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How Do Agricultural Import Tariffs Affect Men and Women Smallholders?

Evidence from Bangladesh

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Abstract

Using newly available customs data from Bangladesh, along with additional administrative and survey data, this study examines how variation in import tariffs on key agricultural inputs affects men's and women's agricultural employment and production—given a high degree of segmentation among men and women in different agricultural activities. In Bangladesh, women and men in agriculture are typically smallholders and maintain distinct occupations within the sector (women in livestock and poultry rearing, and men in crop agriculture). These areas are both heavily dependent on imported commodities (grains and oilseed for livestock and poultry feed, as well as seeds and fertilizer for crop agriculture). The paper shows that import tariff rates are much higher on feed-related inputs; imported inputs for crop agriculture, such as fertilizer, are also heavily subsidized. The paper also shows that the higher resulting prices for inputs used in feed are significantly negatively associated with employment and earnings in poultry and livestock activity, where women are heavily concentrated. Among those marketing output, earnings also tend to be substantially higher in crop agriculture than in livestock/poultry activity, underscoring the need for closely examining how import tariffs can affect more vulnerable groups. Individual producers are also heavily reliant on livestock for own-consumption activity, reducing their ability to pass on increased input costs.

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1. Introduction

In this study, we examine how men and women in small-scale agriculture in Bangladesh are differentially exposed to import tariffs on agricultural inputs. We use newly available, product-level customs data from the Bangladesh National Board of Revenue (NBR), combined with recent administrative and employment surveys covering key information on employment, prices and production. Together, the data reveal several potential links between rising input costs — stemming from tariff and subsidy policies, along with other factors — and economic activities in agriculture. This includes: (a) marked differences in areas of agriculture that men and women are involved in; (b) a heavy dependence of these activities on imports; (c) substantially higher tariff rates on imported agricultural inputs that affect women's activities in agriculture — namely, dairy and poultry farming — as opposed to crop activities, where men are more concentrated; and (d) higher resulting prices for inputs used in poultry and livestock activity are significantly negatively associated with employment and earnings. The results underscore how trade and tariff policies have varying implications for women vis-à-vis men, given gender differences in economic roles.

Overall, substantial interest has built in recent years on the individual-disaggregated employment effects of tariff policy, particularly amid growing agricultural commodity supply shocks, and trade protectionism across several regions globally. Estimates from the World Trade Organization across countries indicate that input tariffs tend to be higher in sectors that employ more women, such as food and beverage retail as well as agriculture (World Bank and WTO, 2020). However, there is little evidence from low- and middle-income contexts within sectors and for different areas of production, due in part to the lack of regularly-published, granular data on tariffs linked with industries and activities of male and female producers and workers. Our paper makes significant contributions in this area, and also fits in closely with recent literature on the role of trade policy (and, in particular, tariff liberalization) on women's labor outcomes — showing that these inequalities also carry through within different areas of agriculture —with important implications for gender-sensitive policy design as well.

Understanding the individual-disaggregated effects of tariffs, in particular, is important because men and women, particularly in low- and middle-income countries, are often concentrated in different industries, including activities within agriculture (de Brauw and Bulte, 2021; Slavchevska et al., 2021). Effects from changes in trade policy on employment can therefore vary substantially within the population, depending on the country context and how policies are targeted towards specific industries. Trade liberalization, for

example, can raise women's employment and wages in industries where they tend to work and that are more export oriented (Pieters, 2018). It could also induce a shift away from agriculture towards services, as well as formal employment (Connolly, 2022, finds in the case of trade liberalization in Brazil that this was particularly pronounced for women). Intrahousehold shifts in labor supply can also result; Besedeš et al. (2021) find that the removal of trade barriers between the U.S. and China led to an exit of less-educated men from manufacturing, but greater entry of women into the labor force to compensate for the reduction in family income. In one of the few studies from low-income contexts, Giovanetti et al. (2022) find, in the case of Ethiopia, that policy shifts to reduce import tariffs led to greater competition in agriculture and a movement away from specific areas of agricultural employment where women were concentrated.

Agriculture, in particular, is highly relevant in this vein, given the prominence of this sector across developing countries, the different sub-sectors sectors in which men and women work for pay or for home consumption, and the different tasks that they perform in agricultural value chains (de Brauw and Bulte, 2021). Depending on the country, many agricultural commodities also face substantial import tariffs as a result of government efforts to protect domestic producers from international competition (Artuc et al., 2021).[3] Even countries where agriculture makes up a large percentage of GDP often remain net importers of agricultural commodities due to supply-related challenges in keeping up with domestic demand. The reliance within agriculture on imports as well as heavy tariffs for certain agricultural commodities can lead to varying effects on employment outcomes — import tariffs, for example, can have detrimental effects depending on the type of agricultural activity and whether inputs are used directly or through an intermediary. In low and middle-income contexts, most men and women in agriculture are also small producers, with a mix of own-consumption and production for sale in the market — but often with uneven earnings (World Bank, 2018; Gomez y Paloma, Riesgo and Louhichi, 2020). Women also tend to have lower earnings than men across sectors in agriculture, and are much more likely to engage in agricultural activities for household consumption (FAO, 2023). As a result, these farmers are typically unable to pass on increased input costs to customers — without subsidies or other countervailing government interventions — and end up bearing most or all of the burden of tariffs.

[3] Artuc et al. (2021) also provide evidence on the consumption side — using harmonized tariff data from 54 countries, they find that higher tariffs on agricultural products across countries tend to negatively bias female-headed households, as they spend a larger share of their budget on agricultural products relative to male-headed households.

Against this context, Bangladesh presents an interesting case for analysis. While the economy is gradually transitioning away from agriculture towards manufacturing and services, about a third of employed men and 60 percent of employed women continue to work in the sector, particularly in small-scale, non-commercial activities.[4] Women and men in agricultural occupations in Bangladesh also typically work in different activities (women are more likely to be concentrated in livestock and poultry rearing, mostly in a self-employed capacity, and men in crop agriculture). Both areas of agriculture are heavily dependent on imported commodities (grains and oilseed for animal feed, as well as seeds and fertilizer for crop agriculture). Using new NBR customs data from 2015-2021, we find that tariffs, as measured by *total tax rate* (referred to as TTR in this paper)[5] across different duties, are very different across these two sets of inputs – with higher TTR on inputs for livestock and poultry activity, compared to seeds for crop agriculture, and heavy subsidies to offset the cost of imported fertilizer for crops. As we discuss in the paper as well, with a much greater share of production for own-consumption and lower earnings from selling products in the market, women in small-scale agriculture in Bangladesh are also likely to absorb the full impact of tariff-related costs.

The higher tariff rates on inputs affecting livestock and poultry rearing in Bangladesh have implications for women's economic outcomes in these sectors, particularly in parallel with higher global price swings in commodities needed for animal feed. The 2016/17 Bangladesh national labor force survey also shows that, similar to other countries, women in agriculture are overall much more likely to be in less permanent and formal employment arrangements than men, including working part-time and as own-account workers as opposed to formal work in larger agricultural enterprises. In that vein, greater pressures on input costs may lead to reduced incomes and consumption, given less stability in their employment status and fewer alternatives to move to other jobs. More recent labor force data would allow for a closer examination of actual impacts on employment (the 2022 labor force survey has been completed, but not yet publicly available),[6] although traditional distinctions in women's versus men's roles in agriculture are unlikely to change substantially, even if employment has fluctuated due to demand and supply shocks stemming from the Covid-19 pandemic. Data from the 2018/19 Bangladesh Integrated Household Survey also shows that individual producers are also heavily reliant on livestock and poultry production for their household's own

[4] World Bank Development Indicators, https://data.worldbank.org/indicator/SL.AGR.EMPL.ZS?locations=BD

[5] The Bangladesh National Board of Revenue denotes TTR as TTI (or total tax incidence). For the purposes of clarity, we use the term "rate" instead of incidence, as the taxation literature refers to incidence as the distribution of a tax's economic burden across different groups.

[6] While the 2022 LFS is not yet available, a provisional report was released by the Bangladesh Bureau of Statistics in March 2023 with some key findings on employment at the national, urban and rural levels (BBS, 2023).

consumption, reducing their ability to pass on increased input costs. Overall, our findings establish key inequalities — and associated risks, that can be tested in further analysis when newer labor force survey data become available — that women in agriculture face with respect to agricultural import tariffs in Bangladesh. This study also contributes to an understanding of these issues in low- and middle-income contexts, where customs data are often difficult to obtain on disaggregated product categories, and hence in understanding how men and women across industries would be affected by policies affecting the costs of key inputs imported by those industries.

2. Bangladesh: Trends in agriculture and gender differences in agricultural activities

Although agriculture as a share of GDP has declined steadily in Bangladesh over the last several decades, the sector continues to support the bulk of rural employment opportunities, accounting for about 11.7 percent of Bangladesh's gross domestic product (GDP) and 45 percent of its overall employment in 2022 (Bangladesh Bureau of Statistics, 2023). Rice is the dominant crop, covering 75 percent of crop land and accounting for 80 percent of crop value in recent years (FAO 2016).[7] A growing urban population and rising per capita incomes have led to increasingly diversified diets among households, however (Figure 1), accompanied by a steady increase in poultry and dairy farming for domestic consumption (Figure 2). The share of those employed in livestock and poultry production is around 20 percent (Department of Livestock Services, Bangladesh); there are approximately 80,000 poultry farms in Bangladesh and approximately 8.5 million people employed in the poultry sector, second in size only to the ready-made-garment sector (USDA, 2021).

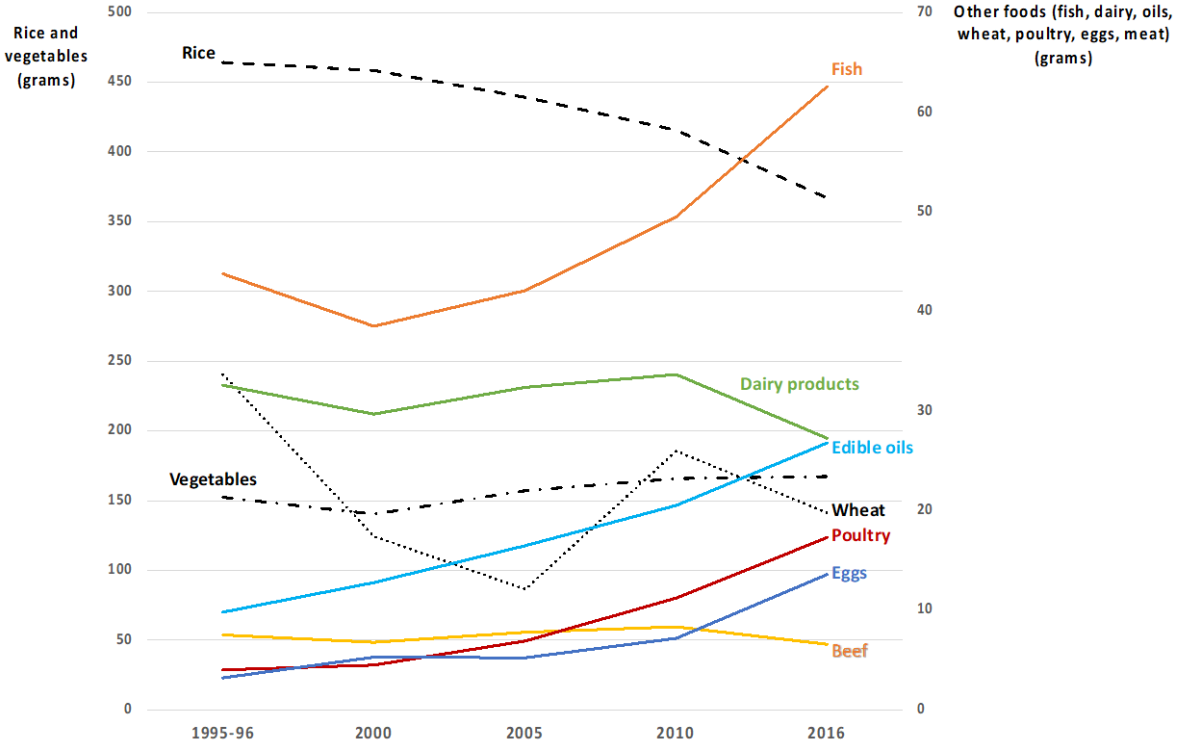
The gender implications of these shifts in consumption and production are significant. Figure 3 shows that, based on the nationally-representative 2016/17 Bangladesh Labor Force Survey, men and women are involved in distinctly different segments of agriculture—where women are more likely to be involved in rearing animals such as buffalo and dairy cows (accounting for 32 percent of all employed women nationally), as well as poultry, sheep and goats.[8] Men, on the other hand, are much more likely to be involved in rice production (15.5 percent of employed men) and other vegetable crops. Several reasons underpin these gender roles in agriculture. One is mobility constraints – in livestock activities, for example,

[7] The Bangladesh government is also actively involved in the certification of seeds and fertilizer (World Bank, 2019).
[8] Separately, the Bangladesh LFS shows that women, more broadly, are engaged in fewer industries than men – the top 10 industry categories of employment constitute about three-quarters of employed women, and only 44 percent of employed men Appendix Tables A1 and A2 provide a more detailed breakdown for the top 90 percent of employed.

women are better able to spend more time near the house, while maintaining other responsibilities within the household (Kabir et al., 2019). Limitations on women's inheritance of land, as well as easing women's ownership and registration of land, is another factor, and in turn constraints on access to finance for expanding operations. Genoni et al. (2021), for example, as part of the World Bank Rural Income Diagnostic for Bangladesh, present data from the 2015 Bangladesh Integrated Household Survey showing that only 13 percent of rural women solely or jointly own agricultural land, compared to 70 percent of rural men.

