COVID-19 Impact on Poverty Dynamics in Bangladesh

An Analytical Investigation

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Acronyms and Abbreviations

ADB	*Asian Development Bank*
AIS	*Average Income Shortfall*
APG	*Average Poverty Gap*
BBS	*Bangladesh Bureau of Statistics*
BIGD	*BRAC Institute of Governance and Development*
BSIC	*Bangladesh Standard Industry Classification*
CAR	*Compound Annual Rate*
CBN	*Cost of Basic Need*
COVID-19	*Coronavirus Disease 2019*
EIA	*Energy Information Administration*
EPB	*Export Promotion Bureau*
FGT	*Foster-Greer-Thorbecke*
FY	*Fiscal Year*
GCC	*Gulf Cooperation Council*
GDP	*Gross Domestic Product*
GIS	*General Income Shock*
GoB	*Government of Bangladesh*
GVCs	*Gross Value Chains*
HCR	*Head Count Ratio*
HIES	*Household Income and Expenditure Survey*
HH	*Household*
HS	*Harmonized System*
IMF	*International Monetary Fund*
LFS	*Labour Force Survey*
LHS	*Left Hand Side*
LPL	*Lower Poverty Line*
MoF	*Ministry of Finance*
OECD	*Organization for Economic Co-operation and Development*
PGI	*Poverty Gap Index*
PGR	*Poverty Gap Ratio*
Pov	*Poverty*
pp.	*Percentage Points*
RHS	*Right Hand Side*
RMG	*Ready-Made Garment*
SANEM	*South Asian Network on Economic Modeling*
SMEs	*Small and Medium Enterprises*
SPG	*Square Poverty Gap*
SPGI	*Square Poverty Gap Index*
SPGR	*Square Poverty Gap Ratio*
SSNP	*Social Safety Net Programme*
TPG	*Total Poverty Gap*
UNCTAD	*United Nations Conference on Trade and Development*
UNDESA	*United Nations Department of Economic and Social Affairs*
UP	*Upper Poverty*
UPL	*Upper Poverty Line*
USA	*United States of America*

Executive Summary

The COVID-19 pandemic presents a number of socio-economic challenges worldwide. There are increasing fears that the Bangladesh economy might also suffer from long-term, anti-developmental challenges as a result of the pandemic. Much of Bangladesh's decade-long development achievements, such as the impressive fall in poverty rates, might encounter major setbacks as a result of prolonged economic downturns. In this context, this study focuses on identifying the impacts of the COVID-19 pandemic on the poverty dynamics in Bangladesh.

In almost two decades, Bangladesh notably reduced its poverty rate from as high as 50% in early 2000 to 20.5% in 2019. Over this period, both the disparity in rural-urban poverty and the magnitude of the East-West divide in poverty incidence have decreased. However, this was not sufficient. While Bangladesh made commendable progress in reducing the incidence of poverty, the number of vulnerable poor remained high - almost 28 million in 2019. Such a high rate puts millions of lives dwindling to and from poverty during times of crisis, which was also observed during this pandemic.

This paper identifies the mechanism of how economic disruptions sparked by the pandemic transmit a steep fall in income. The supply chain disruption hampered the marketing of agricultural products as well as their prices. Uncertainties, high transport costs, slumped demand, restrictions on the movement of vehicles, etc. exacerbated a negative price impact on the producers. However, the pandemic does not seem to have a direct impact on the production function of the agricultural outputs.

The impact on the manufacturing sector was both internal and external. The primary internal source of impact was the forced lockdown of factories, as a result of a larger nationwide lockdown. The external source of impact originated from the slowdown in trade, both locally and in partner countries. Due to the ban on international shipments, the import of raw materials and the export of finished goods were severely hampered. Even after the end of the lockdown, many manufacturing industries could not go into production at full capacity due to the lack of raw materials, unavailability of new orders, or cancellation of existing orders.

The impact on the service sector was wide. Besides essential services such as banks and hospitals, all other major service sectors such as hotels, restaurants, transport, tourism, retail trade etc. remained closed, or at best, partly opened. A significant portion of workers from these sectors relied entirely on their day-to-day earnings and was greatly affected as a result.

In this context, this study attempted to simulate the poverty scenario in the country assuming a 25% general income shock. Using the latest Household Income and Expenditure Survey (HIES), the most comprehensive nationally representative data, this study finds that the overall poverty rate in the country will almost double - increasing from 20.5% to 40.9%. Due to the 25% income shock, the total number of poor in the country will increase to 69.4 million from the existing 34.7 million. The number of urban poor will increase from 7.3 million to 15.3 million while rural poor will increase from 27.3 million to 53.8 million.

However, the rate of poverty increase is not homogenous across the country, and there is clearly an East-West divide. The poverty rates in the Western regions, such as Dinajpur, Magura, Potuakhali, Kurigram, Rajshahi, Rangpur, etc. take a more chronic turn than in the Eastern regions such as Brahmanbaria, Gazipur, Munshiganj, Narayanganj, Sylhet, etc.

The study also finds that the depth (measured in terms of Poverty Gap Ratio) and severity (in terms of Squared Poverty Gap) of poverty varies greatly by region. A 25% income shock would increase the

poverty gap ratio for the rural areas to 13.9 and for the urban areas to 10.4. Furthermore, although at the national level the poverty gap index is 12.9 and the square poverty gap is 4.8 after the shock, 36 districts will experience a higher poverty gap index and square poverty gap index than the national level. In the case of the Squared Poverty Gap, the rural SPGR will increase to 5.2 while in the Urban it will increase to 3.8. Both the PGR (36.8) and SPGR (18.3) are the highest for Kurigram.

Such a divide becomes more prominent when we apply other measures such as the Total Poverty Gap (TPG) and the Average Income Shortfall (AIS). In terms of TPG to bring up all the 69.3 million poor people in the country at least up to the poverty line, the Government will need to transfer Tk 45 billion per month. The districts which would require the most allocation are Dhaka (Tk 1.8 billion), Dinajpur (Tk 1.8 billion), Chittagong (Tk 1.9 billion), Gaibandha (Tk 1.1 billion), Kishoreganj (Tk 2 billion), Kurigram (Tk 1.6 billion), Mymensingh (Tk 1.4 billion), Rangpur (Tk 1.3 billion), amongst others.

On average, a typical poor household in rural areas would need a transferred benefit of Tk 2316 per month, while in urban areas it would be Tk 2678 per month. However, a typical household in more poverty-prone areas would require a significantly higher transfer benefit. For example, Tk 4579 for Bandarban, Tk 3583 for Kurigram, Tk 2943 for Dinajpur, and Tk 3509 for Kishoreganj, among other districts, are needed for a poor household to move up to the poverty line.

With respect to this study's findings, employment is one of the main sources of COVID-19 impact transmission. In this regard, the occupational sectors where the concentration of poor people would be higher due to the income shock are identified. Due to the income shock, almost 52% of the total workers in crop and animal production will fall below the poverty line, taking the total number of workers in this sector who are below the poverty line to 12.4 million. In the case of the textile and RMG manufacturing industry, the income shock will induce an increase in the total number of poor in the sector from .9 million to 1.81 million (an increase of 107%). With a similar magnitude of shock, the number of new poor in the major services sectors would be 1.3 million in the wholesale and retail trade, 1.1 million in the transport, and .27 million in the food and beverages services activities. All these sectors would experience nearly double the number of poor workers. In total, out of the 63 million workers, due to the 25% income shock, our simulation shows that a total of 13 million new workers will fall below the poverty line, in addition to the existing 14 million poor in the labour force. That is, the total number of workers below the poverty line would increase by almost 94%.

In the context of this study's findings, there are a number of policy recommendations (general, area-specific and industry-wise) that could act as a guide to policymakers. Both the coverage as well as the transfer benefits of the social safety net should be expanded. Due to the reduction in private consumption as a result of the economic downturn caused by the pandemic, the GoB can provide direct cash transfers to the poor and vulnerable people to stimulate the economy. The healthcare services for the poor need to be restructured so that it is adequate for this segment of the population, without them worrying about high medical bills. By reducing supply chain disruptions through proper transportation, timely delivery of goods from the Chittagong port and adequate production, the GoB should ensure food security.

There is a strong geographical dimension to the poverty dynamics of the country and all policies should focus on said dynamics. Areas with a higher than the national average predicted rise in poverty (Mymensingh, Sunamganj, Cox's Bazar, Narail, Chattogram, Netrokona etc.) should be given more attention. Policies should also have a separate focus on the urban poor as most of the social protection programmes are rural-focused, and the SSNP coverage in the urban areas is very few.

In terms of the industries, workers from crop and animal production will be affected greatly, with most of them being self-employed. The GoB should provide cash subsidies and should also ensure that

farmers have adequate resources for production. The apparel industry will be greatly impacted by the pandemic - the government must provide cash subsidies and other benefits for the exporters. Similar benefits should be provided to all exporting sectors, however. The GoB should announce a sector-specific stimulus package, especially for low-income informal workers in transportation, wholesale and retail trade, and construction sectors who have no or little savings. The implementation of stimulus packages should start immediately for micro, small and medium enterprises, with the process being simple.

Section I

Introduction

Despite stringent policies from governments across the globe, COVID-19 continued to spread steadily beyond the borders. As the virus went viral across the economies, the global economic growth forecasting was lowered down to (negative) -3.0% from an earlier projection of 2.9% (IMF, 2020). Due to the economic standstill caused by the global pandemic, the world economy is projected to lose as much as $8.8 trillion in 2020 (ADB, 2020). Due to the fall in demands and disruptions in global supply chains, the global trade volume is projected to fall by 3.75% in 2020 damaging imports and exports in all economies (OECD, 2020).

The challenge posed by the COVID-19 pandemic is unprecedented in nature. Never in the history of modern civilisation had there been so much uncertainty as has been exposed during this pandemic. Being one of the virus hotspots, there are paramount fears that Bangladesh's economy might also suffer from long-term anti-developmental challenges instigated by this crisis. Sparked by the COVID-19 crisis, the economic shortfalls of this pandemic might mean wide-ranging impacts from employment to poverty and inequality in Bangladesh. Many of Bangladesh's decade-long development achievements, as such the impressive fall in poverty rates, might dissolve with prolonged economic downturns.

In pursuit of containing the spread of coronavirus, Bangladesh went through a 66-day lockdown from 25 March to 31 May. With forced workers staying at home and closed factories, the supply shock created by the virus was unavoidable. Severe disruption in the supply chain adversely affected all economic agents including agro-producers, manufacturers, traders and retailers, as well as wageworkers in different sectors. Despite the reopening of the economy, the crisis may linger for long. With the global economy tailing towards a great depression, both the RMG as well as remittances, the two most important sources of external income, are under serious threat like never before. Given the pre-existing challenges, such as Jobless economic growth, automation and defeminization of employment in the manufacturing sector, slacked growth in private investment etc. this pandemic crisis will cause a more profound impact on the economy. With a 106 million working-age population where each year, an additional 1.2 million workers enter the labour force (Razzaque, Khondker, Uddin, & Rahman, 2018), such challenges are more paramount. Under the present situation, the challenge is more daunting as the opportunities for overseas employment seem bleak.

The anecdote foretells if appropriate policies are not undertaken promptly, the impact of this crisis on poverty, inequality and other socio-economic development indicators would be much more long-lasting. For better-targeted policy management of the COVID-19 risk in the context of Bangladesh, it is essential to understand the dynamics of poverty in the country and ensure a seamless public policy with assistance to the poor and vulnerable. Against this backdrop, this study focused on identifying the impacts of the COVID-19 pandemic on the poverty dynamics in Bangladesh.

The rest of the paper is organized as follows: Section (2) analyzes the baseline poverty profile of Bangladesh. A detailed analysis of poverty profile by regions, various poverty measures, and industry are presented in this section. Section (3) discusses the COVID-19 impact transmission mechanism in the Bangladesh poverty scenario. Section (4) describes simulation methodology and analyzes the simulation results critically. Section (5) assesses the responsiveness of poverty rates to income shocks by districts. Section (6) provides a concluding remark along with active policy recommendations.

Section II: Baseline Poverty Profile of Bangladesh

2.1 Poverty profile by regions

Bangladesh successfully reduced the overall incidence of poverty at a commendable rate. The poverty rate in the country fell from 56.7% in 1992 to 20.5% in 2019 (Figure 1). On average, poverty in the country fell at a compound annual rate of 3.6% during this period. The urban poverty rates in the country fell from 43% in 1992 to 16% in 2019 while the rural poverty rate fell from 59% to 22%. It is noticeable that the gap in rural and urban poverty rates has been squeezed over the decades. In 2000, the rural poverty rates were 17 percentage points higher than the urban poverty rates; by 2019 – this gap reduced to 6 percentage points. One reason for the faster fall in rural poverty rates compared to stalling fall in urban poverty rates could be explained by rural-urban migration. The urban population in the country increased at an annual average growth rate of 3.9% since 2000 (UNDESA, 2018). Over sixty% of the internal migrants moved to Dhaka while 16% moved to Chattogram during this period (Farole & Cho 2017). Such migration to Dhaka and Chattogram contributed to about 0.5 percentage point poverty reduction between 2010-16 (World Bank, 2019).

Figure 1: Trend of poverty reduction in Bangladesh
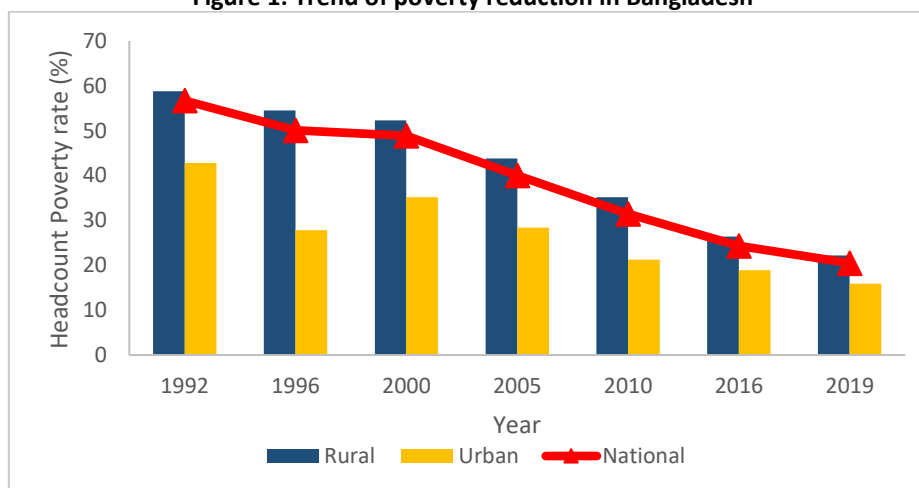
Source: BBS
Notes: upper poverty line estimates

Despite such a prudent fall in the poverty rate nationwide, the story is vastly different between regions. The pace of poverty reduction was much faster in the Eastern part of the country, particularly, in Dhaka, Chattogram and Sylhet compared to the Western regions such as Rajshahi, Rangpur, and Khulna (World Bank, 2019). Between, 2010 and 2019, the upper poverty rate in Barisal, Chattogram, Dhaka and Sylhet almost halved (Figure 2). In contrast, the poverty rate in the Eastern region fell at a much slower pace. On average, the compound annual rate of poverty reduction in the Western regions was three times slower than in the eastern regions. Amongst others, industrial agglomeration and a stronger flow of outward international migration could be the two of the main factors behind a faster fall in poverty rates in the eastern regions than in the western regions (Sen et al., 2014; Hill & Endara, 2019).

Figure 2: Upper poverty rates by divisions
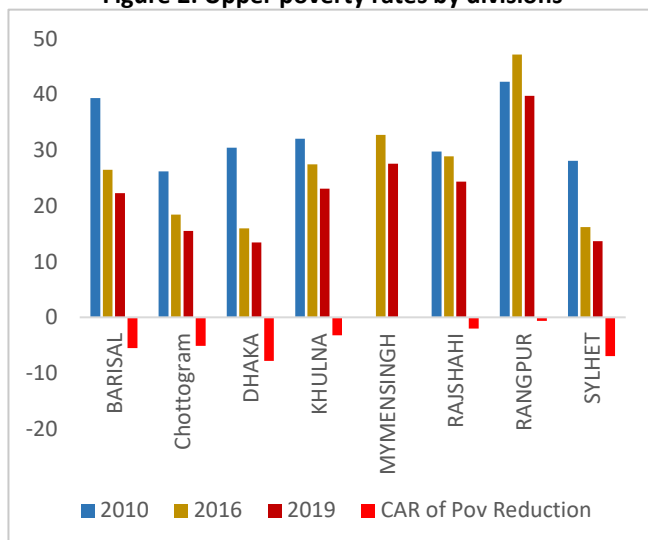
Figure 3: Lower poverty rates by divisions
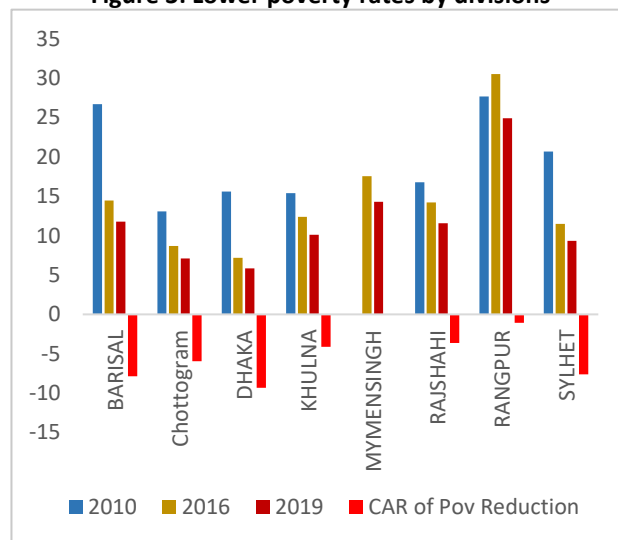
Source: BBS, HIES.
Note: The poverty rates for 2019 at the divisional level are the authors' estimation based on the BBS projected rate of poverty in 2019; Mymensingh became a division after 2010; CAR of Pov Reduction stands for Compound Annual Rate of Poverty Reduction between 2010 and 2019.

Figure 4: Poverty and vulnerability by national, rural and urban
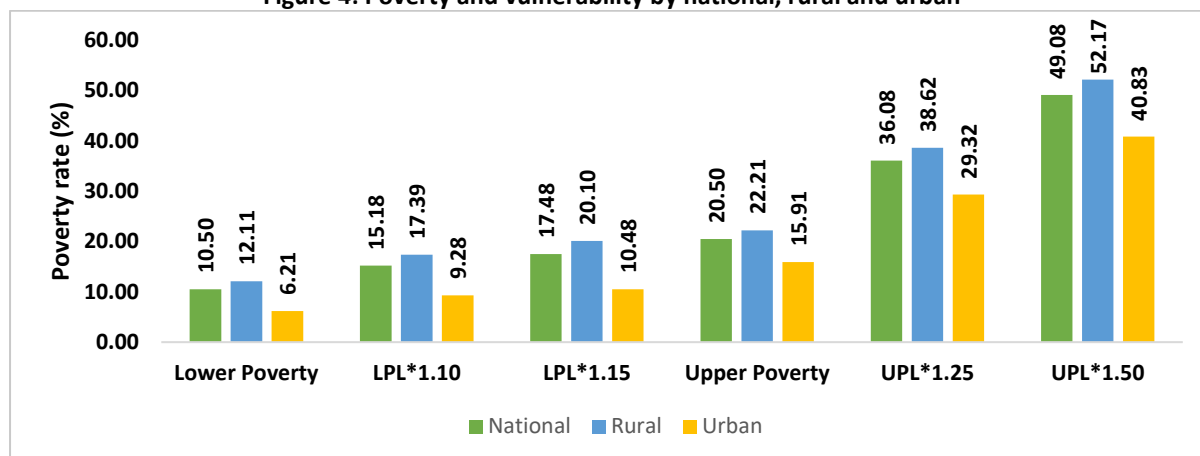
Source: Authors' estimation based on HIES 2016 and updated to 2019

Another noteworthy feature of the poverty dynamics in Bangladesh is its high concentration of vulnerable people around the poverty line. For instance, a 25% increase in the upper poverty line would increase the incidence of poverty in the country by 15.6 percentage points (Figure 4). Moreover, a 1.5 times increase in the upper poverty line would put half of the population below the upper poverty line. Nonetheless, a large number of poor people are highly concentrated around the lower poverty line. A 10% increase in the LPL would result in an additional 4.7% of the population below the extreme poverty line which is equivalent to more than 7.5 million population. A west-east divide is prominent in the case of vulnerable poverty as well. The vulnerable poor are more concentrated in the Western regions than in the East (Table 1).

Table 1: Poverty and vulnerability profile by regions

Division	LPL	LPL*1.10	LPL*1.15	UPL	UPL*1.25	UPL*1.50
BARISAL	11.79	16.83	19.75	22.3	38.42	52.19
CHATTOGRAM	7.1	10.88	12.51	15.51	31.3	44.97
DHAKA	5.86	8.8	10.22	13.47	25.69	37.72
KHULNA	10.11	15.03	18.09	23.14	40.09	53.46
MYMENSINGH	14.31	20.96	23.96	27.59	48.55	63.14
RAJSHAHI	11.6	17.02	19.97	24.36	41.37	54.88
RANGPUR	24.91	32.23	35.18	39.77	55.53	65.85
SYLHET	9.36	14.72	17.55	13.67	29.37	43.63

Source: Authors' estimation based on HIES 2016 and updated to 2019

The regional incidence of poverty can also be analyzed at the district level. There is a large variation in poverty incidence across the districts in the country (Figure 5). Out of the 64 districts, 37 districts have a poverty rate higher than the national average of 20.5%. The highest poverty rate is seen in Kurigram (59.6%), followed by Dinajpur (54.2%), Bandarban (53.2%), Magura (47.7%), Kishoreganj at (45.1%), Khagrachhari (44.3%), and Jamalpur (44.2%), amongst others. On the other hand, Narayanganj has the least incidence of poverty (2.2%), followed by Munshiganj (2.6%), Madaripur (3.1%), Gazipur (5.8%), Faridpur (6.5%), Feni (6.8%), Dhaka (8.4%), amongst others.

Figure 5: Baseline poverty scenario by districts
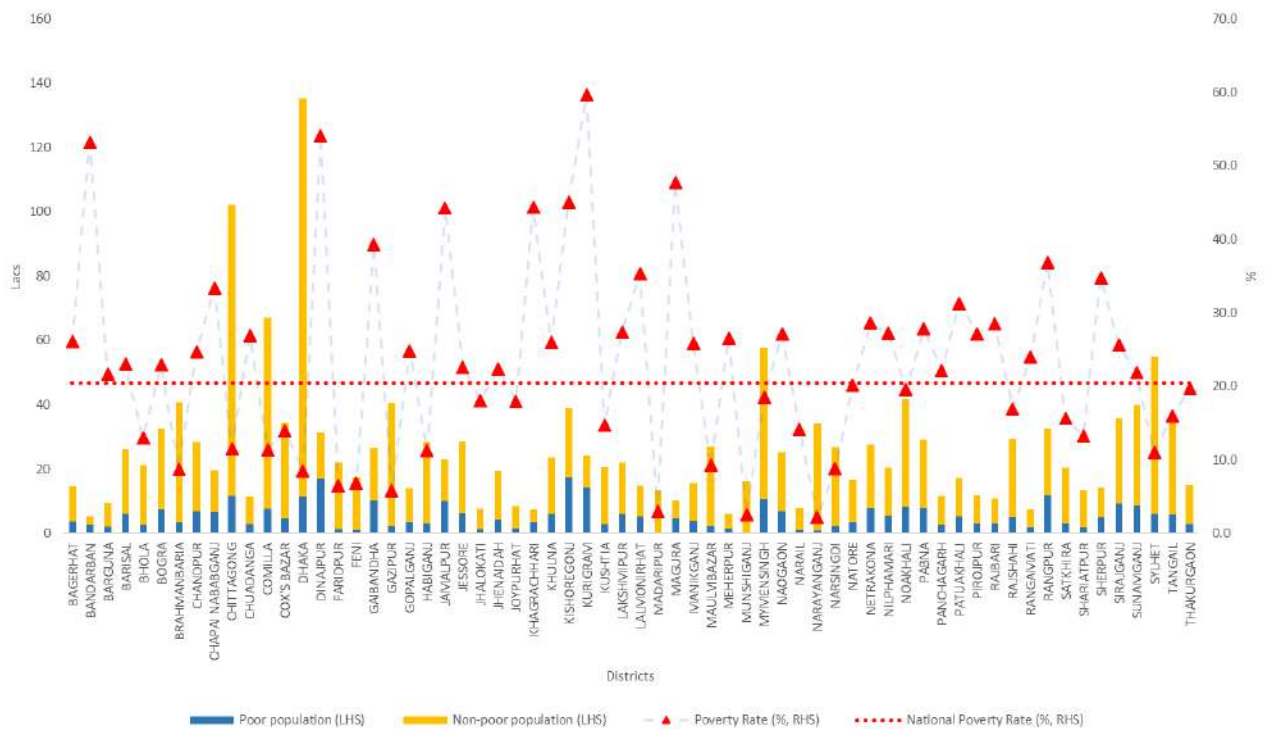
Source: SANEM estimation based on HIES.
Note: Population and poverty rates updated to 2019.

4

2.2 Incidence of poverty by employment and industries

For identifying the impact of COVID-19 on the poor and marginalized people, it is important to observe their employment status. This section observes the concentration of poor people in industries they are employed in. A close observation of the concentration of the poor and vulnerable people across the industries would enable us to draw sector-specific essential insights. A thorough observation would enable us to understand – where the poor are most concentrated for their work, and how poverty in those sectors would be affected if there are income shocks.

From the HIES 2016, we classify the employment industries according to Bangladesh Standard Industry Classification (BSIC 4). After further broader grouping of the industrial sectors, we find that around 47.5% of the total employed population below the upper poverty line are engaged in Crop and animal production, forestry, and fishing (Table 2).[1] Other leading sectors where poor people are most concentrated are textile manufacturing (6.6%), construction (7.4%), wholesale and retail trade (9.7%), and transport (10.5%).

Table 2: Where the poor are most concentrated in the employment industry?

