1.4	2.4	1.6	2.0	2.9	1.0	1.7		2.0
Student	24.5	20.5	23.4	22.1	16.5	22.5				0.3		0.0
Unemployed	3.0	2.5	1.4	2.0	1.2	2.4						
Children	11.3	12.8	11.0	11.2	10.6	11.6						
Old age people and Disable	0.8		0.7			0.4						
Others	9.4	8.7	8.2	6.1	10.6	8.6	2.0	2.4	3.8	1.7	3.5	2.4
No secondary occupation							77.8	76.6	79.0	80.2	82.4	78.2
Not applicable							14.3	15.3	12.4	13.1	11.8	14.0
N	832	595	291	358	85	2161	832	595	291	358	85	2161
Rajshahi division												
Farmer/cultivator	22.1	22.7	20.9	23.5	20.3	22.3	3.0	3.5	2.4	3.7	3.4	3.3
Housewife/ Homemaker	25.6	25.7	26.4	24.4	27.1	25.5		0.3	0.4	0.2		0.2
Agri. Laborer	0.8	1.2				0.5	3.0	1.5	0.2			1.1
Non-agri. Laborer	1.2	0.2	0.2			0.3	0.8	0.3	1.1			0.5
Salaried Job	3.6	3.5	4.7	1.6	1.7	3.1	0.2	0.8		0.3	1.7	0.4
Business	0.8	1.7	2.4	1.7		1.6	2.4	2.0	3.3	2.8	1.7	2.5
Student	22.1	23.6	27.6	27.8	32.2	25.6		0.2	0.2	0.2		0.1
Unemployed	1.8	1.8	1.1	0.9		1.4						
Children	14.3	12.3	9.6	10.6	11.0	11.7						
Old age people and Disable		0.2	0.2	0.5	1.7	0.3						
Others	7.6	7.2	6.9	9.0	5.9	7.7	3.2	4.7	2.0	1.7	2.5	3.0
No secondary occupation							71.2	72.5	79.3	79.2	78.0	75.6
Not applicable							16.1	14.3	10.9	12.0	12.7	13.3
N	497	657	450	643	118	2365	497	657	450	643	118	2365
Khlna division												

Occupation	Primary Occupation						Secondary occupation					
	Landless	Marginal	Small	Medium	Large	All	Landless	Marginal	Small	Medium	Large	All
Farmer/cultivator	23.6	29.1	29.8	24.1	29.6	26.7	3.0	1.9	0.4	1.7	1.4	1.8
Housewife/ Homemaker	24.9	27.2	28.9	27.8	26.8	27.1	0.3	0.3	0.4			0.2
Agri. Laborer	1.6			0.7		0.6	4.3	3.4	3.1	0.3		2.6
Non-agri. Laborer	1.0	0.6				0.4	1.0	0.3	0.4			0.4
Salaried Job	1.0	0.6	2.6	3.1	7.0	2.0		0.3				0.1
Business		1.2	0.4	1.7		0.8	1.6	2.8	1.3	2.0	5.6	2.2
Student	22.6	24.5	25.4	25.1	26.8	24.5						
Unemployed	1.0	1.2	0.4	2.7	1.4	1.4						
Children	13.1	8.7	6.1	7.8	5.6	8.9						
Old age people and Disable	0.7	0.9		0.7		0.6						
Others	10.5	5.9	6.1	6.4	2.8	7.0	5.6	5.3	3.9	2.4	2.8	4.3
No secondary occupation							70.2	75.5	83.8	82.7	83.1	77.9
Not applicable							14.1	10.2	6.6	10.8	7.0	10.5
N	305	323	228	295	71	1222	305	323	228	295	71	1222
Barisal division												
Farmer/cultivator	21.0	21.3	23.2	20.1	14.3	20.8	2.2	2.6	1.3	1.8	1.6	2.0
Housewife/ Homemaker	22.9	27.4	21.9	25.0	25.4	24.5			0.7			0.1
Agri. Laborer			0.7	0.6	1.6	0.3	1.8		1.3	0.6		0.9
Non-agri. Laborer	0.4		0.7			0.2	1.8					0.6
Salaried Job	4.8	3.5	9.9	4.9	4.8	5.3		0.9	0.7	0.6		0.5
Business		0.4		5.5	3.2	1.4		0.4		1.8		0.5
Student	25.8	19.6	23.2	18.9	19.0	22.0			1.3			0.2
Unemployed	0.4	0.4		0.6	3.2	0.6						
Children	12.2	10.0	7.9	10.4	11.1	10.5						
Old age people and Disable		0.9	0.7	1.2		0.6						
Others	12.5	16.5	11.9	12.8	17.5	13.9	4.8	8.3	4.6	1.8	4.8	5.1
No secondary occupation							76.8	77.0	82.1	82.3	79.4	79.0
Not applicable							12.5	10.9	7.9	11.0	14.3	11.1
N	271	230	151	164	63	879	271	230	151	164	63	879
Sylhet division												
Farmer/cultivator	25.8	29.1	26.4	25.9	35.6	27.2	3.7	0.9	0.8	0.8		1.7
Housewife/ Homemaker	22.3	22.9	24.0	22.2	20.3	22.5				0.4		0.1
Agri. Laborer	0.3	1.3		0.4		0.5	0.9	1.3				0.6
Non-agri. Laborer	1.7	0.9				0.8	3.4	0.4	1.6			1.5
Salaried Job	1.1	1.8	1.6	1.9	1.7	1.6		1.3		0.4		0.4

Occupation	Primary Occupation						Secondary occupation					
	Landless	Marginal	Small	Medium	Large	All	Landless	Marginal	Small	Medium	Large	All
Business		1.3		1.9		0.8		1.8	2.3	1.9	1.7	1.3
Student	19.8	16.3	16.3	15.0	25.4	17.7				0.4		0.1
Unemployed	4.0	3.1	1.6	3.4		3.1						
Children	15.5	14.1	17.1	16.2	10.2	15.2						
Old age people and Disable	0.3			0.4		0.2						
Others	9.2	9.3	13.2	12.8	6.8	10.5	3.7	7.0	8.5	5.3	5.1	5.5
No secondary occupation							68.8	70.0	68.2	71.1	83.1	70.4
Not applicable							19.5	17.2	18.6	19.9	10.2	18.4
N	349	227	129	266	59	1030	349	227	129	266	59	1030

Chapter-6

Table-6.1: Percentage of Farm Households/farmers according to region/division

Farm Class	Division						
	Dhaka	Chittagong	Rajshahi	Khulna	Barisal	Sylhat	All
Landless	40.0	37.2	22.1	25.6	32.1	34.2	31.8
Marginal	31.9	28.1	30.2	29.3	26.7	23.6	29.2
Small	11.7	13.8	18.0	18.6	18.2	13.7	15.4
Medium	14.8	17.4	25.6	21.1	17.6	23.6	19.9
Large	1.6	3.6	4.1	5.4	5.5	5.0	3.8
Total	100	100	100	100	100	100	100
N	445	363	461	242	165	161	1837

Table 6.2: Different crops cultivated by different class of farms in present year and 5 years before (in %)

Crops	Landless		Marginal		Small		Medium		Large		Total	
	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before
Aus	13.8	13.5	13.8	12.1	17.4	16.9	14.0	14.4	15.9	14.7	14.5	13.9
Aman	62.7	59.7	66.2	63.8	70.6	71.2	74.8	74.5	75.4	73.5	67.8	66.4
Boro	82.6	79.5	84.7	80.0	80.1	77.3	78.4	75.7	73.9	72.1	81.7	78.2
Wheat	1.9	1.7	2.2	3.1	2.8	3.8	3.0	2.6			2.3	2.6
Jute	8.4	6.8	6.7	6.0	6.0	6.9	5.5	4.7	4.3	4.4	6.8	6.0
Sugarcane	0.9	0.8	0.9	1.4	0.7	0.4	0.8	0.6			0.8	0.9
Tobacco	0.9	0.4	1.1	0.8	0.7	0.4	2.7	1.2	2.9	2.9	1.4	0.8
Maze	1.2		1.9	1.2	2.1	1.2	3.0	1.5	2.9	1.5	2.0	0.9
Masur	0.5	0.8	1.9	2.3	2.1	2.7	1.6	1.5	1.4		1.4	1.7
Mung	1.5	1.5	2.4	2.5	5.0	2.7	3.3	2.9	1.4	4.4	2.7	2.4
Chola	0.2					0.4					0.1	0.1
Other pulse	3.4	3.6	2.6	2.7	1.4	3.5	3.8	3.2	2.9	1.5	2.9	3.1
Mustard	4.6	3.0	7.8	7.6	3.5	2.7	4.4	2.9	4.3	2.9	5.3	4.3
Sunflower				0.2		0.8		0.6				0.3
Other oilseed	2.1	1.5	1.1	0.8	1.1	0.8	1.9	1.5	5.8	2.9	1.7	1.2
Onion	0.3	0.6		0.6	0.4					1.5	0.2	0.4
Chilly	2.7	3.0	3.0	2.9	3.2	3.1	5.2	4.7	1.4		3.3	3.2
Bottle gourd	0.5	0.8	0.7	0.6	1.1						0.5	0.4
Bitter gourd	0.2	0.2		0.2	0.7				1.4	1.5	0.2	0.2

Cucumber	0.7	1.1	0.6	0.6		0.4	0.3	0.9			0.4	0.7
Cauliflower	0.3	0.6	0.7	0.6	0.4	1.2	0.8	0.9	2.9	2.9	0.7	0.9
Radish	0.9	0.2	0.6	1.6		1.2	0.8	1.2	2.9	2.9	0.7	1.1
Lal Shak		0.2	0.6	0.2		0.4					0.2	0.2
Bean	0.3	0.4	0.9	0.4			0.3	0.3			0.4	0.3
Potol	0.3	0.4	0.2	0.4	0.7	0.4	0.5	0.3			0.4	0.4
Pui Shak	0.2	0.2	0.6	0.6	0.4	0.4					0.3	0.3
Carrot	0.9	0.6	0.4		0.4	0.4	0.3				0.5	0.2
Borboti					0.7		0.3	0.3			0.2	0.1
Kumda	0.9	0.8	0.4		0.4	0.4					0.4	0.3
Arum	0.2	0.2	0.4	0.6	0.7	0.4	0.3	0.3			0.3	0.4
Tomato	0.2	0.4	0.4	0.6	1.1	0.4	0.3	0.3	1.4	1.5	0.4	0.5
Brinjal	0.3		1.1	0.6	2.5	2.3	2.7	3.5	4.3	2.9	1.5	1.4
Potato	3.6	3.2	6.0	5.8	10.6	5.8	9.9	9.1	10.1	8.8	6.9	5.8
Other vegetables	0.5	0.2	0.6	0.4	0.7	0.4					0.4	0.2
Melon	0.3	0.4	0.7	1.0	0.4	0.8	1.4	1.5	4.3	2.9	0.8	1.0
Banana		0.2	1.1	1.0	1.1	0.8	1.1	1.5			0.7	0.8
Papaya	0.2	0.2	0.6	0.4	0.4	0.4	0.5	0.3			0.4	0.3
Lichi		0.2										0.1
Ground nut	1.4	1.3	0.6	1.2	0.4	0.4	1.1	0.3			0.9	0.9
Grass			0.2	0.2							0.1	0.1
Dhunche					0.4						0.1	
Dhundal							0.3				0.1	
Dhonia	0.2	0.4									0.1	0.1
Jujube	0.2										0.1	
Mango		0.4										0.1
N	585		536		282		365		69		1837	