Table 1, also based on the 2016/17 LFS, underscores that most individuals across the main occupations within agriculture, particularly women, are working in small-scale activities— as own-account workers (self-employed with no employees), and/or in an individual capacity or as part of their household enterprise. Although more recent rounds of the national labor force survey are not yet available, evidence has shown that these gender roles in agriculture have persisted (Bryan, Kato and Bernier, 2021), although employment levels (as well as working conditions) are likely to have worsened considerably from the pandemic (Rahman and Das, 2021).

Figure 1. Daily per capita food intake in Bangladesh (grams), 1995-2016



Source: Bangladesh Bureau of Statistics, Household Income and Expenditure Survey, 2016

Figure 2. Livestock output in Bangladesh, 2006-2020

Figure 2a. Milk and meat production (100,000 metric tons)

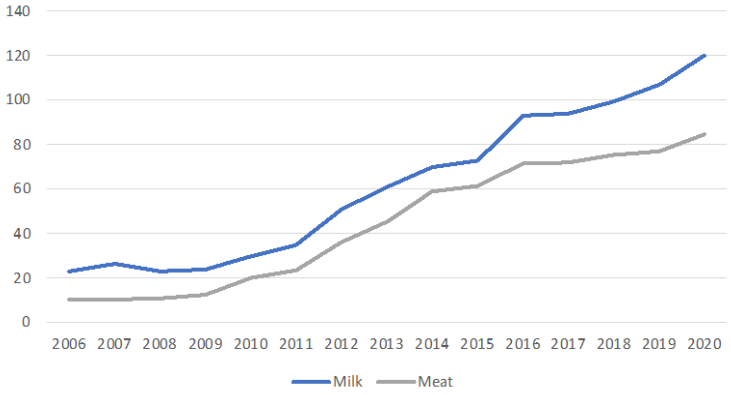
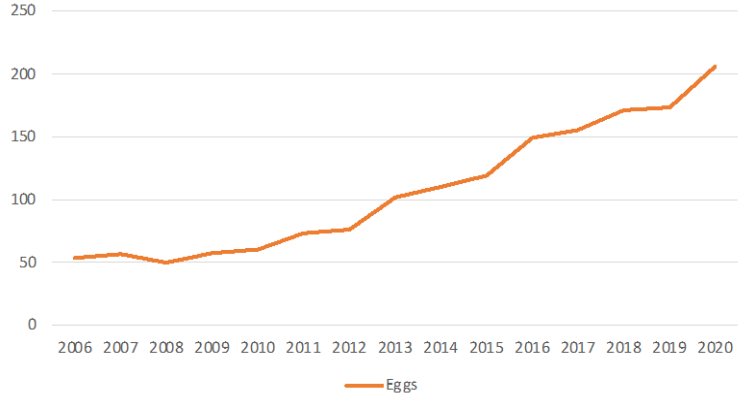
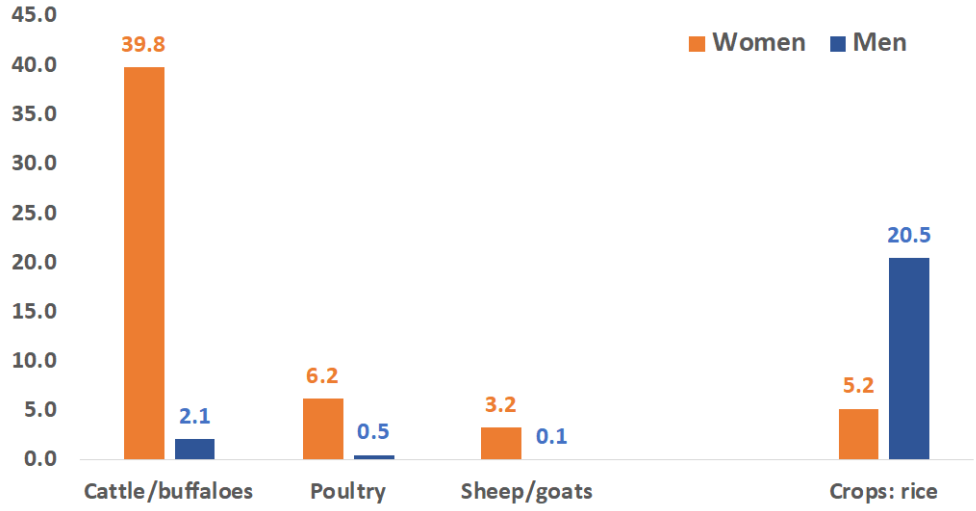


Figure 2b. Egg production (number, in millions)



Source: Department of Livestock Services, Bangladesh.

Figure 3. Share of rural men and women aged 15-64 who are employed in rearing animals, as well as rice production: 2016/17 Labor Force Survey



Source: Bangladesh Labor Force Survey, 2016/17. These can include those self-employed, as well as those employed for others.

Table 1. Among employed men and women aged 15-64 in agriculture: characteristics of employment

	Women						Men		
	Rearing animals			Crop agriculture			Crop agriculture		
	Cattle (dairy) producers	Poultry farming	Raising of sheep/ goats	Rice	Vegetables	Other support activities	Rice	Vegetables	Other support activities
Status in employment									
Self-employed with no employees	62.7	59.6	83.8	24.1	12.6	9.2	55.2	59.1	17.6
Contributing family worker	36.3	34.5	15.5	49.6	80.2	64.8	7.6	8.5	2.6
Employer	0.4	0.3	0.4	3.7	0.3	0.3	10.5	10.6	2.5
Employee	0.5	4.8	0.31	1.9	2.9	3.3	0.6	0.5	1.5
Day laborer	-	-	-	20.5	4.0	21.9	26.1	21.3	75.6
Share reporting part-time employment	83.9	72.2	88.8	47.2	84.1	68.8	27.9	31.1	16.0
Type of ownership									
Individual proprietorship	37.1	18.3	31.0	57.1	13.1	30.6	82.4	84.4	92.0
Household	62.4	78.5	68.4	41.1	84.9	67.8	16.5	13.4	6.6
Private	0.4	1.6	0.6	1.8	1.7	0.8	0.8	1.6	0.7
Government	0.03	1.4	0.03	-	0.2	0.3	0.1	0.3	0.3
How many persons, including respondent, work in this job:									
Only respondent	46.8	62.4	78.2	13.7	12.7	9.6	31.5	34.4	16.0
2-4	52.5	36.5	21.4	73.0	83.9	84.9	59.2	55.7	68.4
5-9	0.4	0.6	0.1	11.9	1.6	4.2	8.0	7.8	13.1
10 or more	0.3	0.5	0.3	1.4	1.8	1.3	1.3	2.0	2.4
Number of respondents	**15,008**	**2,740**	**1,387**	**2,309**	**4,211**	**979**	**16,560**	**3,232**	**2,486**

Source: 2016/17 Bangladesh Labor Force Survey.

3. The role of imports and tariffs in agriculture

Bangladesh's agriculture sector is also heavily reliant on imported inputs across crop agriculture and livestock activity, with varying import tariffs on these inputs. Given the gender differences across agricultural activities discussed in Section 2, a key question, then, is how import costs vary across these activities — with implications for policy on how to improve women's outcomes in agriculture. In this section, we first examine the dependence of different areas of agriculture on imports, and then how tariffs have changed over time for key inputs in these activities. While import costs for men and women farmers are affected by a combination of import tariffs as well as other factors affecting global commodity prices, we do not have the data to disentangle the relative share of import costs due to tariffs — although as we discuss below, many tariffs on agricultural imports in the country have been increasing over the last few years. The main emphasis in this paper is on highlighting and understanding tariff rates on imported inputs, for different areas of agriculture in which men and women are engaged.

3.1 Reliance on imports within Bangladesh's agriculture sector

Within crop agriculture, more than 90 percent of seeds used in Bangladesh are imported, and despite production levels, Bangladesh remains a net importer of rice.[9] Bangladesh also imports much of its fertilizer, including 31 percent of its nitrogen needs, 57 percent of phosphate needs and nearly all (95 percent) of potash needs (Mamun, Glauber and Laborde, 2022).

Raising animals in agriculture also depends heavily on the availability and quality of feed. In Bangladesh, while animal feed is almost entirely domestically produced, feed producers rely heavily on imported grains. This includes maize (corn), the primary ingredient in livestock and poultry feed; about 40 percent of maize is domestically sourced, and the remaining share is imported.[10] Poultry farms, in particular, are the largest feed consumers in Bangladesh, and feed accounts for 45–60 percent of total broiler production costs in Bangladesh (Begum et al., 2014).[11] About 50-60 percent of poultry feed includes maize, with about 20-25 percent from soybean meal (produced largely through soybean oilseed imports), 10-25 percent from mustard oil cake, and 10-20 percent from rice bran (USDA, 2022a). Maize also

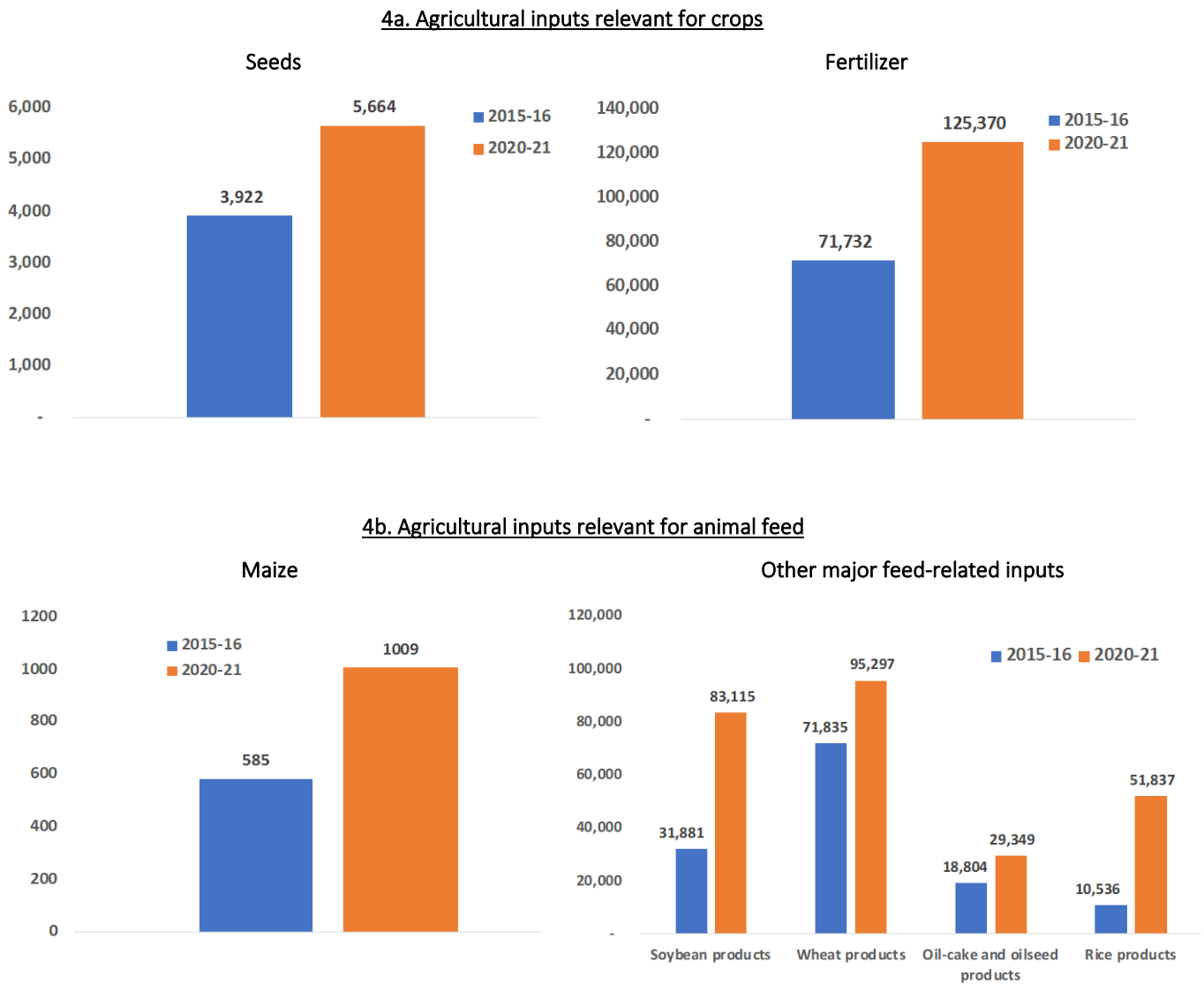
[9] "Bangladesh getting fully dependent on seed imports." *The Financial Express*, April 7, 2022. https://thefinancialexpress.com.bd/trade/bd-getting-fully-dependent-on-seed-imports-1649302426

