Data Article

Dataset on measuring perception about fertilizer subsidy policy and factors behind differential farm level fertilizer usage in Bangladesh

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A B S T R A C T

The dataset explicates farmer’s perceptions about fertilizer subsidy policy in Bangladesh and the factors that affect farm level fertilizer usage. Primary data were collected from 300 farm households from three regions of the country belonging to four farm size groups i.e., marginal, small, medium and large. Dataset reveals that a major part of sampled marginal farmers was unaware that government is providing huge subsidy on the fertilizer market. Most of the marginal farmers were dissatisfied claiming the uneven distribution of subsidy benefit whereas majority of large farmers were satisfied with current policy and market prices. At the same time, output prices relative to fertilizer price received by the farmers, off-farm income and extension services were significantly affecting fertilizer use intensity of different farm size groups while subsidy policy impact was not significant.

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### Specifications table

| Subject area          | Economics            |
|-----------------------|----------------------|
| More specific subject area | Agricultural economics |
| Type of data          | Table, text file, figure |
| How data were acquired | Field survey         |
| Data format           | Analyzed             |
| Experimental factors  | Before conducting field survey, focus group discussions (FGD) were conducted to familiarize the research team and research issues in the data collection areas. |
| Experimental features | The corresponding researcher herself facilitated the FGDs along with six trained enumerators. In each FGD, 8 to 10 farmers participated to discuss the issues. Moreover, the field level personnel from the Department of Agricultural Extension (DAE), fertilizer dealers and local leaders in the villages participated in the FGDs. |
| Data source location  | Dinajpur, Mymensingh and Tangail districts from northern part of Bangladesh |
| Data accessibility    | The data are available with this article |
| Related research article | Nasrin, M. (2017). Fertilizer subsidy policy in Bangladesh: Impact on rice production and policy consequences. Farming and Rural Systems Economics, edited by Doppler, W., Bauer, S. and Birner, R. Volume 162, Margraf publishers, Germany. |

### Value of the data

- This dataset will help to understand the farmers’ perception regarding the fertilizer subsidy policy in Bangladesh, whether it is really benefitting them from the farmer’s point of view or not and to what extent they are satisfied with the current policy.
- Farmer’s perception could provide scope for further research on the farm behavioral analysis in response to subsidy policy.
- The data on farmer’s perception will allow other researchers to extend the statistical analyses.
- The identified factors behind differential farm level fertilizer usage intensity will provide new arena for conducting research on analyzing farm level subsidy policy benefits.
- These data will be useful for the policy makers to reformulate the policies aiming at the end benefit of farmers.

### 1. Data

The dataset illustrates the perception revealed by farmers about the fertilizer subsidy policy which has been presented in Figs. 1 and 2. Tables 1 and 2 show the extent of fertilizer usage by different farm size groups in the research areas. Fig. 3 reveals the comparison of actual fertilizer application by sampled farm households with the recommendation dose. The subsidized farm level market prices of four major nutrient fertilizers during past several years are shown in Table 3. Different factors which affect farm level fertilizer use intensity have been presented in Table 4.

### 2. Experimental design, materials and methods

The data have been collected from the farm households which were identified through a multi-stage sampling procedure based on purposive selection. The dataset covers three districts namely Dinajpur, Mymensingh and Tangail from northern part of Bangladesh on the basis of rice farming
Fig. 1. Proportion of farmers knowing about fertilizer subsidy policy.

Fig. 2. Farmer’s satisfaction with fertilizer subsidy policy according to farm size groups.

Table 1
Share of farms using different types of fertilizers (%). Source: Author’s calculation based on field survey, 2014.

| Types of fertilizers         | Marginal | Small  | Medium | Large |
|------------------------------|----------|--------|--------|-------|
| Urea                         | 100.00   | 99.35  | 100.00 | 100.00|
| Triple super phosphate (TSP) | 95.35    | 97.40  | 95.29  | 100.00|
| Muriate of potash (MoP)      | 93.02    | 96.10  | 97.65  | 100.00|
| Di-Ammonium Phosphate (DAP)  | 2.33     | 16.88  | 8.24   | 33.33 |
| Zinc sulphate (ZnSO4)        | 25.58    | 28.57  | 55.29  | 53.33 |
| Gypsum                       | 4.65     | 12.34  | 15.29  | 26.67 |
concentration and fertilizer usage. From each district, several sub-districts were selected. In total, 300 farm households belonging to different farm size groups (i.e., marginal, small, medium and large) were interviewed for necessary data collections along with some focus group discussions and key informant interviews. Among the sampled farm households, 14.33% were marginal farms, 52.33% were small farms, 28.33% were medium farms and 5.00% were large farms, respectively. This sample distribution is representative of overall Bangladesh agriculture, where 84.39% of total farm households (more than 15 million) are marginal and small, 14.04% are medium and 1.54% is large farmers [2]. Different descriptive statistics like, sum, average, percentages, etc. were used to describe the farmer’s perception about subsidy policy. Reasons for farm level fertilizer usage differences among different farm size groups were analyzed using multiple regression model (OLS).