Table 6.3: Average amount of land (decimal) cultivated for different crops by different farm class in present year and 5 years before

Crops	Landless		Marginal		Small		Medium		Large		All	
	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before
Aus	19.94	21.62	17.34	21.05	22.67	30.35	27.42	35.38	71.83	117.23	23.04	29.12
Aman	88.42	73.55	110.19	108.32	124.41	125.38	222.01	221.99	569.45	614.02	144.91	141.45
Boro	82.24	66.96	91.76	71.72	126.05	112.56	198.80	172.68	522.44	446.16	131.44	110.60
Wheat	2.04	0.98	1.01	1.85	1.63	2.68	2.99	4.06	0.00	0.00	1.79	2.07
Jute	5.04	3.28	3.15	2.64	4.51	4.72	4.95	5.20	4.52	5.68	4.37	3.79
Sugarcane	0.35	0.26	0.39	0.48	0.54	0.00	0.94	0.42	0.00	0.00	0.50	0.31
Tobacco	1.15	0.44	0.90	1.72	1.63	1.06	6.59	3.45	7.25	5.80	2.46	1.71
Maze	0.68	0.00	0.82	0.58	1.91	0.93	6.13	1.51	4.32	0.96	2.13	0.65
Masur	0.36	0.32	1.16	1.13	0.94	1.65	1.44	1.50	1.45	0.00	0.94	0.98
Mung	2.46	1.81	1.87	1.05	3.60	2.21	4.08	4.49	1.30	5.65	2.74	2.32
Chola	0.03	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.01	0.01
Other pulse	4.56	2.46	2.05	2.30	1.45	2.71	6.38	3.96	8.84	4.49	3.87	2.83
Mustard	3.17	1.39	6.23	5.36	2.88	2.46	5.46	3.43	4.30	2.87	4.51	3.18
Sunflower	0.00	0.00	0.00	0.05	0.00	0.14	0.00	0.16	0.00	0.00	0.00	0.07
Other oil seed	2.35	1.93	2.77	3.24	2.85	2.45	1.84	1.11	26.61	25.45	3.36	3.11
Onion	0.08	0.13	0.00	0.34	0.06	0.00	0.00	0.00	0.00	0.96	0.04	0.18
Chilly	1.52	0.76	0.72	0.80	1.41	1.31	2.96	2.58	0.17	0.00	1.50	1.19
Bottle gourd	0.10	0.15	0.11	0.23	0.15	0.00	0.00	0.00	0.00	0.00	0.09	0.12
Bitter gourd	0.03	0.06	0.00	0.03	0.23	0.00	0.00	0.00	0.58	0.87	0.07	0.06
Cucumber	0.30	0.47	0.14	0.20	0.00	0.09	0.00	0.41	0.00	0.00	0.13	0.30
Cauliflower	0.09	0.12	0.22	0.25	0.18	0.46	0.53	0.19	4.35	5.80	0.39	0.44
Radish	0.17	0.02	0.11	0.41	0.00	0.37	0.38	1.00	0.58	1.01	0.18	0.42
Lal Shak	0.00	0.03	0.40	0.17	0.00	0.04	0.00	0.00	0.00	0.00	0.12	0.06
Bean	0.11	0.21	0.38	0.24	0.00	0.00	0.18	0.00	0.00	0.00	0.18	0.14
Potol	0.09	0.09	0.11	0.62	0.17	0.08	0.08	0.03	0.00	0.00	0.10	0.23
Pui shak	0.03	0.03	0.09	0.13	0.04	0.04	0.00	0.00	0.00	0.00	0.04	0.05
Borboti	0.00	0.00	0.00	0.00	0.19	0.00	0.06	0.18	0.00	0.00	0.04	0.04
Kumda	0.51	0.36	0.02	0.00	0.18	0.07	0.00	0.00	0.00	0.00	0.20	0.13
Carrot	0.73	0.39	0.09	0.00	0.35	0.04	0.27	0.00	0.00	0.00	0.37	0.13
Arum	0.09	0.09	0.05	0.19	0.35	0.23	0.18	0.18	0.00	0.00	0.13	0.15
Tomato	0.02	0.15	0.06	0.17	0.20	0.28	0.09	0.09	0.43	0.43	0.09	0.18
Brinjal	0.09	0.00	0.34	0.21	1.00	0.75	1.35	1.53	1.00	0.96	0.59	0.52

Crops	Landless		Marginal		Small		Medium		Large		All	
	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before	Last year	5 yrs. before
Potato	1.49	1.36	3.70	3.46	6.84	4.26	11.07	9.20	21.90	12.68	5.62	4.40
Other vegetables	0.15	0.39	0.10	0.07	0.29	0.23	0.00	0.00	0.00	0.00	0.12	0.08
Melon	0.26	0.09	0.60	0.63	0.67	0.82	1.81	1.59	7.25	5.80	0.99	0.88
Banana	0.00	0.15	0.34	0.53	0.61	0.53	0.58	0.88	0.00	0.00	0.31	0.43
Papaya	0.06	0.00	0.11	0.10	0.12	0.12	0.55	0.27	0.00	0.00	0.18	0.12
Mango	0.00	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.13
Ground nut	0.96	0.08	0.30	0.65	0.35	0.23	0.85	0.27	0.00	0.00	0.62	0.65
Dhonia	0.06	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03
Grass	0.00	0.06	0.07	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.02
Dhunche	0.00		0.00		0.00		0.00		0.00		0.00	
Dhundal	0.00		0.00		0.00		0.27		0.00		0.05	
Jujube	0.56		0.00		0.00		0.00		0.00		0.18	
N	585		536		282		365		69		1837	

Table 6.4 (A) Percentage of farmers shifted themselves from certain crops

Crops	Landless						Marginal						Small					
	% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting				
		High price of fertilizer	Un timely availability of [illegible]	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of fertilizer	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of fertilizer	Economic loss/ less profit	Natural cause	Other reasons
Aus	14.3	4.8		14.3			18.9	2.7	2.7	24.3	8.1	8.1	10.3	3.4		17.2		
Aman	57.1	4.8		66.7	14.3	14.3	62.2	13.5	10.8	45.9	18.9	35.1	82.8	13.8	6.9	82.8	17.2	44.8
Boro	47.6			57.1	9.5	19.0	59.5	10.8	8.1	43.2	10.8	40.5	65.5	17.2	10.3	37.9	6.9	37.9
Wheat	4.8			4.8									3.4	3.4				
Jute	19.0			23.8		14.3	10.8		2.7	10.8			3.4			3.4		
Tobacco	14.3			28.6		4.8	2.7			2.7		2.7	3.4			6.9		3.4
Maze	14.3	4.8		14.3	4.8	9.5	8.1			2.7		5.4	13.8	3.4	3.4	10.3	3.4	6.9
Masur							2.7			5.4		2.7	3.4			3.4		
Mung	9.5	4.8		9.5	4.8								17.2	3.4	3.4	24.1	3.4	3.4
Chola	4.8			9.5														

Crops	Landless						Marginal						Small					
	% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting				
		High price of fertilizer	Un timely availability of	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of fertilizer	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of fertilizer	Economic loss/ less profit	Natural cause	Other reasons
Other pulse	9.5			14.3		4.8	8.1	2.7		10.8		2.7	3.4			6.9		
Mustard							18.9		5.4	13.5	2.7	10.8	13.8	3.4	3.4	3.4		6.9
Other oilseed	19.0	4.8		19.0			5.4			2.7	2.7		3.4				3.4	
Chilly							10.8	2.7		10.8		5.4	3.4			3.4	3.4	
Bitter gourd													6.9			10.3		6.9
Cucumber							2.7			5.4								
Cauliflower																		
Radish	4.8			9.5			2.7					2.7						
Lal Shak							2.7			2.7								
Carrot	4.8					4.8	5.4			5.4		5.4						
Kumda													3.4			6.9		
Brinjal	9.5			9.5	4.8													
Potato							16.2	5.4	5.4	2.7	5.4	16.2	27.6			31.0	13.8	3.4
Other vegetables							2.7			2.7		2.7	3.4			3.4		3.4
Melon	4.8			4.8		4.8												
Banana							2.7			2.7								
Papaya							2.7					5.4						
Ground nut	4.8			4.8	4.8													
N	21						37						29					

Table 6.4 (B) Percentage of farmers shifted themselves from certain crops

Crops (last year)	Medium						Large						All					
	% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting				
		High price of fertilizer	Un timely availability of	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of	Economic loss/ less profit	Natural cause	Other reasons
Aus	25.0	2.5	2.5	27.5		2.5	50.0			5.0			19.1	3.1	1.5	22.9	2.3	3.1
Aman	57.5	7.5	15.0	67.5	10.0	20.0	75.0			75.0		25.0	64.9	9.9	9.2	64.9	14.5	29.0
Boro	50.0			10.0		2.5	25.0						55.0	0.8		3.8		0.8
Wheat	7.5												3.8					
Jute	7.5			27.5									9.2		0.8	16.0		2.3
Tobacco	10.0	2.5	2.5	5.0		5.0							6.9	0.8	0.8	8.4		3.8
Maze	10.0			10.0		5.0							10.7	1.5	0.8	8.4	1.5	6.1
Masur	2.5			7.5									2.3			4.6		0.8
Mung	7.5	5.0		7.5		2.5							7.6	3.1	0.8	9.2	1.5	1.5
Chola													0.8			1.5		
Other pulse	15.0	2.5	5.0	12.5	5.0	10.0							9.2	1.5	1.5	10.7	1.5	4.6
Mustard	15.0		5.0	5.0	5.0	12.5	25.0			25.0		25.0	13.7	0.8	3.8	6.9	2.3	9.2
Other oilseed	15.0	5.0	2.5	7.5		7.5	50.0			50.0			11.5	2.3	0.8	7.6	1.5	2.3
Chilly	10.0			30.0									6.9	0.8		13.0	0.8	3.1
Bitter gourd													1.5			2.3		1.5
Cucumber													0.8			1.5		
Cauliflower	5.0			10.0		2.5							1.5			3.1		0.8
Radish													1.5			1.5		0.8
Lal Shak													0.8			0.8		
Carrot	2.5					2.5							3.1			1.5		3.1
Kumda													0.8			1.5		
Brinjal	5.0			10.0			25.0	25.0	25.0		25.0	25.0	3.8	0.8	0.8	4.6	1.5	0.8
Potato	22.5			32.5		12.5	50.0	25.0	25.0	25.0	25.0	50.0	19.1	2.3	2.3	18.3	5.3	13.7
Other vegetables													1.5			1.5		1.5
Melon	5.0			5.0		2.5							2.3			2.3		1.5
Banana													0.8			1.5		