Occupational Industry	LPL (%)	UPL (%)
Crop and animal production	47.7	44.5
Forestry and logging	1.3	1.0
Fishing and aquaculture	2.0	2.0
Manufacture of food products	2.0	2.1
Manufacture of textiles	6.8	6.6
Manufacture of furniture	1.6	1.9
Other manufacturing	2.7	2.7
Construction	6.9	7.4
Wholesale and retail trade	8.6	9.7
Transport	9.9	10.5
Food and beverage service activities	1.7	1.5
Other Services	5.0	5.6
Others	4.0	4.5
Total	100	100

Source: Authors' estimation based on HIES 2016 and updated to 2019

Although most of the poor are engaged in crop and agriculture, Table 2 does not provide any insight into the distribution of poor people in a particular industry. To understand the concentration of employed poor in each of the major industries, we break down the total employed in a particular industry by lower and upper poverty lines (Table 3). The table shows that, in the crop and animal production industry, 28.4% of the total employed are below the upper poverty line. Sectors, where more than a quarter of the total employed are below the upper poverty line, include Forestry (33.9%), Manufacturing of tobacco (36.3%), construction (26%), and activities related to domestic help (30.9%). Amongst other major sectors, such as textiles, retail trade, and transportation, 18%, 16.8% and 24.8% of the total workers are poor, respectively.

Considering 25% and 50% shifts in the upper poverty line (in the case of LPL – the shifts are 10% and 15%) we see that a vast proportion of the employed persons in all these sectors are highly vulnerable to income shocks. For instance, a 25% upward shift in the upper poverty line would increase the poverty rates in the crop and animal production industry by almost 20 percentage points. In the case

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[1] An employed individual is considered poor if he is from a poor household.

of other leading sectors, the rate of increase would be: textiles (14 percentage points), constructions (18 percentage points), wholesale and retail trade (14 percentage points), transport (18 percentage points), etc.

Table 3: Incidence of poverty and vulnerability for the employed by major industries

BSIC CODE	Description	Lower Poverty	LPL*1.10	LPL*1.15	Upper Poverty	UPL*1.25	UPL*1.50
1	Crop and animal production	15.55	21.46	24.78	28.42	47.01	59.87
2	Forestry and logging	22.87	31.25	35.10	33.91	56.37	67.13
3	Fishing and aquaculture	10.60	15.49	18.31	21.12	39.11	55.68
10	Manufacture of food products	9.05	13.10	14.83	19.19	35.86	50.19
12	Manufacture of tobacco products	22.38	29.17	30.37	36.32	48.70	61.50
13	Manufacture of textiles	9.48	12.56	14.39	18.02	32.43	45.82
15	Manufacture of leather and related products	13.06	17.29	19.06	26.97	46.29	59.05
16	Manufacture of wood and products of wood and cork	11.35	16.28	18.99	23.95	40.64	54.65
28	Manufacture of machinery and equipment	7.82	13.03	14.15	17.69	33.06	49.60
31	Manufacture of furniture	8.42	12.81	15.36	20.39	39.40	52.33
35	Electricity, gas, steam and air conditioning supply	6.16	7.62	8.80	13.93	23.62	37.86
41	Construction of buildings	5.94	9.10	10.68	13.08	26.16	38.83
43	Specialized construction activities	12.12	17.81	20.52	25.60	43.26	56.71
45	Wholesale and retail trade and repair of vehicles	7.72	11.23	13.25	16.81	30.72	43.73
47	Retail trade, except for motor vehicles and motorcycles	6.02	9.78	11.79	16.84	32.38	46.63
49	Land transport and transport via pipelines	12.02	16.75	19.77	24.76	42.12	55.73
56	Food and beverage service activities	12.77	16.50	18.56	22.62	41.39	53.87
81	Services to buildings and landscape activities	12.99	18.90	22.63	27.62	45.69	59.50
82	Office administrative, office support and other activities	4.45	7.17	7.81	10.41	20.63	30.66
84	Public administration and defence	3.85	5.44	6.68	8.19	17.78	28.60
85	Education	2.85	4.48	5.25	6.88	15.48	25.03
86	Human health activities	4.10	5.74	6.98	9.47	18.65	33.34
97	Activities of households as domestic personnel	15.50	18.89	22.50	30.92	47.36	61.62
0	Others	6.89	11.12	12.60	15.21	26.48	38.94

Source: Authors' estimation based on HIES 2016 and updated to 2019

The broad sector and the employment category-specific incidence of poverty also revealed that there is a significant variation in poverty incidence across the sectors and employment categories (Table 4). In terms of all kinds of poverty measures i.e. lower poverty, upper poverty, and vulnerable poverty, the poverty incidence is higher for the agriculture sector compared to non-agricultural sectors. Accordingly, all employment categories (day labourer, self-employed, and employee) under agriculture sectors are associated with a higher incidence of poverty compared to employment categories under non-agriculture sectors. Besides, there observe some dynamics of poverty incidence across the rural-urban dimension. For instance, in the agriculture sector, in terms of lower poverty measures the overall poverty is higher in rural, but in terms of upper poverty and vulnerability measures poverty is higher in urban. The poverty dynamics of day labourers of the agricultural sector

are the key determinant of such a pattern of poverty incidence in this sector- in terms of all types of poverty measures, day-labourer in urban is associated with more poverty incidence and the responsiveness of poverty increases as moving lower poverty to vulnerability. Again, for the non-agriculture sector, though the overall poverty rate is higher in rural in terms of all types of poverty measures, day-labourers are poorer in urban in terms of upper poverty and vulnerability measures.

Table 4: Incidence of poverty and vulnerability by broad sectors and employment categories

		Agriculture			Non-Agriculture		
	Employment Category	LPL	UPL	UPL*1.25	LPL	UPL	UPL*1.25
National	Day Labourer	20.39	34.61	53.98	13.63	27.50	45.76
	Self Employed	10.87	20.90	38.41	7.49	15.59	29.16
	Employee	17.27	28.31	48.94	7.73	15.11	28.36
	Overall	15.79	27.96	46.46	9.62	19.33	34.32
Rural	Day Labourer	20.34	33.89	53.34	14.97	27.23	45.25
	Self Employed	11.39	21.03	38.64	9.20	16.78	30.75
	Employee	20.05	28.40	53.13	11.55	18.66	32.86
	Overall	16.07	27.68	46.33	12.21	21.39	36.98
Urban	Day Labourer	20.81	41.15	59.86	11.23	27.99	46.69
	Self Employed	6.48	19.85	36.46	5.09	13.94	26.94
	Employee	10.21	28.07	38.27	4.16	11.79	24.16
	Overall	13.41	30.28	47.57	6.29	16.68	30.90

Source: Authors' estimation based on HIES 2016 and updated to 2019

Based on the discussions in this chapter, several important features of Bangladesh's poverty can be identified. Despite an impressive performance in poverty reduction, the number of vulnerable poor was still very high: more than 27 million. Both poverty, as well as vulnerability, has strong regional bias. The rural population and western districts of the country are more poverty-stricken as well as vulnerable prone than the eastern districts. The pace of poverty reduction was much slower in the western regions than in the east. Such a slow pace in poverty reduction indicates the regional incapacities as well as the depth and severity of poverty in those regions.

The poverty dynamics can also be inspected from an employment perspective, as has been discussed in this chapter. As identified, most of the poor population in the country are engaged in five major sectors: crop and animal production, textile manufacturing, construction, retail and wholesale, and transport. The intra-industry vulnerability analysis shows that workers in agricultural sectors are more vulnerable to poverty than in any other sector. The such disaggregated pattern in poverty dynamics identifies that even a homogenous income shock will result in a disproportionately heterogeneous impact on poverty highly concentrated in a few industries, sectors, and regions.

Section III: The Transmission Mechanism of the COVID-19 Impact on the Poverty Dynamics in Bangladesh

The anecdotal discussion in section two lucidly identifies that any income shock will have a disproportionate impact on poverty across regions and occupations. For a comprehensive understanding of the poverty dynamics, it is important to analyze the sources of such income shocks and how these income shocks might transmit to the poverty dynamics in the country. This chapter discusses the transmission mechanism of the income shock induced by COVID-19 to the Bangladesh economy. To enrich the discussion, we incorporate both demand shock and supply shock perspectives simultaneously.

3.1 COVID-19 impact transmission mechanism to the poverty dynamics in Bangladesh

One of the founding sources of economic impacts induced by COVID-19 is uncertainty afflicting the decisions of the consumers, producers and entrepreneurs.[2] In pursuit of decelerating the spread of COVID-19, the world economy has been at a near standstill since the beginning of the year. The projections of the economic losses from the COVID-19-induced economic slowdowns vary considerably. However, unanimously the global economy is facing the toughest crisis since the Second World War. The IMF has categorised the economic crisis sparked by the pandemic as the worst economic downturn ever since the great depression (Gopinath, 2020). Disruptions in the trade and Global Value Chains (GVCs) are undeniably at the centre of the crisis. The capital outflow from the developing countries to the advanced economies is further worsening the crisis mitigating the strength of the emerging economies (UNCTAD, 2020).

The crisis poses unprecedented challenges for Bangladesh. For abating, the spread of coronavirus Bangladesh Government announced 'public holidays' since 25 March 2020. While a number of industries were reopened on April 25 only to a limited scale, the public closure continued till 30 May 2020. Since the onset of the public holidays, local transport in the country was prohibited, as well as economic activities were largely kept limited. The constrained economic activities reduced the mobility of labours, hindered the internal supply chain of goods and services and severely limited the earning opportunities.

Against the backdrop, we can broadly identify two major sources from which the 'pandemic impacts' would originate: (i) impacts stemming from supply chain disruptions in the country; and (ii) impacts originating from the global depression. The most direct, and at the same time clearly distinguishable consequences of these impacts will be reflected in the fall in economic outputs, i.e. through the fall in the GDP growth rate of Bangladesh. The IMF has revised its earlier projection of Bangladesh's economic growth rate from 8% to 2% (Figure 6). Although the growth rate predictions for Bangladesh vary by agencies, nevertheless, even with a 2% economic growth rate Bangladesh will be one of the highest pacing countries.[3]

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[2] Such impacts stemming from the COVID-19 pandemic are attributed to more than half of the economic contractions in countries like the USA (Baker et al, 2020).

[3] Bangladesh Bank has predicted the economic growth in the country would be 3.8% for the FY2020. Source: https://tbsnews.net/economy/bb-sees-fast-economic-turnaround-next-year-79786; accessed on 3 June 2020

Figure 6: Growth forecasts for Bangladesh and the global economy for 2020
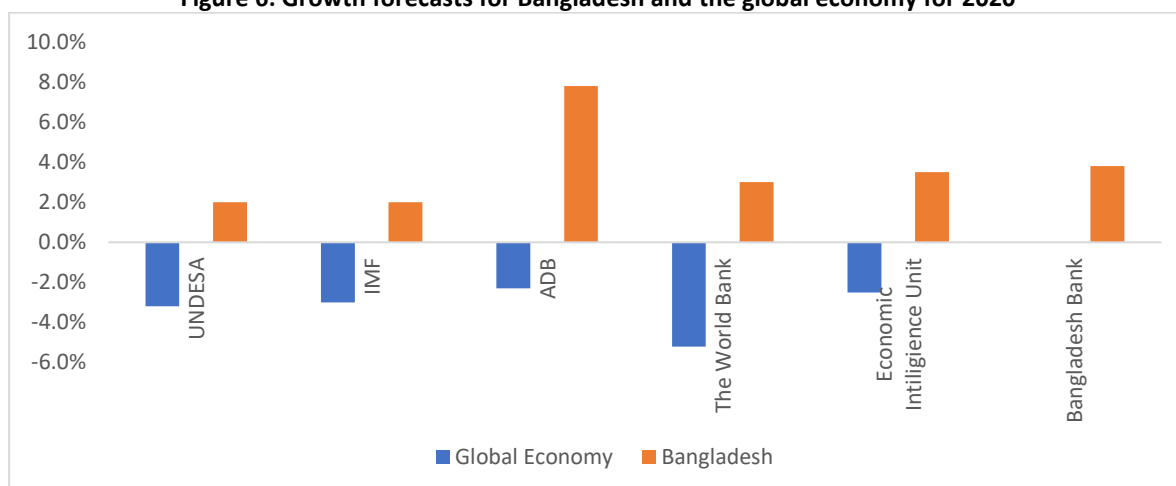
Source: Compiled from respective websites.
Note: The World Bank projects the worst-case scenarios as -4.8% and -2% for the Global economy and Bangladesh. The ADB forecast does not incorporate COVID-19 impacts on Bangladesh.

The impact on poverty dynamics emanating from supply chain disruption or global economic depression is not as direct as it is on the GDP growth rate. The channel through which domestic supply chain disruption or the global depression affects different economic agents is not uniform. The supply chain disruption would affect the producers and workers in the agricultural sector in a different way than in the manufacturing sector. The following sections provide a brief overview of how different sectors are being affected due to the crisis, and how the impact is being transmitted to poor and vulnerable people in the form of income shocks.

3.1.1 Transmission mechanism in the agricultural sectors

There are a couple of ways how the disruption in the supply chain and economic activities affected the agricultural sector. Principally, the lockdown collided with the major cropping season in the country. Transplantation of many crops starts in early March and ends in May-June. These crops include Aus (mid-March to mid-April), Jowar (mid-April to June), Jute (early March to early May), etc. It is also the harvesting of major crops such as Boro (April to May/June), wheat (March to mid-April), and Maize (April to May), amongst others.[4] In addition, this is also the peak season for harvesting fruits (Jackfruit, Mango, Litchi, etc.), spices (Ginger, Turmeric, Onion, Garlic), and a variety of other vegetables. All these major crops constitute more than half of the total agricultural production of Bangladesh.[5] In terms of volume of production, Boro is the most important and single largest crop in the country. Unlike the other major crops which mainly rely on local labour, Boro harvesting highly depends on migrant labour. In particular, during the Boro harvesting season, many migrant workers from poorer regions move to harvest regions for work. However, despite the lockdown and restrictions on labour mobility, there was not much impact on the Boro harvesting as anticipated.

There are a couple of reasons why the labour immobility did not hamper much the Boro harvesting. For instance, since the beginning of the lockdown announcement, many people left for their villages. Such 'lockdown announcement migration' increased the pool of local labours. As a result, even though there was a shortage of 'seasonal migrant' labours, it did not have much impact on the Boro harvesting in terms of labour supply and labour wage. Therefore, the impact on the Boro harvesters was minimal. However, the impact on the 'seasonal migrant' workers was significantly different. As has been

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[4] One variety of Aman paddy is also transplanted in Mid-March-Mid April
[5] Source: Yearbook of Agriculture Statistics 2019, BBS

reported in the news media, amidst the lockdown many 'seasonal migrant' labours actually migrated to the harvesting regions. But, due to the lockdown, the transport cost for these migrant workers was several folds higher than any other normal season. The 'net income' of these migrant workers, therefore, was much lower due to the pandemic compared to the pre-pandemic scenario. Moreover, not all the workers who wanted to migrate to the harvesting regions could do so. As a result, the income shock on such migrant labours 'who could not even migrate' was surely much larger.

Like Boro harvesting, the shortage of 'migrant labours' did not cause much chaos to other agricultural producers. Therefore, the impact of the pandemic on the producers did not transmit through the production function. Rather, the impact is transmitted to them through the profit function and the market price mechanism. Due to the disruption in local transport, the transport price soared across the country. Some estimates suggest the transportation cost increased by more than 30% during this pandemic.[6] Moreover, the active hours of business operation were severely limited. In combination, both disrupted the supply chain severely. For instance, the local Haat-Bazaars (or local wholesale markets) were restricted to operate only for a couple of hours once or twice a week. Most of the small and marginal producers rely on Haats to sell their products. Due to the restrictions, the number of buyers and sellers in Haats significantly fell. Such a fall in the number of buyers, increased transport costs, and restrictions on operational hours raised the uncertainty for the sellers in the product market. Therefore, the total expected profit fell for the producers. Such disruptions severely affected the producers, petty traders as well as consumers solely reliant on weekly Haats. Notwithstanding, large producers or commercial farmers might have a relatively lower impact. A strong buyer-seller network or near-fixed buyer-seller relationship ensured more symmetric information for such large farmers compared to small producers.

Amongst other agricultural sectors, both poultry and fisheries took a deep toll during this pandemic. Lower demand for poultry and dairy goods resulted in lower prices of poultry and dairy commodities: the price of chicken dropped as much as 75% while the egg prices dropped by more than 50% within the first few weeks of the lockdown.[7] Reports suggest that the loss in the poultry sector could be as much as Tk 17 billion. There are more than 6.5 million workers working in the poultry sector alone (LFS, 2017). According to the industry insiders, 50% of the small farms out of 83,000 poulters might not survive the crisis if it prolongs. At the current market price, the cost of rearing a chicken is higher than the selling price. Such a fall in price would result in a fall in the production of agriculture and dairy products for the next season.

In the case of dairy products, the per day production of marketable milk products in Bangladesh is close to 15 million litres; of them, 2.5 million remained unsold during the lockdown.[8] This plummeted demand for dairy products stemmed from several factors. Since the start of the lockdown, all the pasteurisation plants stopped procuring milk. Moreover, another major source of dairy demand – the sweetmeat makers were also under business closure directive from the Government during the lockdown. More than 12 million people who are directly or indirectly engaged in the dairy sector suffered from the supply chain disruption.[9]

The impact of the lockdown can also be traced to the fisheries sector. Due to the fall in demand and shortage of transport, most of the fish farmers either had to keep fish in ponds or sell them at the local markets. Both have price implications. Noteworthy to mention, commercial fish farming has a

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[6] https://tbsnews.net/economy/rural-economy-reels-shutdown-63994; accessed on 19 May 2020

[7] https://www.dhakatribune.com/health/coronavirus/2020/04/03/coronavirus-local-poultry-industry-facing-a-massive-loss; accessed on 19 May 2020

[8] https://www.dhakatribune.com/health/coronavirus/2020/04/03/coronavirus-local-poultry-industry-facing-a-massive-loss; accessed on 19 May 2020

[9] *ibid*

high degree of regional agglomeration or clustering in Bangladesh. Most of the commercial fisheries or hatcheries are concentrated around Mymensingh, Kishoreganj, and Netrokona, among other districts. Due to the lockdown, there was an oversupply of fish in such clusters lowering the market price for fish. Unlike crop and horticulture, the variable cost in poultry, dairy and fish farming is much higher due to the price of feeds and poultry medicines. Since the start of the crisis, the feed prices of poultry, livestock and fish have increased by several folds. Keeping fish in ponds is, therefore, more expensive now than before. On top of that, due to labour shortages during the lockdown, many hatcheries remained closed across the country.

Figure 7: Exports of frozen fish and shrimps
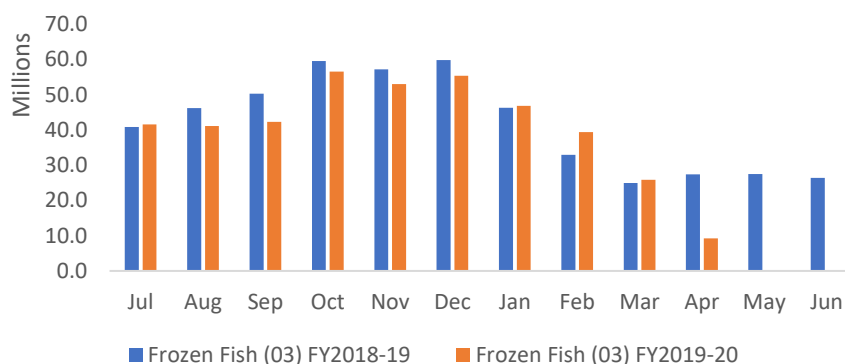
Source: Authors' estimation based on EPB Dataset; All the categories under HS (03) considered as frozen fish and shrimps

Fish processing particularly, frozen shrimp and crabs, and dried fish production also suffered due to the lockdown. During the lockdown – the economic activities remained stranded in Cox's Bazar – one of the largest fish sites in Bangladesh leaving thousands of workers related to this sector out of work.[10] The frozen shrimps and crab farming in the country remained at a halt. Both the fall in demand at the destination market and the closure of the airports in the country contributed to a steep fall in exports in this sector. The month-to-month comparison of export growth of these products (HS 03) shows that, even in March 2020, the export growth in the sector was positive (Figure 7). However, in April 2020, this sector's export fell by 67%. Apparently, the lockdown in the country attributed more to this fall than the demand slump in the destination countries. Due to the halt in exports, the frozen fish, shrimps, and crab farmers sold their products in the domestic market. The oversupply caused a further fall in prices which were already low due to demand slacks. As a consequence, the farmers who solely relied on the domestic market for these commodities were eventually got more affected.

3.1.2 Transmission mechanism in the manufacturing sector

The disruption in the supply chain has caused severe consequences in manufacturing production. The manufacturing sector heavily relies on the supply of raw materials as well as capital machinery. Bangladesh's major sources of manufacturing raw materials and capital machinery are China and India. Imports from both these countries remained stagnant since the onset of the pandemic. Noteworthily this fall in raw material import is a result of economic standstills both at home and abroad. On one hand, most of the source countries were under economic lockdown limiting options for raw material importers. In many cases, the cost of importing from the source countries increased significantly. On the other hand, there was a fall in demand for raw materials in the country due to the 'economic activity restrictions' or cancellation of existing orders, etc. Moreover, import cost

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[10] Source: https://tbsnews.net/economy/rural-economy-reels-shutdown-63994

includes bank interest rates (against the line of credits), transport fares, as well as inventory costs. All of these could instigate many importers of raw materials and capital machinery to halt imports. The Chattogram port, which handles 80% of the total external trade of the country, ran over its capacities as importers did not release their products from the port authorities since the beginning of the lockdown.

Due to such shortages in imports, many small and medium manufacturing enterprises were more severely affected than the larger ones. The larger factories, thanks to their well-established networks as well as capacity for raw material and machinery inventories, were able to run their operations amidst a short-term supply disruption. In the case of small and medium enterprises that mostly rely on parts and raw materials from the local dealers suffered from the supply chain disruption most. An inevitable consequence of such supply chain disruption is the rise in the price of raw materials. As a result, the price of finished goods also increases. To the small and medium manufacturers, such a rise in price only results in a deeper fall in total revenue due to an elastic demand curve. With fewer assets, less access to financial sources and higher borrowing constraints, an unprecedented supply chain disruption such as the current one only means an existential crisis for SMEs.

In the manufacturing sector, one of the largest impacts of this pandemic crisis will be on the readymade garments (RMG) industry. The work orders in the RMG sector are expected to reduce by 30% as global clothing consumption is projected to fall by 65%.[11] According to key industry insiders, the total loss in the RMG sector could be as much as $5 billion attributable largely to the global pandemic. A month-to-month comparison of the RMG export reveals that the sector had already a negative export growth compared to FY2018-19 (Figure 8). The onset of the pandemic exacerbated the falling growth rate. The export in March 2020 was 20.1% lower than in March 2019. In April, most of which all the RMGs in the country were under lockdown, the export growth in the sector fell by 85%. Since the RMG comprises more than 84% of the country's total export basket, the total export growth tails the following pattern. In April 2020, Bangladesh's total export was 83% lower than in 2019 (Figure 9 and 10).

Figure 8: Trend of exports of RMG

Figure 9: Trend of total exports
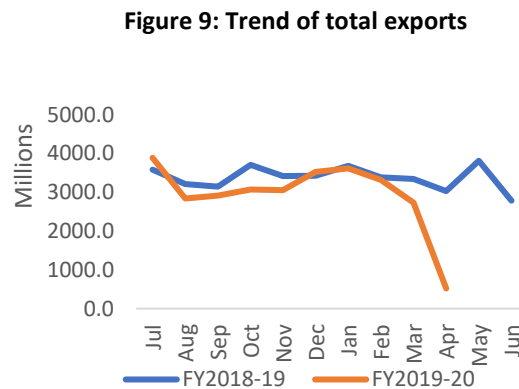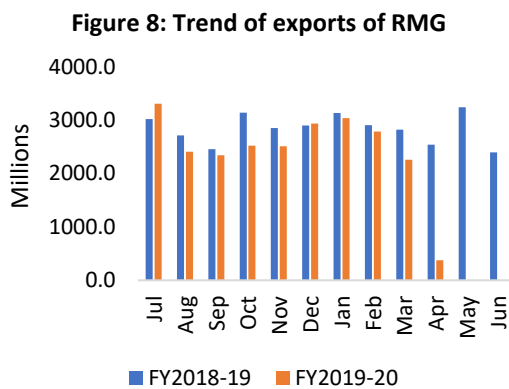
Source: Authors' estimation based on EPB data; latest available data as of 3 June 2020

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[11] Source: Dhaka Tribune, 4 June 2020; accessed on 4 June 2020.

Figure 10: Month-to-month export growth by major products
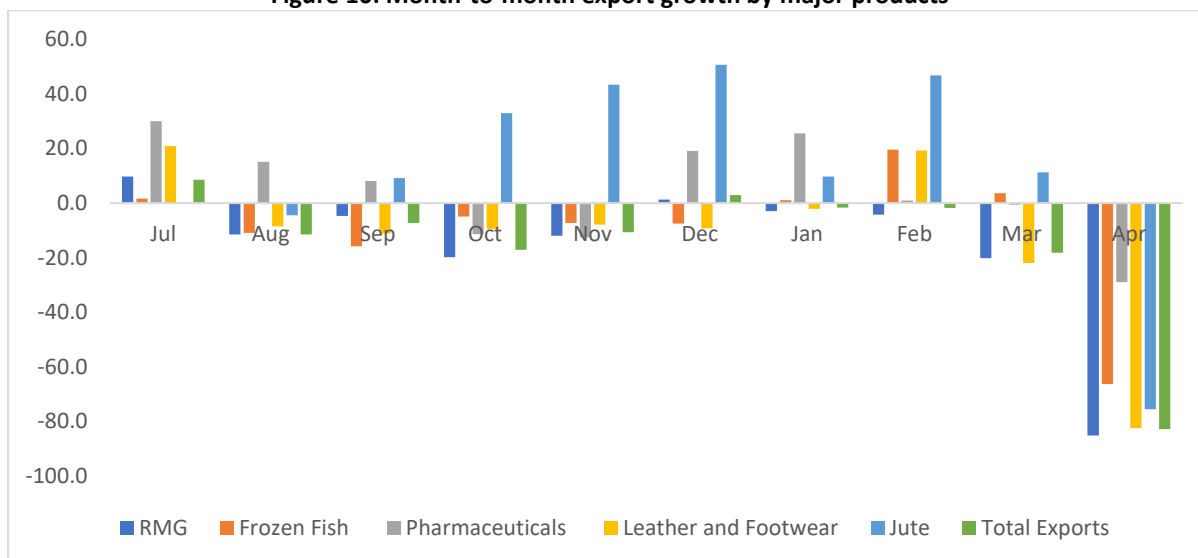
Source: Authors' estimation based on EPB data; latest available data as of 3 June 2020

The fall in the RMG exports will have severe consequences on the economy as well as on the poverty dynamics. As many as a quarter of the sector's four million workers might be laid off.[12] However, even if the job cut is not as large as it is being projected, there are expectations that the wage in the sector could fall sharply. Also, during the lockdown, there are reports that many RMG workers received as much as 40% lower wages than usual. The job cut, or the fall in the RMG wages, will have adverse consequences on poverty. As already mentioned in section 2, more than 18% of the total RMG workers are poor. Therefore, these will only deepen the poverty crisis further.

