Harvesting of Boro Paddy in Haor Areas of Bangladesh: Interplay of Local and Migrant Labour, Mechanized Harvesters and Covid-19 Vigilance in 2020

A Quick Survey Report

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Bangladesh Rice Research Institute

May 2020

Publication no. : 302
First Edition 2020
300 copies

Published by
Director General
Bangladesh Rice Research Institute

Edited by
M A Kashem

Suggested citation
Kabir *et al* (2020) Harvesting of Boro Paddy in *Haor* Areas of Bangladesh: Interplay of Local and Migrant Labour, Mechanized Harvesters and Covid-19 Vigilance in 2020, 40 pages.
BRRI, Gazipur 1701, Bangladesh

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Acknowledgement

The core research team is grateful to the research team leader Emeritus Professor Dr M A Sattar Mandal of BAU, Mymensingh for his timely initiatives and constant guidance for the research, extensive feedback on the early draft report, strenuous edits and significant intellectual contributions to the final report. We remain thankful to Dr Md Shahjahan Kabir, Director General (DG), Bangladesh Rice Research Institute (BRRI) for guidance and contribution in the report. Finally, special thanks to DG, BRRI for providing funds to print the report.

Abstract

During countrywide lockdown due to COVID-19 pandemic wage workers from different parts of the country were encouraged to move to *haor* areas for harvesting Boro paddy amid risk of community transmission of the virus in late April to early May 2020. This study attempted to delineate the socioeconomic and health risk management status of migrant harvest labour and to assess the yield and prices of Boro paddy in three haor districts of Kishoreganj, Netrakona and Sunamganj. A quick and clean questionnaire survey was conducted using mobile phones to collect first hand data from 90 labour leaders and 90 Boro farmers during 4th week of April – 1st week of May 2020. Both tabular and inferential analyses were carried out in the study. Ministry of Agriculture very promptly mobilized the local administration, law enforcement agencies and health department with support from the Dept. of Agricultural Extension to make special arrangements for speedy movement of migrant labour to *haor* areas for harvesting Boro paddy. Trucks, engine boats and pickup vans were common transports for migrant labour. The wage workers migrated mainly from Pabna, Tangail, Sirajganj, Mymensingh, Sylhet, Manikganj and non-haor areas of Sunamganj. Most wage workers were 30 – 40 years old. The availability of migrant harvest labour was 20% higher in Sunamganj and 2% higher in Kishoreganj in the current year, compared to last year. However, their availability in Netrakona was 6% lower this year than the last year. Overall, the participation of migrant labour in harvesting Boro paddy in the last year (2019) was 74% – 80%, but it decreased to 60%– 69% this year (2020). This was due to the higher participation in harvesting of Boro paddy by local workers many of whom were actually returnees from cities due to Corona shutdown. The contributions of combine harvesters and reapers were 6%, 7% and 9% in Sunamganj, Kishoreganj

and Netrakona, respectively. The cost of harvesting Boro rice by combine harvesters and reapers including the cost of carrying by labour and threshing by power threshers was 31% – 39% lower than the cost of manual harvesting, carrying and threshing. The health risk management practices of migrant labourers included maintaining social distance from (i) dwellers of in-migration village and from each other while harvesting rice in the fields. Besides, the labourers wore masks while travelling by vehicles, walking out to fields for harvesting rice and going to market places for buying essentials. However, they could not comply social distancing properly in their places of accommodation. Besides, they could not wear masks always while harvesting rice because of hot humid weather and they could not wash hands frequently because of the unavailability of water in the fields. The average yields of wet paddy were 54 – 60 mounds/acre for BRRI dhan28, 64 – 67 mounds/acre for BRRI dhan29, and 70 – 72 mounds/acre for hybrids. These yields were 69% – 82%, 20% – 33% and 20% – 30% higher in 2020 than in 2019, respectively, due to very favourable weather conditions. Similarly, the average market price of wet Boro paddy was BDT 706 – 783/mound in April 2020, which was 20%-30% higher than in April 2019. However, the current price of Boro paddy was 20% – 30% lower than the farmers' expected price this year. Thus, the procurement of Boro paddy at the declared minimum price of BDT 26/kg needs to be implemented at full scale during the harvesting period so that farmers' incentives to produce rice is sustained. In future, more harvesting machines will be required in *haor* areas for timely harvesting of Boro paddy.