Bangladesh agriculture is mainly driven by the rice sub-sector; the cropping pattern being dominated by a single crop. About 96% of total cereal food supply comes from rice [3] and it alone covers more than 75% of country’s total cropped area [2]. The country has a high cropping intensity of 176%, much of which is due to rice monoculture [4]. Rice is grown in three seasons namely, *aus*, *aman* and *boro*. *Aman* is the monsoon season while *boro* and *aus* fall in the dry season and overlap each other. However, *boro* rice is mostly grown in dry season by substituting land from *aus* rice and other minor dry season crops, such as pulses and oilseeds [5]. Among different fertilizers, farmers in Bangladesh use nine fertilizers more commonly in rice production which are urea, triple super phosphate (TSP), muriate of potash (MoP), di-ammonium phosphate (DAP), zinc sulphate (ZnSO4), calcium sulfate dihydrate (gypsum) and single super phosphate (SSP). Among them, urea, TSP and MoP are considered as basic nutrient fertilizers and the use of other fertilizers vary year to year [5]. Urea and DAP contain 46% and 18% nitrogen, respectively; MoP contains 50% potassium while 37.4% phosphorus is present in TSP [6].

The increasing demand for food, caused by rapid rising population, has been met by improved agricultural productivity since green revolution in Bangladesh [7]. Fertilizer has been a vital input which accounts for about 50–60% of the total increase in cereal production [8]. Considering the central role of agriculture in the economies of Bangladesh, promoting efficient and effective use of fertilizer through providing subsidies has emerged as an important target of policies in recent

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1 Marginal farmers operate between 0.02 and 0.2 ha of land; small farmers operate between 0.2 and 1.0 ha of land; medium farmers operate between 1.0 and 3.0 ha of land and large farmers operate above 3.0 ha of land [14].
decades. Subsidies have played an important role in the pricing of fertilizers in the country. Fertilizer subsidies were initiated with an overall objective of augmenting farmers’ optimum usage of fertilizers technically and boosting agricultural production. Policy makers follow a universal subsidy policy in the country and reduce the market prices of fertilizers which could give extra benefits for better-off producers who would have used fertilizers anyway [9].

The research areas are rice production concentrated zones and also have recorded fertilizer consumption. However, data reveal that most of the marginal farmers in these areas (72.09%) were ignorant about the fact that government is giving huge amount of subsidy on fertilizer market just to keep the market price within their purchasing capacity. Instead, they claim that government is giving
nothing to them to bear the rising costs of farming. However, majority of medium (about 84%) and large farmers (80%) know about fertilizer subsidy (Fig. 1). Lack of information contributed to this situation. Only 20% of marginal farmers, who knew about fertilizer subsidy policy, were satisfied with current market price and subsidy policy. More than 60% marginal farmers were dissatisfied whereas almost 67% large farmers were satisfied with the current subsidy policy (Fig. 2). The satisfied farmers believed that the subsidized rate of fertilizer has lowered their investment on fertilizers which ultimately reduces the production cost. On the other hand, farmers, showing dissatisfaction on the subsidy policy, have claimed that this policy creates uneven distribution of subsidy among the farmers.

Although majority of farmers are using chemical fertilizers in the country, proportion of farmers experiencing deficit in fertilizer use is higher among the small farm holders than the large farm holders [10]. The dataset shows that almost all the sampled farmers (except small farmers) in research areas used urea during survey year. Majority of farmers use all of the three main types of chemical fertilizer (urea, TSP and MoP). Share of farmers using DAP and gypsum is comparatively low for all farm size groups. A noticeable pattern is revealed from the data in the case of DAP use. One third of large farmers use DAP whereas only about 2% of marginal farmers use this fertilizer. In case of small and medium farms, this number is also lower (Table 1). This could be because of high price of DAP compared to other fertilizers as revealed from Table 3. It has been clear that the market prices are

| Year      | Urea | TSP | MoP | DAP |
|-----------|------|-----|-----|-----|
| 2010–11   | 12   | 22  | 15  | 27  |
| 2011–12   | 20   | 22  | 16  | 27  |
| 2012–13   | 16   | 22  | 15  | 27  |
| 2013–14   | 16   | 22  | 15  | 25  |
| 2014–15   | 16   | 22  | 15  | 25  |
| 2015–16   | 16   | 22  | 15  | 25  |

