

Final Technical Report (Revised)
on
A Quantitative Analysis of
Fertilizer Demand and Subsidy Policy in Bangladesh



This study was carried out with the support of the



National Food Policy Capacity Strengthening Programme



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Date: December, 2010

A Quantitative Analysis of Fertilizer Demand and Subsidy Policy in Bangladesh

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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 **The subsidy on fertilizers was withdrawn completely in December 1992 and importation and distribution of fertilizer made open.**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.

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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 than 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

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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

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(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 than 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

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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

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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 dearth 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**

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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 fertilizer 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.

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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.
79. 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.**