Crops (last year)	Medium						Large						All					
	% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting					% of farms shifted from cropping	Reasons for Shifting				
		High price of fertilizer	Un timely availability of	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of	Economic loss/ less profit	Natural cause	Other reasons		High price of fertilizer	Un timely availability of	Economic loss/ less profit	Natural cause	Other reasons
Papaya													0.8					1.5
Ground nut	7.5			10.0	2.5	2.5							3.1			3.8	1.5	0.8
N	40						4						131					

Chapter -7

Table 7.1: Source of agriculture credit collection

Farm class	Source of credit									
	Gov. Bank	Krisi Bank	Pvt. Bank	NGO	Local Samiti	Mohajon	Familiar rich men	Relatives/ friends/ neighbor	others	Total
Land less	3.4	4.5	3.4	32.1	7.2	7.9	3.0	36.6	1.9	100
Marginal	5.8	15.0	2.4	31.4	5.3	4.8	2.4	30.0	2.9	100
Small	5.3	21.1	1.1	27.4	1.1	10.5	3.2	28.4	2.1	100
Medium	10.7	39.8	1.9	13.6	3.9	3.9	1.0	22.3	2.9	100
Large	8.3	58.3	4.2	12.5		4.2		8.3	4.2	100
All	5.6	17.0	2.6	27.8	5.0	6.6	2.4	30.4	2.4	100
N	39	118	18	193	35	46	17	211	17	694

Table 7.2: Month of credit collection

Credit collection month	Farm class					
	Land less	Marginal	Small	Medium	Large	All
January	23.8	24.6	24.2	17.5	29.2	23.3
February	12.8	8.2	8.4	16.5	4.2	11.1
March	10.9	4.8	6.3	8.7		7.8
April	5.7	3.9	6.3	6.8	8.3	5.5
May	1.9	2.9	2.1	1.0	8.3	2.3
June	2.3	3.4	3.2	1.9	8.3	2.9
July	3.0	2.4	8.4	5.8	4.2	4.0
August	3.0	3.4	5.3	1.0	4.2	3.2
September	1.5	6.3		1.0	4.2	2.7
October	7.9	11.1	11.6	16.5	8.3	10.7
November	8.7	12.1	11.6	4.9	12.5	9.7
December	13.6	12.1	8.4	14.6	4.2	12.2
Not reported	4.9	4.8	4.2	3.9	4.2	4.6
All	100	100	100	100	100	100

Table 7.3: Use of credit for different crop

Crop	Farm class					
	Land less	Marginal	Small	Medium	Large	All
Aus	7.5	6.3	8.4	4.9		6.6
Aman	9.8	15.0	8.4	10.7	25.0	11.8
Boro	70.9	62.8	61.1	67.0	66.7	66.4
Wheat	1.1	0.5		1.9		0.9
Jute	6.0	2.9	6.3	5.8	4.2	5.0
Sugarcane	0.4	0.5	3.2	1.9		1.0
Tobacco	1.9	2.4	1.1	1.9	4.2	2.0
Maze	1.5	1.4		4.9		1.7
Masur		0.5				0.1
Mung	0.4	1.9	1.1	1.0		1.0
Chola		0.5	3.2	1.0		0.7
Other pulse	0.8	1.4	1.1	2.9	8.3	1.6
Mustard	0.8		1.1			0.4
Sunflower			1.1			0.1
Other oilseed	0.4	0.5				0.3
Onion	0.4					0.1
Chilly	1.5		1.1			0.7
Bitter gourd			1.1			0.1
Cucumber		0.5				0.1
Lal Shak	0.4			1.0		0.3
Carrot	1.1	0.5				0.6
Borboti		0.5	1.1			0.3
Kumda		0.5				0.1
Tomato			2.1			0.3
Brinjal	0.4	1.0	1.1			0.6
Potato	3.8	7.2	5.3	5.8	4.2	5.3
Other vegetables		0.5				0.1
Melon	0.8		1.1			0.4
Banana				1.0		0.1
Papaya		0.5		1.0		0.3
Jujube	0.4	0.5				0.3
Mango	0.4					0.1
Lemon		0.5				0.1

Betel leaf	0.4					0.1
Not reported	6.4	8.2	13.7	6.8	4.2	7.9
N (incidence)	265	207	95	103	24	694

Table 7.4: Use of credit for inputs

Inputs	Farm class					
	Land less	Marginal	Small	Medium	Large	All
Fertilizer	62.6	58.9	50.5	55.3	45.8	58.2
Seeds	24.2	25.6	29.5	34.0	33.3	27.1
Plough	8.3	10.1	8.4	8.7	8.3	8.9
Tractor	17.7	6.8	8.4	8.7	4.2	11.4
Power tiller	18.5	9.2	6.3	13.6	4.2	12.8
Irrigation equipment	8.3	11.1	4.2	4.9	8.3	8.1
Cost of labour	35.5	44.0	34.7	35.0	29.2	37.6
Land charge/lease	1.1	3.4	1.1			1.6
Pesticide	5.3	10.6	8.4	10.7	4.2	8.1
Purchase of livestock	1.1	1.0	2.1	1.9	8.3	1.6
Others	1.5	1.0	3.2	3.9	0.0	1.9
Not reported	21.5	19.3	29.5	27.2	41.7	23.5
N (incidence)	265	207	95	103	24	694

Chapter -8

Table 8.1: Average amount of crop production in 100 decimal of land [in kg]

	Landless		Marginal		Small		Medium		Large		All	
	Expected production	Actual production	Expected production	Actual production	Expected production	Actual production	Expected production	Actual production	Expected production	Actual production	Expected production	Actual production
Aus	738	664	748	662	701	683	705	644	582	567	722	659
Amon	805	722	836	762	817	794	837	830	794	768	818	770
Boro	1578	1511	1595	1516	1787	1750	1575	1539	1508	1477	1613	1554
Wheat	556	502	775	728	564	533	1713	1687			921	879
Jute	5876	5817	3128	3079	3159	3112	3670	3613	3308	3272	4291	4240
Maize	2012	1901	3033	2962	2332	2307	2610	2607	1857	1844	2496	2439
Masur	235	193	778	756	166	161	304	225	346	325	470	413
Mung	296	261	395	395	444	361	675	662	123	65	450	412
Other pulse	315	312	590	485	384	360	351	307	273	271	401	360
Mustard	538	467	445	345	597	582	409	366	388	281	459	400
Other oilseed	1063	1036	800	772	485	476	629	588	914	903	821	800
Chilly	469	421	590	575	463	386	508	484	1239	1211	550	499
Potato	7457	7400	7047	6986	6570	6617	6514	6312	5950	5947	6726	6690
N	585		536		282		365		69		1837	

Table 8.2: Per unit price of crop, [average in taka]

	Landless		Marginal		Small		Medium		Large		All	
	Expected price	Actual price	Expected price	Actual price	Expected price	Actual price	Expected price	Actual price	Expected price	Actual price	Expected price	Actual price
Aus	1416	1072	1675	1098	1493	1045	1441	1113	1490	1160	1514	1087
Aman	1673	1250	1743	1367	1708	1304	1707	1310	1620	1256	1704	1305
Boro	1605	1170	1838	1185	1787	1115	1647	1108	1892	1040	1723	1150
Wheat	2350	1938	2400	1644	2325	1665	2142	1434			2305	1663
Jute	3234	2650	3167	2532	3188	2228	2839	2481	2594	2094	3122	2511
Sugarcane	209	176	429	354	116	104	1081	738			498	374
Tobacco	4344	3769	6928	5151	7688	9000	4775	4011	8938	7175	5698	4824
Maze	1700	1170	1667	1196	1554	1220	1531	1225	1438	1069	1597	1196
Masur	6450	5500	5696	4634	6107	5250	6406	5156	2500	2500	5965	4948
Mung	4749	4175	5313	4352	4829	3776	5771	4375	6250	5000	5168	4149
Other pulse	3070	2482	2564	1924	4719	2438	3800	2833	4125	3125	3346	2431
Mustard	4196	3491	4423	3380	4904	3448	4331	3536	4300	3350	4399	3444
Other oilseed	5615	2542	3292	2708	3500	2667	3645	2852	4000	3438	4270	2774
Onion	3000	2750			2500	1500	2000	1250			2625	2063
Chilly	6742	5320	4660	3678	8655	5695	4500	3915	363	275	5582	4332
Bitter gourd	3000	2000	2500	2000	2313	1813			2375	1650	2479	1821
Cauliflower	1063	803	840	691	1063	625	1358	865	1500	1000	1131	791
Radish	835	670	1625	1263	500	450	850	554	1250	625	1082	784
Lal Shak	1250	1000	877	543							970	657
Bean	2500	1583	3400	2300	5000	5000	3750	2000			3325	2325
Potol	1250	1375	1188	1000	1475	1500	975	1156			1242	1298
Pui Shak	875	625	1400	1167	750	750	1000	750			1138	938
Carrot	1600	1175	1000	750	1250	1000	1250	1000			1438	1078
Borboti					2333	2000	1500	1000			2000	1600
Kumda	2908	2306	1133	783	50	25					1912	1469
Arum	2000	500	1275	1045	413	1500	2063	1750	750	375	1400	1238
Tomato	1333	1000	1333	1167	2475	1460	6250	5000	2625	2250	2277	1664
Brinjal	1625	1140	1958	1319	2500	2094	2163	1825	1938	1438	2087	1620
Potato	1780	1247	1469	1119	1791	1221	1767	1303	1713	1338	1694	1230
Other vegetables	1020	883	2313	1125	1563	1150	2000	1500			1678	1075

Table 8.3a: Average amount of crop loss [in kg]

Name of Crops	Landless								Marginal								Small							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	Less use of fertilizer	Untimely availability of fertilizer	Less use of inputs due to poverty	Less irrigation	Natural	Use of fake fertilizer	Insects	Other	Less use of fertilizer	Untimely availability of fertilizer	Less use of inputs due to poverty	Less irrigation	Natural	Use of fake fertilizer	Insects	Other	Less use of fertilizer	Untimely availability of fertilizer	Less use of inputs due to poverty	Less irrigation	Natural	Use of fake fertilizer	Insects	Other
Aus	38	26	4		21		2		29	19	6	4	26		2		3	9		6				
Amon	31	14	8	1	22		2	4	25	13	4		25		3	3	2	1	2		15		3	
Boro	12	4	16	3	24		5	4	15	9	12	9	33		1		9	6	8	3	6	1	2	2
Wheat	20	14	12			8				14		8	19	2		4	6	9	1			8	4	3
Jute					49		2	7		23		23	1				23	9			15			
Maize	11	13	8		51		23	5	7	3	25		15		6	15	9	2			11		2	1
Masur	8		3	5	23	3			4		3	3	13								5			
Mung	4				26		5										15				63		2	
Other pulse					3				11		1	38	53		1		5				19			
Mustard	23	6	16	1	16		7		4	19	2	10	84		34	13	4				11			
Other oilseed	3		5		12		7		5	1	2		13		7		1				8			
Chilly	14	9			23		1		1				9		5		4	7	1	16	36		3	
Potato	16	2	3	3	26		1	6	11	2	9	3		27	3	6	3		11	3	27		3	6

Table 8.3b: Average amount of crop loss [in kg]