1.0 Introduction

Dry season irrigated Boro rice accounts for about 54% of total rice production and thus has a significant contribution to food security in Bangladesh. *Haors* are low-lying wetland areas in north-eastern and north-central parts of the country and play important roles through (i) providing about 18% of total Boro production (BBS, 2018), and (ii) generating employment opportunities for off-farm wage workers in harvesting Boro rice about a month earlier than the other areas. On average, *haor* districts and *haor* covers, respectively about 19% and 9% of total Boro rice areas in the country (Table 1 and BBS, 2018). It can be noted that each h*aor* area covers in the range of 22% -73% of the total arable land of the seven *haor* districts (Figure 1). *Haor* area is mainly suitable for Boro rice cultivation. Boro area under *haor* was higher (36% of total Boro area) in Sunamganj followed by Kishoreganj (23% of total Boro area) and Habiganj (11% of total Boro area) (Figure 2). However, rice cultivation in the *haor* areas is frequently affected by early flash floods due to heavy rainfalls and onrush of water from the upstream of Meghalaya hills in India. The flood is a great threat to the food security of *haor* people because Boro rice is the main source of food round the year. Therefore, farmers in the areas employed a large number of migrant labour to expedite rice harvesting with a view to escaping unexpected crop loss due to flash floods.

In the current year, public travel restriction was imposed from 26 March 2020 because of community transmission of pandemic disease COVID-19. The farmers, rice researchers and the government extension department were concerned about the movement of wage workers from other regions to *haor* areas this

This quick survey report is prepared by a core research team from Agricultural Economics and Agricultural Statistics Divisions of Bangladesh Rice Research Institute (BRRI), Gazipur. The team includes Dr Md Jahangir Kabir, Dr Md Shahjahan Kabir, Dr Md Abdus Salam, Dr Md Ariful Islam, M Imran Omar, Md Abdur Rouf Sarkar, Md Chhiddikur Rahman, Afroza Chowdhury, Md Shajedur Rahaman, Limon Deb, Md Abdul Aziz and Dr Md A Bakr Siddique. The study has been conceptualized, initiated and led by Dr M A Sattar Mandal, Emeritus Professor of Agricultural Economics at the Bangladesh Agricultural University, Mymensingh and Member of the APA Expert Pool, Ministry of Agriculture, and Government of the People's Republic of Bangladesh. Dr Md Shahjahan Kabir, Director General of Bangladesh Rice Research Institute (BRRI), Gazipur, provided overall support to the timely conduct of the survey.

year. The government of Bangladesh took a very timely and prompt policy decision by providing approval of vehicle movement for transporting wage workers to the *haor* areas for facilitating Boro rice harvesting subject to maintaining social distance and health-protective measures to eliminate risks of transmission of the COVID-19 virus. The health department, civil administration and law enforcement agencies under top level government directions also came forward to facilitate movement of harvest labour from one place to another.

Notably, the government allocated subsidy funds and took a very prompt initiative for the purchase of combine harvesters and reapers before commencing harvesting of Boro rice. The Department of Agriculture Extension (DAE) took all the necessary initiatives for distributing the newly purchased harvesters and reapers, and for repairing of old machines. However, the availability of power harvesters is scanty for harvesting the Boro rice by the machines as the average capacity of a combine harvester is in the range of 30 – 35 ha (Islam, 2018). Thus, the number of available combine harvesters in the *haor* districts is too inadequate to cover the total Boro rice area (Table 2). However, there were some rice reapers as well, which can only harvest but the collection of harvested paddy from fields and threshing them require the services of threshers as well as labour. Therefore, although harvesters and reapers were duly mobilized by the suppliers, albeit less than required, DAE and the individual farmers contracted the migrant labourers for harvesting Boro paddy in the *haor* areas under the lockdown condition this year.