[10] "The feed factor: The feed factor: Global maize shortage could affect local rice market." *TBS News*, March 25, 2022. https://www.tbsnews.net/markets/feed-factor-global-maize-shortage-could-affect-local-rice-market-391054

[11] Broiler refers generally to chicken sold for meat consumption.

constitutes about 60 percent of cattle feed, and is largely imported by domestic feed producers due to demand for higher quality (i.e., higher protein levels) needed in the feed industry (USDA, 2021). Wheat is a key ingredient as well; local production of wheat meets only about 13 percent of total demand (USDA, 2022b). Figure 4 presents the growth in the value of imports, in millions of USD, for key commodities used in crop agriculture as well as animal feed; Appendix Tables A3 and A4 provide a more detailed breakdown across commodity subgroups within these categories. All show large increases in the value of imports across these commodity categories.

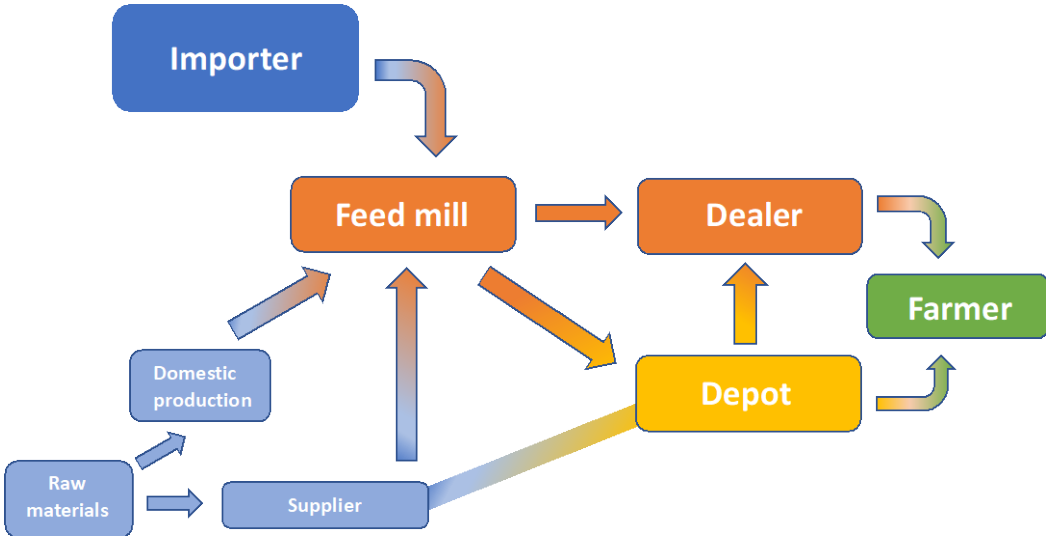
Figure 4. Value of imported agricultural inputs, in millions of USD (2015-16 and 2020-21)



Source: National Revenue Board, Bangladesh. Prices adjusted for inflation (Bangladesh Bureau of Statistics).

Figure 5 presents a typical supply chain for poultry feed in Bangladesh (adapted from Haque et al., 2016). Feed mills receive imported and domestically produced feed ingredients, and then sell the manufactured feed to dealers and distribution depots, from which farmers purchase feed. Overall, the demand for feed is largely met by domestic feed industries that largely import feed ingredients (70 percent), followed by imported feed (5 percent), and homemade mix (25 percent). There are 217 registered feed mills and more than 275 unregistered mills in the country, spanning larger automated feed mills and other small and medium feed mills. Together, they produce a total of 7.5 million metric tons of feed — of which 48 percent is for poultry, 30 percent for cattle, and 22 percent for aquaculture.[12]

Figure 5. Feed distribution in Bangladesh



Notes:
Adapted from Haque et al. (2016).

[12] "Case study: Feed industry fuels Bangladesh corn production." *All About Feed*, May 28, 2021. https://www.allaboutfeed.net/market/market-trends/feed-industry-fuels-bangladesh-corn-production/

3.2 Differences in import costs and subsidies for inputs in animal rearing and crop agriculture

Bangladesh's heavy reliance on imported agricultural inputs has raised agricultural production costs, particularly with large upswings in commodity prices after 2020. Using data from the Department of Agricultural Marketing in Bangladesh on wholesale and retail prices of commodities used in animal feed (data were available for maize and soybean), and crops (data were available for TSP fertilizer) Figure 6 shows that for maize and soybean oil, domestic wholesale and retail prices have increased steadily since 2020. Global prices for these commodities, taken from the World Bank Pink Sheet, have also increased steadily over time, particularly after the onset of the Covid-19 pandemic.

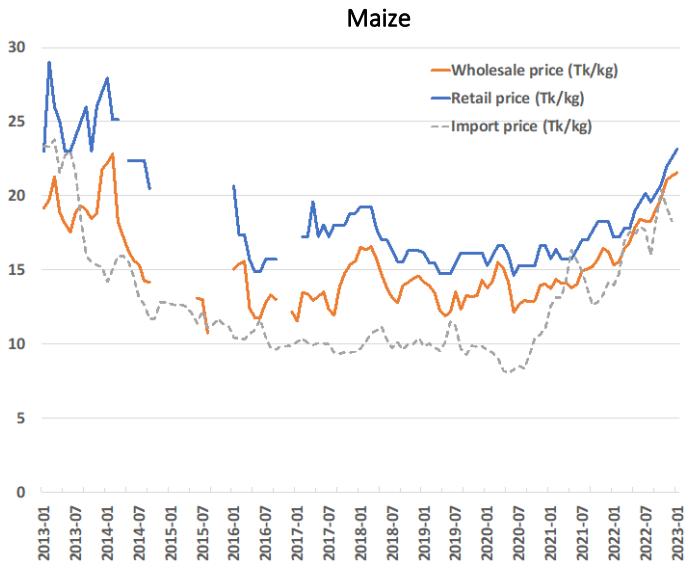
A key takeaway from Figure 6, when comparing global import prices with local wholesale and retail prices, is the enormous extent of fertilizer subsidies in the country as compared to other commodities; the government does factor in a large share of its agricultural budget for import subsidies overall, but these subsidies have largely been focused on fertilizer and seeds (Bangladesh Integrated Household Survey, 2018-19).[13] For fertilizer, total subsidy expenditures are expected to reach a high of $3.2 billion in 2021-22, accounting for about 70-85 percent of market prices for different fertilizers.[14] While the differential between global import prices, as well as wholesale and retail prices, has narrowed for maize since 2020, gaps persist—and also for soybean oil products, where the difference between import prices and wholesale prices have widened since early 2022.

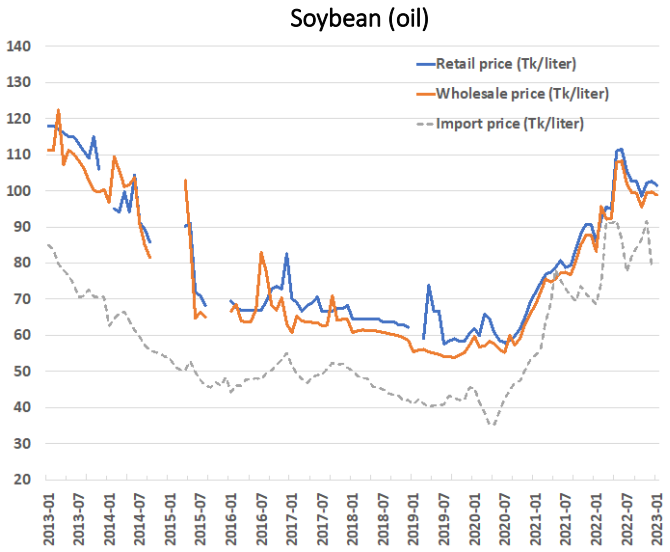
As mentioned earlier, import costs are affected by several factors. Tariffs are one component; as seen with the timing of price fluctuations in Figure 6, global supply shocks are also contributors (stemming, for example, from the Covid-19 crisis, as well as events such as the onset of the Russia Federation–Ukraine war in 2022). While we do not have the data to disentangle the relative shares of tariffs vis-à-vis other global events affecting prices, as discussed below we do find — using customs data from the National Board of Revenue (NBR) — that import tariffs for several commodities relevant to agriculture have remained high, augmenting differences in the costs of imports across crop agriculture and livestock/poultry activity, and with marked differences for activities in which women are involved.

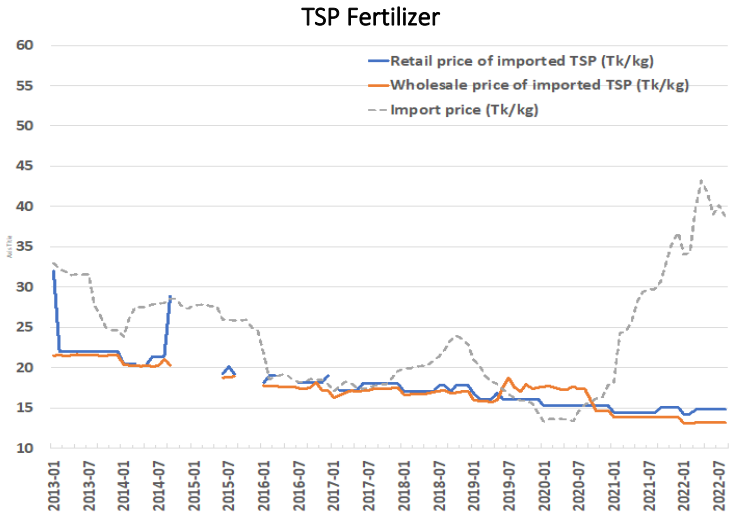
[13] In particular, Section J2A of the 2018-19 BIHS discusses fertilizer subsidies. Only 2 percent of households in the BIHS reported receiving direct subsidies from the government for fertilizer or seeds, although the subsidies may have already been built into the retail price they received. Furthermore, the 2018/19 BIHS shows that while about 80 percent of households had heard about the farmer's agricultural input subsidy card, only 10 percent had the card. The pandemic has also made distribution of these subsidies more challenging.

[14] "Fertilizer subsidy going to be three times higher." *TBS News*, February 14, 2022. https://www.tbsnews.net/bangladesh/fertiliser-subsidy-going-be-three-times-higher-370735

Figure 6. Trends in selected agricultural commodity prices relevant to feed (maize, soybean) and crops (TSP fertilizer), 2013-2023







Notes:

(1) Source: Department of Agricultural Marketing, Bangladesh (for wholesale and retail prices); World Bank Pink Sheet (for related global import prices).

(2) Prices adjusted for inflation (Bangladesh Bureau of Statistics).

Specifically, Figure 7 shows that the total tax rate (TTR)[15] for key imported inputs used in animal feed is substantially higher than for crop agriculture (specifically for seeds; the TTR for fertilizer is zero). The NBR data we use span 2014/15 to 2020/21, from which we identify tariffs on granular product categories (as identified by 8-digit HS, or Harmonized System codes) that are common imports used in livestock/poultry and crop agriculture, and compare how these areas of agriculture are relatively exposed to tariffs. In the following section, we also discuss policy implications looking at how tariffs have changed across these key areas of employment, from 2015 onwards.