Name of Crops	Medium								Large								All							
	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8	1	2	3	4	5	6	7	8
	Less use of fertilizer	Untimely availability of fertilizer	Less use of inputs due to poverty	Less irrigation	Natural	Use of fake fertilizer	Insects	Others	Less use of fertilizer	Untimely availability of fertilizer	Less use of inputs due to poverty	Less irrigation	Natural	Use of fake fertilizer	Insects	Others	Less use of fertilizer	Untimely availability of fertilizer	Less use of inputs due to poverty	Less irrigation	Natural	Use of fake fertilizer	Insects	Others
Aus	17	9	26	13	25		12		5	3	2		4				18	16	6		20		3	
Amon	3	3	4	2	1		2	1	6	6	2	1	6			4	10	14	8	3	11		2	
Boro	9	8	5	9	3		1	1	9	9	6	1	5			1	16	13	4	5	15		2	3
Wheat	6		12		6			2									8	9		3	7	6	3	6
Jute	17	9	31						23	13							16	11	9		14		1	
Maize					3					3			9		1		15	9	15		10		4	4
Masur	17		2	13	44		3		5		3		13				15		11	5	22		4	
Mung					13				19				30		9		4				29		5	
Other pulse	22		3		18		6						2				6		2	8	24		1	
Mustard	12	7		9	27	5			44	63							16	14	5	3	8		13	3
Other oilseed	12		6		23				2		7				2		8	3	3		6		1	
Chilly	19	3	2										28				13	34	1	3	35			
Potato	33	16	7	2	39		4	1					3				6	1	3	3	16		1	6

DCI-1

HH ID No.
District/Upazila:

Farm Class | Fertilizer Demand

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Questionnaire: Farm Household

Preamble
In food production fertilizer is one of the most vital agricultural inputs. Estimation of actual demand for fertilizer, certainty about timely availability of adequate fertilizer, price of fertilizer and subsidy on fertilizer greatly influence food security and agricultural activities. Considering these, FAO has taken an initiative for a study titled 'A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh'. 'Manab Sakti Unnyan Kendra (MSUK)' is conducting this research. Your earnest cooperation is highly required for research data and information. As an interviewer your identity will be kept secret.

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

Manab Sakti Unnayan Kendra (MSUK)

Road # 8, House #5, Mohammadia Housing Society,
Mohammadpur, Dhaka –1207
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Website: www.hdrc-bd.com

Dhaka: October, 2009

SECTION I: IDENTIFICATION OF RESPONDENT

101	Name:
102	Sex: Male = 1 Female = 2
103	Father's/Husband's Name:
104	Mother's Name:
105	Village: Union: Para/Mouja:
106	Upazila :
107	District:
108	Division: Dhaka =1, Chittagong=2, Rajshahi =3, Khulna=4, Barisal=5, Sylhet=6

SECTION II: HOUSEHOLD BACKGROUND INFORMATION

201. Please co-operate by giving information about each of your household members as follows:

Sl.	HH member's name (start from 'household head' then use age sequence: in a descending order)*	Age (in complete yrs.)	Sex Male=1 Female=2	Relationship with the HH head[1]	Education (Highest class passed)[2]	Occupation[3]	
						Main	Secondary[4]
1	2	3	4	5	6	7	8
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							

*	Household member: Takes food from the same '*Chula*`, generally sleep at night under the same roof at least once in the last 6 months; guests will not be included.
1	**Relationship code**: HH head=1, Father=2, Mother=3, Brother=4, Sister=5, Husband=6, Wife=7, Son=8, Daughter=9, Paternal Grand-father=10, Paternal Grand-mother=11, Maternal Grand-father=12, Maternal Grand-mother=13, Paternal Uncle (*chacha*)=14, Paternal Aunt (*chachi*)=15, Maternal Uncle (*khalu*)=16, Maternal Aunt (*khala*)=17, Maternal Uncle (*mama*)=18, Maternal Aunt (*mami*)=19, Brother-in-law (*shalok*)=20, Sister-in-law (*shalika*)=21, Brother-in-law (*debor*)=22, Sister-in-law (*bhabi*)=23, Sister-in-law (*nonod*)=24, Sister-in-law (*jaa*)=25, Others=26.
2	Quomi/Hafeji madrassa=30, NGO school(if no classes)=31,moqtab education=32,adult education =33, If no education then write-down 00
3	**Occupation code:** Farmer/cultivator =01, Housewife =02, Agri-labour = 03, Non-agri-labour = 04, Salaried job =05, Mason =06, Carpenter =07, Rickshaw/van puller =08, Fisherman = 09, Boatman =10, Blacksmith =11, Potter =12, Cobbler =13, Shopkeeper =14, Petty trader =15, Business =16, Tailor =17, Umbrella Repairer =18, Driver =19, Cottage Industry =20, Village doctor/Quack =21, Homeopath/ Ayurvedic/Unani =22, Imam/priest = 23, Electrician/ mechanic =24, Barber =25, Housekeeping aid at other's house =26, Birth attendant/TBA =27, Butcher =28, Teacher =29,Retired service holder/ elderly person =30, Student =31, Unemployed =32, Children (0-6 years) =33, Disabled/ physically challenged =34, Expatriate (who work abroad), Assistant in household works=36, other (specify) =37…….
4	If no secondary occupation, write code (-). If main occupation is "student", secondary occupation will be nil.

202. Is there any member in this HH who has taken an agriculture-related training? Yes=1, No=2

203. Does any of the HH members know about the Leaf Colour Chart? Yes=1, No=2

204. Did the HH members use the Leaf Colour Chart in their cultivation last year? Yes=1, No=2

SECTION III: INFORMATION ON HOMESTEAD AND HOUSEHOLD ASSETS

301	Ownership of the House Own house=1, lives in other's house=2, Tenant house=3, Lives in the house made on the Govt. occupied land=4, Lives in the house made on the *Khas* land=5, Lives in the house made on other's land=6.	
302	Type of roof material (of main dwelling) Tin=1, Tiles=2, Leaves used in thatching/*Chhan*/Jute stick/Leaves=3, Bamboo */Polythene* =4, Concrete=5	
303	Type of wall material of main dwelling Tin =1, Bamboo/Wood =2, Mud wall =3, Straw/ Jute stick /Leaves/ Leaves used in thatching/ *Chhan* =4, Brick =5	
304	Type of floor material of main dwelling Soil/Sand=1, Wood/Bamboo=2, Cement/Brick=3	
305	Amount of land owned by the household	
	Type of land	Amount of land (in decimal)
	1. Homestead	
	2. Arable land	
	3. Pond/Ditch	
	4. Fallow land	
	5. Garden/Nurseries	
	6. Other (please specify)	
306	Is there electricity in home/household? Yes =1 No =2	

307 Please tell about livestock and poultry assets of your household.

Sl.#	Assets	Number If not applicable, write '(-)'	Present market value (Tk.) If not applicable, write '(-)'
1	Cow		
2	Buffalo		
3	Goat/sheep (lamb)		
4	Duck/hen/bird		
5	Others (specify ……)		

Note: * The value obtained at present from selling the asset in the market is the present market value.
* If the animals are shared, then no need to mention.

308. Information on movable household assets

Sl.#	Assets	Number If not applicable, write '(-)'	Joint ownership Yes =1 No=2		Present market value (Tk.) If not applicable, write '(-)'
1	Power Tiller		1	2	
2	Plough		1	2	
3	Deep tube well (DTW)		1	2	
4	Shallow tube well (STW)		1	2	
5	Low lift pump (LLP)		1	2	
6	Traditional irrigation machine		1	2	
7	Threshing machine		1	2	
8	Tractor		1	2	
9	Spray		1	2	
10	Bee – keeping box		1	2	
11	Incubator		1	2	
12	Husking pedal (machine)		1	2	
13	Sugarcane crushing machine		1	2	
14	Ladder		1	2	
15	Spade (hoe)		1	2	
16	Scythe		1	2	
17	Crowbar		1	2	
18	Axe		1	2	

	19	Drum seeder		1	2	
	20	Poultry coop/pinfold (Duck/hen)/enclosure		1	2	
	21	Boat: Traditional/motorized		1	2	
	22	Fishing net		1	2	
	23	Bullock/Buffalo/Horse Cart		1	2	
	24	Rickshaw/Van		1	2	
	25	Motorcycle		1	2	
	26	Bicycle		1	2	
	27	Sewing machine		1	2	
	28	Mobile phone		1	2	
	29	Television		1	2	
	30	Radio		1	2	
	31	Cassette player		1	2	
	32	VCP/VCR/VCD		1	2	
	33	Camera		1	2	
	34	Tube well		1	2	
	35	Furniture (Almira, Bed, Table, Alna etc.)		1	2	
	36	Utensils (including cooking materials)		1	2	
	37	Wrist watch/watch		1	2	
	38	Hand loom		1	2	
	39	Battery of motor		1	2	
	40	Gold ornaments (Ana)				
	41	Silver ornaments (Ana)				
	42	Tree/Bamboo		1	2	
	43	Others (specify ……)		1	2	
	Note:* In case of joint ownership estimate value of that part of the assets owned by the respective household only. * The value obtained at present from selling the asset in the market is the present market value.					

SECTION IV: INFORMATION ON HOUSEHOLD INCOME AND EXPENDITURE

401	Household Income (yearly)			
	Sl. No.	Income source	Income from the sources Yes=1	No=2
	1	Crops	1	2
	2	Vegetable garden adjacent to homestead	1	2
	3	Fruits (beside homestead)	1	2
	4	Trees/nurseries	1	2
	5	Poultry	1	2
	6	Livestock	1	2
	7	Pisciculture/Fisheries	1	2
	8	Wage labor: Agriculture	1	2
	9	Wage labor: Non-agriculture	1	2
	10	Stationery shops	1	2
	11	Business	1	2
	12	Income from agricultural land/ land/ ponds sell /lease etc.	1	2
	13	Rent: house, shop	1	2
	14	Salaried job	1	2
	15	Transport: van, rickshaw, boat, motorcycle, cycle	1	2
	16	Cottage industry (Run by HH member)	1	2
	17	Remittances (home/abroad both)	1	2
	18	Gifts	1	2
	19	Gratuity/Pension etc.	1	2
	20	Social safety allowance: (VGD, VGF, education stipend, old age allowance, widow allowance, distressed allowance, disable allowance, freedom fighter allowance etc	1	2
	21	Others (Specify)	1	2
402	Food and non-food expenditure (monthly/yearly) of household			
	Sl.	Heads of expenditure	Total expenditure (Tk.)	

	No.	
	1 Food (monthly) (Calculate including own produced consumed agricultural goods)	
	2 Clothing (yearly): For adults, children and other household members	
	3 Housing and related (yearly)	
	4 Health care/treatment (yearly)	
	5 Education (yearly)	
	6 Assets bought for the HH last year (specify)	

SECTION V: INFORMATION ON TYPE, QUANTITY AND EXPENDITURE OF AGRICUTURAL INPUTS

501	Please co-operate by giving information about type of land used for cultivation during the last one year. Own land (self cultivated)=1, shared land=2, rented/leased land=3, mortgaged land=4 Note: • If taken as shared (\borga), fill-up table 502, 503 and 504 • If taken as rented/leased/mortgaged land, fill-up table 505 • In case of own land fill-up table 506.