Table 1. Boro areas in *haor* districts and *haor* areas of Bangladesh in 2019-20.

Item	District wise Boro area (ha)	Boro area in the *haor* (ha)
Habiganj	120,000	46,360
Moulovibazar	54,538	26,754
Brahmanbaria	110,885	32,000
Kishoreganj	166,710	103,245
Sylhel	80,565	35,070
Netrakona	184,530	40,865
Sunamganj	219,300	161,105
All	936,528	445,399

Source: DAE 2020.

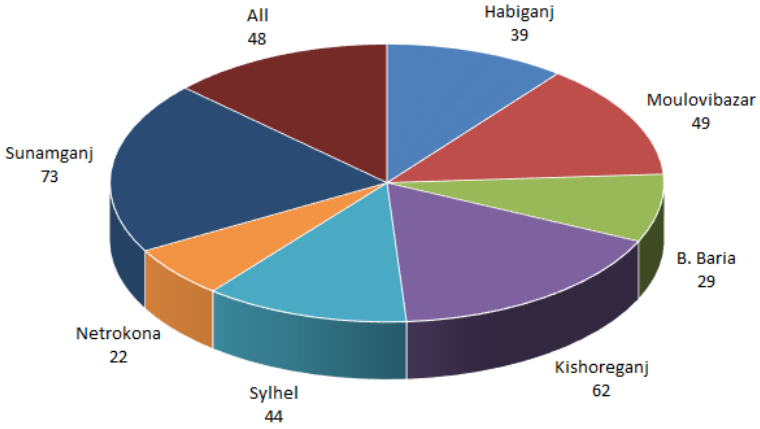

Figure 1: Boro area in the *haor* as % of total Boro area of the respective *hoar* districts of Bangladesh, 2019-20.

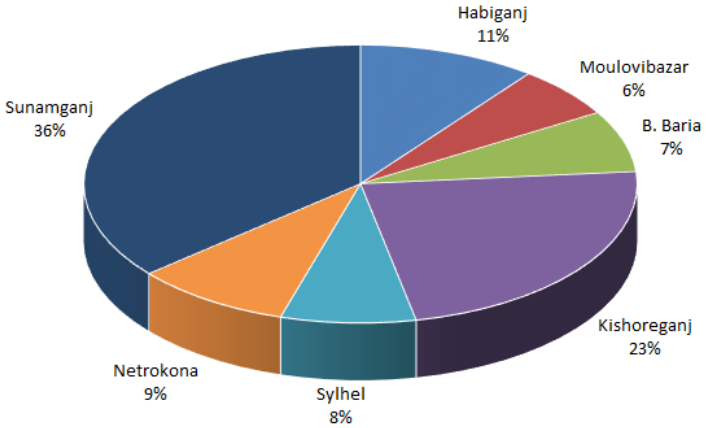

Figure 2: Distribution of Boro areas in *haor* districts of Bangladesh, 2019-2020.

The Upazila Agriculture Officer (UAO) and Upazila *Nirbahi* Officers (UNO) jointly approved all the members of labour groups after primary health checkups through medical officers of Upazila Health Complex. Therefore, studying the

socioeconomic status and health risk management strategies of the migrant harvest workers is a demand of time. Keeping this in mind, the present study aims to delineate (i) socio-economic status and health risk management strategies of Boro harvesting migrant labourers, and (iii) assess the biophysical and market performance of Boro cultivars.

Followed by the introduction to the study, description of survey methods is presented briefly. The report then presents results including socioeconomic status of migrant labourers, their health risk management strategies. In a separate section, biophysical (yield performance) and farm gate price (market performance) of Boro paddy are discussed. This is followed by conclusions and recommendations.

Table 2. Mechanization scenarios for harvesting rice in the *haor* districts of Bangladesh.