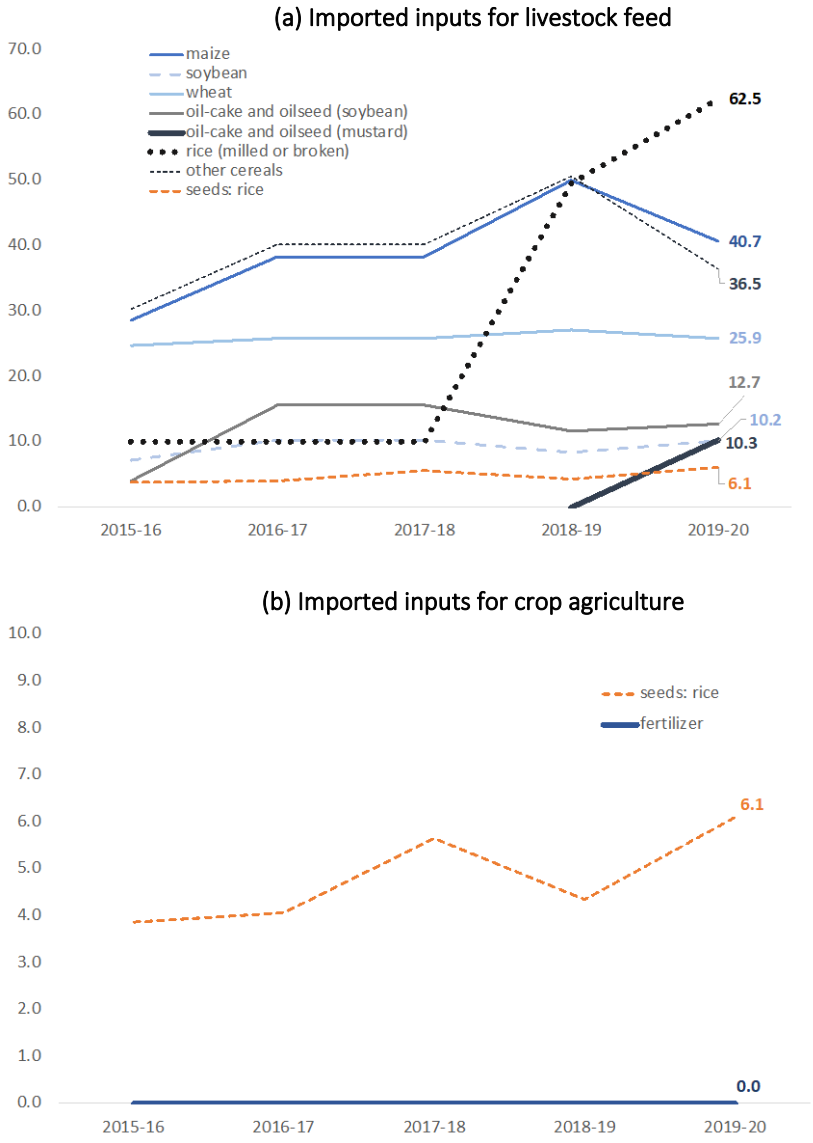
For maize, for example, the average TTR for different products ranged from about 29 percent in 2015-16 to 40.7 percent in 2019-20 (Appendix Table A5 has a more detailed breakdown across different maize products, as well as other commodities in the graph). Among other heavily imported commodities, the average TTR for soybean products was about 10-12.7 percent in 2019-20, 25.9 percent for wheat, and 36.5 percent for other cereals.

Figure 7, on the other hand, shows much a lower TTR on seeds for crop agriculture. Appendix Table A6, which provides a more detailed breakdown, shows there are no tariffs on the main variety of maize seed that is imported, as well as vegetable seeds. The range of TTR across different seed products has ranged from 5-10 percent in 2021, barring higher TTRs on otherwise very small imports of soybean, millet and canary seeds. Figure 8 also shows that between 2015-16 and 2020-21, the change in TTR has been substantially higher for inputs for livestock/poultry activity, versus crop agriculture. As discussed in the following section, among those marketing output, earnings in crop agriculture tend to be substantially higher than in livestock/poultry activity. Higher tariff rates for key inputs among animal producers are therefore likely to be particularly burdensome for this group. Policy priorities that have driven the shift in TTRs in different fiscal years (for example, between FY 2015-16 and FY 2016-17, and between FY 2018-19

[15] The Total Tax Rate (TTR) for any imported good = Customs Duty (CD) + Regulatory Duty (RD) + Supplementary Duty (SD) + Value Added Tax (VAT) on imported goods + Advance Income Tax (AIT) + Advance Trade VAT (ATVI). The CD is levied on the CIF value (total value including cost, insurance and freight) of imported goods, while the RD is levied on the sum of the (CIF value + CD + SD). Specifically, RD have been applied as an interim measure since 2000/01, against the backdrop of gradually decreasing customs duties. SD is usually levied on the landed value of goods plus customs duty, but excluding VAT, on imports of luxury goods and production and supply of goods and services considered undesirable on social, moral, religious or health grounds — but has often be used by authorities as a tool for levying additional tariffs on any imported goods, including non-luxury and essential goods. VAT are levied at a single rate of 15 percent on all imports and domestically produced goods. In the case of imports, valuation is based on the c.i.f. value plus import duty and, in some cases, supplementary duty. Exports are zero-rated; VAT paid on imports used in the manufacture of exports is refunded. Due to the limited capacity of the tax administration in collecting VAT on imported items for trade at retail level, the tax is collected at the import stage. The AIT is levied on all commercial importers.

and FY 2020-21) include protecting the domestic production of certain feed ingredients by increasing import tariffs, which has been viewed as important for enhancing crop production.[16] Appendix Figures A1 and A2 present a breakdown of the components of TTR for these inputs; for seeds in crop agriculture, the TTR is mostly comprised of AIT and ATV, whereas for inputs in crop agriculture, there are also several commodities with higher regulatory duties.

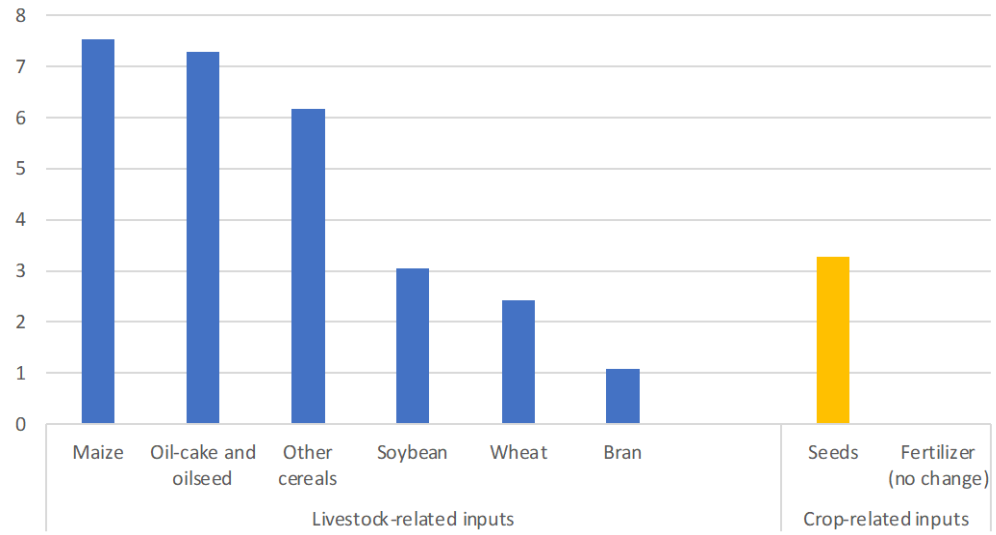
Figure 7. Total tax rate (TTR) for imported agricultural inputs, 2015-16 to 2019-20



[16] Proposals for changing import tariffs come from (1) Feed Industries Association of Bangladesh (FIAB) and (2) Bangladesh Poultry Industries Central Council (BPICC). They represent feed millers in poultry and livestock. They send the proposals for import tariff change to the DLS. DLS holds meetings with them for finalizing the proposals. Then the DLS forwards the proposals to the Ministry of Fisheries and Livestock. Ministry of Fisheries and Livestock in turn sends the proposals to the National Board of Revenue (NBR) for consideration.

Notes:
(1) Source: National Board of Revenue, Bangladesh.
(2) *Total tax rate* = Customs Duty+ Regulatory Duty + Supplementary Duty Incidence + VAT Incidence + AIT + ATVI
(3) Refers to soybean oil cake and oilseed; in 2019-20 the TTR for imported mustard oil cake rose from 0 to 10.5%.
(4) See Appendix Tables A5 and A6 for a more detailed breakdown across specific commodities within each category.

Figure 8. Percentage point change in TTR on imports of livestock/poultry- and crop-related inputs, 2015-16 to 2020-21



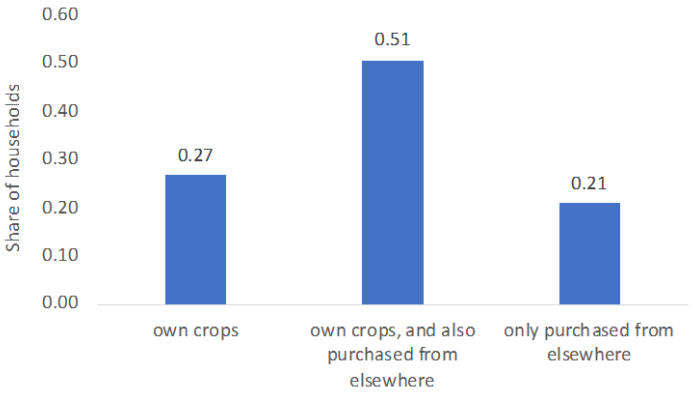
4. Implications of rising import costs for men and women in agriculture

4.1 Dependence on market purchases for agricultural inputs and variation in income and profits across agricultural activities

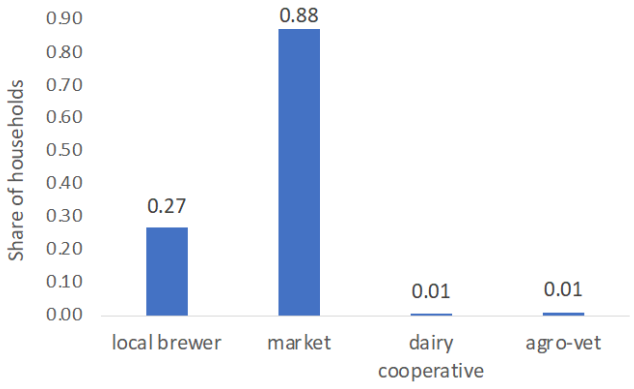
Given the reliance of agriculture on imports, alongside substantial gender differences in agricultural activities, an important question is how import policy — and tariff structure — might have implications for men and women in agriculture. Figure 9 presents data from the 2018/19 Bangladesh Integrated Household Survey (BIHS), which is nationally representative of rural areas and presents granular data on the production and income of rural households. The data show that even among smallholder farmers, agricultural producers rely heavily on market purchases for animal feed ingredients (mainly from dealers, as discussed in Figure 5 earlier), as well as seeds — as opposed to solely own-production.[17] Around three-quarters of dairy farmers purchased at least some share of their feed from the market or other outside sources. Similarly, among households in crop agriculture, about 92 percent of households (and 33 percent exclusively) relied on market purchases for seeds.