502	Does the land owner bear the crop-based input cost at a time? Yes=1 No=2 (go to next qs)		
	Crops	Amount of land(s) (decimal)	TK.

503	In the last one year did you get any fertilizer or money from the land owner to purchase fertilizer for the crops harvested in shared (borga) land? Yes = 1 No = 2 (go to next qs)

Crops	Amount of land (decimal)	Input	Type of support or expenditure Value paid=1, Input supply=2		Share paid by the land owner	
					Share of Expenditure	Share of Input
		Fertilizer	1	2		
		Fertilizer	1	2		
		Fertilizer	1	2		
		Fertilizer	1	2		

Crop Code: **Agricultural crops**: Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8, Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17,
Vegetables : Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34,
Fruits : Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

504	Does the land-owner comply to provide any share of the crop produced or cash from the crop sold? Yes = 1 No = 2

Crop	Amount of land (decimal)		Owner's share Crop share=1, Share of the value of the crop sold=2		Owner's share	
					Crop share	Share of the value of the crop sold
			1	2		
			1	2		
			1	2		
			1	2		

505	Expenditure for taking land on rent/lease/mortgage		
Amount of land	Duration of rent/lease/mortgage	Expenditure	Crops cultivated in

(decimal)	(months)	(Tk.)	the last one year

Crop Code: **Agricultural crops**: Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8, Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17, **Vegetables :** Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34, **Fruits :** Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

506. Please provide information about the fertilizer required and used for the crops you harvested (last one year) during September 2008 to October 2009 (Bangla Bhadra-Ashiwn 1415 to Ashiwn-Kartik 1416)

Crops[2]	Names of Seed	Type of seed[3]	Amount of own land (decimal)	Amount of shared (Borga) land (decimal)	Amount of land on rent/lease/ mortgage (decimal)	Amount of irrigated land (decimal)	Type of fertilizer	Requirement of fertilizer Yes=1, No=2	Amount of fertilizer required (Kg) for highest output	Total amount of fertilizer procured (Kg)	Source of fertilizer[4]	Amount of fertilizer procured (Kg)	Total cost to purchase fertilizer	Reasons for not using adequate fertilizer[5]	Time spent to procure fertilizer (Days)	Month of procuring fertilizers
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)		Urea (granular)	1 2			1 2 3 4					Bangla (1st procurement)
							Urea (guti)	1 2			1 2 3 4					(2nd procurement)
							TSP	1 2			1 2 3 4					
							MoP	1 2			1 2 3 4					English (1st procurement)
							SSP	1 2			1 2 3 4					(2nd procurement)
							Others	1 2			1 2 3 4					

1.Type of land: Low land (sub merged under water in every rainy season)=1, Medium-high land (inundated by every flood)=2, High land = 3

2 Crop code: **Agricultural crops:** Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8, Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17, **Vegetables :** Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34, **Fruits** : Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

3 Type of seed: Traditional =1, Hybrid =2, High Yielding Variety =3

4 Source of fertilizer: Dealer of own union=1, Dealer of near-by union=2, Influential person=3, Open market=4

5 Reasons for not using adequate fertilizer: Fertilizer price was high=1, fertilizer could not be purchased timely=2, Adequate fertilizer was not available=3, Could not bring adequate fertilizer due to transport problem=4, There were financial scarcity=5, others (specify ……..) = 6

Crops[2]	Names of Seed	Type of seed[3]	Amount of own land (decimal)	Amount of shared (Borga) land (decimal)	Amount of land on rent/lease/ mortgage (decimal)	Amount of irrigated land (decimal)	Type of fertilizer	Requirement of fertilizer Yes=1, No=2	Amount of fertilizer required (Kg) for highest output	Total amount of fertilizer procured (Kg)	Source of fertilizer[4]	Amount of fertilizer procured (Kg)	Total cost to purchase fertilizer	Reasons for not using adequate fertilizer[5]	Time spent to procure fertilizer (Days)	Month of procuring fertilizers
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)		Urea (granular)	1 2			1 2 3 4					Bangla (1st procurement)
							Urea (guti)	1 2			1 2 3 4					(2nd procurement)
							TSP	1 2			1 2 3 4					
							MoP	1 2			1 2 3 4					English (1st procurement)
							SSP	1 2			1 2 3 4					(2nd procurement)
							Others	1 2			1 2 3 4					

1.Type of land: Low land (sub merged under water in every rainy season)=1, Medium-high land (inundated by every flood)=2, High land = 3

2 Crop code: **Agricultural crops:** Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8, Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17, **Vegetables :** Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34, **Fruits** : Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)		Urea (granular)	1 2			1 2 3 4					Bangla (1st procurement)
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							TSP	1 2			1 2 3 4					
							MoP	1 2			1 2 3 4					English (1st procurement)
							SSP	1 2			1 2 3 4					(2nd procurement)
							Others	1 2			1 2 3 4					

1.Type of land: Low land (sub merged under water in every rainy season)=1, Medium-high land (inundated by every flood)=2, High land = 3

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			Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)		Urea (granular)	1 2			1 2 3 4					Bangla (1st procurement)
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							TSP	1 2			1 2 3 4					
							MoP	1 2			1 2 3 4					English (1st procurement)
							SSP	1 2			1 2 3 4					(2nd procurement)
							Others	1 2			1 2 3 4					

1.Type of land: Low land (sub merged under water in every rainy season)=1, Medium-high land (inundated by every flood)=2, High land = 3

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
			Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)	Amount of low-land Amount of medium height-land Amount of high-land Total amount of land(s)		Urea (granular)	1 2			1 2 3 4					Bangla (1st procurement)
							Urea (guti)	1 2			1 2 3 4					(2nd procurement)
							TSP	1 2			1 2 3 4					
							MoP	1 2			1 2 3 4					English (1st procurement)
							SSP	1 2			1 2 3 4					(2nd procurement)
							Others	1 2			1 2 3 4					

1.Type of land: Low land (sub merged under water in every rainy season)=1, Medium-high land (inundated by every flood)=2, High land = 3

2 Crop code: **Agricultural crops:** Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8, Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17, **Vegetables :** Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34, **Fruits** : Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

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5 Reasons for not using adequate fertilizer: Fertilizer price was high=1, fertilizer could not be purchased timely=2, Adequate fertilizer was not available=3, Could not bring adequate fertilizer due to transport problem=4, There were financial scarcity=5, others (specify ……..) = 6

507. Please cooperate by giving information on agricultural input cost incurred for the crops harvested during the period from September 2008 to October 2009 (Bangla Bhadra-Ashiwn 1415 to Ashiwn-Kartik 1416)

Crops[2]	Use of own assets of a HH (did not pay to the others)=1, Not owned by HH (had to pay to the others outside the HH)=2	Total Cost (Tk.)								Total days worked		Daily wage rate (no. of days)		Appointment of labourers by contract			
														Paid in TK		Paid by crops	
		Irrigation cost	Cost for seed	Amount of seed (Kg)	Cost of sapling	Cost for pesticide	Transport cost for cultivation	Cost of plough/ power tiller/tractor	Rent for land	Male	Female	Male	Female	Types of contract	Cost of contract	unit	Quantity
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	1																
	2																
	1																
	2																
	1																
	2																
	1																
	2																
	1																
	2																

Appointment of long-term labourer	Number of long-term labourer	Duration (in month)	Long-term wage based total cost (TK)
19	20	21	22
Yes=1 No=2			

1. Types of contract: crops sowing=1, crops cutting/harvesting=2, husking/others=3

***2* Crop code:** Agricultural crops: Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8, Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17, **Vegetables** : Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34, **Fruits :** Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

Note: * The market value of the assets of a HH which had not to be paid to the others.

The inputs not belonged to a HH (outside of the HH) which had to be paid to the market/others in cash.

** Calculate wage including food expenses (if any) given to the labourer.

508	Whether fertilizer is required for purpose other than agriculture (crop cultivation). Yes = 1 No= 2			
	Purpose for which fertilizer is required	Type of fertilizer	Fertilizer demand round the year (Kg.)	Fertilizer used in last 1 year (Kg)
Pisciculture = 1		Urea (granular) 1		
		Guti Urea 2		
		TSP 3		
		MoP 4		
		DAP 5		
		Others (specify ……) 6		
Animal husbandry = 2		Urea (granular) 1		
		Guti Urea 2		
		TSP 3		
		MoP 4		
		DAP 5		
		Others (specify ……) 6		
Garden/Nursery = 3		Urea (granular) 1		
		Guti Urea 2		
		TSP 3		
		MoP 4		
		DAP 5		
		Others (specify ……) 6		

SECTION VI: IMPACT OF FERTILIZER CRISIS ON CROP PRODUCTION

601	Did you get the fertilizer on time (the time when fertilizer needed to be used in the land) in last one year (from September 2008 to October 2009)? Yes =1, (skip 603) No =2
602	During the particular crop season when the fertilizer could not be availed on time….

	Crop-1: code……..	Crop-2: code……..	Crop-3: code……..
Reasons of being late 1	2	3	4
Results of being late 5	6	7	8

1 Code: There were no fertilizer to the dealer of own union=1, There were no fertilizer to the other dealers of a nearby union=2, the dealers brought fertilizers lately=3, The dealers sold the fertilizer for a very short time in a day=4, the fertilizers were delayed to be received due to the strict rules=5, others (specify)…….=6

2 Code: All the crops were damaged=1, harvesting was low=2, Different crops were cultivated=3, lands were shared to avoid the risks of crops=4, The cultivable lands were sold out and invested into business=5, others (specify)……..=6

3 crops code:

Agricultural crops: Aush=1, Amon=2, Boro=3, Wheat=4, Jute=5, Sugercane=6, Tobacco=7, Corn=8, Moshur pals=9, Mug pals=10, Chola=11, Other pals=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17,

Vegetables: Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34,

Fruits : Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

603	Please co-operate by giving the information below about the cultivation of different crops in last one year…

Crops (cultivated in last one year)	Unit of output	Market price (Tk) per unit of output (at harvesting time)	Expected price per unit of output	Actual gross output	Highest output possible in a land	Value of *** by-products	Main reasons for low output*			Low production due to fertilizer Yes=1 No=2	For which fertilizer, output became low **
							1st Main reason	2nd Main reason	3rd Main reason		
1	2	3	4	5	6	7	8	9	10	11	12
									1 2		
									1 2		
									1 2		
									1 2		
									1 2		
									1 2		
									1 2		
									1 2		
									1 2		

For column 8, 9, and 10			
	1. less fertilizer was used 2. Timely use of fertilizer was not possible 3. Other expenditures was not possible due to high fertilizer cost 4. Fertilizer other than the required type was not effective 5. The crops were damaged due to pests and insects 6. The crops were damaged due to bacteria and diseases 7. Less production due to insufficient weeding 8. Low yield due to lack of improved seed	9. Was not able to spend money for fertilizer & other works. 10. Sufficient irrigation was not possible due to high cost 11. Sufficient irrigation was not possible due to lack of electricity. 12. Sufficient irrigation was not possible due to lack of diesel. 13. Sufficient irrigation was not possible because water layer went down 14. Crops were damaged due to flood	15. Crops were damaged due to high tidal bore 16. Crops were damaged due to hail/storm 17. Crops were damaged due to drought 18. Crops were damaged due to river erosion 19. Crops were damaged due to water and air pollution 20. Small amount of seed was sowed 21. Low production due to use of tainted fertilizer
**	Urea (granular)=1, Urea (Guti) =2, TSP=3, MoP=4, DAP=5, Others (specify ……..)=6		
***	Paddy Straw, Jute stick, Coconut fibre, oil-cake etc, included. Total value of by-products as to be calculated.		