Nonetheless, another large consequence of the fall in the RMG exports will be on the backward and forward linking industries such as textile spinning, dyeing, weaving, packaging and accessories, etc. Hundreds of thousands of workers engaged in these sectors would also face job losses and/or wage cuts.

3.1.3 Transmission mechanism in the service sector

The transmission channel of the domestic lockdown to the services sector is slightly different from the agriculture or the manufacturing sector. As has already been noted in section 2, more than a quarter of the workers in the transport sector and the workers in the food and beverages service activities (such as restaurant services) are already below the poverty line. A 25 percentage upward shift in the upper poverty line would bring more than 20 percentage points of additional workers in these sectors below the poverty line.

In terms of employment, the largest service sector in the country is wholesale and retail trade where more than eight million workers are engaged (LFS, 2017). The pandemic lockdown collided with two major public events in the country: The Pahela Boishakh (14 April), and the Eid-ul-Fitr festival. In combination, these two festivities solely bring more than half of the yearly return to the major portion of wholesale and retail traders. Under the pandemic set-in, the income of the workers in this sector has significantly decreased.

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[12] Source: Penn State Centre for Global Worker's Rights (April 2020)

Transport, the second-largest source of employment in the service sector employing more than 6 million workers, also faced the severity of the crisis. Workers in the sector, such as rickshaw pullers, van drivers, auto and car drivers, and boatmen, amongst others had negligible income during the lockdown period. A quarter of all transport workers were already below the poverty line even before the pandemic set in. The fall in income of the workers in this sector during the crisis means the number of workers below the poverty line has surely increased.

Another major sector dented severely by the pandemic is the restaurants and food-related services. More than 1 million workers are employed in this sector (LFS, 2017). During most of the period of the lockdown, all the restaurants across the country were closed - meaning workers in the sector were basically incomeless. Also, as restaurants are major consumers of agricultural products in the value chain, the impact of the closure is transmitted all through the chain.

Amongst others, hawkers, workers in the tourism and hospitality sector, cleaners, helpers and domestic workers, tailors, barbers, etc. faced a severe crisis during this period.

3.1.4 Transmission of income shock through fall in remittances

The pandemic has so far extended to 210 countries and regions of the world, significantly distressing the global economy. Since the outbreak of the deadly virus is being prolonged, the world is continuing to impose a shutdown situation completely or partially. As a result, major parts of the global economy are forced to suspend or slow down their economic activities. As the economic activities are suspended abroad, there will be impacts on the Bangladesh economy through migrant employment crisis and a fall in income from external sources.

There is no denying that remittance is one of the founding contributors to Bangladesh's development success over the past couple of decades (Raihan et al, 2009). Bangladesh is one of the largest remittance-receiving countries in the world. In the first six months of the FY2019-20, Bangladesh received $9.4 billion as remittances: a 25.5% increase compared to July-December in FY2018-19 (Figure 11). However, since the onset of the crisis in January, the remittance inflow started to fall. In March and April 2020 Bangladesh received $1.3 and $1.1 billion as remittances, a 12.5% and 24.3% fall on a year-to-year basis.

Figure 11: Remittance inflows by months
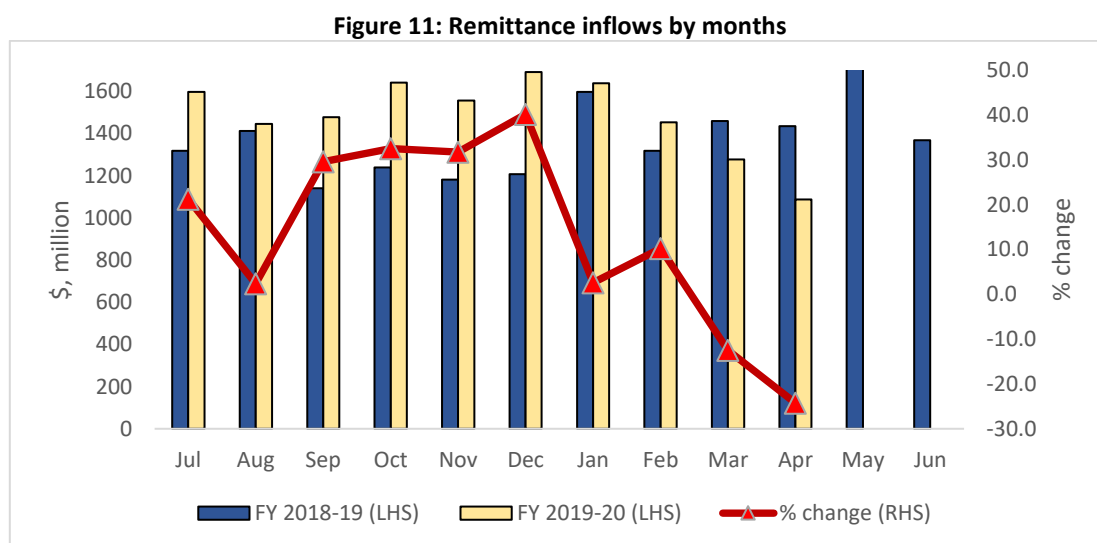
Source: Authors' estimation based on Bangladesh Bank data; data available up to April 2020

Figure 12: Crude oil price and remittance inflows by 'source country groups' (FY2019-20)

Crude oil price and remittances by source country groups
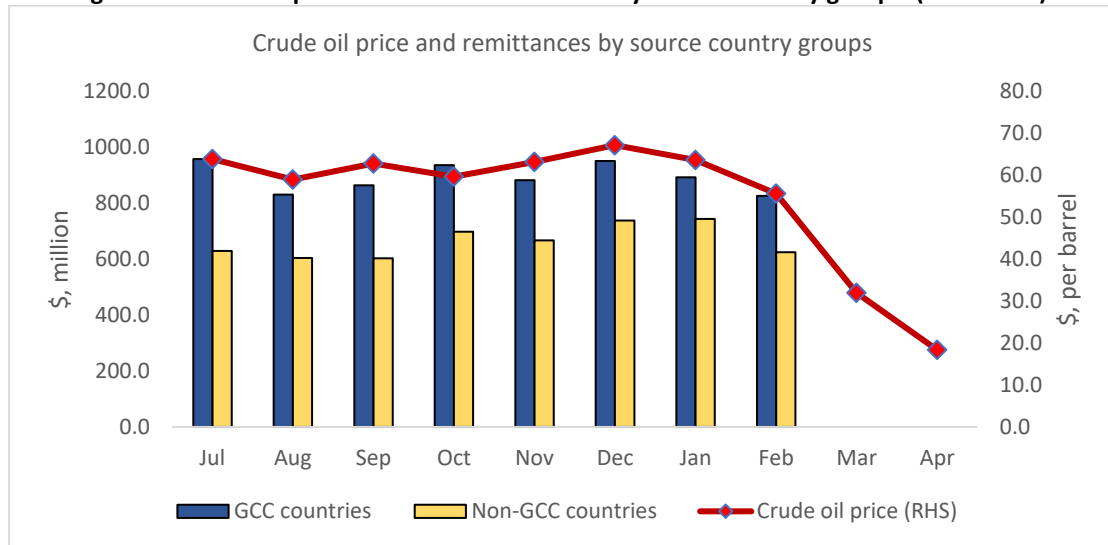
Source: Authors' estimation based on Bangladesh Bank data; remittances data available up to February 2020; crude oil price data has been taken from the U.S. Energy Information Administration (EIA)[13]

Directly or indirectly, the fall in remittances is primarily induced by the coronavirus pandemic. The direct impact emerges from the economic lockdowns in the destination countries and therefore months-long stagnancy in earnings. The indirect impact stems from the sharp fall in oil prices in the global market. As the world came to a standstill since the start of the pandemic, the global oil demand fell sharply. The falling oil prices stimulated a sharper fall in remittances from the Gulf Cooperation Council countries (GCC) (Figure 12). As evident in Figure 12, compared to the remittances from the non-GCC countries, remittances from the GCC countries fluctuate significantly with international oil price changes. With slack in demand and economies running on recessions, there is little hope that the oil market will turn around soon. As a result, the total inflow of remittances from the GCC countries could remain low even in the post-crisis period. However, due to a severe economic crisis, the inflow of remittances from the non-GCC countries might well remain low.

In fact, the crisis may deepen further in the post-pandemic world, particularly in the non-GCC countries such as the USA, Italy, and Malaysia. Due to the demand shortfalls, it is inevitable that there will be higher levels of unemployment in the migration destination countries. During economic downturns, migrant workers from foreign origins are disproportionately affected (Taran, 2009). Migrants who remain employed are often face reduced pay, working hours, or worsened working conditions. Often xenophobic violence deepens such crisis (Bartlett, 2010). Not being included in the social safety net coverages also adds miseries to the migrant workers. All these indicate an inevitable fall in remittance inflow even in the post-pandemic world. The World Bank (April 2020) projected that the remittance inflow to Bangladesh might fall by 22% while the global remittances might drop by 20%.

The fall in remittance inflow will have direct impacts on poverty, inequality as well as food security. Around 12% of the remittance-receiving households are already under the poverty line. Moreover, according to the HIES 2016, remittance-receiving households spend on an average 45% of the total remittances after food consumption expenditure.[14] As a result, a fall in remittance income would make the remittance-receiving households more vulnerable to poverty and food security.

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[13] https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=RBRTE&f=M; accessed on 1 June 2020
[14] Authors' estimation

The observations in this chapter detail the transmission mechanism of how the supply chain disruption, as well as global economic depression, might channel up to the poverty and inequality dynamics in Bangladesh. The backdrop identifies that these impacts will transmit through employment or price shocks to the workers employed in the major economic sectors. Consequentially, these impacts would result in significant income shocks pulling millions of people in Bangladesh below the poverty line. The following section estimates the likely poverty rates in the country based on income fall simulations.

Section IV: Simulation Methodology and Results

4.1 Methodology

To estimate the poverty impact of COVID-19, this study has assumed different shock scenarios considering the transmission mechanisms discussed in section 3, and other secondary information. Then, by simulation exercise, it attempted to identify their impact on overall poverty, region-specific poverty, and industry-wise poverty rates. The scenarios include uniform income shock, differential income shock by industry, and a shock in remittance earnings.

Poverty is calculated by applying the Cost of Basic Needs (CBN) approach. The CBN method consists of calculating the cost of obtaining a consumption bundle believed to be adequate for basic consumption needs. A person who can afford the cost of this basic consumption needs bundle is nonpoor. In contrast, if a person cannot afford the cost of this bundle then he is poor. Poverty lines under the CBN method, therefore, represent the minimum per capita expenditure that a person needs to be able to afford to meet his basic needs.

Starting in 2000, the HIES defined 16 different geographical strata that have been used since then to estimate the cost of the basic consumption bundle. This study has also considered 16 different geographical strata. The estimation of this bundle at different geographical levels allows accounting for the cost of living differences across areas and therefore provides a more accurate picture of living standards after accounting for price differences across geographic areas.

The first step for estimating a poverty line consists of estimating the cost of this basic consumption needs bundle for food. The basic consumption bundle consists of eleven items: coarse rice, wheat, pulses, milk, oil, meat, fish, potatoes, other vegetables, sugar, and fruits, as recommended by Ravallion and Sen (1996) following Alamgir (1974). This basic consumption bundle provides the minimal nutritional requirements corresponding to 2,122 kcal per day per person. The price for each item in the bundle is estimated using the median of the unit values (price per unit) for each of the items reported by a reference group of households calculated separately for each stratum. The food poverty line is then computed for each stratum by multiplying the estimated prices with the quantities in the food bundle.

Once the food poverty lines have been estimated as the minimum cost of the basic consumption needs bundle for each stratum, the second step consists of computing non-food allowances using two different methods. In the first one, the non-food allowance is estimated by taking the median amount spent on non-food items by a reference group of households whose total per capita expenditure is close to the food poverty line. The non-food allowance estimated using this method is called the "lower non-food allowance". In the second method, the non-food allowance is estimated by taking the median amount spent on non-food items by a reference group of households whose food per capita expenditure is close to the food poverty line. The non-food allowance estimated using this method is called the "upper non-food allowance". Lastly, the food poverty lines are added to the lower and upper non-food allowances and this yields the official upper and lower poverty rates at the stratum level (16 upper poverty lines and 16 lower poverty lines).

4.1.1 Data description

This study has used the latest Household Income and Expenditure Survey (HIES, 2016) and the latest Labour Force Survey (LFS, 2017) of BBS. This is noteworthy to mention that, at the time of the study, there were no other nationally representative data to carry out a comprehensive poverty dynamics analysis. HIES provides the most comprehensive indicators for estimating household consumption,

income, expenditure, the incidence of poverty and inequality in Bangladesh. The data collection period for HIES 2016 was from April 2016 to March 2017. The data covers 46,076 households (70% rural; 30% urban) and the sampling design enables to estimate of impacts at the district (Zila) level.

4.1.2 Measures of poverty and its indicators

For estimating poverty, this study applies the Foster-Greer-Thorbecke (FGT) index, a widely used measure of poverty. It is noteworthy to mention, the BBS also follows the FGT index for measuring the poverty rates. The FGT measure of poverty for a given population is defined as

$$FGT_\alpha = \frac{1}{N} \sum_{i=1}^{H} \left(\frac{z - y_i}{z}\right)^\alpha$$

Where N is the size of the population, H is the number of poor people, y_i is the income of the 'i'th individual, and z is the poverty line income. As has already been mentioned, this study uses the CBN method for defining the poverty line income. The α in the FGT index can take 0, 1, or 2, and based on the value of α, the index provides three major measures of poverty.

When α = 0, the FGT index provides the Head Count Ratio (HCR):

$$FGT_0 = HCR = \frac{H}{N}$$

The head count ratio measures the incidence of poverty showing the percentage of the population in a given region living below the poverty line. However, the HCR does not provide the depth of the poverty; i.e. how far are the poor below the poverty line. With α = 1, the FGT index provides us with the poverty gap ratio which shows such depth of poverty:

For α=1:

$$Poverty\ Gap\ Ratio\ (PGR) =\ FGT_1 = \frac{1}{N} \sum_{i=1}^{H} \left(\frac{z - yi}{z}\right)$$

The PGR estimates the depth of poverty by measuring how far, on average, the poor are from the poverty line in a respective region. If two districts have the same level of headcount poverty rates but different PGR, the region with higher PGR would indicate a deeper poverty crisis. However, the PGR does not consider the severity of the poverty rates in different regions taking income inequalities into account. The FGT index measures the severity of poverty incidence by Squared Poverty Gap when α=2:

$$SPG =\ FGT_2 = \frac{1}{N} \sum_{i=1}^{H} \left(\frac{z - yi}{z}\right)^2$$

The SPG is basically a weighted sum of poverty gaps, with the weight proportionate to the poverty gap. This measure provides higher weight to those whose incomes fall far below the poverty line than those who are nearer to it. In regions where HCI and PGR are the same but SPG is different, a higher value of SPG would indicate a more severe poverty crisis.

Based on these exercises, this study also measures other important dimensions of poverty measurements, namely total poverty gap (TPG), average poverty gap (APG) and the average income shortfall (AIS).

The total poverty gap (TPG) measures the total required amount of funds necessary to pull up all the poor from a region to the poverty line. It is the sum of the difference between the poverty line and actual income levels of all poor populations. That is,

$$TPG = \sum_{i=1}^{H} (z - y_i)$$

Dividing the total poverty gap into the total number of poor people in a certain region, we get the average income shortfall (AIS):

$$AIS = \frac{TPG}{H}$$

Both TPG and AIS provide some very handy policy suggestions, such as where should be more resources be allocated, how much to allocate as poverty mitigating strategies to different regions, etc.

4.1.3 Simulation methodology

Assuming different sets of scenarios, this study undertakes different simulation exercises. In the first scenario, the study has assumed that a 3-month lockdown can lead to a fall in at least a quarter of a household's annual per capita income. A couple of rapid assessments have shown that the income of as many as 80% of the households decreased during the lockdown (BIGD, 2020). Estimates suggest that up to 75% of the total monthly income for poor households was suppressed during the initial phase of lockdown. A fall in income of this magnitude for three consecutive months could generate as much as a 23% fall in annual per capita income – which is close to our presumption.

Considering this scenario, by simulation exercise, the study attempts to find out the impact on different dimensions of poverty. In this regard, inducing a 25% income shock for all households, the study has measured the poverty headcount ratio by location and by industry and calculated other poverty measurements such as poverty gap ratio (PGR), squared poverty gap ratio (SPGR), total poverty gaps (TPG), and average income shortfall (AIS), etc. using HIES 2016 dataset.

Since the study has used the 2016's dataset, all types of poverty estimation have been updated to the 2020's level. According to HIES 2016's dataset, the national poverty rate was 24.3. Bangladesh Bureau of Statistics (BBS) recent estimates provide that national poverty has been reduced to 20.5%, this implies that from 2016 to 2020 national poverty rate reduced by 15.8%. By assuming uniform reduction for all regions, the study has updated the 2016s poverty rates to the 2020s. After inducing a 25% income shock, reducing monthly per capita expenditure by 25%, and then comparing with poverty lines, the study has found a new set of poverty rates for all regions. After that, it calculated the percentage change in the poverty rate for each region and considering those percentages it calculated updated poverty rates for every region. For instance, after inducing a 25% income shock national poverty rate was found 48.6%. This implies that the national poverty rate increased by 99.5% at the 2016s level. Thus, to get an updated national poverty rate the study increased the 2020s national poverty rate, 20.5%, by 99.5%, which is found 40.9%. Thus, with a negative income shock of 25%, the overall poverty rate is estimated to be 40.9%.

Applying the same methodology, the simulation exercise is carried out for different income shocks for alternative scenarios, such as 5%, 10%, 15%, and 20%. However, for the brevity of analysis, all these scenarios are put in the annexe.

4.2 Simulation results

4.2.1 Impact on poverty under different scenarios by regions (districts and divisions)

The simulation results suggest that (Table 5), due to a negative income shock of 25%, the national poverty rate will increase to 40.9%, while the rural poverty rate will increase to 43.78% and the urban poverty rate will be 33.17%. This provided that due to the pandemic, at the national level, another 20.4% population will fall into poverty. Moreover, in Rural the poverty impact will be higher than in urban. In this scenario, the rural poverty rate will be increased by 21.57% while urban poverty will be increased by 17.26%.

Table 5: Impact of 25% general income shock on poverty

	Upper poverty (UP)	UP after 25% GIS	Percentage point change
National	20.50	40.89	20.39
Rural	22.21	43.78	21.57
Urban	15.91	33.17	17.26

Source: Authors' estimation based on HIES 2016 and updated to 2019

However, the change in poverty rates due to the 25% income fall will not be homogenous across divisions (Table 6). The estimates show that the Mymensingh division will be the most affected compared to other divisions: an additional 27.13% of the population of the division will fall into poverty. Though the Rangpur division's poverty will be increased by 19.93 % (second lowest), its actual poverty rate will be 59.70% which is the height among the divisions. Although the estimated impact is found to be relatively lowest for the Dhaka division (16%), as the initial hot spots of infections are concentrated in this division and many of these areas under this division have a high density of population, in reality, fall in income of households in these regions can be much higher than being estimated under the 25% income shock.

Table 6: Impact of 25% general income shock on poverty by division

Division	Upper Poverty (2020)	UP After 25% GIS	Percentage Point Change
BARISAL	22.30	43.36	21.06
CHITTAGONG	15.51	36.77	21.26
DHAKA	13.47	29.48	16.01
KHULNA	23.14	45.00	21.86
MYMENSINGH	27.59	54.73	27.13
RAJSHAHI	24.36	46.29	21.93
RANGPUR	39.77	59.70	19.93
SYLHET	13.67	34.57	20.90

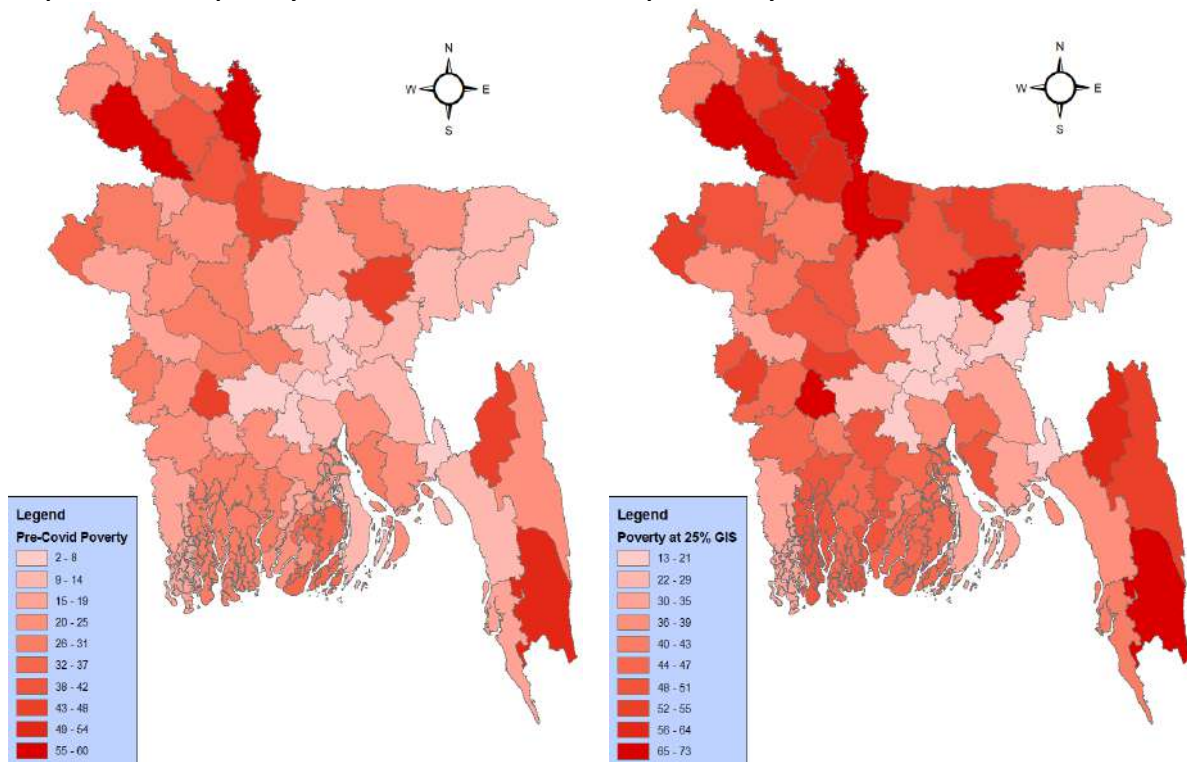*Source: Authors' estimation based on HIES 2016 and updated to 2019*

To understand the poverty rates at a more disaggregate level, we estimate the impact of a 25% income shock at the district levels (Annex 1: Table A.2). It is observed that given the geographical dynamics of poverty in Bangladesh, such a negative income shock on poverty rates will vary across the regions. The simulation results suggest that though at the national level an additional 20.4% of people will fall into poverty, 39 districts will experience a rise in the percentage of poverty more than the national average. For example, in Rangamati there will be an additional 30.9% of people falling into poverty. In the same fashion, other major affected districts with higher percentages (than the national average of 20.4%) of additional people falling into poverty will be Mymensing (30.2%), Sunamganj (28.7%), Cox's Bazar (27.5%), Nilphamary (27.2%), Narail (27.1%), Chottogram (26.9%), Netrokona (25.9%), Chuadanga (25.8%), Sherpur (25.6%), Barguna (25.5%), Shariatpur (25.3%), etc. Besides, such a

negative income shock will bring the poverty rate to more than 60% for some poorer districts like Kurigram (73.4%), Dinajpur (71%), Bandarban (69%), Magura (67.2%), Kishoregonj (66.5%), Jamalpur (44.2%), Khagrachhari (63.9%) and Sherpur (60.3).

The district levels poverty impact analysis can be elaborated through the analysis of poverty concentration in the country. Map 1 addresses the pre-COVID poverty scenario at the district level. From Map 1, it is observed that pre-COVID poverty rates are much higher in the Western region of the country such as Rangpur, Rajshahi and Khulna compared to the Eastern region such as Sylhet, Dhaka and Chittagong. Accordingly, to have an overview of poverty concentration after COVID-19, we estimate poverty rates at 25% general income shock (Map 2). It is observed that the east-west divide is still prominent in the case of poverty rates after income shock. The after-shock poverty rates will be comparatively lower in the Eastern part of the country (apart from Mymensingh Division and the Chittagong Hill Tracts) than that in the Western part.

**Map 1: Pre-COVID poverty rates at the district level**   **Map 2: Poverty rates at 25% GIS at the district level**

Source: Authors' estimation based on HIES 2016 and estimated to 2019

Although the east-west divide is prominent with regard to the poverty rates before and after the shock, it might not be true in the case of real poverty impact. Map 3 addresses this real poverty impact, which basically shows the percentage point difference of poverty rates between pre-COVID and the 25% General Income Shock resulting from COVID. It is observed that the real poverty impact due to the ongoing crisis has no prominent east-west divide, even though all districts across the country will not be equally affected. This is primarily because of the nature of the COVID-19 crisis, which is unprecedented and unpredictable. Nonetheless, established industrial agglomeration and rapid urbanization will indeed contribute to reducing post-COVID poverty rates at a faster rate in the Eastern part of the country compared to the Western part.