Item	Total combine harvester (no.)	New combine harvester in 2020 (no.)	Total reaper (no.)	New reaper in 2020 (no.)
Habiganj	57	22	195	33
Moulovibazar	44	5	124	3
Brahmanbaria	39	17	20	3
Kishoreganj	88	40	99	13
Sylhel	68	11	173	2
Netrakona	102	53	25	1
Sunamganj	142	44	213	10
All	540	192	849	65

Source: DAE, 2020.

2.0 Methodology

Netrakona, Kishoreganj and Sunamganj Districts were selected purposively for the study because of the higher number of wage workers migrating to those districts than that of other *haor* districts namely Sylhet, Moulvibazar, Habiganj and Brahmanbaria. *Haor* farmers of Sylhet district did not employ migrant labourers from other districts in the current year. Some labourers from non-*haor* areas of the district migrated to Sunamganj for harvesting Boro rice. Besides, *Haor* farmers of Moulvibazar, Habiganj and Brahmanbaria employed a few migrant labourers for harvesting Boro paddy in the current year because a large number of non-farm wage workers in cities went back to their villages due to lockdown and participated in harvesting Boro paddy. Before conducting the survey, the contract mobile phone numbers of labour leaders and employer farmers were collected through Upazila Agriculture Officer (UAO) of the selected Upazilas. The telephone interviews were conducted during the fourth week of April to the first week of May 2020 for collecting primary data from the purposively selected 90 labour leaders and 90 farmers of 90 villages of the selected *Haor* districts (Table 3). Before commencing the interview, the data enumerators built up a rapport with both the leaders of wage workers and employer farmers by introducing and explaining the aim of the survey clearly. Thereafter, a short structured questionnaire was used for collecting the data. A descriptive statistical tool was used for analysing the data. An inferential analysis i.e. a two-sample t-test was done using software program STATA15 to assess if there are any significant variations in the mean yield and prices of Boro paddy between the studied locations.

Table 3. Study locations and distribution of samples in the *haor* areas of Bangladesh.

District	Upazila	Number of labour leaders	Number of total labour	Number of farmers
Sunamganj		60	1,294	60
	Jamalganj	20	503	20
	Jagannathpur	10	106	10
	Derai	20	408	20
	Dharmapasha	10	277	10
Netrakona		15	311	15
	Mohonganj	5	106	5
	Kaliajuri	5	125	5
	Modon	5	80	5
Kishoreganj		15	436	15
	Nikli	5	99	5
	Mithamain	5	154	5
	Itna	5	183	5
Total		90	2,041	90

Source: Telephone survey 2020.

3.0 Results and Discussion

3.1 Socioeconomic status of migrant labourers

3.1.1 Demographic features

Table 4 shows the source and destination locations of the wage workers and their mode of transports to the *haor* areas of Bangladesh. It was observed that wage workers migrated to *haor* areas of Sunmganj from Tangail, Netrakona, Sirajganj, Pabna, Mymensingh, Sylhet and Habiganj. It can be noted that wage workers from the non-haor areas of Sunamganj, and Sylhet also migrated to *haor* areas for harvesting Boro paddy. Besides, wage workers from Mymensingh, Pabna, Sirajganj, Tangail, Manikganj and even from the non-*haor* areas of Netrakona migrated to Kishoreganj for harvesting Boro paddy. Similarly, wage workers from Pabna, Sirajganj, Mymensingh, Tangail and even non-haor areas of Netrakona migrated to *haor* areas of Netrakona for harvesting Boro paddy (Table 4 and Figure 3).

Table 4. Sources and destination locations of migrant labourer in *haor* areas of Bangladesh.