604	The information of total consumption, storage, selling and buying of crops produced in last one year

Crops[1]	Unit of production	The amount of the output that were consumed and stored in the HH	The amount that were sold in the market	Distribution of crops in other sources		The amount of crops that were bought to meet the consumption-demand of HH
				Source[2]	Amount	
1	2	3	4	5	6	7

1 crops code:
Agricultural crops: Aush=1, Amon=2, Boro=3, Wheat=4, Jute=5, Sugercane=6, Tobacco=7, Corn=8, Moshur pals=9, Mug pals=10, Chola=11, Other pals=12, Mustard=13, Sunflower=14, Other oilseed=15, Onion=16, Chilly =17,
Vegetables: Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34,
Fruits : Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

2 source code: wage to labourer =1, land-owner=2, loan returned=3, loan sanctioned=4, to help=5, others=6

605. Would you please cooperate by giving information about crops cultivated at different times?

		Crop-1				Crop-2				Crop-3			
		Crop[1]	Amount of land (decimal)	Unit of output	Output	Crop[1]	Amount of land (decimal)	Unit of output	Output	Crop[1]	Amount of land (decimal)	Unit of output	Output
Cultivation in the last one year													
Cultivation 5 years ago													
Change in acreage (comparison between last one year and 5 years ago)	Reasons for decrease in acreage of cultivation[3]												
	Reasons for increase in acreage of cultivation[4]												
	Reasons behind lower amount of output[3]												
	Reasons behind higher amount of output[4]												
	Reasons for crop shifting[5]												

Code:

1. Crops

Agricultural crops: Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8 Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, 1Sunflower=14, Other oilseed=15, Onion=16, Chilly =17,

Vegetables: Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, Brinjal=32, Potato=33, , Other vegetables=34,

Fruits: Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

3. Reasons for decrease in acreage of cultivation:

Costly=1, Less profitable=2, Unavailability of adequate fertilizer=3, Man-power scarcity to supervise farming=4, Household has been earning from alternative source=5, New type of crop is profitable=6, Cultivation of new type of crop is less risky =7, Untimely availability of fertilizer=8, High price of fertilizer=9, Low fertility of land=10, Land has been sold=11, Land has been grabbed=12, Land lost due to river erosion=13, attack of pests and insects=14, drought=15, fertilizer quality is not good=16, heavy rainfall/storms=17, lack of irrigation=18, low quality seed=19, diseases of crops=20, Due to family reason land property has been divided=21, Price of crops has declined=22, Others (Specify)……..…=23

4. Reasons for increase in acreage of cultivation: Better fertilizer=1, Better seed= 2, More profitable=3, Cost is relatively low=4, More productive=5, Fertilizer is timely available=6, Small amount of fertilizer is used=7, Small risk in cultivation=8, adequate irrigation=9.

5. Reasons for Crop shifting:

high price of fertilizer=1, fertilizer can't be availed timely=2, fertilizer quality is not good=3, To cultivate previous crop is more risky=4, Being motivated by the local people cultivating new type of crop=5,Leakage of water from the adjacent land=6, Irrigation is hampered due to drought=7,Crop damaged due to flood/ prone area=8, Large number of buyers for new crop =9, Assigned to cultivate a particular crop for a company due to contract=10, Saline water is a barrier to cultivate=11, New crop is cultivating after getting more fertile land=12, Previous crop require more labour=13, Labour cost has increased=14,Unavailablity of labourer=15, Land has been sold=16, Quality seed is not available=17, More profitable=18, previous crop selling is lowered=19, previous crop production is lessened=20, Occupation has been changed=21, Financial crisis=22, Adequate fertilizer is not available=23, Others (Specify)……..…=24

606. Information on procurement of fertilizer for the particular crop for which greater amount of fertilizer was needed in the last year (put code) ……..

Source of fertilizer[1]	Number of times had to go to purchase fertilizer	Distance of fertilizer source from residence		Road condition[2]	Transport which is used[3]	Availability of transport Was easy=1 Was not easy=2	Change in transport Made=1 Not made=2	Change in transport (number of times)	Total Transportation cost (Tk)	Time for single movement (minutes)
		Distance by respondent	Distance in meter							
1	2	3	4	5	6	7	8	9	10	11
Dealer of own union						1 2	1 2			
Dealer of the near-by union						1 2	1 2			
Influential person						1 2	1 2			
Near-by market (open market)						1 2	1 2			

Source of fertilizer	In the queue Did wait=1 Did not wait=2 (skip to col.16)	Time spent to wait in the queue (minutes)	Expenditure for queue Had to bear=1 Had not to bear =2	Expenditure for maintaining queue (Tk.)	Availability of fertilizer per demand Yes=1 No=2	On credit purchase of fertilizer from the source Was made=1 not made=2	After how many days credit was repaid
	12	13	14	15	16	17	18
Dealer of own union	1 2		1 2		1 2		
Dealer of the near-by union	1 2		1 2		1 2		
Influential person	1 2		1 2		1 2		
Near-by market (open market)	1 2		1 2		1 2		

607. Which is the most convenient source[1] of fertilizer? ……. Reasons for convenience[4]……..

Code:

1. ***Sources of fertilizer:*** Dealer of own union=1, Dealer of the nearby union=2, Secretly from dealer/ influential persons=3, Open market =4
2. ***Road Condition***: Concrete and smooth=1, concrete and unsmooth=2, *kacha* road=3, Totally crumbled=4, Partly crumbled=5, Had to cross culvert=6, Had to cross canal/marsh/pond=7,
3. ***Transport***: Rickshaw=1, Cycle=2, Boat=3, Push cart=4, Bullock cart=5, tractor=6, Motor car=7, Tempo/Nasimon=8, Motor cycle=9, Van=10, carried on foot=11, By labourer/porter=12, others (specify……..) =13
4. ***Reasons for convenience:*** Fertilizer can be collected quickly=1, Adequate amount will be available=2, Fertilizer will be available timely=3, There will be no hazards of the agriculture office=4, Fertilizer can be purchased on credit=5, Price can not be raised intentionally=6, No complexities in distribution system =7, Others *(specify*)…….=8

5. Crop code

Agricultural crops: Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8 Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, 1Sunflower=14, Other oilseed=15, Onion=16, Chilly =17,

Vegetables: Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34,

Fruits: Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

SECTION VII:
INFORMATION ON AGRICULTURAL CREDIT

701	The information on agricultural credit in the last one year……

Source	Initiative in collection of credit Yes=1 No=2	Problems in collection of credit Yes=1 No=2	Type of problems[1]	Amount of credit (Tk.)	Yearly interest rate (%)	Interest, if paid in kind or in the form of labour service Yes=1 No=2	Miscellaneous expenditure for credit collection (transport and others)	Month of collection		Types of credit usage	
								Bangla	English	Crops[2]	Inputs[3]
1	2	3	4	5	6	7	8	9	10	11	12
1.Govt. Bank	1 2	1 2									
2.Agriculture Bank	1 2	1 2									
3.Private Bank	1 2	1 2									
4.NGO	1 2	1 2									
5.Local samity	1 2	1 2									
6.Mahajan	1 2	1 2				1 2					
7.Familiar rich men	1 2	1 2				1 2					
8.Relatives/friends/neighbour	1 2	1 2				1 2					
9.Others (specify …….)	1 2	1 2				1 2					

1. Type of problems: Adequate creadit was not obtained=1, Complex rules and regulations=2, Greater distance of fertilizer source from residence=3, Delayed=4, credit was not available due to small amount of land=5, Was not possible to give any security=6, no response=8, N/A=9

Note: if the ans of col. 7 is yes, then write down the description below.

Source:
Description:

3 Input codes: Fertilizer=1, seed=2, plough=3, Tractor=4, Power tiller=5, Irrigation machine=6, labourer cost=7, land renting/leasing=8, tax of land=9, pesticides=10, purchasing cattle=11.

2 crops code:
Agricultural crops: Aus=1, Aman=2, Boro=3, Wheat=4, Jute=5, Sugarcane=6, Tobacco=7,Maize=8 Masur dal=9, Mung dal=10, Chola=11, Other pulse=12, Mustard=13, 1Sunflower=14, Other oilseed=15, Onion=16, Chilly =17,
Vegetables: Bottle Gourd=18,Bitter Gourd=19, Cucumber=20, Cauliflower=21, Radish=22, Lal Shak=23, Bean=24, Creeper=26, Carrot=28, Kidney bean=28, Pumpkin=29,Arum-30,Tomato=31, , Brinjal=32, Potato=33, , Other vegetables=34,
Fruits: Melon=35, Banana =36, Guava=37, Papaya=38, Pineapple=39, Lichi=40, Apricot =41, Mango=42, Lemmon=43, Jackfruit=44, Other fruits=45, Other crops =46

SECTION VIII:
PERCEPTION ABOUT ACCESS TO FERTILIZER MARKET, ABILITY TO BUY AND THE HIGHEST PRICE OF FERTILIZER

801	Considering the present market price for crops and your financial ability, what should be highest price (50 Kg bag) for different fertilizers?	
	Type of fertilizer	**(Tk.)**
1	Urea (granular)	
2	Urea (gute)	
3	TSP	
4	MoP	
5	DAP	
6	Others (specify……)	
802	Do you always have the ability to buy fertilizer during harvesting season? Always have the ability=1, Occasionally have the ability=2, Usually have not full ability=3,	

	Never have the full ability = 4, Had to fall in problem only in the year 2008 = 5
803	In case of financial inability to purchase fertilizer during harvesting season what alternatives you do follow? Take loan from relatives/friends/neighbours=1, Take loan from samity=2, Take loan from Mahajan=3, Take loan from NGO=4, Take loan from Bank=5, Sell goods or assets=6, Others (specify……)=7

Give thanks to the respondents for spending their valuable time and for their hospitality and cooperation. Pray for his betterment in life.