Figure 9. Sources of key inputs for livestock and crop agriculture (household-level): Bangladesh Integrated Household Survey (BIHS), 2018/19

8a. Main sources of feed (dairy cows)



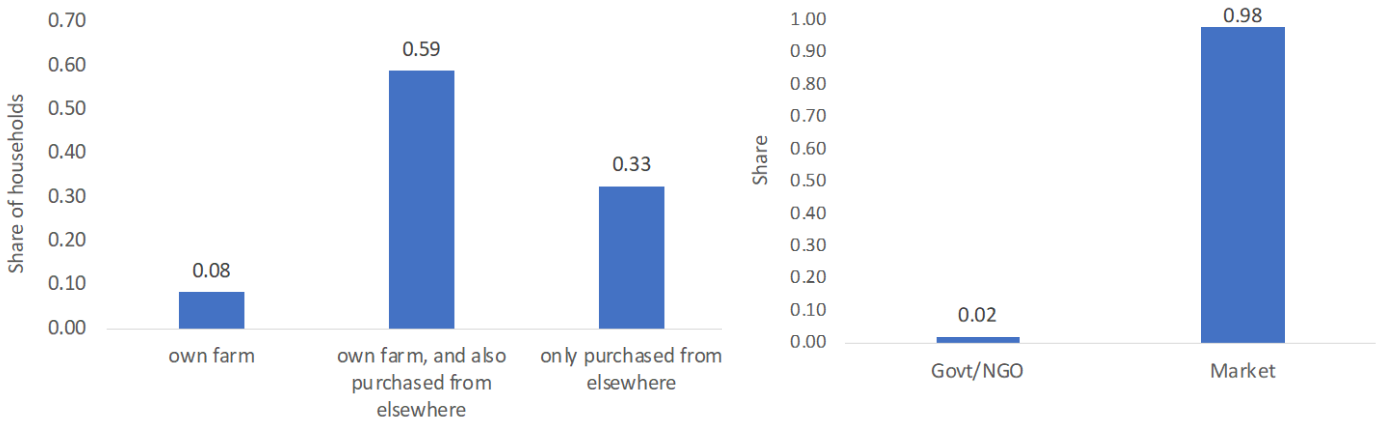
8b. Sources of feed purchase (dairy cows) (2)



8c. Main sources of seeds (crop agriculture)

8d. Sources of seed purchase (crop agriculture)

[17] The BIHS was conducted by the International Food Policy Research Institute (IFPRI) and funded by USAID.



Notes:
(1) Source: 2018/19 BIHS. On feed, similar data were not available for other livestock or poultry rearing.
(2) For sources of feed purchase, respondents were able to select multiple options.

Table 2 reinforces that among owners/managers of animals in the 2018/19 BIHS, a substantial share of production across activities, and disproportionately for dairy cows and poultry, is for the household's own consumption as well as for sale. About 85 percent of men and women owners/managers raise animals for both consumption as well as sale for meat; this share is about 93 percent for poultry.[18] When considering animal products such as milk and eggs, 82 percent of poultry owners/managers are engaged entirely in own-consumption activities, and about 50 percent of dairy owners/managers. A larger share of men and women who raise sheep/goats or bulls sell these animals in the market, but a substantial share continue to raise these animals for their own consumption along with sale (about 45 percent for sheep/goats, and 22 percent for bulls). The BIHS also reveals interesting gender differences in ownership and management of animals overall. Men, for example, are much more likely to own dairy cows, while women are significantly more likely to be involved in managing the care of these animals, including feed and vaccinations. Poultry, on the other hand, is much more likely to be owned/managed among women (59 percent of women are owners/managers, compared to 8 percent of men). Men are also more likely than women to own other livestock, such as bulls and sheep/goats, although the magnitude of the gender difference is narrower.

Among those selling their products, the 2018/19 BIHS also shows that earnings are low, especially compared to earnings in crop agriculture overall. Table 3 shows that among livestock producers, 85 percent of women and about half of men do not sell any products for pay or profit. Monthly earnings for this group

[18] Additional data from the BIHS shows that among dairy producers, about half who sell milk from their production sell to friends/neighbors, and the remaining half at the market.

range from about 300 taka per month at the bottom of the distribution to 8,000 taka per month at the top. For poultry, a much greater share of women sell their output (about 70 percent), but earnings are much less, ranging from about 50 to 500 taka per month. For the bottom 75 percent of the distribution, these earnings are closely matched and even somewhat overshadowed by annual expenses on feed and medications, of which feed represents the overwhelming share (Table 4). Many farmers also borrow money for agricultural inputs on credit from local shops and dealers (Begum et al., 2014), adding to longer-term debt burdens.

Given the small scale of such activities and the reliance on rearing animals for household consumption as well, individuals have few avenues to counter increases in input costs for animal feed and care. Earnings from crop agriculture tend to be substantially greater as compared to earnings from livestock/poultry activity — and as discussed earlier, crop agricultural activities mainly involve men (30 percent of men reported monthly earnings in crop agriculture, compared to only 2 percent of women).

Table 2. Among rural population aged 15-64 (BIHS 2018/19): share owning/managing livestock and poultry, and extent to which products are for sale versus household consumption

	Women		Men	
	Mean	SD	Mean	SD
(A) Milk cow				
Share aged 15-64 who are reported owners	0.08***	[0.27]	0.22***	[0.38]
+ including non-owners who control buying/selling	0.10***	[0.29]	0.22***	[0.42]
+ including non-owners who manage care of animals	0.25***	[0.43]	0.28***	[0.45]
Among all owners/managers:				
Animals: only for sale	0.10	[0.31]	0.11	[0.32]
Animals: for consumption and sale	0.85	[0.36]	0.85	[0.36]
Animals: only for consumption	0.05	[0.09]	0.04	[0.10]
Products (milk): only for sale	0.36	[0.48]	0.34	[0.48]
Products (milk): for consumption and sale	0.16	[0.36]	0.14	[0.35]
Products (milk): only for consumption	0.49	[0.50]	0.51	[0.50]
Number of respondents who are owners/managers	1,866		1,698	
(B) Poultry				
Share aged 15-64 who are reported owners	0.49***	[0.50]	0.08***	[0.28]
+ including non-owners who control buying/selling	0.50***	[0.50]	0.12***	[0.33]
+ including non-owners who manage care of animals	0.59***	[0.49]	0.15***	[0.36]
Among all owners/managers:				
Animals: only for sale	0.04	[0.24]	0.04	[0.23]
Animals: for consumption and sale	0.93	[0.26]	0.92	[0.28]
Animals: only for consumption	0.03	[0.24]	0.04	[0.24]
Products (eggs): only for sale	0.08	[0.27]	0.08	[0.27]
Products (eggs): for consumption and sale	0.10	[0.30]	0.09	[0.29]
Products (eggs): only for consumption	0.82	[0.38]	0.83	[0.38]
Number of respondents who are owners/managers	4,578		951	
(C) Sheep/goats				
Share aged 15-64 who are reported owners	0.09***	[0.29]	0.13***	[0.33]
+ including non-owners who control buying/selling	0.11***	[0.31]	0.15***	[0.35]
+ including non-owners who manage care of animals	0.20***	[0.40]	0.18***	[0.38]
Among all owners/managers:				
Animals: only for sale	0.52	[0.50]	0.51	[0.50]
Animals: for consumption and sale	0.43	[0.49]	0.45	[0.50]
Animals: only for consumption	0.05	[0.14]	0.04	[0.15]
Number of respondents who are owners/managers				
(D) Bulls				
Share aged 15-64 who are reported owners	0.05***	[0.23]	0.18***	[0.38]
+ including non-owners who control buying/selling	0.08***	[0.27]	0.19***	[0.39]
+ including non-owners who manage care of animals	0.19***	[0.40]	0.22***	[0.42]
Among all owners/managers:				
Animals: only for sale	0.71	[0.45]	0.73	[0.45]
Animals: for consumption and sale	0.22	[0.42]	0.22	[0.41]
Animals: only for consumption	0.07	[0.15]	0.05	[0.16]
Number of respondents who are owners/managers				

Notes: (1) 2018/19 BIHS. Shares are calculated on the sample of rural men and women aged 15-64. Significant differences in means between men and women are reflected by asterisks; *** p<0.01, ** p<0.05. All estimates are adjusted by household sampling weights. (2) Very few individuals owned buffalo. Data on livestock products were only collected for dairy cows and poultry.

Table 3. Monthly earnings (taka) in different agricultural activities, across men and women

	Women		Men	
	Mean	SD	Mean	SD
Rearing milk cows/buffalo				
Share with no earnings from livestock activities (did not sell products)	0.85***	[0.36]	0.52***	[0.50]
Household livestock income from each group (women & men), including zeroes	394.8***	[1680.4]	1950.5***	[3938.9]
Household livestock income from each group (women & men), > 0	2201.8***	[3433.7]	3452.2***	[4720.4]
Number of respondents engaged in livestock activities	*2,953*		*2,246*	
Share relative to all individuals in agricultural production	*0.39*		*0.49*	
Poultry				
Share with no earnings from poultry activities (did not sell products)	0.28***	[0.45]	0.75***	[0.44]
Household poultry income from each group (women & men), including zeroes	176.6***	[286.4]	1629.3*** (4)	[10,319.1]
Household poultry income from each group (women & men), > 0	200.3***	[297.1]	5895.3*** (4)	[19,100.5]
Number of respondents engaged in poultry activities	*4,436*		*191*	
Share relative to all individuals in agricultural production	*0.58*		*0.04*	
Crop agriculture				
Share with no earnings from crop agriculture (did not sell products)	0.54***	[0.13]	0.18***	[0.46]
Household crop income from each group (women & men), including zeroes	841.8***	[1626.1]	4571.0	[5957.1]
Household crop income from each group (women & men), > 0	1652.5	[1964.6]	4762.7	[6005.2]
Number of respondents engaged in crop agriculture	*270*		*2,181*	
Share relative to all individuals in agricultural production	*0.04*		*0.47*	

Notes: (1) 2018/19 BIHS. Estimates focused on men and women aged 15-64. Significant differences in means between men and women are reflected by asterisks; *** p<0.01, ** p<0.05. All estimates are adjusted by household sampling weights. (2) Percentiles of income were based on the full sample of men and women. For men working in poultry, there were not enough observations at the highest quintile to construct reliable estimates (and likewise for women in crop agriculture). (3) Because of the coding of labor categories, separate estimates for sheep/goats, dairy cows, buffalo and bull rearing are not available under livestock. (4) Estimates vary widely because of the small number of men in livestock.

Table 4. Annual expenses in rearing dairy animals and poultry (household level)

	Amount (taka)	
	Mean	SD
Rearing milk cows/buffalo		
(1) Fodder/feed purchased	2418.1	[7404.9]
(2) Medicine/treatment costs	342.9	[1179.8]
(3) Other expenses, if purchased	62.5	[975.5]
Total purchased expenses (1)+(2)+(3)	2823.5	[8131.9]
Number of households	2,127	
Rearing poultry		
(1) Fodder/feed purchased	2497.6	[50,171.5]
(2) Medicine/treatment costs	291.3	[5275.5]
(3) Other expenses, if purchased	112.2	[3731.6]
Total purchased expenses (1)+(2)+(3)	2901.1	[55,661.8]
Number of households	1,994	

Notes: (1) 2018/19 BIHS. All estimates are adjusted by household sampling weights. (2) The BIHS also asked about male and female hired labor costs, but only 2 households reported hiring female labor and 11 households reported hiring male labor.

One counterpoint to these trends is that men and women within the same household could engage in a mix of activities, so that lower earnings among women poultry farmers, for example, could be offset by higher earnings by men engaged in crop agriculture. We find, however, that women in poultry rearing are more likely to live in worse-off households with respect to household per capita income (Figure 10) and profits (Figure 11). Men working in livestock and crop agriculture, on the other hand, are much less likely to be in the poorest income quintile, and profits tend to be highest within crop agriculture. While it can be difficult to disentangle the share of production for consumption versus sale – likely the higher expenses on feed mean that some amount is being consumed, and some sold, so that looking strictly at profits may be misleading – the findings show that women in livestock and poultry rearing tend to be in relatively worse-off households along income and profits. Rising costs of necessary feed inputs, given the low incidence of subsidies on feed-related imports, can therefore have an outsize negative effect on women engaged in livestock and poultry rearing.