Map 3: Percentage point change in poverty rates
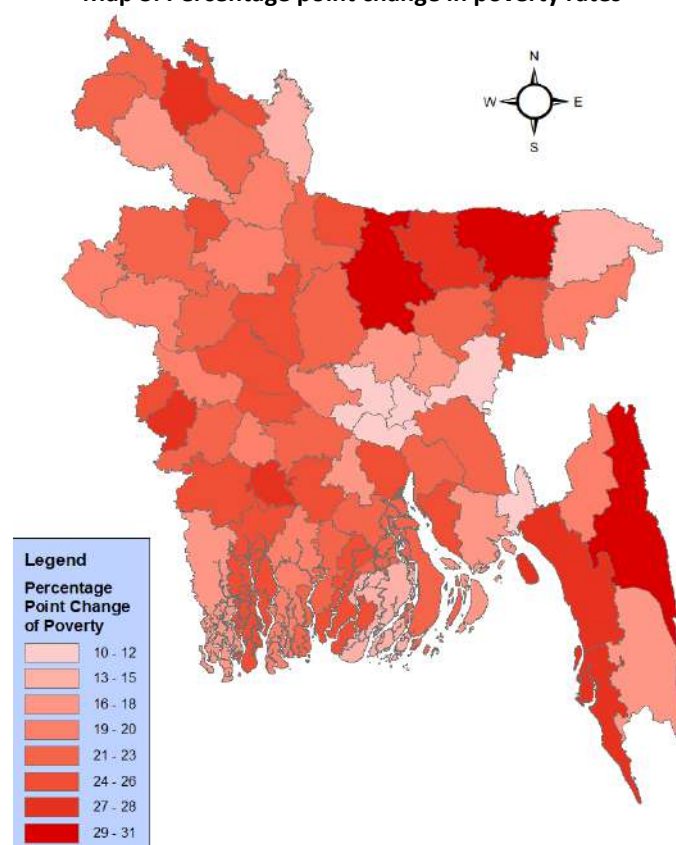
Source: Authors' estimation based on HIES 2016 and estimated to 2019

4.2.2 Impact of COVID-19 by other poverty measures

Poverty Gap Index (PGI) and Square Poverty Gap Index (SPGI) are two supportive measurements used to show the depth and severity of poverty over the Head Count Ratio (HCR). In addition, the total poverty gap (TPG) provides the total amount required to uplift all the poor above their poverty line for a region while the average income shortfall (AIS) provides an average estimate of how much (on an average) money would each poor need to be uplifted from poverty.

We find that, due to the 25% income shock, the total number of poor in the country will increase to 69.4 million from the existing 34.7 million (Table 7). The number of urban poor will increase from 7.3 million to 15.3 million while in the rural it will increase from 27.3 million to 53.8 million. The number of the new poor population increases in Dhaka (1.5 million), Chittagong (2.4 million), Comilla (1.4 million), Mymensingh (1.7 million), and Sunamganj (1.2 million).

Based on our simulation exercises we find that a 25% income shock will take the poverty gap ratio to 12.9 from its current value of 5.0 and the square poverty gap index to 4.8 from its current value of 1.5 at the national level. Therefore, the depth of poverty will increase by 2.5 folds, while the severity of poverty incidence will increase by more than 3 folds at the national level.

Like the headcount poverty rates, both the depth and severity of poverty vary by location. For rural, the poverty gap ratio will increase from 5.4 to 13.9; in urban, it will increase from 3.9 to 10.4. Before the pandemic, the rural SPGR was 1.7 while the urban SPGR was 1.2. Due to the income shock, the estimates show that the rural SPGR can increase to 5.2 while the urban SPGR can increase to 3.8. It suggests that, in terms of both depth and severity of poverty, the COVID-19 pandemic would disproportionately hurt the rural regions.

In terms of the total poverty gap, due to the pandemic, the TPG (per month) has increased to Tk 41 billion from Tk 15 billion, which means an additional Tk 25 billion per month would be required to pull up all the poor in the country up to the poverty line. Moreover, due to the income shock the average income shortfall per poor increases to Tk 592 per month from Tk 454 per month at the national level. This means on average, a typical household will require at least Tk 2393 per month, in addition, to being uplifted from poverty. Interestingly, unlike the HCR, PGI, and SPGI, the average income shortfall (AIS) is higher for urban poor households (Tk 2678) than the rural poor households (Tk 2316).

The division-wise estimates (Table 8) show that changes in both the poverty gap index and the square poverty gap index are highest for the Rangpur division and lowest for the Dhaka division, the values are 12.1 and 10.3 for Rangpur and 5.7 and 2.2 for Dhaka respectively. Moreover, the average income shortfall per household after the shock is highest for the Rangpur division (Tk 2,751) and lowest for the Khulna division (Tk 2,083). This particularly shows that the depth of poverty is more significant in Rangpur than in any other division. Moreover, the total poverty gaps in these regions are estimated to be: Barishal – Tk 2.4 billion; Chittagong – 8.2 billion; Dhaka – Tk 7.4 billion; Mymensingh – Tk 3.9 billion; Khulna – Tk 4.1 billion; Rajshahi – Tk 5.1 billion; Rangpur - Tk 7.4 billion; and Sylhet – Tk 2.3 billion.

We also examine the depth and severity of poverty by districts (Table 9). It is observed that there is a large variation in poverty by depth and severity among the districts. The simulation results suggest that though at the national level the poverty gap index will be 12.9 and the square poverty gap will be 4.8 after the shock, 36 districts will experience a higher poverty gap index and square poverty gap index than the national average. For instance, the PGR in Kurigram is 36.8, and SPGI is 18.3 which is the highest in the country. In the same fashion, other districts with most chronic depth and severity of poverty will be Bandarban (34 & 16.9), Dinajpur (32 & 14.5), Gaibandha (23 & 9.7), Jamalpur (25.9 & 10.8), Khagrachhari (26.9& 11.4), Kishoregonj (26.9 & 11.4), Magura (28.2 & 12.3, Rangpur (22.1 & 8.2) etc.

Moreover, the average income shortfall after the shock rises substantially for almost all districts. However, the AIS amount increases most for the poorer regions. For an instance, per month the highest AIS per household is observed in Bandarban (Tk 4579); Kurigram (Tk 3583); Khagrachhari (Tk 3497), Dinajpur (Tk 2943), Kishorganj (Tk 3509), Patuakhali (Tk 3119), Jamalpur (Tk 2662), Magura (Tk 2872) amongst others.

In terms of TPGs, the highest allocation amount would be required for Chittagong (Tk 1.9 billion), Dhaka (Tk 1.8 billion), Dinajpur (Tk 1.8 billion), Gaibandha (Tk 1.1 billion), Kishoreganj (Tk 2 billion), Kurigram (Tk 1.6 billion), Mymensingh (Tk 1.4 billion), and Rangpur (Tk 1.3 billion), amongst others. For the richer regions, both the TPG as well as AIS are significantly lower. As such, the total monthly requirement for Gazipur, Munshiganj, and Narayanganj would be Tk 81 million, Tk 22 million and Tk 16 million. The AIS per poor households in these regions is also one of the lowest in the country: Gazipur (Tk 1560), Munshiganj (Tk 1452); and Narayanganj (Tk 1353).

Table 7: Impact of 25% general income shock on PGI, SPGI and AIS

	Poverty Gap Ratio (PGR)	PGR at 25% GIS	SPGR	SPGR @25% GIS	Number of Poor (Million)	Number of Poor @ 25 % GIS	New Poor (Million	TPG (Tk, Million)	TPG at 25% GIS (Tk, Million)	Increase in TPG (Million Tk)	AIS per poor (Tk)	AIS per poor at 25% GIS (Tk)	AIS Per Poor HH (Tk)	AIS Per Poor HH @ 25 % GIS (Tk)
National	5.0	12.9	1.5	4.8	34.77	69.35	34.58	15771.6	41074.1	25302.6	454	592	1833	2393
Rural	5.4	13.9	1.7	5.2	27.31	53.83	26.52	11870.2	30660.2	18790.1	435	570	1767	2316
Urban	3.9	10.4	1.2	3.8	7.34	15.30	7.96	3837.3	10286.2	6448.9	523	673	2083	2678

Source: Authors' estimation based on HIES 2016

Table 8: Impact of 25% general income shock on PGI, SPGI and AIS by division

Division	Poverty Gap Ratio (PGR)	PGR at 25% GIS	SPGR	SPGR @25% GIS	Number of Poor (Million)	Number of Poor @ 25 % GIS	New Poor (Million	TPG (Tk, Million)	TPG at 25% GIS (Tk, Million)	Increase in TPG (Million Tk)	AIS per poor (Tk)	AIS per poor at 25% GIS (Tk)	AIS Per HH (Tk)	AIS Per HH @ 25 % GIS (Tk)
BARISAL	5.5	13.9	1.8	5.3	2.10	4.08	1.98	967.0	2426.0	1458.9	461	595	1914	2469
CHITTAGONG	3.5	10.4	1.0	3.6	5.81	13.77	7.96	2770.0	8156.7	5386.6	477	592	2091	2597
DHAKA	3.2	8.9	0.9	3.1	5.63	12.32	6.69	2645.6	7392.5	4747.0	470	600	1875	2394
KHULNA	5.2	14.1	1.5	5.1	3.77	7.34	3.56	1495.7	4080.7	2585.0	396	556	1485	2083
MYMENSINGH	6.4	17.1	1.9	6.2	3.39	6.72	3.33	1494.2	3947.2	2453.0	441	587	1706	2272
RAJSHAHI	5.6	14.8	1.6	5.4	4.80	9.12	4.32	1928.0	5144.3	3216.3	402	564	1499	2105
RANGPUR	11.9	24.0	4.2	10.3	7.02	10.54	3.52	3680.9	7427.7	3746.8	524	705	2046	2751
SYLHET	2.6	9.2	0.7	2.9	2.05	5.19	3.14	656.3	2254.8	1598.5	320	434	1565	2126

Source: Authors' estimation based on HIES 2016

Table 9: Impact of 25% general income shock on PGI, SPGI, and AIS by district

District	Poverty Gap Ratio (PGR)	PGR at 25% GIS	SPGR	SPGR @ 25 % GIS	Number of Poor (Million)	Number of Poor @ 25 % GIS	New Poor (Million)	TPG (Tk, Million)	TPG at 25% GIS (Tk, Million)	Increase in TPG (Million, Tk)	AIS per poor (Tk)	AIS per poor at 25% GIS (Tk)	AIS Per HH (Tk)	AIS Per HH @ 25 % GIS (Tk)
BAGERHAT	6	15.3	1.8	5.7	0.38	0.67	0.29	155.1	393.6	238.4	404	587	1535	2228
BANDARBAN	20.7	34	8.5	16.9	0.28	0.36	0.08	225.2	369	143.9	813	1028	3624	4579
BARGUNA	4.3	13.8	1.2	4.6	0.21	0.45	0.25	78.2	244	165.8	376	537	1481	2114
BARISAL	5.4	14.3	1.7	5.3	0.6	1.19	0.58	258.3	691.6	433.3	428	583	1778	2423
BHOLA	3	9.1	0.9	3	0.28	0.74	0.46	116.2	354.6	238.5	422	482	1876	2146
BOGRA	5.3	13.8	1.5	5.1	0.74	1.4	0.65	307.1	797.2	490.1	413	571	1425	1970
BRAHMANBARIA	1.8	5.5	0.5	1.9	0.35	0.74	0.39	152.5	467	314.5	431	627	2076	3022
CHANDPUR	5.6	14.8	1.5	5.3	0.7	1.33	0.63	327.2	880.3	553.1	465	662	1942	2764
CHAPAI NABABGANJ	9.2	20.3	3.1	8.3	0.34	0.71	0.37	132.3	369.6	237.2	482	669	1364	1815
CHITTAGONG	2	8.8	0.5	2.5	1.18	3.94	2.76	439.5	1931.7	1492.2	373	490	1630	2141
CHUADANGA	5	16.1	1.2	5.3	0.3	0.6	0.29	103.1	327.8	224.7	339	550	1218	1976
COMILLA	2	8	0.5	2.4	0.76	2.18	1.41	284.6	1120	835.3	372	514	1580	2180
COX'S BAZAR	3.3	10.5	1	3.5	0.48	1.43	0.95	243.8	758.6	514.8	505	530	2410	2530
DHAKA	1.7	5.6	0.4	1.8	1.14	2.61	1.47	534.9	1807.8	1272.9	471	692	1720	2530
DINAJPUR	17.3	32	6.2	14.5	1.7	2.23	0.53	953.7	1768.8	815.1	561	793	2082	2943
FARIDPUR	1.3	5.9	0.4	1.7	0.14	0.62	0.47	55	247.1	192.1	383	400	1585	1654
FENI	1.3	4.9	0.3	1.5	0.12	0.33	0.21	49.2	180.8	131.6	412	544	1720	2273
GAIBANDHA	11.2	23	3.7	9.7	1.04	1.54	0.49	519.2	1072	552.8	497	698	1881	2641
GAZIPUR	1	4.7	0.2	1.3	0.24	0.85	0.62	81.4	389.7	308.4	345	457	1179	1560
GOPALGANJ	5.5	15.1	1.5	5.3	0.35	0.67	0.32	144.6	395	250.4	413	586	1839	2606
HABIGANJ	2	8.1	0.5	2.4	0.32	0.98	0.66	94.7	372.8	278.1	294	381	1340	1734
JAMALPUR	12.6	25.9	4	10.8	1.02	1.53	0.51	562	1140.1	578.1	551	747	1965	2662
JESSORE	3.8	13.1	0.8	4.1	0.65	1.33	0.68	191.6	659.9	468.3	295	495	1086	1822
JHALOKATI	3.5	11.8	0.9	3.8	0.14	0.32	0.18	50.9	167.3	116.4	369	519	1557	2186
JHENAIDAH	5.2	14	1.5	5	0.43	0.85	0.42	177.8	474.9	297.1	412	556	1557	2098

District	Poverty Gap Ratio (PGR)	PGR at 25% GIS	SPGR	SPGR @ 25 % GIS	Number of Poor (Million)	Number of Poor @ 25 % GIS	New Poor (Million)	TPG (Tk, Million)	TPG at 25% GIS (Tk, Million)	Increase in TPG (Million, Tk)	AIS per poor (Tk)	AIS per poor at 25% GIS (Tk)	AIS Per HH (Tk)	AIS Per HH @ 25 % GIS (Tk)
JOYPURHAT	3.6	11.6	1	3.8	0.66	1.05	0.39	315.8	700.1	384.4	361	478	1958	2720
KHAGRACHHARI	12.7	25.9	4.2	11	0.33	0.48	0.15	200.3	410	209.7	599	849	2465	3497
KHULNA	6	15.7	1.8	5.8	0.61	1.17	0.56	262.1	685.8	423.8	429	587	1672	2289
KISHOREGONJ	13.2	26.9	4.4	11.4	1.75	2.59	0.83	996	2008	1012	568	776	2566	3509
KURIGRAM	22.3	36.8	9.1	18.3	1.44	1.77	0.33	944.1	1559.7	615.6	658	882	2671	3583
KUSHTIA	3.2	9.8	0.9	3.3	0.31	0.71	0.4	116.5	354.7	238.2	379	498	1404	1845
LAKSHMIPUR	7.9	17.8	2.7	7.1	0.6	1.12	0.52	361.9	808.4	446.5	603	725	2553	3069
LALMONIRHAT	8.9	21.2	2.7	8.2	0.53	0.88	0.36	231.4	552.9	321.5	440	626	1808	2572
MADARIPUR	0.4	3.4	0.1	0.8	0.04	0.26	0.22	10.6	85.7	75.1	254	326	1063	1361
MAGURA	14.4	28.2	4.9	12.3	0.49	0.69	0.2	254.7	500	245.3	520	725	2061	2872
MANIKGANJ	6.4	15.6	2	6	0.4	0.71	0.31	181.5	446.4	264.9	451	624	1789	2480
MAULVIBAZAR	1.7	6.7	0.4	2	0.25	0.77	0.52	73.3	294.1	220.7	293	382	1384	1804
MEHERPUR	5.1	15.6	1.2	5.2	0.16	0.31	0.15	55.2	167.5	112.3	339	536	1135	1794
MUNSHIGANJ	0.5	2.6	0.1	0.7	0.04	0.23	0.19	16.8	83.9	67.1	397	368	1578	1462
MYMENSINGH	3.7	12.7	1	4	1.07	2.81	1.74	407.4	1372.4	965	382	488	1467	1877
NAOGAON	6.7	16.6	2.1	6.3	0.15	0.37	0.22	55.8	177.8	122.1	436	597	1227	1627
NARAIL	2.5	10.1	0.6	3	0.11	0.33	0.21	35.9	141.6	105.6	321	435	1263	1710
NARAYANGANJ	0.3	2.2	0	0.5	0.08	0.45	0.38	22.1	164	141.9	295	361	1104	1353
NARSINGDI	1.9	6.5	0.6	2.1	0.24	0.65	0.41	97.7	330.4	232.7	414	509	1717	2111
NATORE	4.5	12.6	1.2	4.4	0.68	1.22	0.54	297.1	730.6	433.5	391	520	1515	2073
NETRAKONA	5.5	17	1.5	5.8	0.79	1.5	0.71	280.3	861.9	581.6	355	573	1505	2429
NILPHAMARI	5.6	16.9	1.5	5.8	0.55	1.11	0.55	201.6	608.9	407.3	364	550	1410	2129
NOAKHALI	5	11.9	1.5	4.5	0.82	1.45	0.63	430.9	1033.5	602.6	524	712	2387	3244
PABNA	6	16.2	1.6	5.8	0.81	1.49	0.68	311	836.3	525.4	384	562	1517	2220
PANCHAGARH	4.8	13.2	1.2	4.6	0.26	0.5	0.24	97.1	268.8	171.6	378	542	1489	2136
PATUAKHALI	9.4	18.5	3.4	8.1	0.54	0.79	0.25	308.6	599.1	290.5	569	756	2346	3119
PIROJPUR	6.8	16.7	2.4	6.5	0.33	0.59	0.26	154.1	372.7	218.6	474	637	1905	2559

District	Poverty Gap Ratio (PGR)	PGR at 25% GIS	SPGR	SPGR @ 25 % GIS	Number of Poor (Million)	Number of Poor @ 25 % GIS	New Poor (Million)	TPG (Tk, Million)	TPG at 25% GIS (Tk, Million)	Increase in TPG (Million, Tk)	AIS per poor (Tk)	AIS per poor at 25% GIS (Tk)	AIS Per HH (Tk)	AIS Per HH @ 25 % GIS (Tk)
RAJBARI	5.9	17.2	1.6	6	0.31	0.58	0.27	122.7	352.1	229.5	394	606	1518	2335
RAJSHAHI	3.8	10.9	1.1	3.8	0.5	1.08	0.58	194.2	569.6	375.3	388	528	1562	2121
RANGAMATI	4.2	14.8	1	4.6	0.18	0.41	0.23	64.2	228.7	164.5	363	564	1570	2439
RANGPUR	10.4	22.1	3.5	9.2	1.2	1.9	0.7	599.4	1264	664.6	500	667	1954	2603
SATKHIRA	3.9	10.2	1.3	3.8	0.32	0.67	0.35	143.7	370.6	226.8	449	550	1687	2069
SHARIATPUR	2.2	9.7	0.5	2.8	0.18	0.52	0.34	55.4	247	191.6	308	472	1294	1980
SHERPUR	8.9	20.9	2.8	8.1	0.5	0.87	0.37	239.8	561.7	321.9	478	646	1828	2471
SIRAJGANJ	5.1	15.2	1.4	5.2	0.92	1.8	0.88	320.8	959.8	639	348	532	1393	2129
SUNAMGANJ	3.9	14.1	0.8	4.4	0.88	2.03	1.15	252	912.8	660.8	287	450	1519	2381
SYLHET	2.5	7.3	0.9	2.6	0.6	1.4	0.8	238.7	668.1	429.4	397	477	1989	2391
TANGAIL	3.7	10.6	1.1	3.7	0.58	1.34	0.76	256.1	726.8	470.8	442	544	1604	1974
THAKURGAON	5	12.9	1.5	4.8	0.3	0.62	0.32	133	342.3	209.3	447	556	1715	2131

Source: Authors' estimation based on HIES 2016

4.2.3 Impact on poverty by occupational industries

As has already been noted in section 3, one of the fundamental sources of covid-19 impact transmission to the economy would be employment. In this respect, it could be valuable to identify the occupational sectors where the concentration of poor people is higher. Such thorough observation could provide critical policy suggestions for the government.

Due to the income shock, almost 52% of the total workers in crop and animal production will fall below the poverty line, an increase of 23.4 percentage points. This means, out of the 24 million existing workers in this sector, after the crisis, there could be as many as 12.4 million workers below the poverty line where 6.8 million workers are new poor.

In fishing and aquaculture, a 25% income shock will bring an additional 260 thousand workers below the poverty line taking the total number of poor in this sector to 560 thousand. A sector where more than 1.2 million workers are engaged – such an increase would mean an increase in the number of workers below the poverty line by 113%.

In the case of the textile and RMG manufacturing industry, a 25% decrease in income would increase the total number of poor in the sector from .9 million to 1.81 million (an increase of 107%). This means, almost 37% of the total workers (4.85 million) in this sector will be below the poverty line. With a 25% income shock, in the construction sector, the total number of workers below the poverty line will increase from 24.9% to 46.5% taking the total number of such workers to 1.63 million.

With a similar magnitude of income shock, the total number of poor in the major services sectors would be: 2.6 million (new 1.3 million) in the wholesale and retail trade, 2.34 million (new 1.1 million) in the transport, and .53 million (new .27 million) in the food and beverages services activities. All these sectors would experience a nearly 100% increase in the number of poor workers.

In total, out of the 63 million workers, due to the 25% income shock, our simulation shows that a total of 13 million new workers will fall below the poverty line in addition to the existing 14 million poor in the labour force. That is, the total number of workers below the poverty line would increase by almost 94%.

Table 10: Impact on poverty by industry

Description	Upper Poverty	Up at 25% GIS	Percentage point increase	Total Employment (million)	Num. of Poor (million)	Poor After Shock (million)	New Poor (million)	Poor Increased	% of Total New Poor
Crop and animal production	28.4	51.9	23.4	23.93	6.80	12.40	5.61	83%	39.2
Forestry and logging	33.9	59.2	25.3	.14	.05	.08	.04	74%	0.8
Fishing and aquaculture	21.1	45.8	24.7	1.22	.26	.56	.30	117%	2.5
Manufacture of food products	19.2	40.9	21.7	.73	.14	.30	.16	113%	2.6
Manufacture of textiles	18	37.3	19.3	4.85	.87	1.81	.94	107%	7.5
Manufacture of furniture	20.4	43.7	23.3	.80	.16	.35	.19	114%	2.3
Other manufacturing	25.4	45.8	20.5	.98	.25	.45	.20	81%	2.3
Construction	24.9	46.5	21.6	3.51	.87	1.63	.76	87%	6.9
Wholesale and retail trade	16.8	35.6	18.7	7.19	1.21	2.55	1.34	111%	11.5
Transport	24.8	47.2	22.5	4.95	1.23	2.34	1.11	91%	10.1
Food and beverage service activities	22.6	46.6	23.9	1.14	.26	.53	.27	106%	1.7
Other Services	12.2	27	14.7	4.55	.56	1.22	.67	120%	6.5
Others	15.6	33	17.4	8.25	1.30	2.74	1.44	111%	5.9
Total	**22.4**	**43.4**	**21**	**62.24**	**13.94**	**26.99**	**13.05**	**94%**	**100**

Source: Authors' estimation based on HIES 2016 and LFS 2016/17, and updated to 2019

4.2.4 Impact on poverty by employment categories under broad employment sectors

The simulation result (Table 11) shows that the overall poverty impact on the non-agriculture sector will be relatively more than the agriculture sector. Due to the income shock of 25%, the poverty rate of the non-agriculture sector will be increased by 101% whereas the poverty rate of the agriculture sector will be increased by 83.74%. But, in absolute terms, the poverty impact will be higher in the agriculture sector compared to the non-agriculture sector. Due to the shock, the poverty rate of the agriculture sector will be 51.37% (increased by 23.41 percentage points) and the poverty rate of the non-agriculture sector will be 38.94% (increased by 19.61 percentage points). Again, comparing the poverty rate in rural and urban reveal that for the agriculture sector the overall poverty impact will be relatively higher in rural (increased by 85.60%) than in urban (increased by 69.25%) but for the non-agriculture sector, the overall poverty impact will be relatively higher in urban (increased by 111.91%) compared to rural (increased by 95.09%). This is very obvious since agricultural employment is more concentrated in rural areas and non-agricultural employment is more concentrated in urban areas.

Like the aggregated employment level, in disaggregated employment level (Classify each employment sector into three categories) the poverty impact will have a similar pattern. For each disaggregated employment category the relative poverty impact (percentage change of poverty) will be higher for employment categories under the non-agricultural sector, but the absolute poverty impact (percentage point change of poverty) will be higher for employment categories under the agricultural sector. Again, comparing each disaggregated employment by rural and urban reveal that for each disaggregated employment category under the agriculture sector the poverty impact will be higher in the rural area than in urban, but for each disaggregated employment category under the non-agricultural sector, the poverty impact will be relatively higher in urban than rural. The simulation result also shows that the relative poverty impact will be highest for the urban non-agricultural sector employee (poverty will have increased by 138%) and lowest for the urban agriculture sector employee (increased by 45.4%). The absolute poverty impact will be highest for rural agriculture sector employees (increased by 28.73 percentage points) and lowest for urban agriculture employees (increased by 12.07 percentage points).