	Name	Signature	Date
Name of Interviewer			
Supervisor			
Coder:			
Editor			

DCI-2

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII): Local Agriculture Officer/(SAAO)

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

Manab Sakti Unnayan Kendra (MSUK)
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Mohammadpur, Dhaka –1207
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Website: www.hdrc-bd.com

Dhaka: October, 2009

Information of Respondent

Name ----------Sex----------.Age ----------
Position ----------
-
Name of Organization ----------Working as SAAO (in Years) ----------
-Years working in this area ----------
Union ----------Upazila ----------District ----------

KII Issues:	
1	Would you please tell us how fertilizer demand in your working area is estimated?
2	Would you please tell about the present fertilizer distribution system in detail?
3	What were the past systems of fertilizer distribution?
4	What are the common and specific problems in different systems of fertilizer distribution introduced by the government?
5	a. Have you faced any fertilizer crisis in your area? Please tell in detail.
	b. What was your personal role/role of your institution in this situation?
	c. What did the dealers do in that situation?
	d. What was the reaction among farmers?
	e. Was there any incident of crop loss due to untimely availability of fertilizer or fertilizer crisis?
6.	Did the farmers used any other alternative to inorganic fertilizer during the fertilizer crisis?
7.	What are the specific reasons of fertilizer crisis?
8.	a. What are the steps that government can follow to overcome the crisis in the present fertilizer distribution system? b. What are your suggestions to improve the present fertilizer distribution system?
9.	Do you think that the farmers in this area are shifting to other crops which require less inorganic fertilizer? If yes, please narrate with some examples.
10.	a. Who gets the real benefit of subsidy?
	b. What according to you would be the best alternative to subsidy?
	c. In what other ways farmers can be more benefited from subsidy? Would you please tell in detail?
11.	Is there any specific factor in this area that should be considered for demand estimation or distribution of fertilizer? Please specify.
12.	a. In present fertilizer distribution system is there any leakage or smuggling of fertilizer? Please mention in detail.
	b. What steps can be taken to stop the leakage or smuggling?
13.	Do you/your institution organize any training program for the farmers on soil condition and fertilizer use? Please tell.

Interviewer will give thanks to respondent for spending his/her valuable time

DCI-3

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII): Local Sub-Dealer of Union

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

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Website: www.hdrc-bd.com

Dhaka: October, 2009

Information of Respondent

Name ----------Sex ----------Age ----------
Name of Farm ----------Years working as a dealer ----------
Union ---------- Upazila ---------- District ----------
Number of village in the Union---------- Name of fertilizers you sell----------

KII Issues:	
1.	Would you please narrate the present fertilizer distribution system? (demand estimation, procurement and distribution of fertilizer, conveyance of fertilizer)
2.	Is there any one to monitor or supervise the distribution system? If yes, how it is done?
3.	Do you face any problem in performing your duty? Please tell with an example.
4.	a. Have you ever faced any major problem in performing your duty? (relating to transport, procurement date, permission to sell, receiving payment, distribution on fixed date etc.) Please tell in detail? b. What did you do in that situation? c. Have you ever purchased fertilizer at price in excess of official price (mention price of different fertilizer, purchase price of fertilizer domestically produced and imported, date of purchase)? d. If yes, what were the necessary steps taken by the authority to tackle that situation?
5.	In your opinion what are the reasons of fertilizer crisis?
6.	What measures should be taken to solve fertilizer crisis?
7.	To make the fertilizer distribution system developed and smooth what steps should be taken?
8.	Do farmers in the area shifts to crops which require less inorganic fertilizer? If yes, please specify.
9.	Is there any peculiarity in this area to be considered for demand estimation or assessment of the distribution system? Please tell detail.
10.	a. In present system is there any possibility of leakage or smuggling of fertilizer? Please tell in detail. b. To stop the leakage or smuggling what steps should be taken?

Interviewer will give thanks to respondent for spending his/her valuable time

DCI-4

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Focused Group Discussion (FGD): FARMERS

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

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Dhaka: October, 2009

Information of Respondents

Name	Age	Marital status	Sex	Education (Highest class passed)	Amount of owned land (in decimal)	Years involved in cultivation

Spot of FGD:

Name of HH head…… Age……..…..

Address:

Para ……. ……. Village …….. Union ……..…..

Upazila …… …….. District ……..……..

Is this area close to border: Yes=1, No=2

FGD Issues

1. What are the major crops farmers cultivate in this area?
2. Which crops require more inorganic fertilizer?
3. How much fertilizer are required for those crops (kg/decimal)?
4. From what source(s) farmers buy fertilizers?
5. a. Do you timely get fertilizer from dealers?
   b. If not, then what happens? Would you please tell in detail?
   c. What are the reasons for untimely availability of fertilizers?
   d. Had there any occasion that because of untimely availability of fertilizers crop production was less then expectation? Please tell in detail with some example.
6. a. Does farmer get the required amount fertilizer from the dealers?
   b. If not, what happens? Tell with some specific examples.
   c. What are the reasons for getting small amount of fertilizer from the dealers?
7. a. Did farmers in the union ever faced serious fertilizer crisis?
   b. What was the outcome of the situation? Please tell in detail.
8. What are the problems in present fertilizer distribution system?
9. What steps should be taken to improve present fertilizer distribution system?
10. Do the farmers in this area shifts to crops which requires less inorganic fertilizer? If yes, please specify.
11. a. Who are the real beneficiaries of subsidy?
    b. What according to you would be the best alternative to subsidy system?
    c. How farmers can be more benefited from present subsidy system?
12. Is there any peculiarity in this area to be considered for demand estimation or assessment of the distribution system? Please tell in detail.
13. a. Is there any possibility of leakage or smuggling of fertilizer in the present fertilizer distribution system? Please mention s in detail.
    b. What steps can be taken to stop the leakage or smuggling?
14. a. What according to you should be the effective system of fertilizer distribution?
    b. What are the benefits of the proposed distribution system?

Interviewer will give thanks to respondent for spending his/her valuable time

DCI-5

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII):
Knowledgeable Person/Media Personal/ Social Worker in Border/Port Area

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

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Dhaka: October, 2009

Identification of Respondent:

Name---------- Age---------- Sex ----------Years living in this area ----------
Profession ---------- Designation(if any) ----------
Name of the organization n (if any) ----------
Adress: Village---------- Para/Ward ----------
Union---------- Upazila ----------.District ----------
Phone ----------

1. Would you please provide the following information?

How far is the border from this area (k. m.)	Which country's border?	Is there any port near the area?	Type of the border	Are there incidents of smuggling through this border?	Does smuggling occur through the border instead of using the port?
(1)	(2)	(3)	(4)	(5)	(6)
	India=1 Myanmar=2	Yes =1 No =2	Land port=1 Sea port=2 Both=3	Yes =1 No =2	Yes =1 No =2

Which items are smuggled through this border	Are fertilizer smuggled?	For how many years fertilizer has been smuggling	How many months in a year fertilizer is usually smuggled?	Which fertilizers are usually smuggled from this country through this border?	What amount of fertilizer is smuggled out daily? (in ton)	What percentage of this amount is smuggled through this port?	Price of fertilizer during smuggling(50 kg bag)		Which fertilizers are smuggled in through this border?	What amount of fertilizer are smuggled in this country through this border daily (in ton)
							Local market (taka)	Price in India/ Myanmar(taka)		
1	2	3	4	5	6	7	8	9	10	11

Fertilizer Code: Urea (granular) =1, Urea (*Guti)* =2, TSP=3, MOP=4, SSP =5, Others (specify)---------- =6

Issues

1. Would you please explain fertilizer smuggling process in detail?
2. Who are involved in fertilizer smuggling?
3. Would you please explain the reasons for fertilizer smuggling? (Please explain in terms of price and quality difference of fertilizer among different sides of the border)
4. Has the government taken any effective step to control fertilizer smuggling?
5. According to you what are the ways to stop fertilizer smuggling?
6. Does political change in national level or serious political incidence play any role in fertilizer smuggling? Please tell in detail.

Note: Interviewer will try to collect official records (from the local police station) of the amount of fertilizer smuggled (both in and out) during last five years).

Interviewer will give thanks to respondent for spending his/her valuable time

DCI-6

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII)):
BCIC Officials/Officials of Fertilizer Factories/Ex-official of BCIC

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

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Dhaka: October, 2009

Information of Respondent

Name …… …….Age …… Sex ……..……
Position …… Organization ……..…….
Address…….Para/Ward…….Village……..Union…….
Upazila ……. District…….. Phone……

Issues

1. a. Would you please tell us about the present subsidy system?
   b. How was the system of subsidy in the past?
   c. What are the merits and demerits of present and past subsidy system?
   d. What are your suggestions to improve present subsidy system?
2. a. Do you face any crisis of fertilizer due to low production or any flaw in distribution? Is fertilizer production delayed due to any reason? (Technical problem in factories/paucity of raw material/delay in receiving subsidy etc)? Please tell in detail.
3. Do you think that there will be a loss in the quality of fertilizer due to lack of proper maintenance/transport problem or other reasons? What amount of fertilizer is tainted or damaged per year due to these reasons?
4. a. Does it happen that fertilizer is smuggled out from factories during production or distribution? Please tell in detail?
   b. What amount of fertilizer is smuggled out yearly because of these reasons?
5. What are your suggestions to stop smuggling and mitigate fertilizer crisis?

Interviewer will give thanks to respondent for spending his/her valuable time

DCI-7

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII)):
Officials of Bangladesh Fertilizer Association (BFA)

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

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Website: www.hdrc-bd.com

Dhaka: October, 2009

Information of Respondent

Name …… ……..……. Age……..……
Sex…….……
Position
…….Organization…….…….…..……..
Address……Phone…….……
……

Issues	
1	a) Would you please tell us the the import mechanism of fertilizer?
	b) How government gives subsidy on imported fertilizer?
	c) Would you please narrate the merits and demerits of present system of subsidy for imported fertilizer?
	d) What measures can be taken to improve present system of fertilizer subsidy?
2.	Would you please tell us about the distribution process of imported fertilizer?
3.	a) During import or distribution of fertilizer does any amount of fertilizer becomes tainted or damaged?
	b) What amount of fertilizer is damaged yearly in this way?
4.	a) Does it happen that import or distribution of fertilizer is sometimes delayed? What are the reasons behind this delay?
	b) What are your suggestions to stop the delay of fertilizer import or distribution?

Interviewer will give thanks to respondent for spending his/her valuable time

DCI-8

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII):
Official of BADC

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

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Website: www.hdrc-bd.com

Dhaka: October, 2009

Information of Respondent

Name …… ……..Age ……Sex ……
Position ……..Organization ……
Address ……Phone ……

	Issues: Import and distribution of fertilizer
1.	a) Would you please tell us about BADC's role in present mechanism fertilizer import?
	b) What problems do you face in following this mechanism?
	c) How do you tackle these problems?
2.	a) Would you tell us about the present distribution system of imported fertilizer?
	b) Would you tell about the problems you face in the distribution phase and steps to be taken in this regard?
3.	How BADC get subsidy on imported fertilizer?
	What type of problem do you face in receiving subsidy?
4.	What are your suggestions to improve the process of import, distribution and subsidy?
5.	Do you think that BADC can contribute more in present fertilizer distribution system? If yes, then how?
6.	In your opinion what necessary steps should be taken to make the present distribution system dynamic and improved? (Please give your assessment separately regarding BADC, BFA and BCIC)
7.	Many organizations are involved in the present fertilizer distribution system(in terms of deployment of manpower, finance, time spent etc). What are your suggestions to minimize these expenses?
8.	Would you please describe the previous fertilizer import and distribution system of BADC?
9.	What problems did you face to implement this system? (please explain it from the context of import, distribution, procurement of fertilizer from BCIC, subsidy etc.)
10.	How BADC could be made more efficient, dynamic and developed in fertilizer distribution?
11.	Do you think that BADC had to face trouble on account of Government's suddenly decision to curb the role of BADC in fertilizer distribution and management?
12.	What is your opinion about the arguments that was put forward to curb BADC's role?
13.	Was the decision congenial for BADC? Give your opinion.