Source location		Destination location	
District	Upazila	District	Upazila
Pabna	Bera and Atghoria	Sunamganj	Dharmapasha
Tangail	Kalihati and Sadar Tangail		
Sirajganj	Shahjadpur and chauhali		Jamalganj
Mymensingh	Nandail		
Sylhet	Kanaighat, Joyintapur, Companiganj, Gowainghat		Derai
Sunamganj	Tahirpur, Bishwamvarpur, Sadar		
Netrakona	Kalmakanda, Purbadhala, Barhatta		Jagannathpur
Habiganj	Ajmiriganj		
Netrokona	Komolakanda, Barhatta, Sadar		Itna
Manikganj	Daulatpu		
Pabna	Faridpur	Kishoreganj	Mithamain
Sirajganj	Chauhali		Nikli
Tangial	Bhuapur		
Mymensingh	Nandail, Dhobaura		
Pabna	Ataikula, Sadar	Netrokona	Mohonganj
Tangail	Bhuapur		Modon
Sirajganj	Sadar		
Mymensingh	Nandail		Khaliajuri
Netrokona	Barhatta		

Source: Telephone survey, 2020.

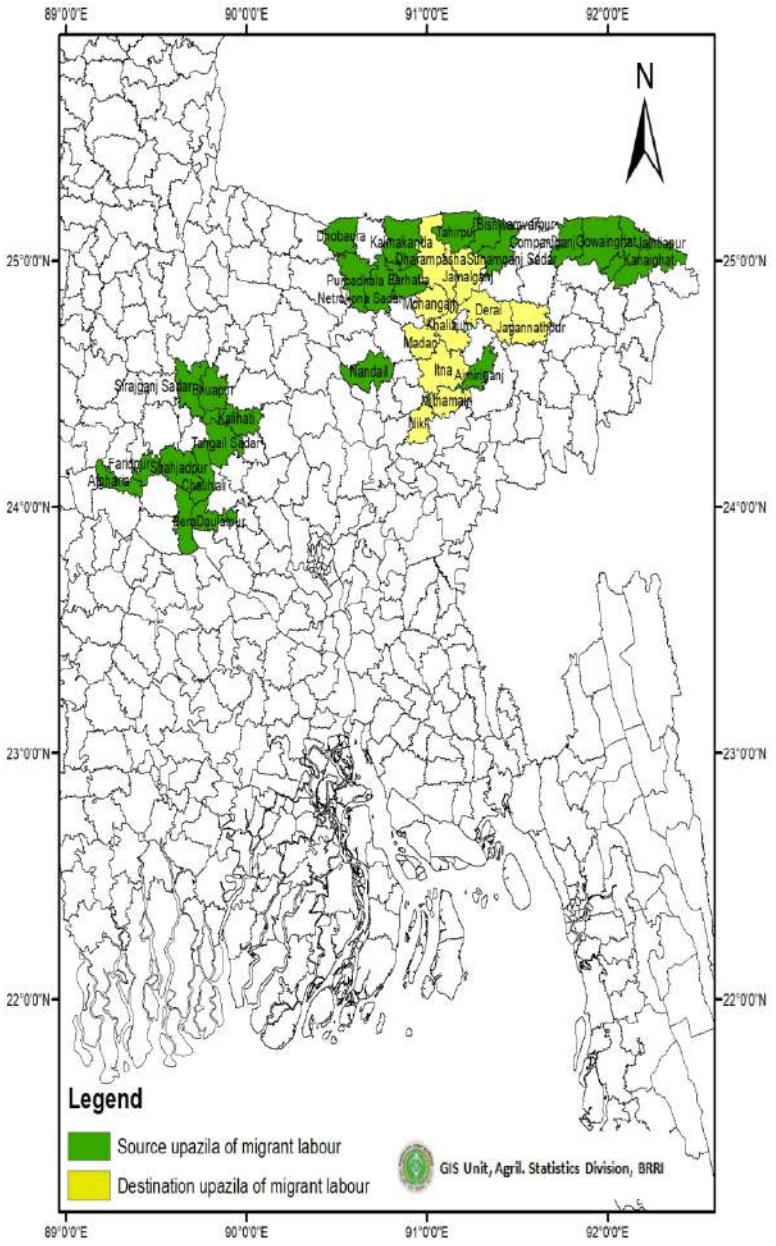

Figure 3: Source and destination locations of migrant Boro harvesting labourers in *haor* areas of Bangladesh.