Figure 10. Share of women and men in key agricultural production activities, in the poorest and richest quintiles of household per capita income

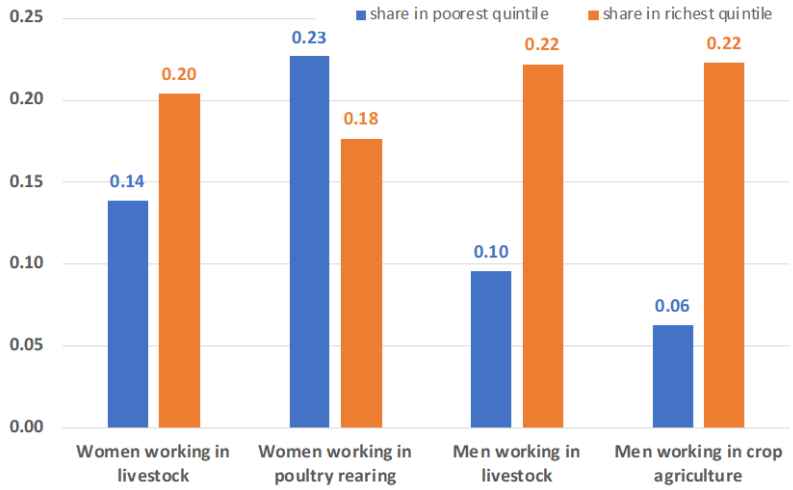
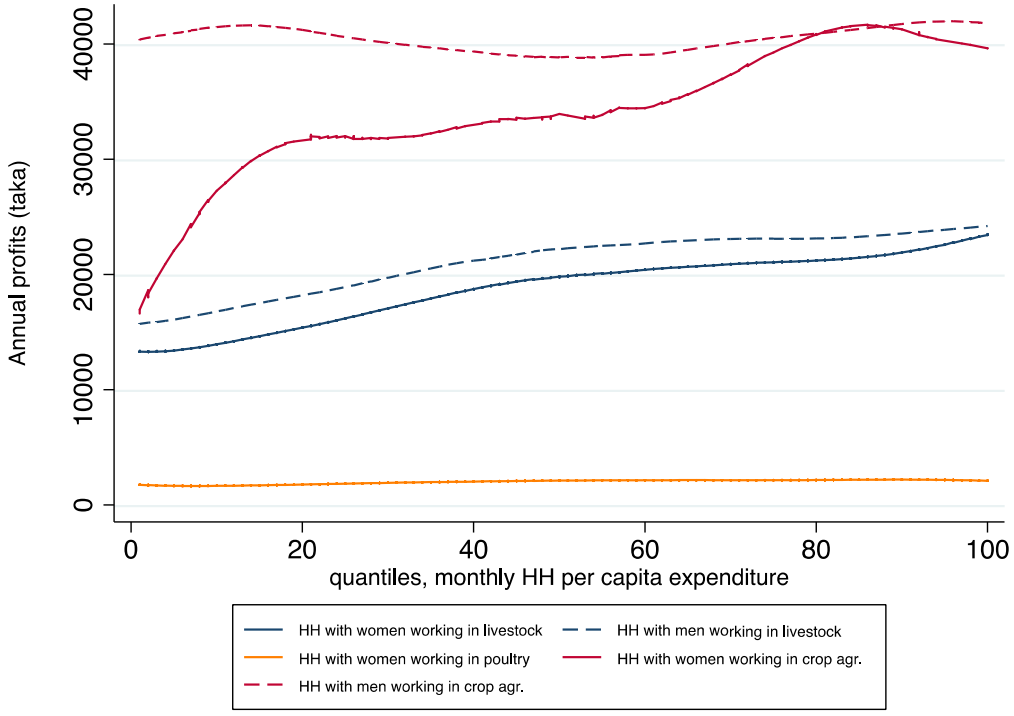


Figure 11. Locally weighted regressions: household profits for different areas of agricultural production, by whether men/women working in these activities

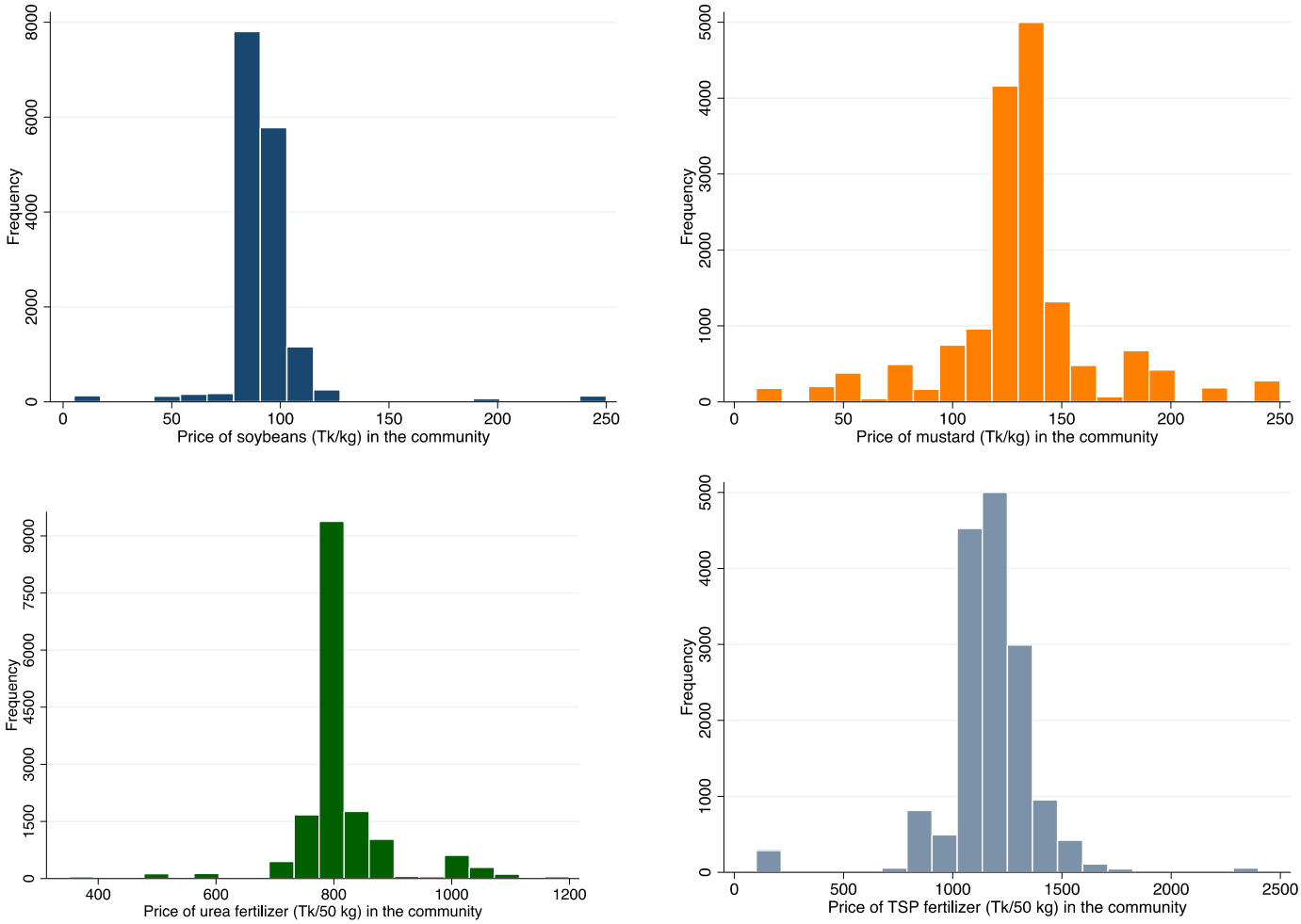


4.2 Regression analysis: Effects of commodity price variation on men's and women's employment, earnings, borrowing and expenditure

Based on the descriptive findings above, there are multiple potential channels through which increased agricultural input prices could affect men and women farmers – through profits (and, as a result, the viability of employment), food consumption, and debt. Although our study is not able to exploit a randomized intervention or exogenous event that would best allow for an understanding of causal channels, the 2018/19 BIHS has a module in its community questionnaire on selected commodity prices in the community that correspond to key inputs for feed and crop agriculture (soybean, mustard and fertilizer). [19] Using variation in these prices, we estimate the association between higher prices of these inputs — which, as discussed earlier, are mainly imported, with higher import costs on feed-related inputs — with individual-level outcomes collected in the 2018/19 BIHS across employment, borrowing and consumption. As discussed in Section 3.1 as well, producers are price takers. Figure 12 presents the distribution of these prices (across soybean, mustard and fertilizer). Most soybean prices ranged between 80-110 taka per kilogram (Tk/kg); mustard prices had wider variation and mainly ranged from 100-150 Tk/kg. Fertilizer prices, measured in 50 kg increments, were on average about Tk 810 for urea fertilizer, and Tk 1,100 for TSP fertilizer.

[19] In the data, each community corresponds to the sampling enumeration area. Prices for other main inputs, such as maize, were not available in the module.

Figure 12. Distribution of community prices of soybean, mustard and fertilizer (BIHS 2018/19)



Notes:
Source: 2018/19 BIHS. Frequency corresponds to the number of respondents.

Using the price data, we run OLS regressions in the following form for all adult men and women, aged 15 and older, in the 2018/19 BIHS sample:

$$y_{ij} = \gamma lnp_j + \beta x_{ij} + \varphi c_j + \varepsilon_{ij} \qquad (1)$$

In equation 1, y_{ij} are economic outcomes for individual *i* in community *j*, across employment (whether they are employed, and if so in which sectors and activities in agriculture); individuals' earnings within agriculture (poultry, livestock, and crop agriculture); the amount of borrowing for different purposes such

as consumption and agriculture; and household per capita food consumption (measured in kilograms). Our key interest is examining the effect of commodity prices in Figure 12, p_j, on these outcomes. We also control for a vector of individual and household socioeconomic characteristics x_{ij}; additional community variables c_j; unobserved individual characteristics ε_{ij}. We run equation (1) separately for men and women, as well as for each of the prices p_j , and control for additional geographic fixed effects (division-level) as well.[20] Since there can be multiple respondents per household, standard errors are clustered at the household level.

Table 5 presents full regression results based on equation (1) showing the association between community prices of these commodities and employment outcomes for women.[21] We find that higher soybean and mustard prices are significantly negatively associated with women's engagement in poultry rearing and livestock, and positively associated with not being employed. Higher fertilizer prices, on the other hand, appear to be linked with a shift towards greater activity in livestock rearing (effects on poultry rearing are not significant), or towards non-agricultural activity. In general, the findings show that employment in crop agriculture is not as sensitive to these prices, something that we observe more generally in additional findings in Tables 7 and 8 as well.

Among other individual and socioeconomic variables, women who are married, middle-aged, and with lower education levels are more likely to be engaged in poultry and livestock rearing, and more likely to be in the second lowest quintile of household non-land asset value. Women in poultry rearing and crop agriculture (as well as non-agricultural employment) were more likely to own a mobile phone and land as opposed to those rearing livestock and who were not employed. The presence of agricultural input suppliers providing credit was also positively linked with women's livestock activity. In general, the results also reveal interesting profiles of women by employment status, apart from the highly significant effects of local input prices.

[20] There are eight divisions in Bangladesh, representing first-level administrative units: Rangpur, Rajshahi, Mymensingh, Sylhet, Dhaka, Khulna, Barisal and Chittagong.

[21] The sign and significance of effects were the same when using alternate specifications for the binary outcome regressions (logit, for example).

Table 5. OLS regressions: association of key community-level input prices with women's employment

	Employment outcomes for women (Y=1 N=0):				
	(1) Poultry rearing	(2) Livestock rearing (dairy cow/buffalo)	(3) Crop agriculture	(4) Non-agriculture	(5) Not employed
Inputs for livestock feed					
Regression (A): Log price (Tk/kg) of soybeans	-0.045**	-0.083***	0.006	0.009	0.043**
Regression (B): Log price (Tk/kg) of mustard	-0.032**	-0.056***	0.001	-0.004	0.043***
Inputs for crop agriculture					
Regression (C): Log price (Tk/50 kg) of urea fertilizer	0.024	0.147***	-0.006	-0.025	-0.093*
Regression (D): Log price (Tk/50 kg) of TSP fertilizer	0.023	0.028*	0.006	0.023***	-0.019
Additional right hand side controls from regression (A): [2]					
Individual age					
18-24 years	-0.227***	-0.193***	-0.035***	-0.050***	0.231***
25-34 years	-0.114***	-0.082***	-0.020***	0.014	0.060***
45-54 years	-0.020	-0.015	0.002	-0.055***	0.012
55+ years	-0.143***	-0.161***	-0.024***	-0.105***	0.191***
Marital status					
Married	0.183***	0.115***	-0.001	-0.045***	-0.146***
Divorced/separated	-0.018	-0.010	0.011	0.127***	-0.087**
Widowed	-0.067**	-0.081***	-0.002	-0.019	0.085***
Highest class completed					
Primary	0.059***	0.013	0.001	-0.041***	-0.021*
Secondary	0.038**	-0.038***	-0.005	-0.052***	0.028**
Madrasa or vocational	-0.031	-0.063***	-0.011*	-0.015	0.076***
Individual assets					
Owns a mobile phone	0.042***	-0.054***	0.022***	0.026***	-0.044***
Log landowning area	0.008***	0.002	0.003***	0.004***	-0.010***
Household characteristics					
HH size	-0.003	-0.001	-0.001	-0.004***	0.004*
Drinking water source on premises	0.003	-0.014	0.002	-0.015**	0.014
HH has electricity	-0.012	-0.030**	-0.006	0.005	0.022**
Distance to nearest market (km)	0.004	0.005***	-0.000	-0.002***	-0.004**
Quintile of HH non-land asset value					
Lowest	0.007	-0.009	0.003	0.008	-0.018
Second lowest	0.030*	0.039**	0.006	0.007	-0.050***
Second highest	0.022	0.025	-0.001	-0.007	-0.029*
Highest	-0.026	0.007	0.002	-0.018*	0.034**
Community variables [2]					
# Agr. input suppliers providing credit	-0.001	0.003**	0.000	0.000	-0.001
Community has canal irrigation	0.008	0.043**	-0.015**	-0.000	-0.021
Community has a private/govt health clinic	0.008	-0.009	-0.005	0.006	0.001
Observations	8,630	8,630	8,630	8,630	8,630
R-squared	0.111	0.166	0.031	0.038	0.156

Notes:
(1) Source: BIHS 2018/19. Standard errors are clustered at the household level. *** p<0.01, ** p<0.05, * p<0.10. All regressions control for division fixed effects. The sign and significance of effects were the same when using alternate specifications for the binary outcome regressions (logit, for example).
(2) Coefficient estimates on right hand side controls were nearly identical for regressions (A) and (B); for brevity the estimates from regression (A) are presented here. Excluded categories are 35-44 years for age; no schooling for highest class completed; and middle quintile of HH non-land asset value. Community variables reflect the enumeration area level.