DCI-9

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII):
Official of Ministry of Agriculture (MOA)

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

Manab Sakti Unnayan Kendra (MSUK)
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Mohammadpur, Dhaka –1207
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E-mail: hdrc.bd@gmail.com, hdrc@bangla.net
Website: www.hdrc-bd.com

Dhaka: October, 2009

Issues:

1. Would you please explain the role of your department for distribution of domestically produced and imported fertilizer? (Please tell us the process of estimation of fertilizer demand, price determination, the quality of imported fertilizer, permit to sell, monitoring the distribution system etc.)

2. What kind of problem do you face to administer these activities?

3. Would you please give your suggestions as how to settle those problems permanently?

4. On different stage from import to distribution, what initiatives can be taken to make the process fast and smooth?

5. What is your assessment about the activities of BADC, BFA and BCIC as management authority of fertilizer distribution system (regarding the quick service, less expenses, to buy fertilizer at cheap price, productivity of fertilizer, delivering fertilizer timely to farmers etc.)?

6. Specify positive and negative sides of production, distribution and import of fertilizer regarding the previous and present system.

7. Many government and private organizations are engaged in the present fertilizer distribution system. How these organizations can be made more effective in thus regard?

DCI-10

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

Key Informant Interview (KII))
Fertilizer Dealer of Upazila

Study undertaken for

Food and Agriculture Organization (FAO)

Study conducted by

Manab Sakti Unnayan Kendra (MSUK)
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Website: www.hdrc-bd.com

Dhaka: October, 2009

Issues	
1.	Would you please tell us about the present distribution system of fertilizer?
2.	What problems do you face in fertilizer distribution? (Please describe in the context of having permission, collection, transport, payment of subsidy, storage, selling etc.)
3.	How do you tackle these problems?
4.	a) What type of problems relating to fertilizer distribution arises in organizations like BCIC, fertilizer sub-dealer of union, agriculture office etc? Please explain in detail.
	b) What initiatives should be taken to overcome such problems?
5.	What are your assessments about change in the distribution system introduced at different time? (Please make a comparative assessment about distribution system of '96 to 2001, '92 to 2006, and card system).
6.	Do you ever pay more than official price to procure fertilizer from BCIC? Please specify the official selling rate and the rate at which you purchase. Mention the year of incident.
7.	What measures can be taken to make the distribution system dynamic and smooth in the peak season of fertilizer? Explain, considering issues like cooperation from government agency, BCIC's role, change in regulations etc.
8.	Do you think that unnecessary delay in production and inadequate supply of fertilizer is due to mismanagement of BCIC?
9.	What measures are usually taken in case of any crisis?
10.	How the crisis management system can be improved?
11.	Is there any gap between required and actual demand for fertilizer determined by agriculture office? If yes, What are it's reasons? How this can be overcome?

Study Area

Divisions	Strata	Districts	Upazillas	Unions	Villages
Barishal	Stratum 1	Barguna	Patharghata	Kalo mega	Smol Pathorgata
				Pathorgata	Gohorpur
	Stratum 2	Barisal	Muladi	Kajir Char	Kajir Char
				Char Lakkipur	Char Lakkipur
		Bhola	Monpura	Sagusia	Sagusia uttarpara
				Hazirhat	Chargaen
		Patuakhali	Kalapara	Kaparbanga	Sudirpur
				Latachapli	Nababpur
		Pirojpur	Mothbaria	Doraj hat	South Laksmipur
				Tikikata	Purbasener tiki
	Stratum 3	Barisal	Ugirpur	Vora kata	Goria
				Sikarpur	Mahara
Chittagong	Stratum 1	Bandarban	Thanchi	Chintu	Chintu Head mastar para
				Thanchi	Apru song para
		Rangamati	Sadar	Sapsori	Sapsori
				Rangamati Sadar	Rangapani
		Khagrachari	Mohalchori	Mubachori	Singi nali
				Mohalchori	Natun para
		Cox'sbazar	Kutubdia	Ali akbori deal	Ali akbori deal
				Baro Gub	Baro Gub
	Stratum 2	Bandarban	Lama	Ruposhi para	Ridoy mastar para
				Lama	Kalida para
		Cox'sbazar	Theknaff	Sadar	Lengur bil
				Bahar chara	Naya kali
		B-Baria	Kasba	Kasba West	Aksina
				Kaimpur	Zazishar
		Noakhali	Chatkhil	Porob kut	Purbo Porob kut
				5 gon	Nisbower
		Chittagong	Sandeep	Horispur	Horispur
				Musapur	Musapur
		Comilla	Homna	2 No Gagutia	South Cunarchar
				Niluki	Bobani
		Noakhali	Subornochor	Char Wapda	Katabunia
				Char amanullha	Katabunia
	Stratum 3	Chandpur	Faridgonj	9 No Gubindopur	Midel Chandpur
				8 No South paikpara	Purba dai chara
		Laksmipur	Sadar	15 No Lahar kandi	Kumit pur
				16 No Sakchar	Kalir Char
		Comilla	Burichong	Burichong	Jagatpur
				4 No Sulnol	Poyat
		B-Baria	Sadar	Sahilpur	North Sahilpur
				Natai	Batpara
Dhaka	Stratum 1	Dahaka	Dohar	Moksud pur	Mohamanika
				Raypara	Raypara
		Maikgonj	Doilotpur	Kolia	Tepari
				Cakmir pur	Ramchandropur
		Sariatpur	Gasairhatt	Kuchai patti	Kuchai patti
				Edulpur	Char mohis kanti
		Narayangonj	Sonargaon	Sammandi	Nilkanda
				Jampur	Jampur
	Stratum 2	Netrokona	Durgpur	Durgapur	Takurbari kanda
				Chandi ghar	Chandi ghar
		Gazipur	Kaliakoir	Moddopara	Thakurpara
				Mouchak	Dhakpara

Divisions	Strata	Districts	Upazillas	Unions	Villages
		Kishorgonj	Katiadi	Bonugram	Gilakandi
				Asmita	Moddopara
		Maikgonj	Singhair	Joymondop	Kiting char
				Talibpur	Islamnagar
		Madaripur	Shibchar	Ditio kondo	Hawldar kandi
				Shibchar	Char samil
		Mymensing	Muktagasa	Kusmail	Baruka
				Basti	Nasirpur
		Gopalgonj	Moksedpur	Govindopur	Kadampur
				Moharajpur	Luhachura
		Narayangonj	Araihazar	Bamondi	Edbardi
				Duptara	Bazbi
		Narsingdi	Sibpur	Aiubpur	Shaspur
				Putia	Mullakanda
		Kishorgonj	Husenpur	Araibaria	Bruha
				Sahedol	Kurimara
	Stratum 3	Mymensing	Fulbaria	Balihan	Noyn bari
				Kushmail	Bruka
		Tangail	Modhupur	Alookdia	Roktipara
				Gulabari	Posisha
		Dahaka	Damrai	Mudipara	Kalampur
				Sumbag	Gowel
		Sherpur	Nalitabari	2 No Purikari	Purikari
				Jugania	Kapashia
Khulna	Stratum 1	Bagerhat	Shitolmari	Hizla	Santikali
				Shibpur	Shibpur moddopara
		Khulna	Khulna sadar	City corporation	Rayer mohol Sunabaga
				City corporation	Bojra sunabanga
	Stratum 2	Narail	Lohagora	Mollikpur	Parmollikpur
				Laksmipasa	Dosher banga
		Khulna	Koira	Uttar bedkashi	Botul bazar
				Koira	Jilihagat
		Khulna	Paikgasa	Horidala	Mahmud kati
				Kopilmuni	Birashi
		Satkhira	Satkhira sadar	Bumra	Lakmidari
				Alipur	Bularayati
		Jessor	Bagarpara	Duhakula	Sesua kula
				Dorajhat	South Laksmipur
	Stratum 3	Jessor	Zikorgasa	Zikorgasa	Mollikpur
				Godkali	Bamanali
		Jhenaidah	Maheshpur	SKB	Hatkalislpur
				Fotepur	Guhalhuda
Rajshahi	Stratum 1	Sirajgonj	Chowhali	5 No Kash kawlia	Jutpara
				3 No Gurjan	Charditpur
		Kurigram	Chilmari	Panati para	Romna
				Thanahata	Smol kusteri
		Bogura	Sonatola	4 No Jurgasa	Jurgasa
				Sunatola	Sujaitpur
		Dinajpur	Bochagonj	Esania	Dhoksai
				Murshid ghat	Krisnopur
		Rangpur	Kawnia	Balapara	Horichoron
				Tepamadupur	Nijdorpa
	Stratum 2	Nilphamari	Kishorgonj	2 No Kutimari	Kutimari
				6 No Kishorgonj	Kishorgonj sadar
		Kurigram	Fulbari	Simulbari	Nandir kuti

Divisions	Strata	Districts	Upazillas	Unions	Villages
				Fulbari	Panimasputi
		Dinajpur	Fulbari	Shibnogor	Purboraj rampur
				Betdigi	Nandolalpur
		Sirajgonj	Tarash	7 No Madai nagar	North moturahar
				2 No Baruhas	Binshara
		Rajshahi	Durgapur	4 No Deluabari	Toripatpur
				3 No maria	Chowbaria
		Gaibanda	Sadullapur	Kamarpara	Puran lasmipur
				Bongram	Joyonpur
		Dinajpur	Nababgonj	7 No Daudpur	Malarpara
				3 No Gupal gonj	Jogonnatpur
		Naogaon	Manda	7 No Manda	Sahapur
				3 No Poranpur	Gupalpur westpara
		Dinajpur	Chirirbandor	Abdulpur	Mazapara
				Omorpur	Lasmipur
	Stratum 3	Natore	Boraigram	1 No Juaria	Kamrul Purbara
				10 No Boraigram	Manikpur purbapara
		Kurigram	Ulipur	Gunaigas	Gunaigas
				Tabakpur	Purir potol
		Rangpur	Rangpur	Pasuram	Balukumar
				Tapudan	Bahar kasna
		Dinajpur	Birgonj	6 No Nijpara	Syedpur kolani
				Moricha	Basudeb pur
		Rajshahi	Baghmara	Bihanali	Bihanali
				10 No Maria	Jatragasi
Sylhet	Stratum 1	Shylet	Goainghat	Alirgon	Purbanagar
				Purbo jaflong	Islampur kalibari
	Stratum 2	Moulavibazar	Kulaura	8 No Rawatgon	Maksudpur
				4 No Joy Chandry	Rampasha
		Sunamgonj	Dharmapasha	Sel boros	Sel boros bir
				Darmapasha	Halda kanda
		Habigonj	Azmirigonj	Kakail sew	Sulri
				1 No Azmirigonj	Birat
		Sunamgonj	Dirai	Karimpur	Chanpur
				Rajnogor	Jahanpur
	Stratum 3	Moulavibazar	Shreemongal	3 No Shreemongal	Uttar Baraura
				2 No Bunbir	Loiyearkul

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