Table 11: Poverty impact by employment categories under broad employment sectors

	Employment Category	Agriculture				Non-Agriculture			
		Upper Poverty @ Baseline	Upper Poverty @ 25% GIS	Percentage Point Change	Percentage Change	Upper Poverty @ Baseline	Upper Poverty @ 25% GIS	Percentage Point Change	Percentage Change
National	Day Labourer	34.61	59.07	24.46	70.68	27.50	50.78	23.28	84.63
	Self Employed	20.90	43.17	22.27	106.54	15.59	33.72	18.13	116.30
	Employee	28.31	52.54	24.23	85.59	15.11	32.70	17.59	116.41
	Overall	27.96	51.37	23.41	83.74	19.33	38.94	19.61	101.45
Rural	Day Labourer	33.89	58.52	24.62	72.65	27.23	49.98	22.75	83.53
	Self Employed	21.03	43.58	22.56	107.27	16.78	35.51	18.73	111.67
	Employee	28.40	57.14	28.73	101.18	18.66	37.65	19.00	101.81
	Overall	27.68	51.38	23.70	85.60	21.39	41.74	20.34	95.09
Urban	Day Labourer	41.15	64.10	22.94	55.74	27.99	52.22	24.23	86.56
	Self Employed	19.85	39.70	19.85	100.00	13.94	31.23	17.29	124.08
	Employee	28.07	40.82	12.76	45.45	11.79	28.06	16.27	138.03
	Overall	30.28	51.25	20.97	69.25	16.68	35.34	18.66	111.91

Source: Authors' estimation based on HIES 2016 and updated to 2019

4.2.5 Impact on poverty by occupation categories

The simulation result also suggests that the poverty impact of COVID-19 will fall disproportionately on different occupations. The people in some occupations will be hit severely. Table 12 shows that the poverty incidence of skilled agricultural, forestry, and fishery workers will be increased by 23.65 parentage points and will reach 51.86%. Besides, occupation categories like plant and machine operators and assemblers, elementary occupations, and craft and related trades workers will significantly be affected. On the other hand, the managers and professionals will have been relatively safer from poverty impact.

Table 12: Occupation-wise poverty impact

Occupation Categories	Upper Poverty	UP @ 25% GIS	Percentage Point Change	Percentage Change
Managers	6.37	14.51	8.14	127.78
Professionals	7.39	19.50	12.11	163.95
Technicians and associate professionals	7.43	26.75	19.32	260.00
Clerks	9.47	24.21	14.74	155.73
Service and sales workers	15.86	34.46	18.60	117.30
Skilled agricultural, forestry and fishery workers	28.22	51.86	23.65	83.80
Craft and related trades workers	20.75	41.66	20.91	100.80
Plant and machine operators, and assemblers	24.28	46.48	22.20	91.42
Elementary occupations	25.58	46.72	21.15	82.67

Source: Authors' estimation based on HIES 2016 and updated to 2020

4.2.6 Poverty impact on youth

The youths are the heartbeat of a nation and have the ability to drive an economy forward by actively participating in political, economic, social, and cultural development issues. COVID-19 pandemic has significantly impacted youths in several dimensions such as health, education, employment, domestic violence, poverty, etc. Poverty impact on youth is the most burning issue as it limits educational, political, social, cultural, and physical power. According to our simulation results, due to the pandemic at the national level, the poverty rate will be increased by 20.40 percentage points and will reach 41.29%. This provided that another 9 million (approx.) youth will fall into poverty which will make a total of 18.20 million youth below the poverty line.

Table 13: Youth's families falling below the poverty line

	Upper Poverty	UP @ 25 % GIS	Percentage Point Change	Poor Youth (in million)	Poor Youth after shock (in Million)	New Poor (in million)
National	20.89	41.29	20.40	9.21	18.20	8.99
Rural	22.40	43.51	21.12	6.99	13.58	6.59
Urban	17.65	36.52	18.87	2.25	4.66	2.41

Source: Authors' estimation based on HIES 2016

4.2.7 Poverty impact on currently enrolled students

The COVID-19 pandemic made a huge bearing on the education systems of Bangladesh. The schools, colleges, and universities have been closed to prevent the transmission of the virus which has many consequences. Besides these direct consequences, COVID-19 might have some indirect consequences on education which may come through the poverty channel. According to our simulation results (Table 14), due to the 25 % fall in annual per capita income, a total of 43.90% of the students (16 million students) families could fall below the poverty line. Before the crisis, the percentage was 22.94, which implies that another 20.96% (which is equivalent to 7.71 million) of students' families will fall into poverty. Such fallout in poverty might have significant negative consequences. Students living in poverty may stop going to school (when school will be reopened). This dropout rate will eventually increase child labour, child marriage, and social decadence. Since many students might leave school before they acquire the basic skills and knowledge needed to thrive within society, which might be consequences on their income opportunities and health soundness which will eventually create generational poverty/cycle of poverty.

Table 14: Student's family below the poverty line

Education level	% below poverty line (pre-crisis)	% below poverty line (post crisis)	Percentage Point Change	Total number	Total number	New poor students
Primary	28.69	51.66	22.97	4,974,516	8,957,166	3,982,650
Secondary	21.10	42.38	21.28	2,210,716	4,439,786	2,229,070
College	12.00	30.19	18.19	250,126	629,149	379,023
University	7.04	18.98	11.94	72,430	195,219	122,789
Total	22.94	43.89	20.96	8,442,922	16,157,004	7,714,083

Source: Authors' estimation based on HIES 2016

Section V: Assessing Responsiveness of Poverty Rates to Income Shocks by Districts

5.1 An overall analysis of responsiveness of poverty to income shocks at the district level

As clearly noted in section-2.1, there is a regional divide in poverty dynamics in Bangladesh. However, the anecdotal analysis does not take into account the intra-region poverty dynamics. More specifically, the analysis does not capture the vulnerability of the population to varying levels of income shocks. That is, with each additional percentage change in income shock, what percentage of the additional population falls into poverty? At the national level, the relationship is linear, however, not one-to-one: for general income shocks of smaller magnitudes, such as 5% the national poverty rate in the country would increase by 3.3 percentage points. For GIS of 20%, 25% and 30% the poverty rate in the country would increase by 15.6 pp, 20.4 pp, and 25.3 pp. This analysis points out divergence in the poverty rates with respect to different income shocks. However, this trend might not be true homogenously for all the districts in the country. For instance, the dynamics of income shock in moderate to highly poverty-prone areas (which has higher poverty rates than the national average) could be very different from the least poor regions. The responsiveness of the percentage point change in the poverty rates to the income shock could view the distribution of the vulnerable poor across regions.

Figure 13: Responsiveness of the poverty rate to the income shock at the national level
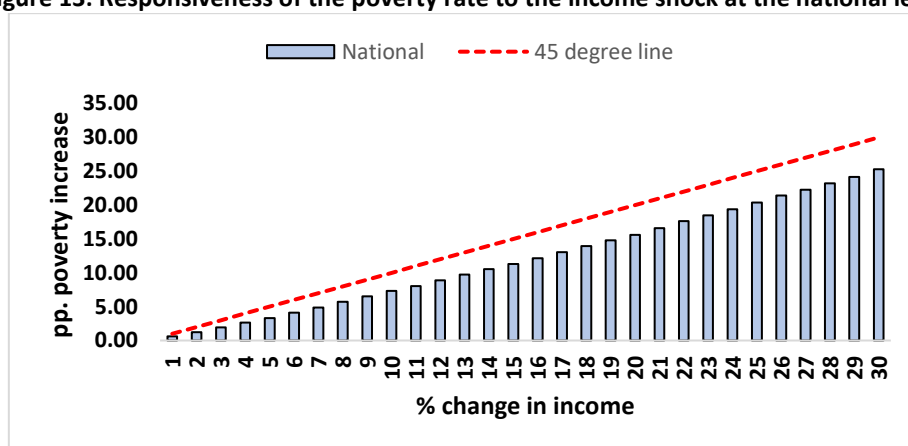
Source: Authors' estimation

Based on the responsiveness of the percentage point increase in the poverty rate to the percentage change in income we can differentiate the districts into five major clusters as follows:

i. **An initial constant rate but later increasing rate:**
For seven districts, namely Barguna, Rangamati, Cox's Bazar, Narail, Mymensingh, Nilphamari, and Sunamganj, where we see a distinct pattern between percentage points increase in poverty and percentage change in income. At lower income shocks, these districts exhibit a one-to-one relationship: if the income falls by 1%, the poverty rate also increases by 1%. However, if the income shocks are substantially higher, the rate of poverty increase in these seven districts would be more than the fall in income. This means a larger proportion of vulnerable people are more clustered around after a certain income threshold. For instance, in Mymensingh, a 15% fall in income would result in an additional 15% poverty in the district. However, any income fall greater than 17% will cause a poverty rate increase of more than 17% in Mymensingh.

Figure 14: Districts with an initial constant rate but later increasing rate of poverty
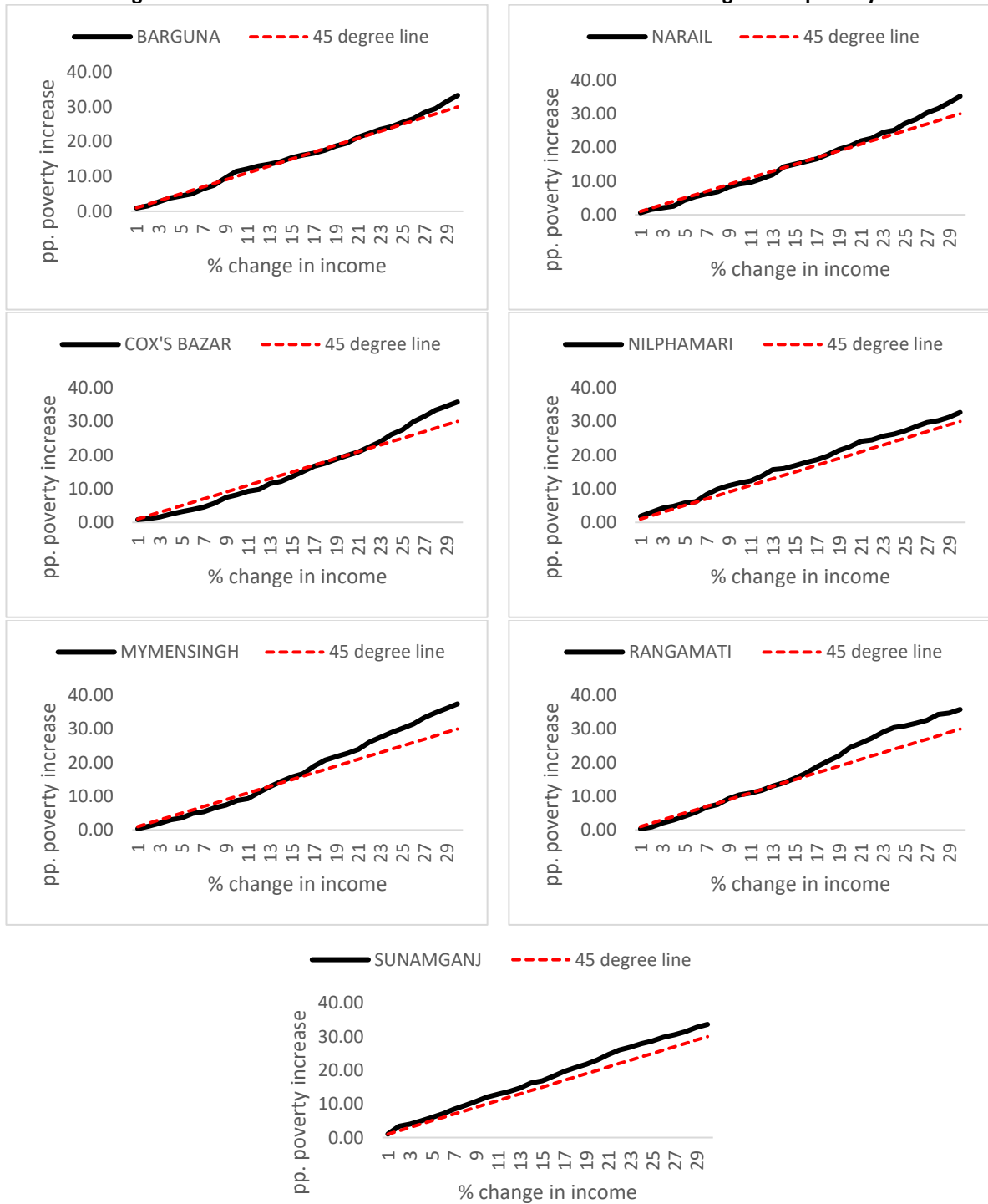
Source: Based on authors' simulations

ii. **An equal proportionate increase in poverty rate as the change in income:**

For another set of 16 districts (such as Chittagong, Meherpur, Netrokona, etc.) we observe an almost equal proportionate increase in the poverty rates with income changes (Figure 15). For each level of income shock, an equal percentage of the population falls below the poverty line. The distribution of vulnerable populations is almost homogenous for these districts. One% fall in income would result in nearly 1% of the additional population falling below the poverty line for these districts.

Figure 15: Districts with an equal proportionate increase in poverty rate as the change in income
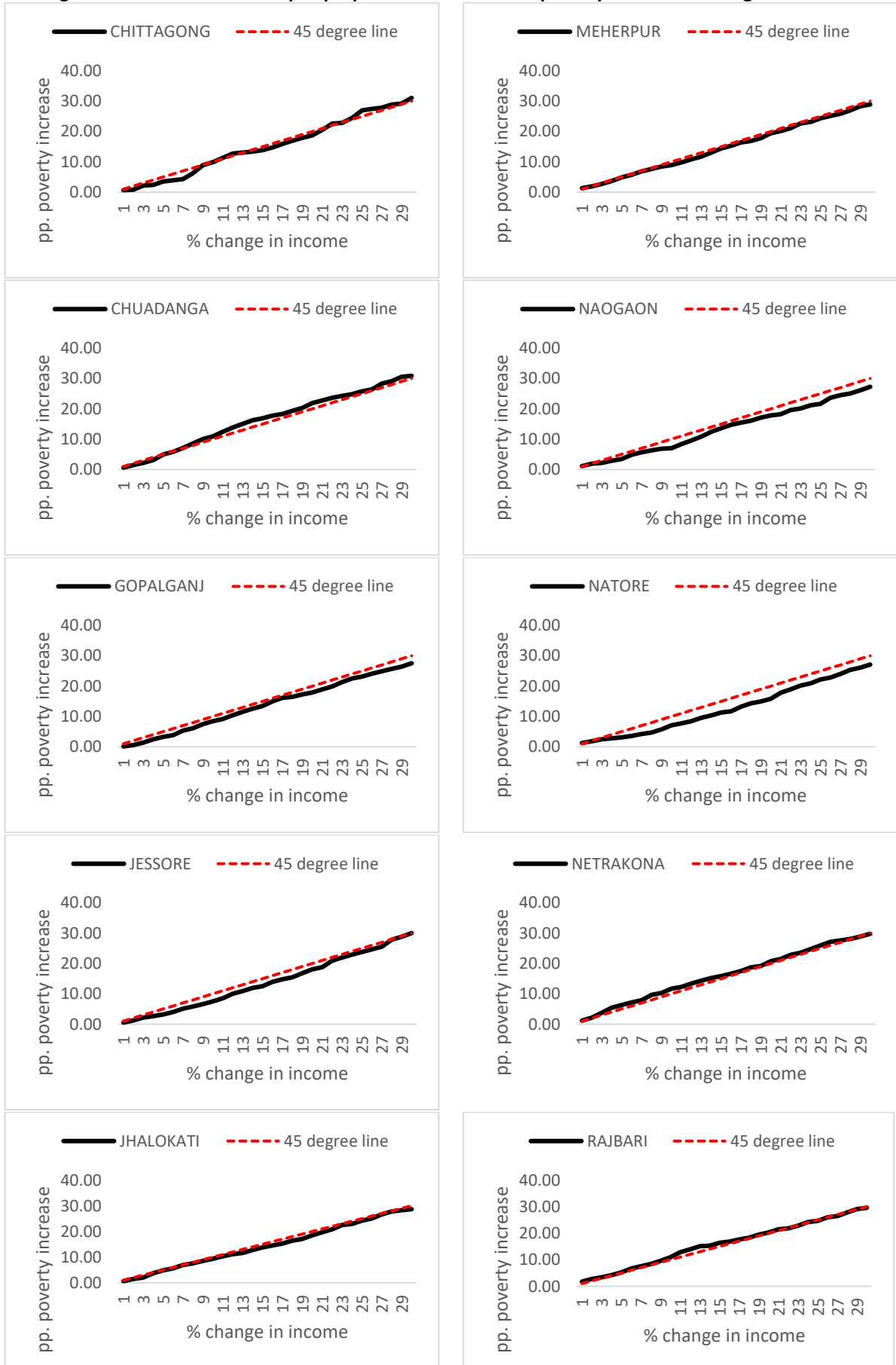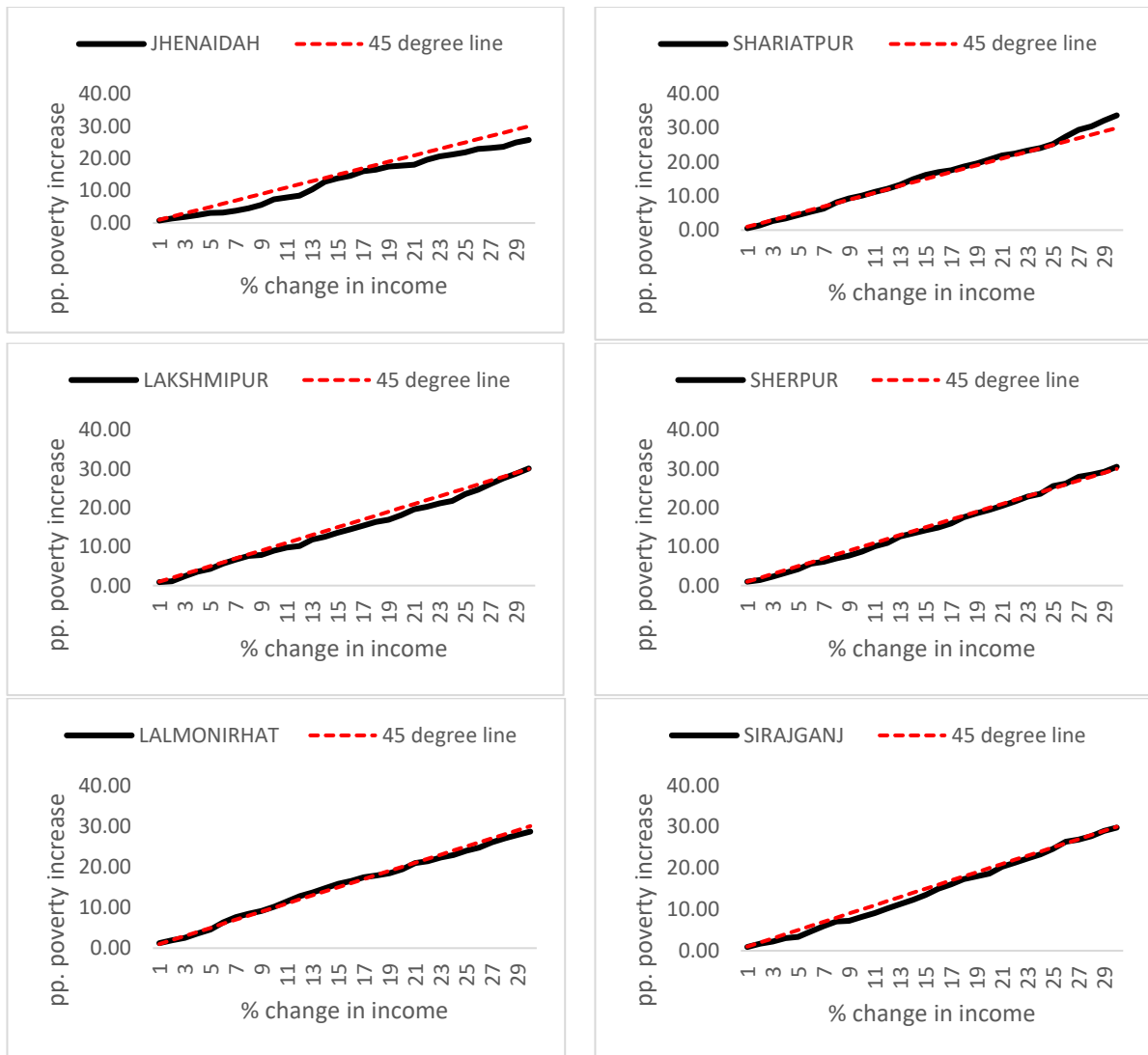
Source: Based on authors' simulations

iii. **Districts with initially constant but later falling rate of poverty with changes in income shocks:**

For around 14 districts it is seen that the change in poverty rate is equal to the fall in income up to a certain level of income shocks. Beyond that, the responsiveness of such shocks declines. For instance, up to 12% of the fall in income in Chapai Nawabganj, the poverty will increase in equal proportion to the change in income fall (as such, a five% fall in income would increase the poverty rate by 5%). Beyond the 12% income shortfall, the increase in poverty would be lower for each additional case of income shock.

Figure 16: Districts with initially constant but later falling rate of poverty with changes in income shocks
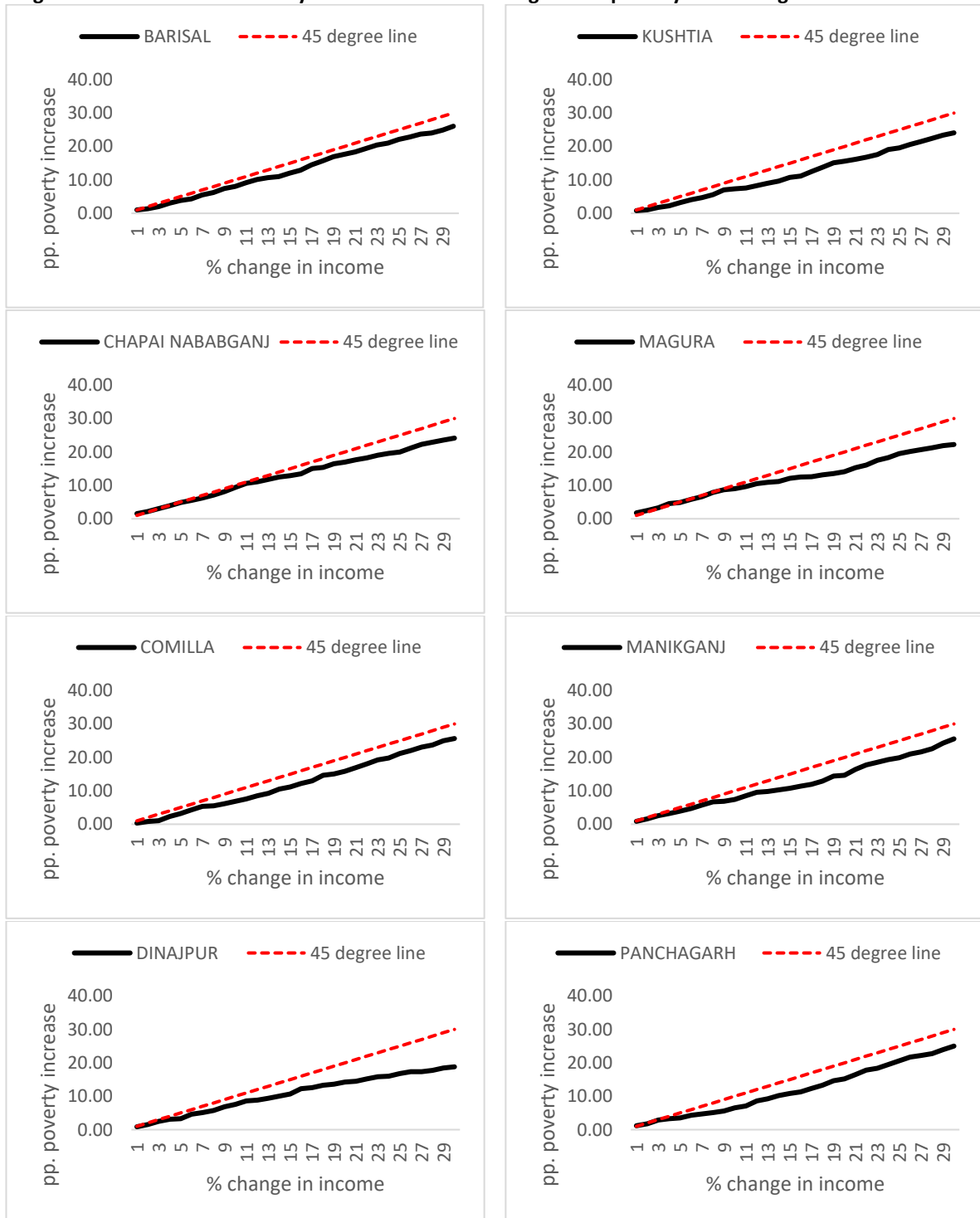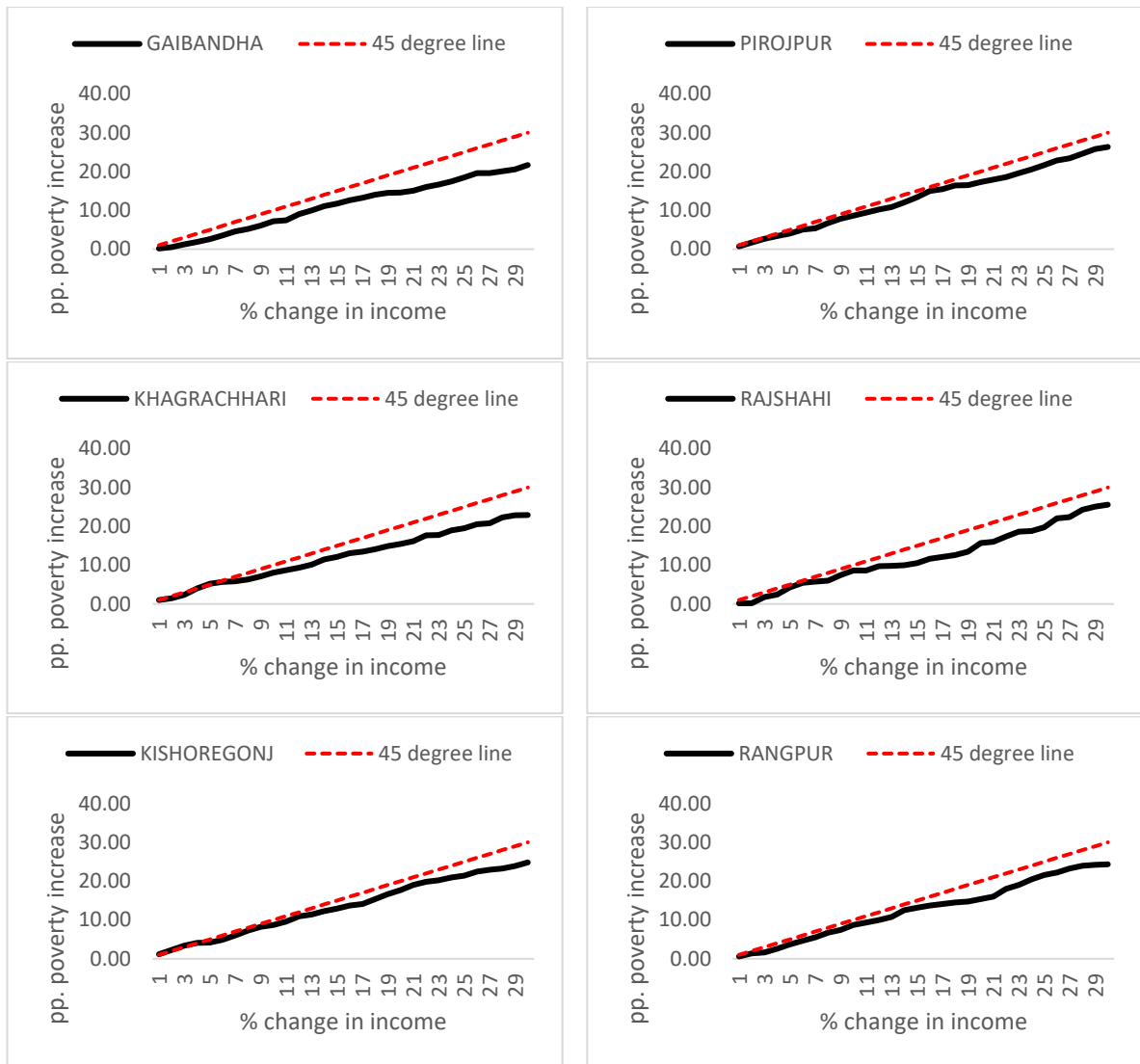
Source: Based on authors' simulations

iv. Districts with a U-pattern relationship between poverty rate and degrees of income shock:

Another pattern that we observe is a U-shape pattern of poverty rate responsiveness to the income shocks. For lower-income shocks, these districts exhibit lower rates of increase in poverty rates. As the degree of shock increases, the percentage points increase in the poverty rate starts to fall before rising again.