Average numbers of wage workers in each group were 22, 29 and 22 in Sunamganj, Kishoreganj and Netrakona, respectively (Table 5). The availability of migrant wage workers in the current year (2020) in Jamalganj and Derai Upazila of Sunamganj was, 20% and 12% higher respectively, compared to last year (2019). On the contrary, the availability of migrant labourers in Dharmapasha and Jagannathpur upazila of Sunamganj was 5% and 7% lower, respectively compared to last year. On average, the availability of migrant labour in the Sunamganj district was 20% higher in the current year, compared to the last year. Similarly, the availability of migrant labour in the Kishoreganj was 12% higher in the current year compared to last year. On the other hand, the availability of migrant labour in the current year in Netrakona was slightly lower (6%) than that of the last year (Table 5). Wage workers during the telephone interviews mentioned that the reason for less in-migration of labour this year was that some of them were unwilling to move due to corona scare countrywide under lockdown situations. Besides, a large number of non-farm wage workers moved back to their villages from cities and were engaged in many cases for Boro paddy harvesting. Most farmers in the telephone interviews pointed out that the shortage of labourers for harvesting paddy was not that acute this year because of a number of factors: (i) a large number of non-farm wage workers went back to their villages and participated in harvesting their own paddy or worked as wage workers for others; (ii) in some areas an adequate number of migrated labourers was available in the areas; (iii) in many areas, social volunteers did also put their hands in harvesting Boro paddy of the farmers who needed it most this year. Besides, in areas where machines were available Boro paddy was quickly harvested by combine harvesters and reapers as well. However, the machines cannot always go to the lower parts of the *haor* to harvest paddy. It is mainly because access pathways for the harvesters are not available to move to the fields.

Table 5. Group size and migration status of Boro harvest labour in 2019 and 2020 in the *haor* areas of Bangladesh.

District (the labourers migrated to)	Upazila (the labourers migrated to)	Average numberer of labour per group	Migration status compared to last year	% of higher or lower
Sunamganj:		22	Higher	20
	Dharmapasha	28	Lower	5
	Jamalganj	25	Higher	20
	Derai	20	Higher	12
	Jagannathpur	11	Lower	7
Kishoreganj:		29	Higher	12
	Itna	37	Higher	11
	Mithamain	31	Higher	12
	Nikli	20	Lower	11
Netrakona:		22	Lower	6
	Mohonganj	21	Lower	9
	Modon	20	Lower	26
	Khaliajuri	25	Higher	29

Source: Telephone survey, 2020.

Table 6 presents the age classification of wage workers in the *haor* areas in Bangladesh. The wage workers were classified as three age groups: (i) Most labour age group, (ii) A few below the most labour age group and (iii) A few above the most labour age group. It was observed that most labourers belonged to the age group in the range between 30-40 years and a few belonged to below and over of the most labourers age groups. The wage workers reported that harvesting and carrying of Boro paddy in the summer months was an arduous job so that people over 40 years or so could not cope with the work so easily (Table 6).

Table 6. Classification of migrant wage workers based on age in the *haor* areas of Bangladesh.

District (the labourers migrated to)	Upazila (the labourers migrated to)	A few lower than most age group		Most labour age group		A few higher than most age group	
		Min	Max	Min	Max	Min	Max
Sunamganj		21	25	33	40	45	50
	Dharmapasha	21	24	31	38	46	51
	Jamalganj	21	26	32	41	45	50
	Derai	20	24	33	40	45	49
	Jagannathpur	24	28	33	39	44	49
Kishoreganj		21	26	32	40	45	50
	Itna	17	25	33	43	48	54
	Mithamain	21	25	31	41	44	50
	Nikli	24	28	31	35	40	45
Netrokona		23	27	30	38	43	50
	Mohonganj	25	30	30	37	40	48
	Modon	24	30	30	38	41	47
	Khaliajuri	20	23	31	39	48	53
Average		21	26	32	39	45	50

Source: Telephone survey, 2020.