Tables 6 and 7 present estimates on community price effects for men's employment as well, alongside other economic outcomes for men and women. Soybean and mustard prices are significantly negatively associated with men's employment in livestock rearing, and to a lesser/less significant extent in crop agriculture as well.[22] Similar to the results for women, higher fertilizer prices are also positively associated with men rearing livestock. Earnings for both women and men in rearing animals declines significantly with higher soybean and mustard prices as well (Table 7), whereas higher fertilizer prices are positively associated with these activities. Earnings from crop agriculture, on the other hand, are not sensitive to prices at all. Finally, Table 7 shows that higher mustard prices are significantly negatively associated with the quantity of household per capita food expenditure; borrowing is mainly positively associated with higher fertilizer prices.

Overall, the results show a clear negative relationship between poultry and livestock employment and prices of commodities that are largely imported and used as main ingredients in animal feed. This has significant implications for women, who are much more likely to be engaged in poultry and livestock rearing, for example, and who (as discussed earlier) also tend to live in lower-income households compared to other groups. While many livestock/poultry farmers may be also consuming their production, the 2018/19 BIHS reveals that only about 28 percent of meat and dairy-related consumption is own produced (as opposed to purchased). About 57 percent of poultry producers and 50 percent of livestock producers still exclusively purchase these products for their consumption. So there is still price sensitivity, as reflected in the coefficient estimates on the price of mustard for household food consumption.

[22] Results for raising poultry are not presented for men, since there were not enough observations/men involved in this activity.

Table 6. OLS regressions (summary table): association of community-level input prices with women's and men's employment

	Employment outcomes (Y=1 N=0):				
	(1) Poultry rearing	(2) Livestock rearing (dairy cow/buffalo)	(3) Crop agriculture	(4) Non-agriculture	(5) Not employed
Women (obs = 8,630)	.				
Regression (A): Log price of soybeans (Tk/kg)	-0.045**	-0.083***	0.006	0.009	0.043**
Regression (B): Log price of mustard (Tk/kg)	-0.032**	-0.056***	0.001	-0.004	0.043***
Regression (C): Log price of urea fertilizer (Tk/50 kg)	0.024	0.147***	-0.006	-0.025	-0.093*
Regression (D): Log price of TSP fertilizer (Tk/50 kg)	0.023	0.028*	0.006	0.023***	-0.019
Men (obs = 7,120)					
Regression (A): Log price of soybeans (Tk/kg)	-	-0.090***	-0.052**	0.032	0.005
Regression (B): Log price of mustard (Tk/kg)	-	-0.036**	-0.026*	0.005	-0.000
Regression (C): Log price of urea fertilizer (Tk/50 kg)	-	0.145***	0.079	-0.031	-0.007
Regression (D): Log price of TSP fertilizer (Tk/50 kg)	-	0.058***	0.011	0.009	-0.026**

Notes:
(1) Source: BIHS 2018/19. Standard errors clustered at the household level. *** p<0.01, ** p<0.05, * p<0.10. All regressions control for division fixed effects.
(2) Regressions also control for individual, household and community characteristics listed in Table 5. Full results with estimates for all controls are available on request.
(3) There were not enough observations to examine men's employment in poultry rearing.

Table 7. OLS regressions (summary table): association of community-level input prices with other economic outcomes

	(1) Log individual earnings from poultry	(2) Log individual earnings from livestock	(3) Log individual earnings from crop agr.	(3) Log individual borrowing in agriculture	(4) Log individual borrowing for consumption	(5) Log HH per capita food consumption (kg; HH-level)
Women (obs = 8,630)	.					
Regression (A): Log price of soybeans (Tk/kg)	-0.571***	0.099	0.023	0.320	0.243	-0.035
Regression (B): Log price of mustard (Tk/kg)	-0.314**	-0.055	-0.014	-0.310*	0.009	-0.047***
Regression (C): Log price of urea fertilizer (Tk/50kg)	0.735	0.056	-0.330	2.493***	-0.278	0.735
Regression (D): Log price of TSP fertilizer (Tk/50kg)	0.370**	2.23	-0.154	-1.17	-0.033	-0.51
Men (obs = 7,120)						
Regression (A): Log price of soybeans (Tk/kg)	-	-0.947***	-0.395	0.102	-0.042	-0.039
Regression (B): Log price of mustard (Tk/kg)	-	-0.315*	-0.185	-0.272	-0.209	-0.038**
Regression (C): Log price of urea fertilizer (Tk/50kg)	-	1.749***	0.975	1.080	-0.391	0.128**
Regression (D): Log price of TSP fertilizer (Tk/50kg)	-	0.566***	0.048	0.102	0.333**	0.015

Notes:
(1) Source: BIHS 2018/19. Standard errors are clustered at the household level. *** p<0.01, ** p<0.05, * p<0.10. . All regressions control for division fixed effects.
(2) Regressions also control for individual, household and community characteristics listed in Table 5. Full results with estimates for all controls are available on request.
(3) There were not enough observations to run regressions on men's individual earnings from poultry rearing.

5. Conclusions and looking ahead

In the context of Bangladesh, an economy where agriculture employs a substantial share of the population, we examine how existing tariffs on major agricultural inputs can have important implications for men's and women's employment outcomes, given the sharp distinction in their agricultural activities. Our comparisons rely on multiple sources of administrative and survey data — including newly available customs data from Bangladesh spanning 2015-2021; additional administrative data sources on production and prices; the most recently available (2016/17) quarterly Labor Force Survey which provides as baseline for understanding agricultural occupations that men and women have typically been concentrated in; as well as the 2018/19 Bangladesh Integrated Household Survey, which provides detailed data on men's and women's agricultural employment, income and expenditures, data on local prices, and engagement in the supply chain.

Overall the findings suggest that import tariffs that raise the costs of necessary inputs in agriculture likely have negative implications for women vis-à-vis men in the sector, given (a) women's disproportionate representation in small-scale livestock/poultry rearing, with a substantial share for household consumption; (b) the reliance among livestock and poultry farmers on feed producers who import most of their ingredients; and (c) higher tariffs on these commodities compared to inputs in crop agriculture. We also show that higher resulting prices for inputs used in feed are significantly negatively associated with employment and earnings in poultry and livestock activity, where women are heavily concentrated. Among those marketing output, earnings also tend to be substantially higher in crop agriculture than in livestock/poultry activity, underscoring the need to closely examine how import tariffs can affect more vulnerable groups. Individual producers are also heavily reliant on livestock for both sale as well as own-consumption activity — the latter of which reduces their ability to pass on increased input costs.

These channels can lead to worse employment outcomes for women, including difficulties in making investments and expanding their operations given higher input costs — particularly given the overwhelming share that animal feed comprises in overall operating expenses of these farmers. Among those marketing output, earnings in crop agriculture also tend to be substantially higher than in livestock/poultry activity, underscoring the need to examine how tariff structure affects more vulnerable groups. There can be detrimental effects on consumption as well, as the findings show vis-à-vis effects of higher mustard prices on the quantity of food consumption. Supporting crop agriculture, including diversification in crop agriculture, and hence domestic production could potentially help the animal feed industry as well; the

government in recent years has been supporting the domestic production of soybeans and maize, although the share of total supply remains small. Domestic production would need to keep pace with demand for animal products, however, and given the split between domestic production and imports for key inputs, this gap is unlikely to close quickly.

The findings also have implications for other countries. While women in lower-income contexts are disproportionately concentrated in informal occupations globally, depending on the country context, the industries they tend to work in are often heavily dependent on imported natural resources and commodities, including within agriculture. In parallel with countries' relative reliance on imported agricultural commodities—as well as the extent to which they are motivated to protect domestic agriculture, through tariffs — import prices of inputs and, in turn, tariffs can have significant effects on their employment. These issues take on particular importance in the current economic environment, where countries are facing multiple supply shocks in agriculture stemming from the global pandemic, greater trade protectionism across countries, conflict, and variation in climate. Additional analyses of how women's and men's employment outcomes are affected by trade policies, amid these shocks — not only on whether they remain employed, but also their working conditions —are critical for future, better-targeted policy design.

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Appendix

Appendix Table A1. Share of employed women aged 15-64: top 90% of employed across industry categories (BSIC-2 digit codes)

	BSIC code (2 digit codes)	Share of employed women aged 15-64 (%)
1	Crop and animal production, hunting	59.19
2	Manufacture of wearing apparel (Ready made garments)	8.30
3	Activities of households as employers (including domestic work for others)	4.93
4	Other personal service activities	4.87
5	Education	4.86
6	Manufacture of textiles	3.11
7	Retail trade, excluding motor vehicles	2.67
8	Human health activities	1.16
9	Manufacture of wood and products of wood	1.09

Appendix Table A2. Share of employed men aged 15-64: top 90% of employed across industry categories (BSIC-2 digit codes)

	BSIC code (2 digit codes)	Share of employed men aged 15-64 (%)
1	Crop and animal production, hunting	27.65
2	Retail trade, except of motor vehicles	14.47
3	Land transport and transport via pipeli	11.48
4	Construction of buildings	5.67
5	Manufacture of wearing apparel (Ready made garments)	4.44
6	Wholesale trade, except of motor vehicl	3.70
7	Education	3.14
8	Fishing and aquaculture	2.69
9	Food and beverage service activities	2.26
10	Public administration and defence; comp	2.03
11	Manufacture of textiles	2.01
12	Other personal service activities	1.88
13	Manufacture of furniture	1.77
14	Specialized construction activities	1.31
15	Manufacture of food products	1.28
16	Manufacture of other non-metallic miner	1.12
17	Wholesale and retail trade and repair o	1.00
18	Activities of membership organizations	0.89
19	Civil engineering	0.82
20	Manufacture of fabricated metal product	0.71

Appendix Table A3. Grains and soybean products relevant to livestock/poultry feed: value of imports (millions USD)

Product categories (8-digit HS codes)	2015-16	2016-17	2017-18	2018-19	2020-21
Maize products					
Cereals: maize, corn - other than seed	380.9	701.5	830.1	680.3	926.9
Maize/corn flour	3.5	3.0	4.4	7.0	4.6
Starch; maize (corn) starch	199.5	232.4	292.6	354.0	293.6
Cereal groats and meal; of maize (corn)	1.5	4.9	6.5	8.6	7.9
Cereal grains; worked (e.g. hulled, pearled, sliced or kibbled) of maize (corn)	-	-	-	0.1	0.5
Soybean products					
Soya beans; other than seed, whether or not broken	31,877	30,203	39,863	60,799	101,466
Flours and meals; of soya beans	3.9	21.1	35.4	37.3	118.8
Wheat products					
Cereals; wheat and meslin, durum wheat, other than seed	71,820.3	89,204.2	122,531.6	123,492.9	116,462.4
Cereal groats and meal; of wheat	4.5	2.9	2.8	5.9	.
Wheat or meslin flour	10.2	13.8	18.0	18.9	11.2
Oil-cake and oilseed products					
Oil-cake resulting from the extraction of soybean oil	14,982.1	16,940.7	24,450.8	16,893.1	26,897.6
Oil-cake resulting from the extraction of other oils	3,187.3	3,571.7	5,462.9	5,694.5	8,074.1
Oil seeds from mustard seeds	634.1	692.7	979.2	797.2	898.8
Rice products					
Cereals; rice, semi-milled or wholly milled, whether or not polished or glazed (1)	9,870.7	7,192.7	103,580.9	6,697.3	62,009.1
Cereals; rice, semi-milled or wholly milled, whether or not polished or glazed (2)	428.4	340.4	1,679.2	21.4	743.9
Cereals; rice, broken	237.2	223.5	2,367.3	544.5	603.6
Bran products					
Maize	33.5	229.8	132.1	38.8	37.1
Wheat	35.1	25.8	28.4	109.8	2193.1
Other cereals					
Cereal flours; other than wheat, meslin, and maize (corn)	3.6	3.4	3.5	10.9	4.8
Cereal groats and meal	0.5	1.3	1.7	2.9	6.6
Cereal pellets	23.0	33.9	24.2	35.4	208.4
Cereal grains; rolled or flaked, of oats (1)	15.9	10.8	0.01	1.0	21.5
Cereal grains; rolled or flaked, of oats (2)	23.6	14.3	1.5	1.5	0.7