Figure 17: Districts with a U-pattern relationship between poverty rate and degrees of income shock
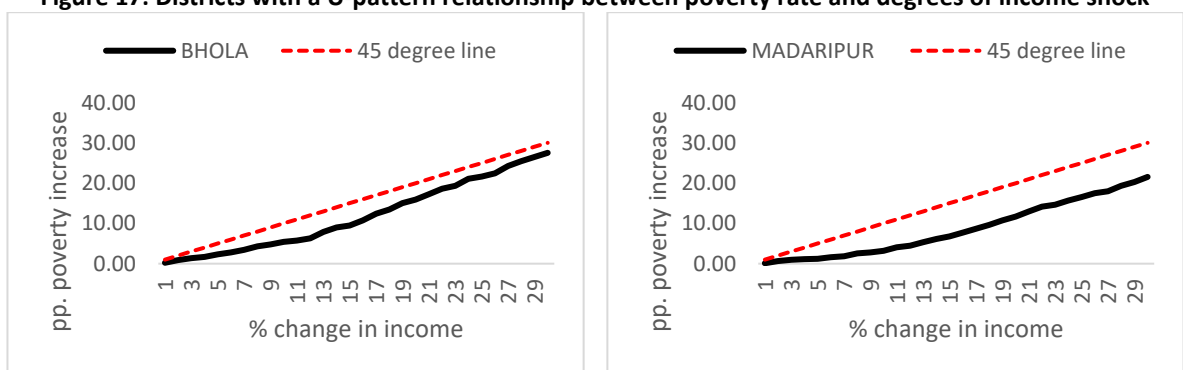
Source: Based on authors' simulations

v. **Districts with a constant diverging pattern between poverty rate and degrees of income shock:**

For 15 districts the simulation shows a constant divergence between the percentage fall in income and the percentage points increase in poverty. Most of the districts showing this pattern fall into two categories: (i) either these districts have the least poverty rates in the country (such as Narayanganj, Munshiganj, Gazipur, Narsingdi, Sylhet, Brahmanbaria, etc.) or (ii) they are the most poverty-stricken

districts (such as Kurigram, Bandarban, or Patuakhali). It implies there is a high degree of regional disparity between these two categories of districts. In districts in the first category, the number of vulnerable populations is so small, that even very large income shocks will not put many dents on the poverty status. On the other hand, the districts in the second category are already so poor that a larger income shock will only deteriorate the meagre condition of these poor populations in spite of increasing the number of poor.

Figure 18: Districts with a constant diverging pattern between poverty rate and degrees of income shock
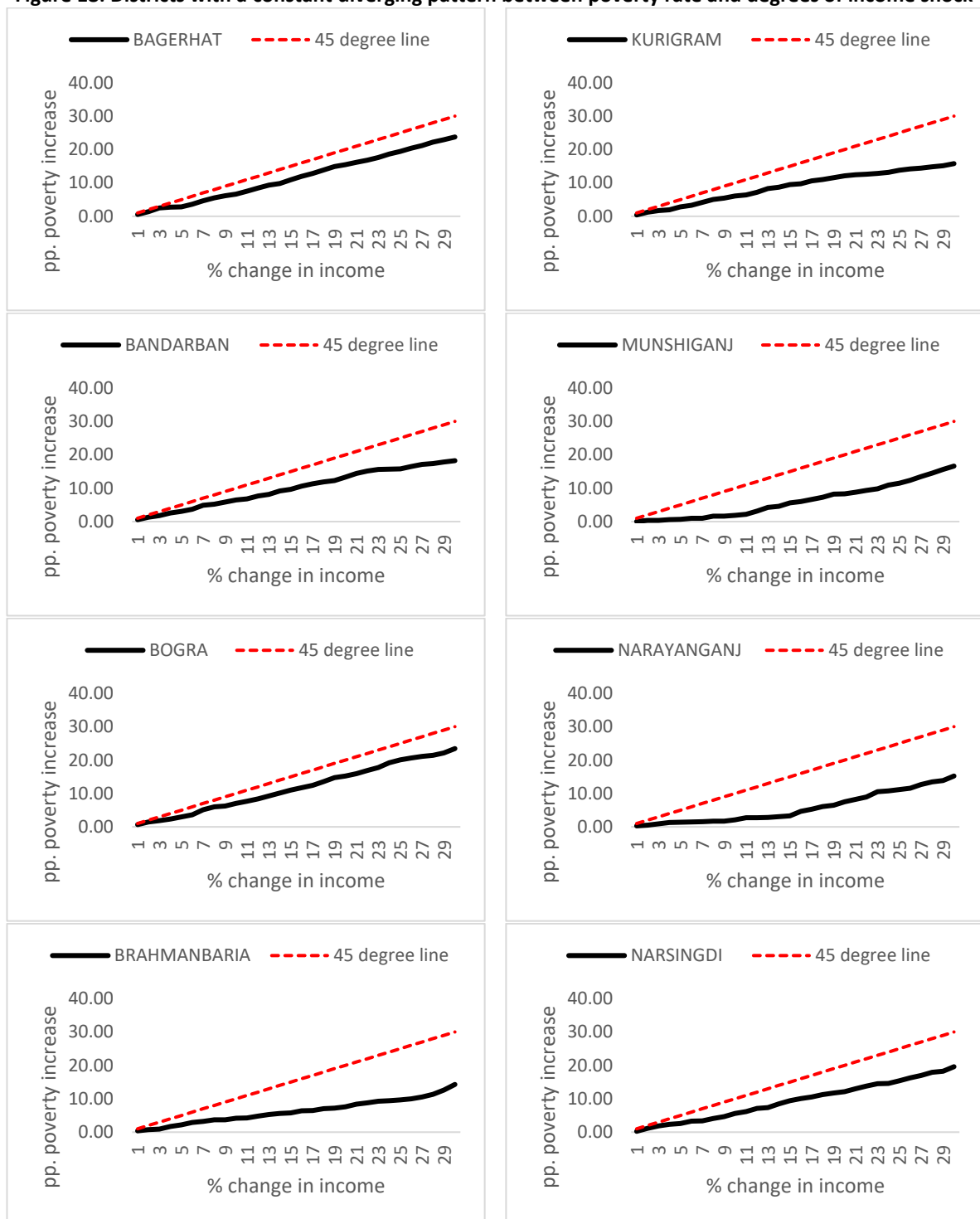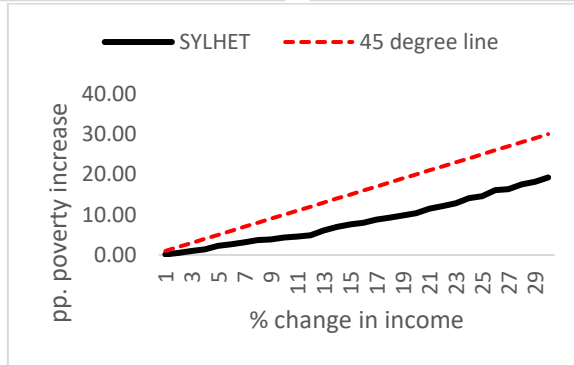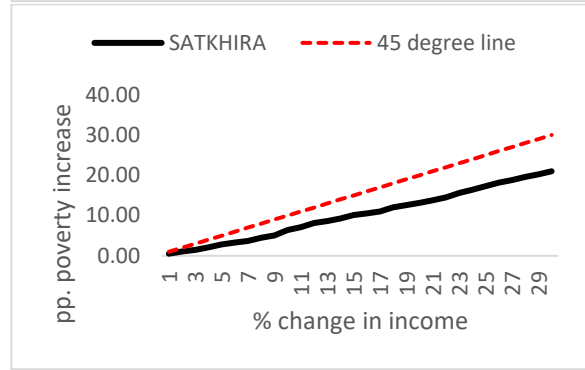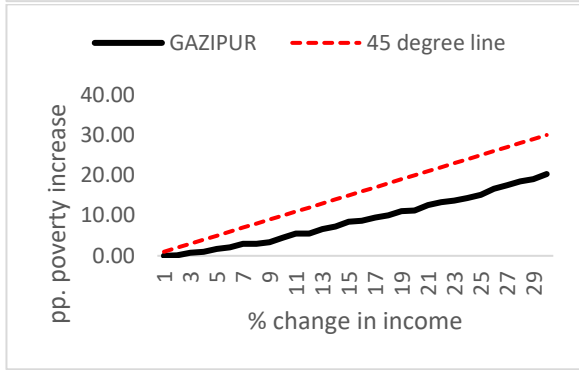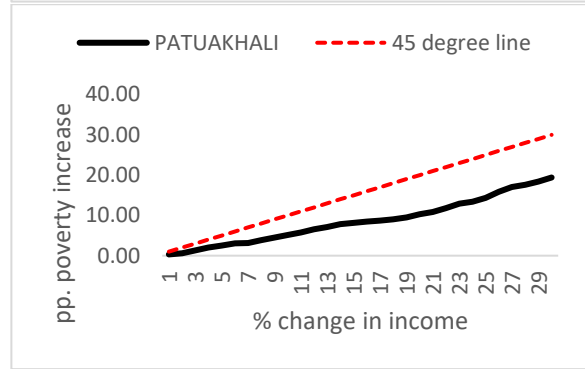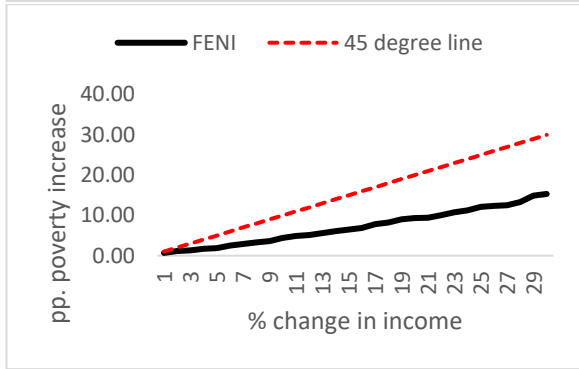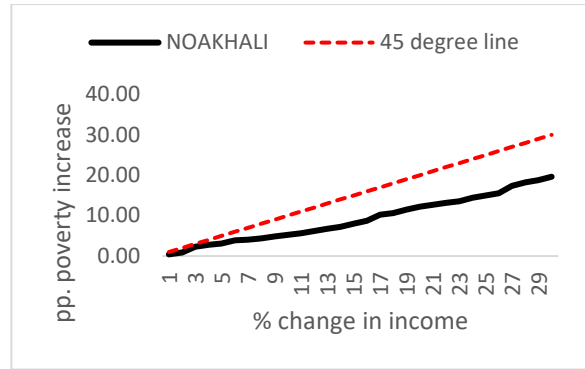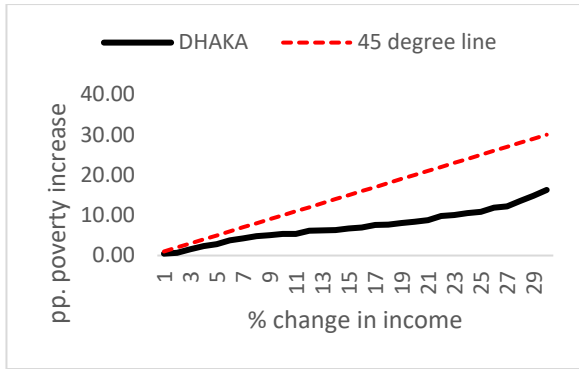
Source: Based on authors' simulations

5.2 A Rural-urban analysis of responsiveness of poverty to income shocks at the district level

As observed in section 4.1, it is obvious that the responsiveness of poverty to income shocks is not homogenous across all the districts in the country. Even the responsiveness of poverty to income shocks might not be homogenous both in urban and rural areas in the country. While the relationship between percentage point change in poverty and percentage change in income is linear both in urban and rural areas (at a national level), the responsiveness of poverty to income shocks is greater in rural areas compared to urban areas (Figure 19). This implies people in rural areas are more likely to be vulnerable compared to urban areas in the country. However, the analysis might not be true homogenously across all districts in the country. For instance, the responsiveness of poverty to income shocks in Dhaka Urban and Rangpur Urban might not be homogenous. In this consideration, this section discusses the responsiveness of poverty to income shocks for Urban as well as Rural areas at the district level separately.

Figure 19: Responsiveness of poverty to income shocks both in urban and rural areas
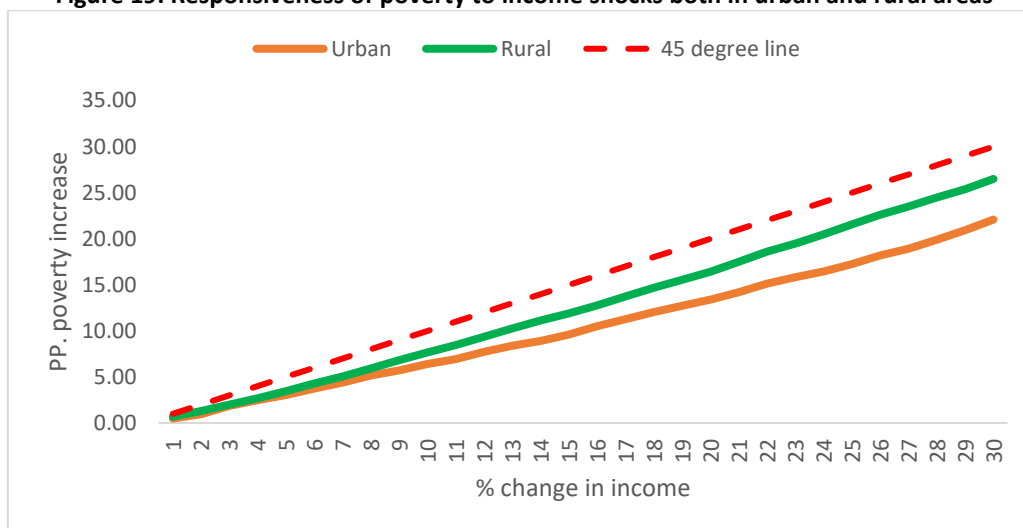
Source: Based on authors' simulations

The analysis of the rural-urban dynamics of the responsiveness reveals that for some districts the responsiveness of poverty to income shock is larger in the urban area, for some districts in the rural area and for some districts the responsiveness is kind of equal for both rural and urban area. There are at least 16 districts (like Bagerhat, Bhola, Brahmanbaria, Chandpur, Chittagong, Comilla, Dhaka, Feni, Madaripur, Munshiganj, Narayanganj, Natore, Noakhali etc.) in which responsiveness of poverty to income shocks is larger in urban areas compared to rural areas (Annex 2: Figure A.1). This means people with urban areas are more likely to be vulnerable compared to rural areas for these districts in the country. Rapid industrialization has occurred in these districts over the last decades. As a result, more unskilled labour migrated to these regions for their better livelihoods and lacked access to job security as well as income certainty. Besides, costs of living have increased several times in urban areas of these districts over the last decades. On the other hand, the responsiveness of poverty to income shocks is larger in rural areas compared to urban areas for more than half of the districts in the country (Annex 2: Figure A.2). Some of these districts are Bandarban, Barisal, Bogra, Cox's Bazar, Chuadanga, Dinajpur, Gaibandha, Jhenaidah, Jamalpur, Khulna, Kustia, Lakhmipur, Lalmonirhat, Narail, Narsindi, Rangpur, Rangamati etc. The rural areas in these districts are economically distressed compared to the urban areas. This is because rural areas in these districts depend on agriculture most which always remains at risk of natural hazards while the cost of living in urban areas in these districts is not too expensive. Moreover, there are some districts in which the responsiveness of poverty to income

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shocks is unpredictable or somewhat equal for both rural and urban areas (Annex 2: Figure-A.3). These districts are Barguna, Faridpur, Joypurhat, Kishoreganj, Maulvibazar, Nilphamari, Pabna, Patuakhali etc. There might be no significant socio-economic difference between urban and rural areas in these districts.

Section VI: Conclusion and Policy Recommendations

The challenges posed by the COVID-19 pandemic are unprecedented in nature. Countries around the world are trying to gauge the economic losses dented by the crisis. Being one of the virus hotspots, there are paramount fears that Bangladesh's economy might also suffer from long-term anti-developmental challenges instigated by this crisis. Many of Bangladesh's decade-long development achievements, as such the impressive fall in poverty rates, might dissolve with prolonged economic downturns. This study focused on identifying the impacts of the COVID-19 pandemic on the poverty dynamics in Bangladesh.

Over the decades, Bangladesh successfully reduced its incidence of poverty from as high as 50% in early 2000 to 20.5% in 2019. Over this period, the disparity in rural-urban poverty has declined, and at the same time, the magnitude of the East-West divide in poverty incidence has reduced. Notwithstanding this prudency, the achievement was not good enough. Although Bangladesh impressively reduced the poverty rate, the number of vulnerable poor remained high: as high as almost 28 million in 2019. Such a high rate of the vulnerable population puts millions of lives dwindling to and from poverty had there been any crisis. The scenario was not different during this COVID-19 pandemic.

This paper identifies the mechanism of how economic disruptions sparked by the pandemic transmit a steep fall in income. The supply chain disruption hampered the marketing of agricultural products as well as their prices. Uncertainties, high transport costs, slumped demand, restrictions on the movement of vehicles, etc. exacerbated a negative price impact on the producers. However, the pandemic does not seem to have a direct impact on the production function of the agricultural outputs.

The impact on the manufacturing sector stems from two sources: one is internal, and the other is external. The primary internal source of impact was the forced lockdown of factories. Due to the lockdown in the country, most of the factories remained closed for over a month. The external source of impact originated from the slumped trade, both at home and in partner countries. Due to the ban on international shipments, the import of raw materials was severely hampered; so was the export of finished goods. Both these internal and external factors hindered the production in the manufacturing sector. Even after the opening up the lockdown on 26 April, many manufacturing industries could not go into production at full capacity due to a lack of raw materials, unavailability of new orders, or cancellation of existing orders.

The impact on the service sector was wide. Apart from Banks and hospitals, all other major service sectors such as hotels, restaurants, transport, tourism, retail trade etc. remained closed, or at best, partly opened. A significant portion of workers from these sectors relied entirely on their day-to-day earnings. Due to the public closures, undeniably these millions of workers were affected by this pandemic crisis.

Against such a backdrop, this study attempted to simulate the poverty scenario in the country under the broad assumption of a 25% general income shock. Using the latest Household Income, Expenditure Survey (HIES), the most comprehensive and nationally representative data, this exercise finds that, with a 25% general income shock, the overall poverty rate in the country will almost double: an increase from 20.5% to 40.9%. We find that, due to the 25% income shock, the total number of poor in the country will increase to 69.4 million from the existing 34.7 million. The number of urban poor will increase from 7.3 million to 15.3 million while in the rural it will increase from 27.3 million to 53.8 million.

However, the rate of poverty increase is not homogenous across the country, and there is clearly an East-West divide. The poverty rates in the Western regions, such as Dinajpur, Magura, Potuakhali, Kurigram, Rajshahi, Rangpur, etc. take a more chronic turn than in the Eastern regions such as Brahmanbaria, Gazipur, Munshiganj, Narayanganj, Sylhet, etc.

Our analysis also finds that in terms of depth (measured in terms of Poverty Gap Ratio) and severity (in terms of Squared Poverty Gap) varies largely by region. A 25% income shock would increase the poverty gap ratio for the rural areas to 13.9 and for the urban areas to 10.4. The simulation results further suggest that though at the national level the poverty gap index is 12.9 and the square poverty gap is 4.8 after the shock, 36 districts will experience a higher poverty gap index and square poverty gap index than the national level. In the case of the Squared Poverty Gap, the rural SPGR will increase to 5.2 while in the Urban it will increase to 3.8. Both the PGR and SPGR are highest for Kurigram, 36.8 and 18.3 respectively.

Such a divide becomes more prominent when we apply other measures such as the Total Poverty Gap (TPG) and the Average Income Shortfall (AIS). In terms of TPG to bring up all the 69.3 million poor people in the country at least up to the poverty line, the Government will need to transfer Tk 45 billion per month. The districts which would require the most allocation would be Dhaka (Tk 1.8 billion), Dinajpur (Tk 1.8 billion), Chittagong (Tk 1.9 billion), Gaibandha (Tk 1.1 billion), Kishoreganj (Tk 2 billion), Kurigram (Tk 1.6 billion), Mymensingh (Tk 1.4 billion), Rangpur (Tk 1.3 billion), amongst others.

On average, a typical poor household in the rural areas would need a transferred benefit of Tk 2316 per month, while in the urban it would be Tk 2678 per month. However, a typical household in more poverty-prone areas would require a significantly higher transfer benefit. For example, it would need Tk 4579 for Bandarban, Tk 3583 for Kurigram, Tk 2943 for Dinajpur, and Tk 3509 for Kishoreganj, among other districts, for a poor household to bring it at par the poverty line.

This study also notes that one of the fundamental sources of covid-19 impact transmission to the economy would be employment. In this respect, it identifies the occupational sectors where the concentration of poor people would be higher due to the income shock. Due to the income shock, almost 52% of the total workers in crop and animal production will fall below the poverty line taking the total number of workers in this sector who are below the poverty line to 12.4 million. In the case of the textile and RMG manufacturing industry, the income shock will induce an increase in the total number of poor in the sector from .9 million to 1.81 million (an increase of 107%). With a similar magnitude of shock, the number of new poor in the major services sectors would be 1.3 million in the wholesale and retail trade, 1.1 million in the transport, and .27 million in the food and beverages services activities. All these sectors would experience nearly double the number of poor workers. In total, out of the 63 million workers, due to the 25% income shock, our simulation shows that a total of 13 million new workers will fall below the poverty line in addition to the existing 14 million poor in the labour force. That is, the total number of workers below the poverty line would increase by almost 94%.

6.1 Recommendations

6.1.1 General policies

- Both the coverage as well as the transfer benefits of the social safety net should be expended. According to the Ministry of Finance (MoF), the total safety net as a percentage of GDP was 2.54% in 2018/19. After excluding pension and school stipend, the rate stood at only 1.56%.
- The economic fallout followed by the pandemic will reduce private consumption significantly. The GoB can provide direct cash transfers to the poor and vulnerable people to stimulate the economy.
- Due to the increase in chronic poverty, there can be an increasing pattern in the poor avoiding healthcare services due to the fear of medical expenses. Therefore, the healthcare services for the poor need to be revamped. Over the years, the country's public health expenditure as a percentage of GDP remained less than 1%. The GoB will have to come out from the traditional budget and health expenditure should be at least 5 or 6% of the country's GDP so that government can ensure enough medical supplies to the poor and vulnerable population.
- The GoB should ensure food security by removing disruptions in the supply chain. Government can reduce supply chain disruptions through proper transportation, timely delivery of goods from Chittagong port and adequate production.

6.1.2 Area-specific policies

- There is a strong geographical dimension to the poverty dynamics of the country. All policy actions should keep a special focus on these spatial dynamics.
- Due to a 25% income shock, 40 districts will experience a rise in the percentage of poverty more than the national average. For example, poverty rates by districts will increase by: in Mymensingh (30.2%), Sunamganj (28.7%), Cox's Bazar (27.5%), Narail (27.1%), Chattogram (26.9%), Netrokona (25.9%) etc. A particular focus should be given to these regions.
- Although the total number of poor will be higher in rural, the urban poverty rates will also be severely increased. Given that, most of the social protection programmes are rural-focused, and the SSNP coverage in the urban areas is very few, it is the urban poor who might suffer the crisis for a long. Therefore, the strategy must incorporate a separate focus on the urban poor.