### Table 3
Farm level market prices of different fertilizers in Bangladesh during last six years. Source: [1].

### Table 4
Factors affecting farm households' fertilizer use intensity (Ordinary least square regression method). Source: Author’s estimation

| Variables                               | Marginal     | Small        | Medium & large | Coeff. | Robust SE | Coeff. | SE    | Coeff. | Robust SE |
|-----------------------------------------|--------------|--------------|----------------|--------|-----------|--------|-------|--------|-----------|
| Education (years)                       | 0.204        | 0.398**      | 0.669**        | 0.134  | 0.314     | 0.537  | 0.265 |
| Farming experience (years)              | −0.258       | 0.145        | 0.537          | 0.418  | 0.145     | 0.537  | 0.751 |
| Satisfaction about fertilizer subsidy policy (1 = yes) | 2.283***     | 1.168        | 2.102          | 1.201  | 1.168     | 2.321  | 0.079 |
| Off-farm income (BDT/ household)        | 0.006***     | 0.004**      | 0.003**        | 0.002  | 0.004     | 0.001  | 0.001 |
| Value of agricultural assets (BDT/household) | 0.036        | 0.057**      | 0.041**        | 0.120  | 0.057     | 0.023  | 0.011 |
| Availability of labor (man-day/ha)      | 1.781**      | 1.525***     | 0.870***       | 0.813  | 1.525     | 0.566  | 0.340 |
| Manure applied (ton/ha)                 | −0.015       | −0.012       | 0.019          | 0.014  | 0.016     | 0.015  | 0.016 |
| Fertilizer-paddy price ratio            | −0.442***    | −0.636**     | −0.728**       | 0.027  | 0.034     | 0.134  | 0.199 |
| Expected product price (BDT/kg)         | 0.254***     | 0.191***     | 0.122          | 0.135  | 0.038     | 0.012  | 0.319 |
| Assessment of soil fertility (1 = good or average) | 6.070***     | 5.771        | 3.402**        | 2.021  | 5.771     | 15.033 | 1.851 |
| Extension services (1 = received)       | 5.524***     | 6.182**      | 4.829**        | 2.235  | 6.182     | 9.066  | 1.701 |
| Credit access (1 = yes)                 | 4.216***     | 3.939        | 2.561          | 1.016  | 3.939     | 4.691  | 12.832 |
| Constant                                | 53.405       | 128.204      | 158.524        | 75.975 | 81.181    | 155.786 | 10.17*** |
| Model fit (R²)                          | 0.72         | 0.59         | 0.58           | 0.59   | 0.53      | −      | −     |
| Adjusted R²                             | 22.83***     | 14.88***     | 10.17***       | −      | −         | −      | −     |

***, ** and * represent statistical significance at 1%, 5% and 10% level, respectively.

Coeff. = coefficients, SE = standard error.
comparatively higher for TSP and DAP. The dataset exhibits the extensive use of urea fertilizer in both seasons compared to other fertilizers by all farm categories in research areas as is evident from Table 2. The large farmers use the highest amount of fertilizer (about 298 kg/ha in aman season and 497 kg/ha in boro season). On the other hand, marginal farmers are in disadvantageous position in using fertilizer. They extensively use those fertilizers for which market prices are lower. They applied only basic nutrients during aman season. Small farmers use more urea fertilizer in both seasons than medium farmers while medium farmers are in better position with regard to the application of other fertilizers. All the farmers use less than the recommended dose for all types of fertilizers during both rainfed (aman) and irrigated (boro) seasons (Fig. 3).

Since the introduction of chemical fertilizer in the history, the governments of many countries have been continuously providing subsidies on fertilizer to ensure the farm level availability. As mentioned by [11], governments across sub-Saharan Africa spend about an estimated USD 2 billion each year on fertilizer subsidy programs. However, in many countries, fertilizer subsidy was not successful in increasing fertilizer usage as there were many other reasons apart from market price for which farmers could not use adequate amount in time [12,13]. The major factors responsible for this differential fertilizer usage of farmers are explored by this dataset. The multiple regression model was run separately for three groups of farmers namely, marginal, small and medium & large farms. The large farm group was combined with medium farm group as the sample size for large farm does not fulfill the minimum number of samples for any econometric analysis to get better estimation results. The OLS estimation results are presented in Table 3. As revealed from the Table 3 that, farming experience and manure application did not show any significant impact on fertilizer use intensity for all farm categories. Among other variables, off-farm income, labor availability, fertilizer-paddy price ratio and extension services showed significant impact for all categories. The price ratio has negative but significant impact on fertilizer use showing lowest magnitude for marginal farms. These farmers are more sensitive to price movements in the market especially for paddy. As fertilizer price is almost invariant among the respondents, the estimated coefficient indicates the positive correlation between paddy price and farmer’s use intensity of fertilizer.

The impact of education is insignificant for marginal farms. Farmer’s satisfaction about subsidy policy variable turns out positive although it does not have significant impact on small and medium & large farm’s fertilizer usage. The estimated coefficient for value of agricultural assets variable is positive and significant for small and medium & large farm groups. It has insignificant positive impact marginal farm’s fertilizer use intensity. Marginal farmers do not have enough livestock animals and other small agricultural equipment due to lack of sufficient capital. On the other hand, medium and large farmers’ fertilizer use does not significantly depend on their expectation as they normally don’t have urgency of selling their output immediately after harvesting. Farmer’s own assessment of soil fertility has positive significant impact on fertilizer use for marginal farmers but negative significant impact on fertilizer use in case of large farmers. The estimated coefficient for credit access indicates that access to credit from different sources significantly increases marginal farmer’s fertilizer use (Table 3).

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Transparency document. Supporting information

Transparency document associated with this article can be found in the online version at https://doi.org/10.1016/j.dib.2019.01.005.
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