Appendix Table A4. Inputs in smallholder crop agriculture: value of imports (millions USD)

Product categories (8-digit HS codes)	2015-16	2016-17	2017-18	2018-19	2020-21
Seeds					
Cereals; maize (corn), seed (1)	782.7	1,135.4	1,017.3	1,657.9	1,469.8
Cereals; maize (corn), seed (2)	472.4	460.4	523.4	351.1	553.7
Cereals; wheat and meslin, durum wheat, seed	0.03	0.01	0.02	0.01	0.10
Cereals; rice in the husk (paddy or rough)	260.5	200.4	390.3	723.2	823.2
Cereals; rice in the husk (paddy or rough)	212.8	219.0	313.9	521.4	169.9
Soya beans; seed, whether or not broken (1)	0.002	0.003	0.09	0.001	0.01
Soya beans; seed, whether or not broken (2)	0.01	6.8	0.02	0.003	0.01
Seed; sugar beet seeds, of a kind used for sowing	3.5	1.3	5.3	0.02	0.67
Seeds of herbaceous plants	.	.	0.001	2.59	13.83
Seeds; vegetable seeds, of a kind used for sowing	1,283.5	1,485.2	1,753.8	1,725.5	2,453.1
Cereals; grain sorghum, seed	55.6	78.9	135.2	143.3	293.8
Cereals; millet, seed	0.49	0.06	0.65	1.14	1.40
Cereals; canary seeds	0.51	0.20	0.79	0.003	2.20
Cereals; barley, seed	0.001	0.001	1.31	3.4	18.3
Cereals; oats, seeds	0.001	.	0.001	0.010	0.09
Other seeds used for sowing	850.4	1,197.1	846.3	1,415.9	1,122.9
Fertilizer					
Made from animal or vegetable products	16.9	21.2	16.9	14.7	23.5
Nitrogenous, urea	30,911.9	16,487.6	26,894.0	46,561.8	28,691.6
Nitrogenous, ammonium sulphate	190.5	166.2	365.3	436.6	390.2
Nitrogenous, ammonium nitrate	9.9	0.20	8.7	21.4	16.1
Nitrogenous, mixtures of urea and ammonium nitrate	.	1.9	2.9	.	3.5
Nitrogenous, other	0.4	1.7	2.3	0.07	0.03
Phosphatic	.	.	20,545	20,785	14,464
Potassic, potassium chloride	18,332.8	15,223.7	17,150.2	18,749.6	17,871.9
Potassic, potassium sulphate	411.5	420.1	461.8	401.6	400.1
Nitrogen, phosphorus and potassium	0.63	0.01	1.8	35.4	3.2
Diammonium	21,348.4	14,844.7	24,178.7	31,318.9	62,948.9
Ammonium	480.9	416.1	572.0	822.9	540.3
Nitrogen and phosphorus	0.02	0.63	0.29	0.01	0.30
Other	28.3	35.4	27.4	22.4	16.5

Appendix Table A5. Grains and soybean products relevant to animal feed: total tax rate (TTR) of imported goods

Product categories (8-digit HS codes)	2015-16	2016-17	2017-18	2018-19	2020-21	Percentage point Change in TTR between 2015-16 and 2020-21
Maize products						
Cereals: maize, corn - other than seed	5.0	5.0	5.0	5.0	10.1	5.1
Maize/corn flour	19.5	58.7	58.7	56.7	36.3	16.8
Starch; maize (corn) starch	60.0	58.7	58.7	56.7	67.1	7.1
Cereal groats and meal; of maize (corn)	30.0	31.1	31.1	32.4	31.1	1.1
Cereal grains; worked (e.g. hulled, pearled, sliced or kibbled) of maize (corn)	.	.	.	99.1	58.7	
Soybean products						
Soya beans; other than seed, whether or not broken	0	0	0	0	5.1	5.1
Flours and meals; of soya beans	14.3	20.6	20.6	16.7	15.3	1.0
Wheat products						
Cereals; wheat and meslin, durum wheat, other than seed	0	0	0	0	5.1	5.1
Cereal groats and meal; of wheat	30.0	31.1	31.1	32.4	31.1	1.1
Wheat or meslin flour	19.5	20.6	20.6	21.9	20.6	1.1
Oil-cake and oilseed products						
Oil-cake resulting from the extraction of soybean oil	4.0	15.6	15.6	11.7	12.7	8.7
Oil-cake resulting from the extraction of other oils	4.0	10.3	10.3	11.7	6.8	2.8
Oil seeds from mustard seeds	0	0	0	0	10.3	10.3
Rice products (milled or broken)						
Cereals; rice, milled	10.0	10.0	10.0	28.0	55.0	45.0
Cereals; rice, milled	10.0	10.0	10.0	60.3	77.5	67.5
Cereals; rice, broken	10.0	10.0	10.0	60.3	55.0	45.0
Bran products						
Maize	4.0	5.1	5.1	6.3	5.1	1.1
Wheat	4.0	5.1	5.1	6.3	5.1	1.1
Other cereals						
Cereal flours; other than wheat, meslin, and maize (corn)	19.51	58.7	58.7	56.7	36.3	16.8
Cereal groats and meal	30.0	31.1	31.1	32.4	28.1	-1.9
Cereal pellets	30.0	31.1	31.1	32.4	28.1	-1.9
Cereal grains; rolled or flaked, of oats (1)	36.0	43.1	43.1	99.1	58.7	22.7
Cereal grains; rolled or flaked, of oats (2)	36.0	37.1	37.1	32.4	31.1	-4.9

Notes:

(1) See https://customs.gov.bd/portal/services/tariff/index.jsf for a detailed breakdown of products by chapter.

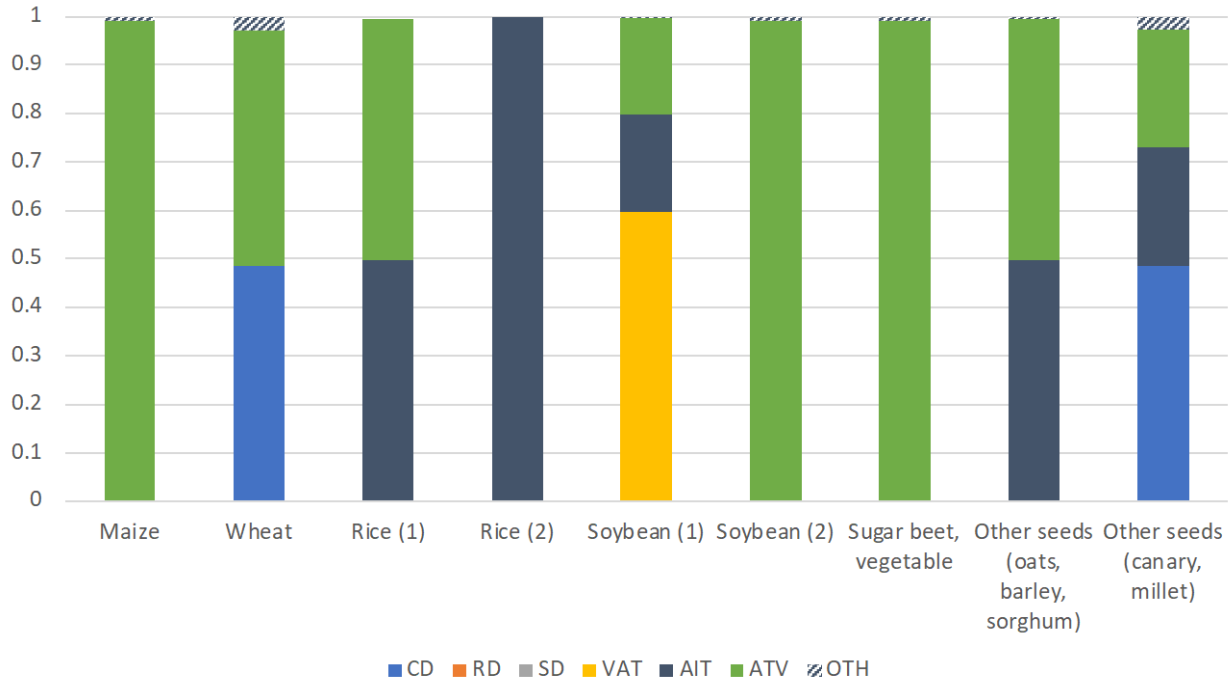
(2) Total tax rate = Customs Duty+ Regulatory Duty + Supplementary Duty Incidence + VAT Incidence + AIT + ATVI

Appendix Table A6. Inputs in smallholder crop agriculture: total tax rate (TTR) of imported goods

Product categories (8-digit HS codes)	2015-16	2016-17	2017-18	2018-19	2020-21	Percentage point change between 2015-16 and 2020-21
Seeds						
Cereals; maize (corn), seed (1)	0	0	0	0	0	0.0
Cereals; maize (corn), seed (2)	0	0	0	0	5.1	5.1
Cereals; wheat and meslin, durum wheat, seed	9.3	10.3	18.2	11.7	10.3	1.0
Cereals; rice in the husk (paddy or rough)	5.0	5.0	5.0	5.0	10.1	5.1
Cereals; rice in the husk (paddy or rough)	5.0	5.0	5.0	5.0	5.0	0.0
Soya beans; seed, whether or not broken (1)	24.0	25.1	25.1	26.3	25.1	1.1
Soya beans; seed, whether or not broken (2)	0	0	0	0	5.1	5.1
Seed; sugar beet seeds, of a kind used for sowing	0	0	0	0	5.1	5.1
Seeds of herbaceous plants	.	.	0	0	5.1	-
Seeds; vegetable seeds, of a kind used for sowing	0	0	0	0	0	0.0
Cereals; grain sorghum, seed	5.0	5.0	5.0	5.0	10.1	5.1
Cereals; millet, seed	15.0	15.0	15.0	15.0	20.6	5.6
Cereals; canary seeds	15.0	15.0	15.0	15.0	20.6	5.6
Cereals; barley, seed	5.0	5.0	5.0	5.0	10.1	5.1
Cereals; oats, seeds	5.0	.	5.0	5.0	10.1	5.1
Other seeds used for sowing	0	0	0	0	0	0.0
Fertilizer						
Made from animal or vegetable products	0	0	0	0	0	0.0
Nitrogenous, urea	0	0	0	0	0	0.0
Nitrogenous, ammonium sulphate	0	0	0	0	0	0.0
Nitrogenous, ammonium nitrate	0	0	0	0	0	0.0
Nitrogenous, mixtures of urea and ammonium nitrate	0	0	0	0	0	0.0
Nitrogenous, other	0	0	0	0	0	0.0
Phosphatic	0	0	0	0	0	0.0
Potassic, potassium chloride	0	0	0	0	0	0.0
Potassic, potassium sulphate	0	0	0	0	0	0.0
Nitrogen, phosphorus and potassium	0	0	0	0	0	0.0
Diammonium	0	0	0	0	0	0.0
Ammonium	0	0	0	0	0	0.0
Nitrogen and phosphorus	0	0	0	0	0	0.0
Others	0	0	0	0	0	0.0

Notes:
(1) See https://customs.gov.bd/portal/services/tariff/index.jsf for a detailed breakdown of products by chapter.
(2) Total tax rate = Customs Duty+ Regulatory Duty + Supplementary Duty Incidence + VAT Incidence + AIT + ATVI

Appendix Figure A1. Breakdown of TTR on imports of crop-related inputs (seeds), 2020-2021



Appendix Figure A2. Share of TTR across different duties and import taxes: imports of livestock/poultry-related inputs, 2020-2021