6.1.3 Industry-wise policies

- The impact of Covid-19 will hit hard workers from crop and animal production. Most of the workers in this sector are self-employed. The government must ensure enough seeds, fertilizers and insecticides so that farmers can continue their production. A cash subsidy to the poor farmers in this sector could be essential.
- The apparel industry will be greatly impacted by the worldwide pandemic. The government must extend the scope of cash subsidies and other benefits for the exporters. However, benefits should be rolled out to all other exporting sectors as well, and should not be confined to the RMG only.

- The pandemic will hit hard low-income people, particularly informal workers in transportation, wholesale and retail trade, and construction sectors who have no or little savings. The GoB should, therefore, announce a sector-specific stimulus package.
- The GoB has already announced a stimulus package for micro, small and medium enterprises. The implementation of the packages should start immediately. Procedural complexities should be eased.

6.1.4 Other policies

- The government should identify vulnerable migrant families who heavily depend on remittance income. All such households should be brought under a support package.
- Support policy should also cover all the returned migrant workers who might not be able to migrate in near future due to the global economic downturns.

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Annexe 1

Table A.1: Poverty rates by districts

District	Population	Poverty Rate (%, RHS)	Poor population (LHS)
BAGERHAT	1,470,943	26.1	384,409
BANDARBAN	520,406	53.2	276,931
BARGUNA	962,629	21.6	208,295
BARISAL	2,626,682	23.0	605,381
BHOLA	2,119,535	13.0	276,218
BOGRA	3,247,264	22.9	744,116
BRAHMANBARIA	4,070,418	8.7	353,185
CHANDPUR	2,846,997	24.7	702,695
CHAPAI NABABGANJ	1,963,028	33.4	655,327
CHITTAGONG	10,231,773	11.5	1,179,747
CHUADANGA	1,131,828	26.9	304,338
COMILLA	6,704,467	11.4	763,116
COX'S BAZAR	3,448,479	14.0	481,356
DHAKA	13,530,308	8.4	1,141,000
DINAJPUR	3,140,568	54.1	1,700,510
FARIDPUR	2,206,744	6.5	143,607
FENI	1,757,286	6.8	119,792
GAIBANDHA	2,658,249	39.3	1,044,308
GAZIPUR	4,062,322	5.8	236,948
GOPALGANJ	1,405,109	24.9	349,177
HABIGANJ	2,845,655	11.3	321,465
JAMALPUR	2,305,495	44.2	1,019,461
JESSORE	2,873,248	22.6	650,105
JHALOKATI	761,072	18.1	138,078
JHENAIDAH	1,933,136	22.3	431,383
JOYPURHAT	858,673	18.0	154,635
KHAGRACHHARI	755,364	44.3	334,886
KHULNA	2,349,116	26.0	610,066
KISHOREGONJ	3,889,567	45.1	1,753,564
KURIGRAM	2,409,196	59.6	1,436,711
KUSHTIA	2,074,838	14.8	306,201
LAKSHMIPUR	2,192,060	27.4	600,134
LALMONIRHAT	1,488,218	35.3	526,030
MADARIPUR	1,342,736	3.1	41,336
MAGURA	1,026,333	47.7	489,785
MANIKGANJ	1,560,754	25.8	403,161
MAULVIBAZAR	2,692,891	9.3	249,798
MEHERPUR	614,482	26.5	163,113
MUNSHIGANJ	1,630,087	2.6	41,897
MYMENSINGH	5,770,493	18.5	1,067,905
NAOGAON	2,513,261	27.1	680,370

District	Population	Poverty Rate (%, RHS)	Poor population (LHS)
NARAIL	788,594	14.2	111,598
NARAYANGANJ	3,413,377	2.2	74,098
NARSINGDI	2,682,689	8.8	236,132
NATORE	1,677,162	20.2	338,383
NETRAKONA	2,758,358	28.6	788,881
NILPHAMARI	2,034,456	27.2	553,256
NOAKHALI	4,194,087	19.6	821,390
PABNA	2,913,628	27.8	809,138
PANCHAGARH	1,159,146	22.2	257,169
PATUAKHALI	1,733,230	31.3	543,328
PIROJPUR	1,199,360	27.1	325,300
RAJBARI	1,091,762	28.5	310,764
RAJSHAHI	2,940,784	17.0	498,858
RANGAMATI	736,805	24.0	176,988
RANGPUR	3,247,072	36.9	1,197,108
SATKHIRA	2,040,748	15.7	319,426
SHARIATPUR	1,360,186	13.2	179,904
SHERPUR	1,442,899	34.8	501,723
SIRAJGANJ	3,587,624	25.7	920,366
SUNAMGANJ	4,010,369	21.9	877,482
SYLHET	5,473,349	11.0	601,130
TANGAIL	3,618,453	16.0	578,168
THAKURGAON	1,509,793	19.7	298,087
National	**169,605,642**	**20.5**	**34,769,157**

Source: Authors calculation based on HIES 2016 and updated to 2019.

Table A.2: Impact of 25% general income shock on poverty by district

District	Upper Poverty	UP After 25% GIS	Percentage Point Change
BAGERHAT	26.1	45.6	19.44
BANDARBAN	53.2	69.0	15.81
BARGUNA	21.6	47.2	25.56
BARISAL	23.0	45.2	22.11
BHOLA	13.0	34.7	21.65
BOGRA	22.9	43.0	20.05
BRAHMANBARIA	8.7	18.3	9.66
CHANDPUR	24.7	46.7	22.00
CHAPAI NABABGANJ	33.4	53.3	19.96
CHITTAGONG	11.5	38.5	26.97
CHUADANGA	26.9	52.7	25.78
COMILLA	11.4	32.5	21.14
COX'S BAZAR	14.0	41.5	27.51
DHAKA	8.4	19.3	10.85
DINAJPUR	54.1	71.0	16.81

District	Upper Poverty	UP After 25% GIS	Percentage Point Change
FARIDPUR	6.5	28.0	21.51
FENI	6.8	18.9	12.11
GAIBANDHA	39.3	57.8	18.49
GAZIPUR	5.8	21.0	15.12
GOPALGANJ	24.9	48.0	23.15
HABIGANJ	11.3	34.4	23.14
JAMALPUR	44.2	66.2	21.98
JESSORE	22.6	46.4	23.78
JHALOKATI	18.1	42.4	24.24
JHENAIDAH	22.3	44.2	21.87
JOYPURHAT	18.0	43.3	25.29
KHAGRACHHARI	44.3	63.9	19.55
KHULNA	26.0	49.7	23.75
KISHOREGONJ	45.1	66.5	21.44
KURIGRAM	59.6	73.4	13.76
KUSHTIA	14.8	34.3	19.54
LAKSHMIPUR	27.4	50.9	23.50
LALMONIRHAT	35.3	59.3	23.93
MADARIPUR	3.1	19.6	16.51
MAGURA	47.7	67.2	19.47
MANIKGANJ	25.8	45.8	19.92
MAULVIBAZAR	9.3	28.6	19.35
MEHERPUR	26.5	50.9	24.36
MUNSHIGANJ	2.6	14.0	11.48
MYMENSINGH	18.5	48.7	30.22
NAOGAON	27.1	48.7	21.60
NARAIL	14.2	41.3	27.15
NARAYANGANJ	2.2	13.3	11.15
NARSINGDI	8.8	24.2	15.37
NATORE	20.2	42.4	22.18
NETRAKONA	28.6	54.5	25.91
NILPHAMARI	27.2	54.4	27.23
NOAKHALI	19.6	34.6	15.01
PABNA	27.8	51.1	23.33
PANCHAGARH	22.2	42.8	20.61
PATUAKHALI	31.3	45.7	14.37
PIROJPUR	27.1	48.8	21.65
RAJBARI	28.5	53.2	24.69
RAJSHAHI	17.0	36.7	19.76
RANGAMATI	24.0	55.0	30.96
RANGPUR	36.9	58.4	21.58
SATKHIRA	15.7	33.0	17.32
SHARIATPUR	13.2	38.5	25.30
SHERPUR	34.8	60.3	25.56
SIRAJGANJ	25.7	50.3	24.69

District	Upper Poverty	UP After 25% GIS	Percentage Point Change
SUNAMGANJ	21.9	50.6	28.68
SYLHET	11.0	25.6	14.57
TANGAIL	16.0	36.9	20.93
THAKURGAON	19.7	40.8	21.04

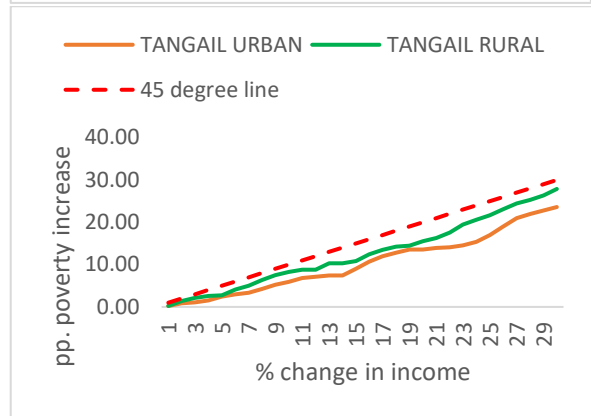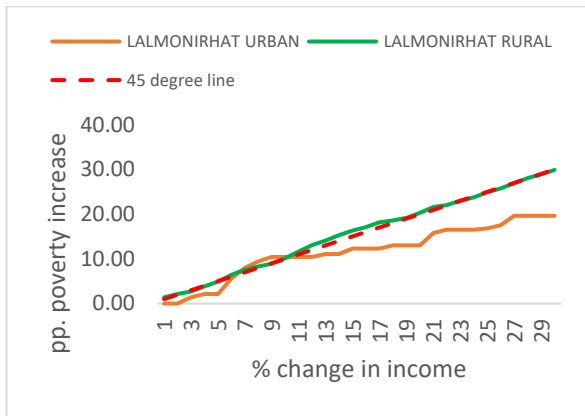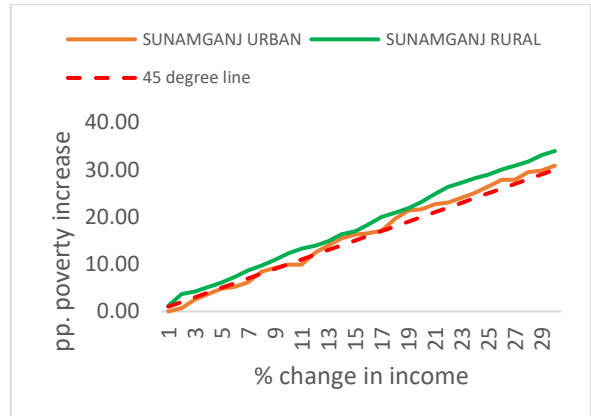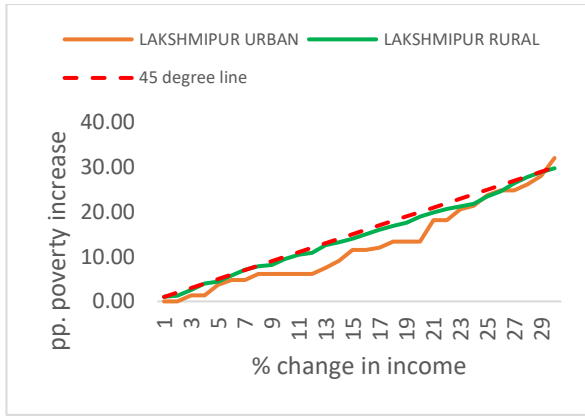*Source: Authors calculation based on HIES 2016 and updated to 2019*

Annexe 2

## Figure A.1: Greater responsiveness of poverty to income shocks in urban areas compared to rural areas
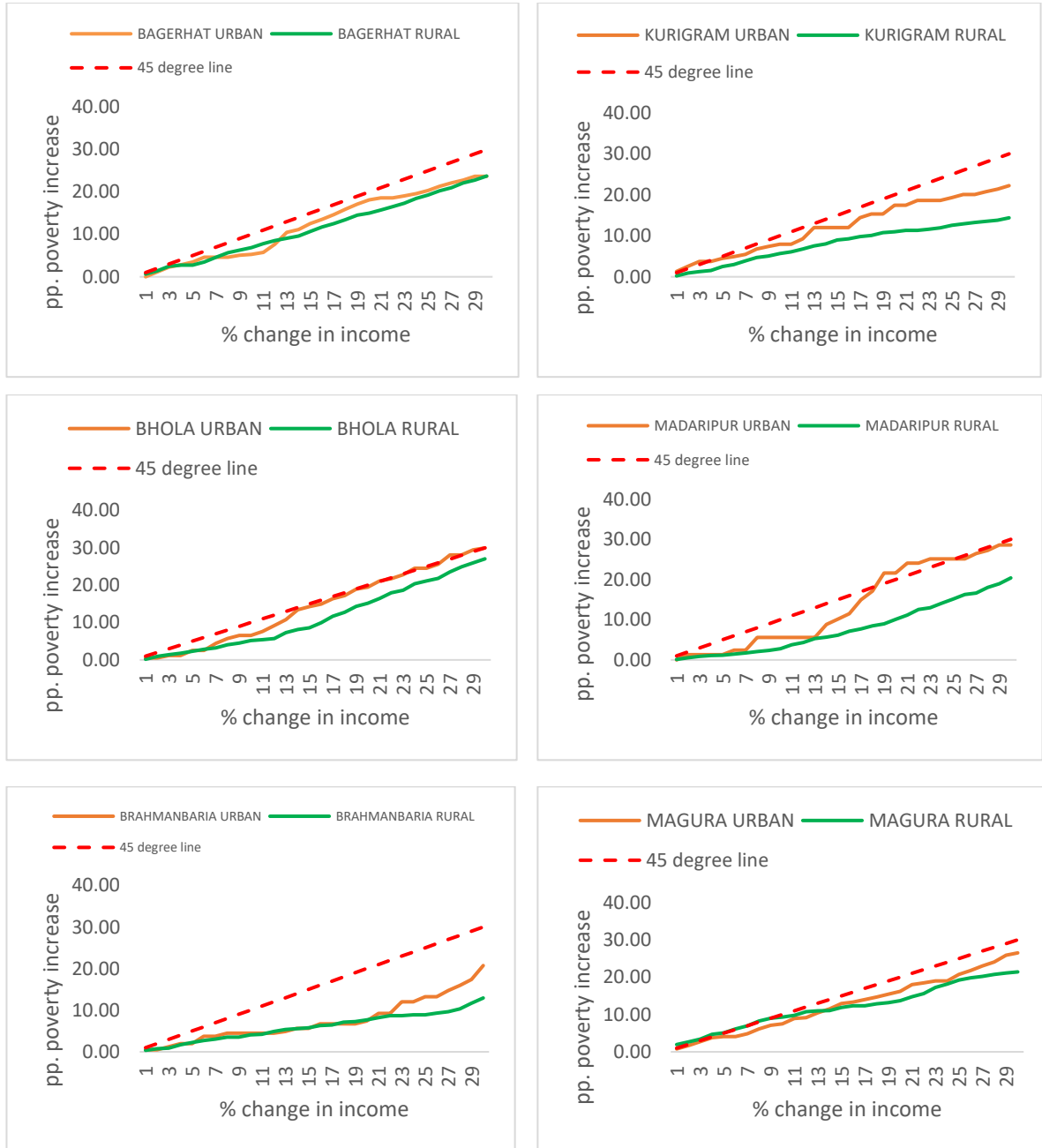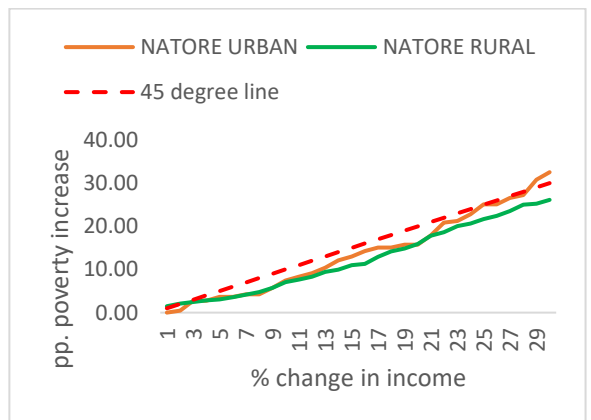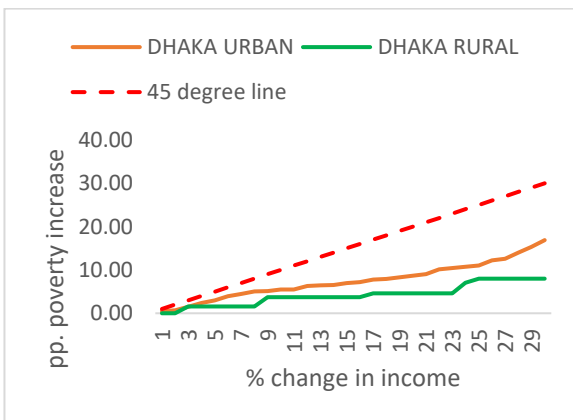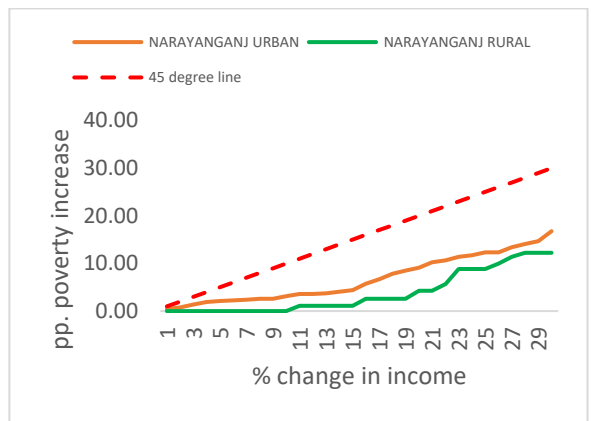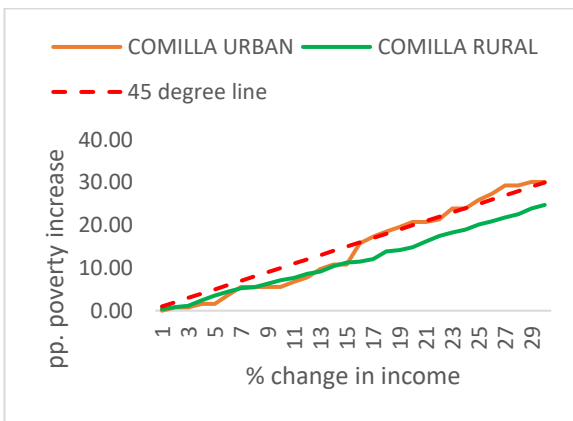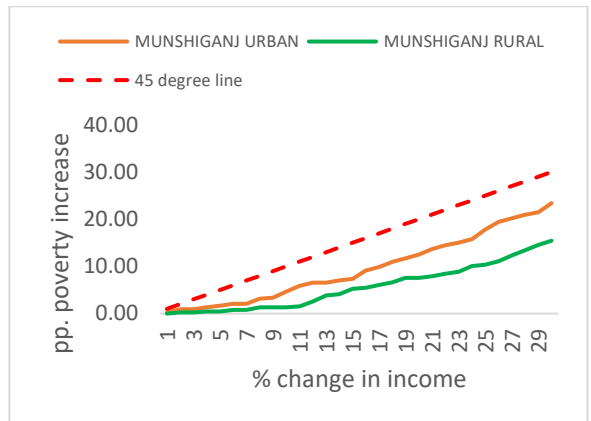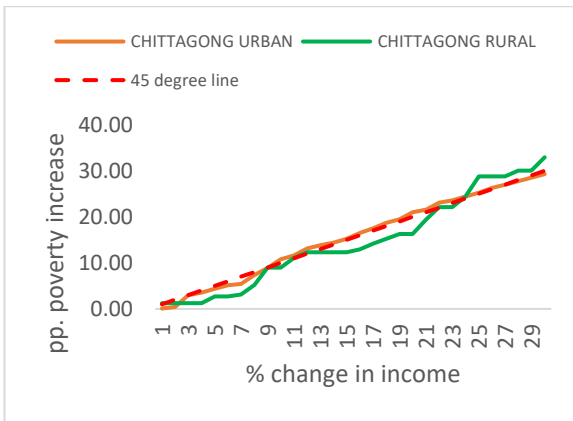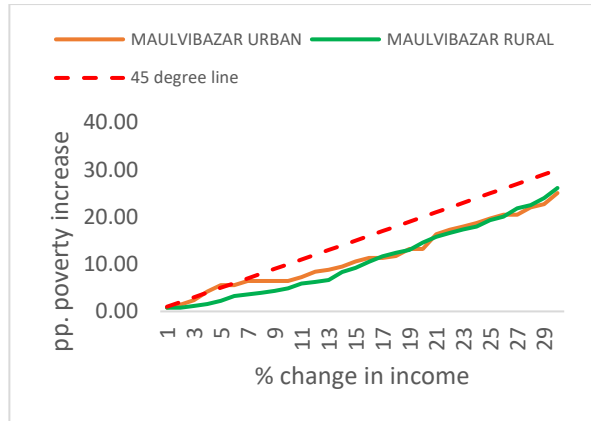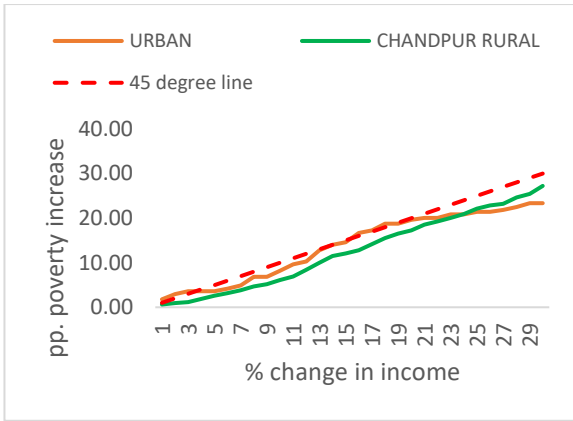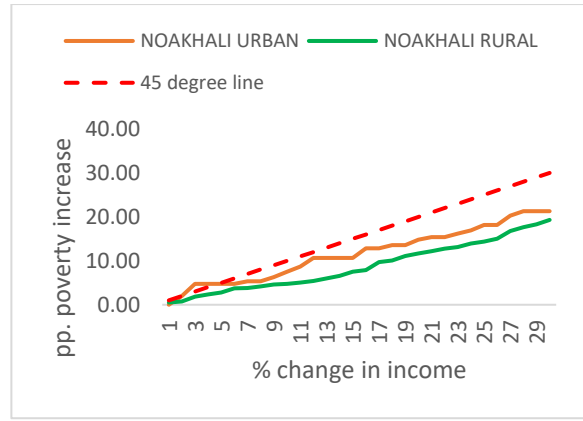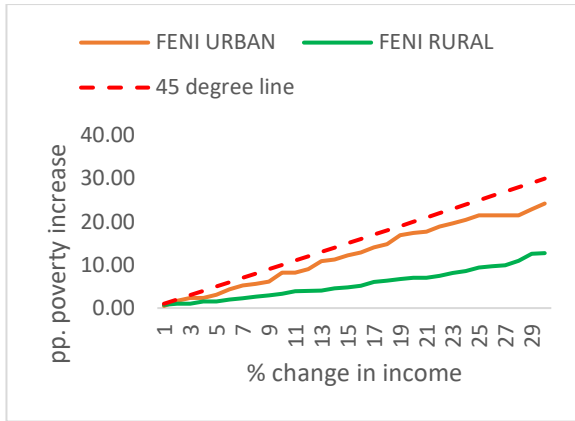
Source: Based on authors' simulations

Figure A.2: Lower responsiveness of poverty to income shocks in urban areas compared to rural areas
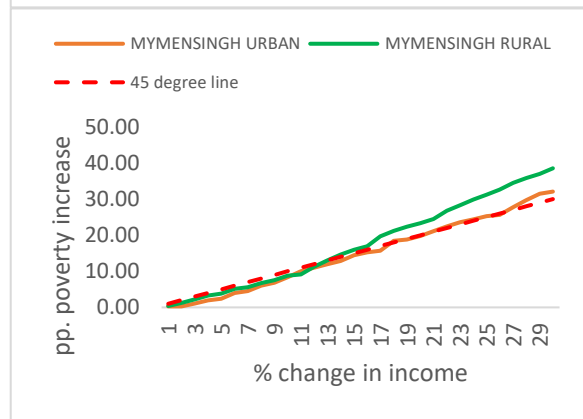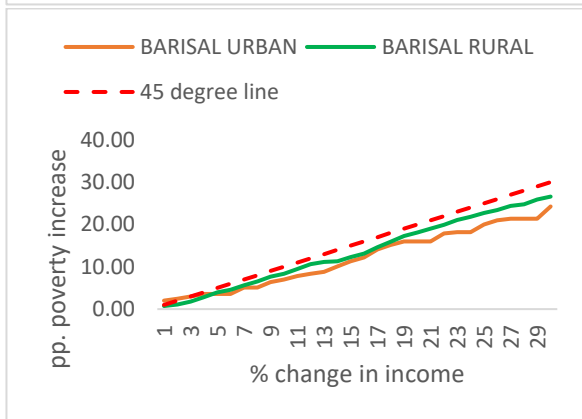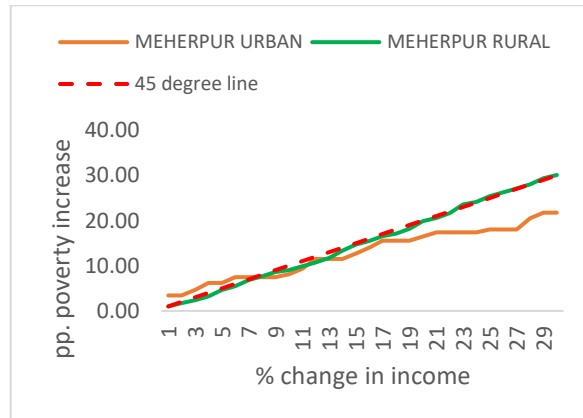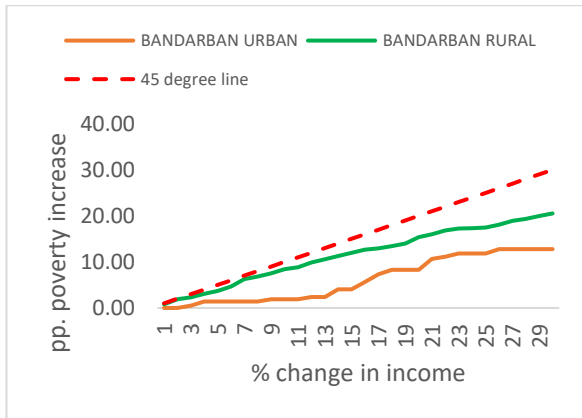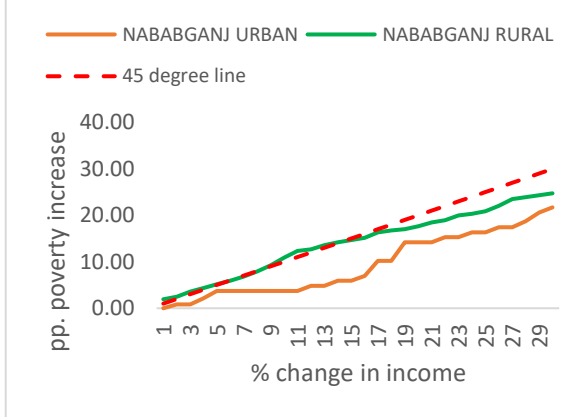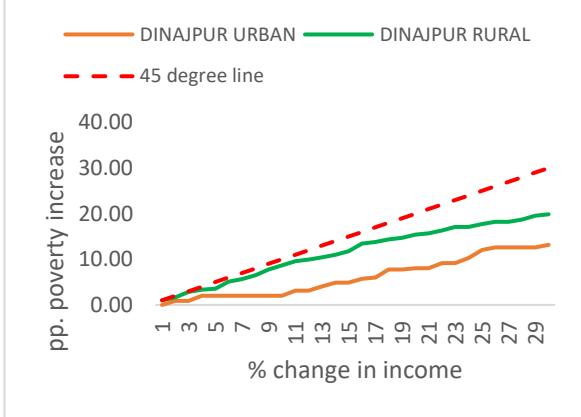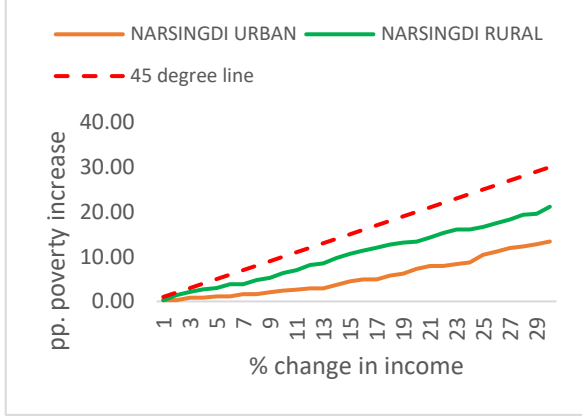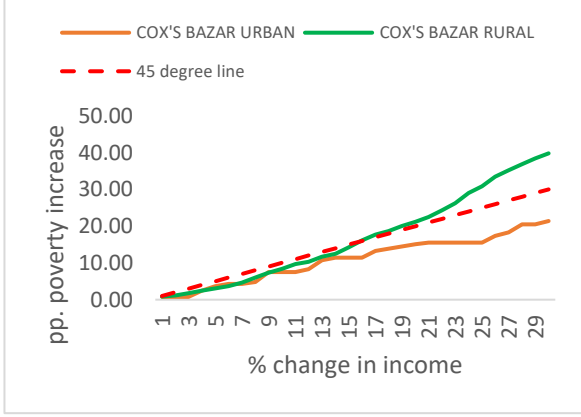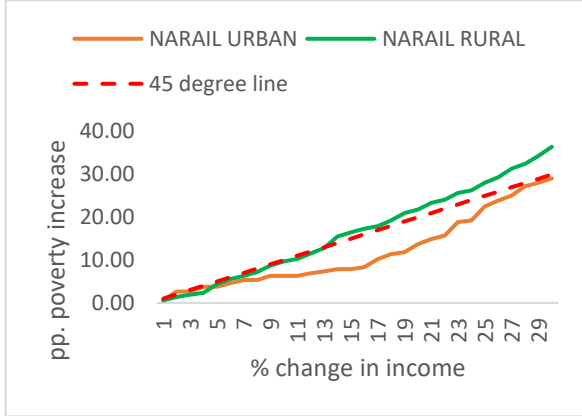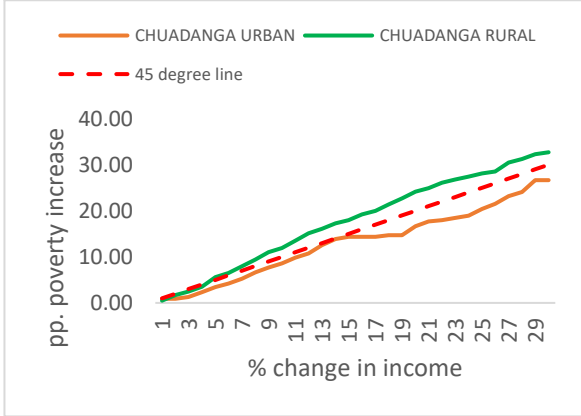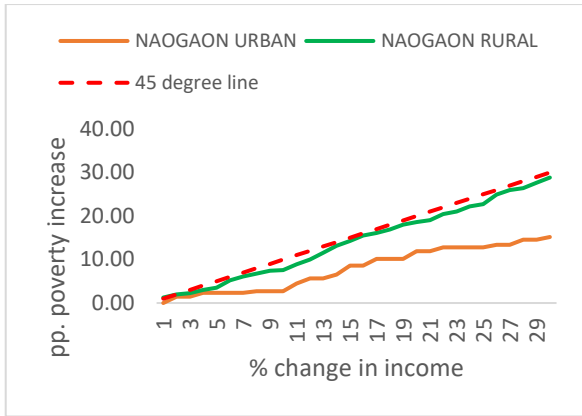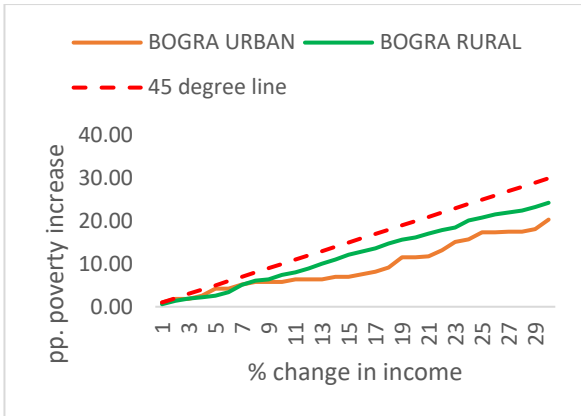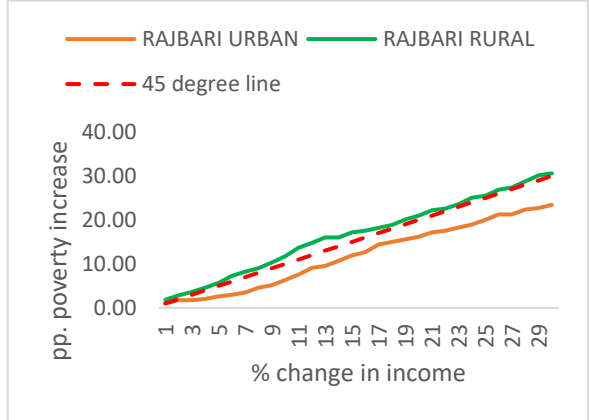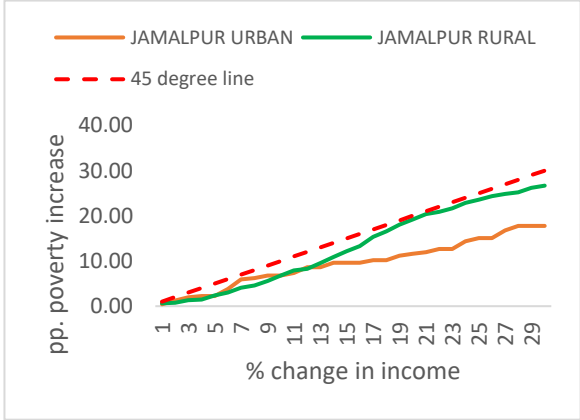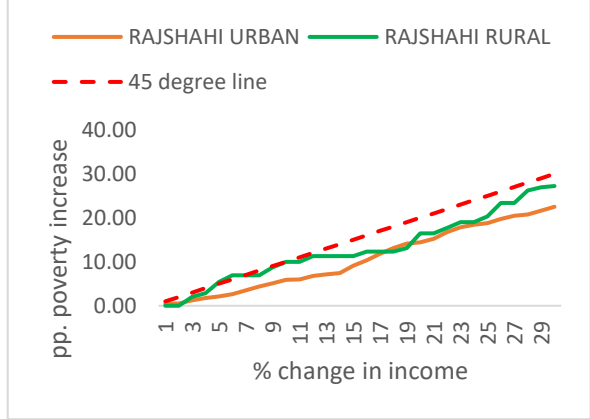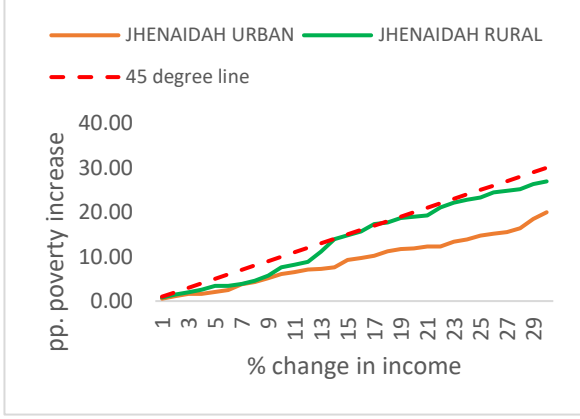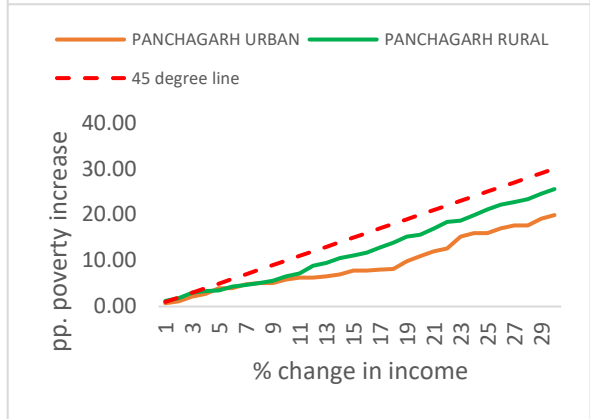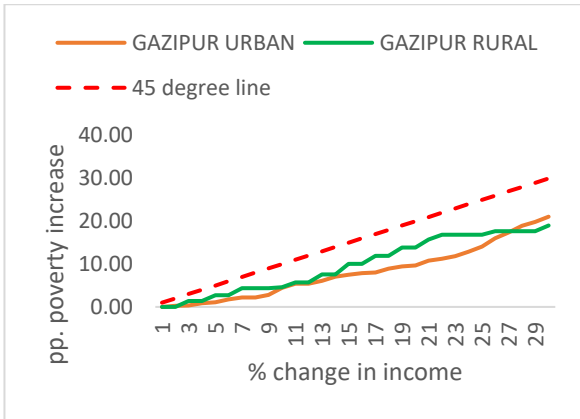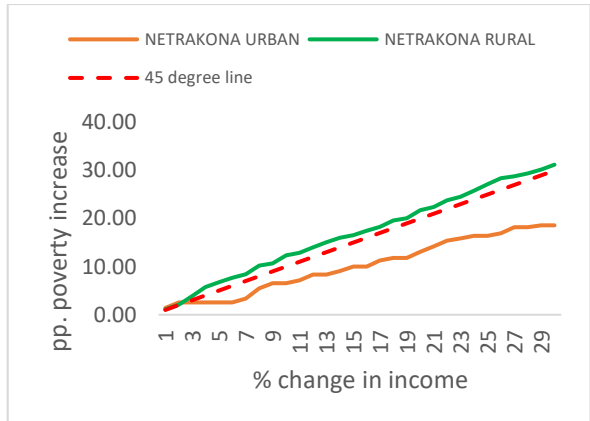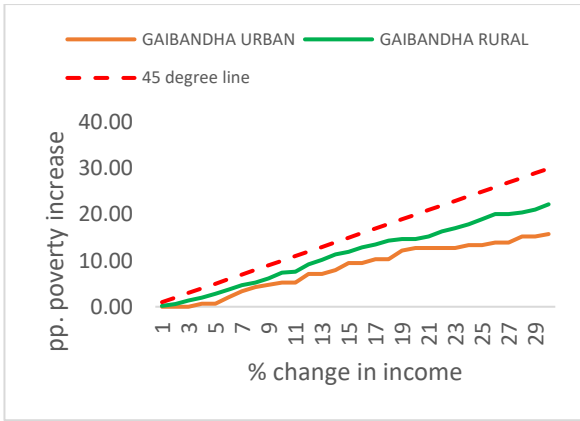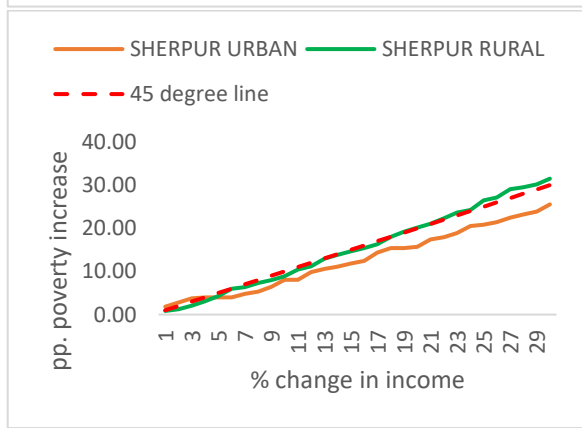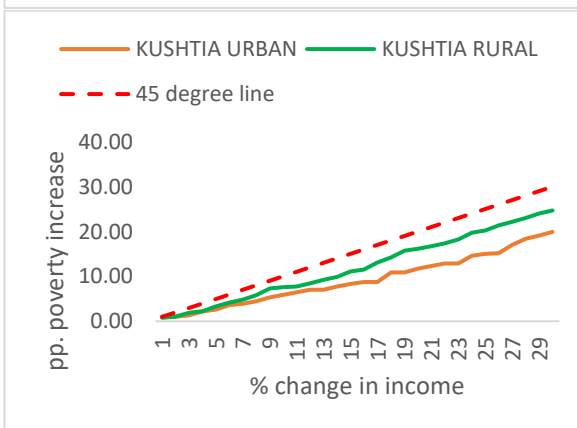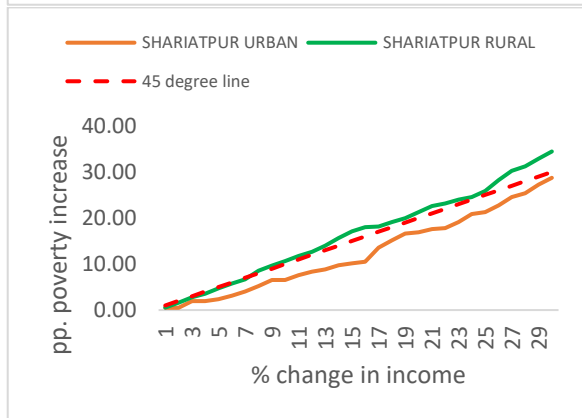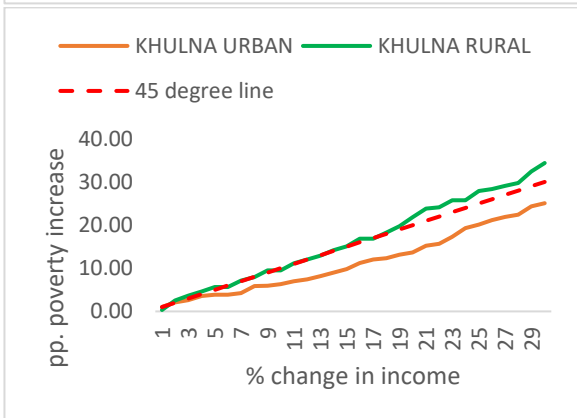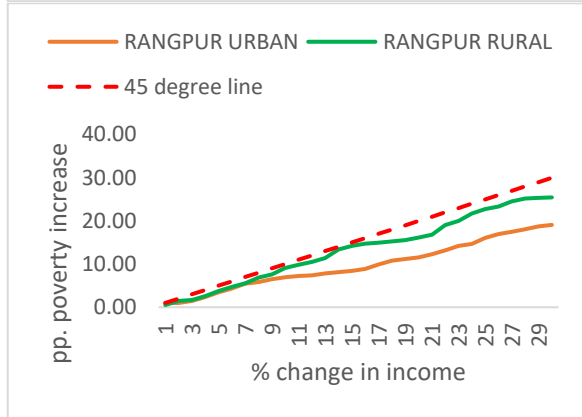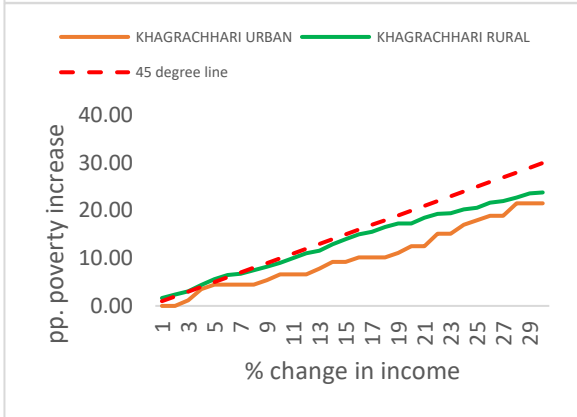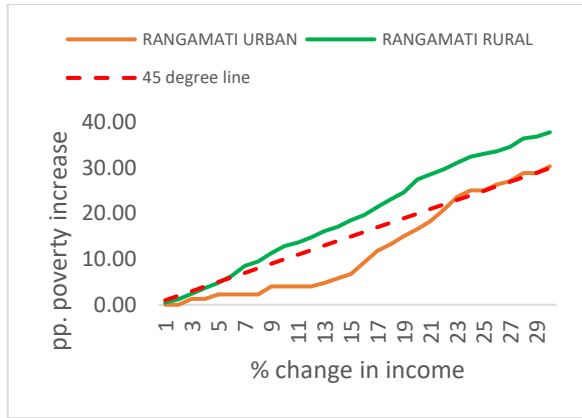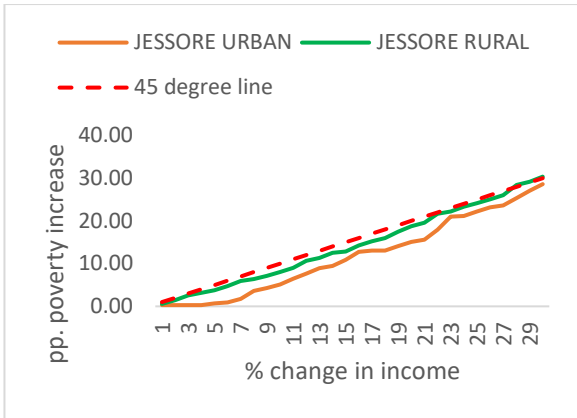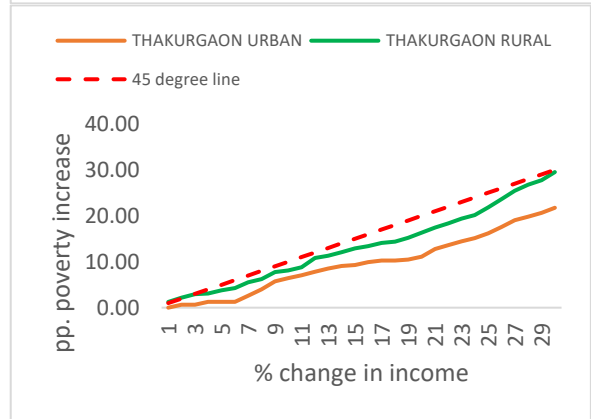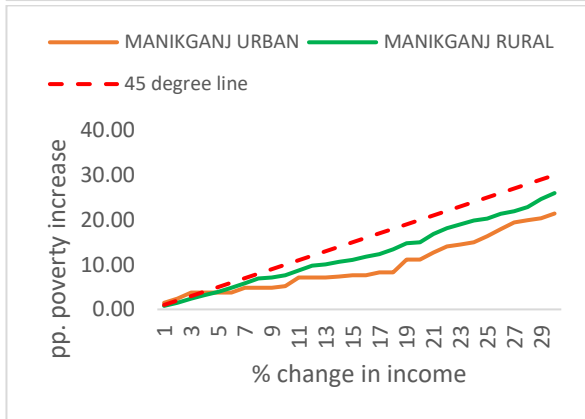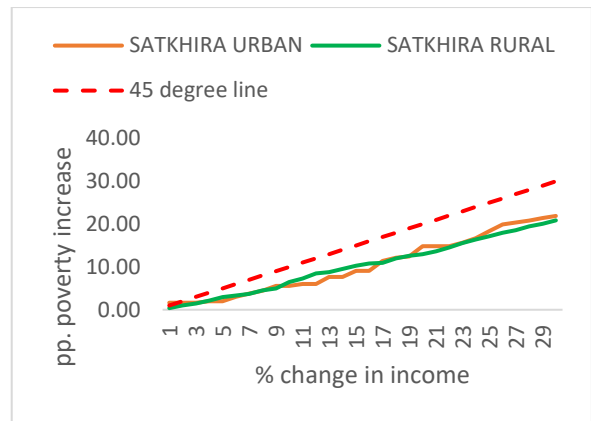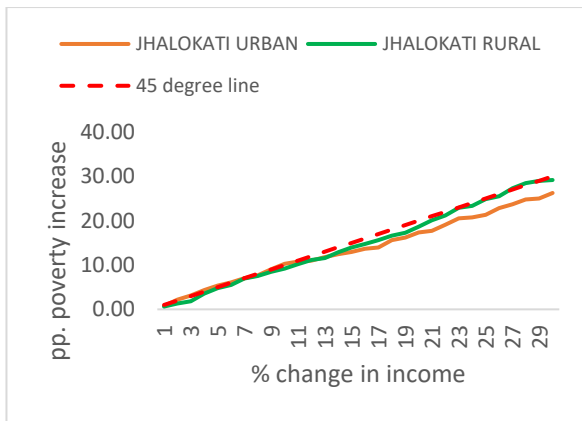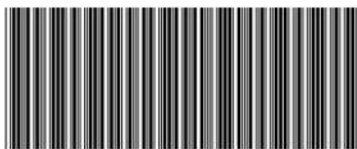
Source: Based on authors' simulations

Figure A.3: Unpredictable or somewhat equal responsiveness of poverty to income shocks in both rural & urban areas
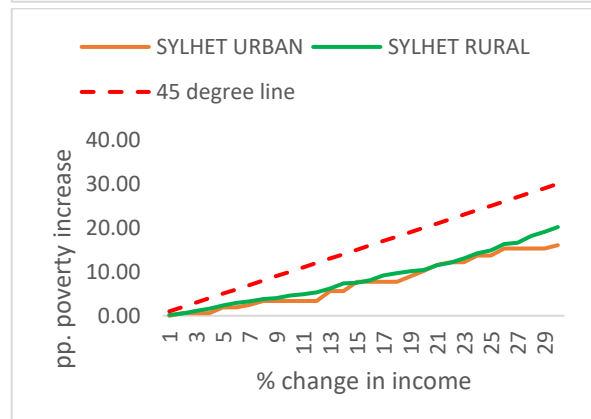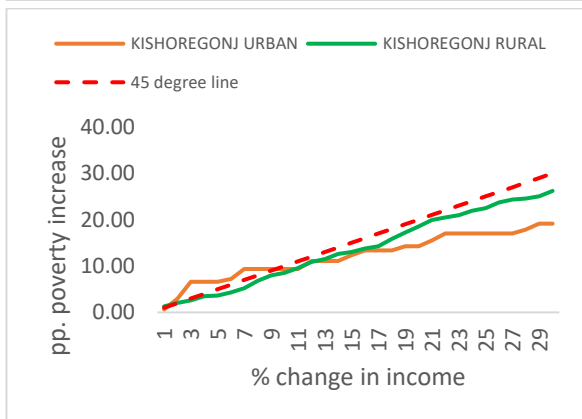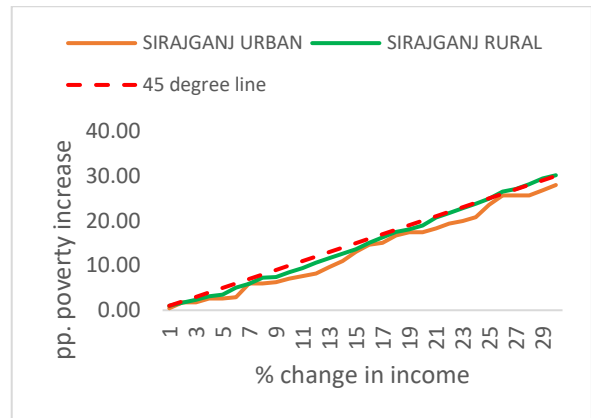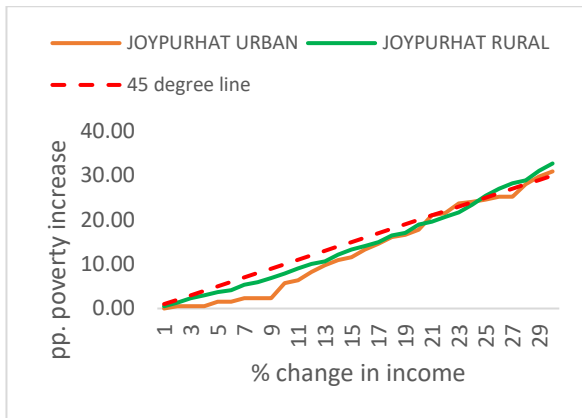
Source: Based on authors' simulations

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