3.1.2 Labour availability, mechanization status and Boro harvesting cost

Table 7 presents labour availability scenarios and the contribution of labourers and power harvesters for Boro paddy harvesting. Farmers reported during interviews that the availability of wage workers for harvesting Boro paddy was usually scarce in the *haor* areas in the past and that they mostly relied on migrant labourers for harvesting the crop. However, both the farmers and labour leaders during interviews said that the availability of wage workers for harvesting Boro paddy in the current year was somewhat higher than usual because most non–farm wage workers including rickshaw pullers, auto/CNG drivers, hawkers, petty traders and readymade garments workers of every village went back home from cities and towns

due to lockdown and worked as off-farm wage workers for harvesting paddy. Small and marginal farmers harvested their paddy themselves to reduce cost of labour and also to retain whatever little savings they had for the uncertain future of Covid- 19 crisis. Besides, some paddy areas were harvested by the increased number of power harvesters this year. The mobilization of harvesters and reapers by the private companies as a result of timely initiatives and monitoring from the Ministry of Agriculture raised confidence about timely harvest of paddy well ahead of the onset of rains. The wage workers reported that they had usually stayed in the *haor* areas for about a month for harvesting Boro paddy, but in the current year the harvesting of paddy took only three weeks because of the availability of higher number of local labour as well as larger number of machines, compared to past years.

The sample farmers mentioned that 96% – 100% of their total Boro area was harvested by migrant labourers and that they invited the labour leaders to bring migrant labourers to the village for harvesting paddy.

Besides, the majority of farmers said that the migrant labour charges lower wages than local labour. The survey revealed that local labour harvested 30% of total Boro paddy in Sunamganj, 28% in Kishoreganj and 37% in Netrakona in the current year (2020). In contrast, local labour in the last year (2019) harvested 18%, 15% and 20% of total Boro paddy area in Sunamganj, Kishoreganj and Netrakona, respectively. On the other hand, the contributions of migrant labour for harvesting Boro paddy were in the range of 60% – 69% of total Boro area in the current year (2020), but these proportions were in the range of 74% – 80% of the total Boro area in the last year (2019). As stated earlier, farmers explained that the lower contribution of migrant labour in 2020 was caused by the higher participation of local non–farm wage workers in harvesting Boro paddy.

On average, the contribution of combine harvesters and reapers in harvesting Boro paddy this year were 6%, 7% and 9% in Sunamganj, Kishoreganj and Netrakona, respectively. Some farmers mentioned that the overall contributions of combine harvesters and reapers in their villages were as low as 6% in Sunamganj, 7% in Kishoreganj and 9% in Netrakona. This was mainly because it was not possible to move the harvesters in the

middle of *haor* because of wet soil and unavailability of access roads to the paddy fields. Moreover, there were not enough harvesters available in the area either (Table 7).

Table 7. Labour availability and contribution of manual labour and machines for harvesting of Boro paddy in the *haor* areas of Bangladesh.

Items	Sunamganj (n=120)	Kishoreganj (n=30)	Netrakona (n=30)
% of total Boro area in 2020 harvested by:			
Local labour	30	28	37
Migrant labour	66	69	60
Harvesters and reapers	6	7	9
% of total Boro area in 2019 harvested by:			
Local labour	18	15	20
Migrant labour	78	80	74
Harvester and reapers	4	5	6

Source: Telephone survey 2020.
Note: Out of total respondents (n) in each location, labour leaders and farmers represent equal numbers.

Both the wage workers and farmers mentioned that the wage for harvesting Boro rice in 2020 was 12%–15% lower than in 2019 due to the availability of additional wage workers consisting of local and migrant labour this year. There were three systems of wage payments: (i) cash contract per unit area harvested, (ii) contract of sharing a certain amount of paddy for per unit area harvested, and (iii) daily wage basis (Table 8). The leaders of wage workers reported that paddy sharing was the most common mode of payment of wages for harvesting Boro paddy in the *haor* areas of Bangladesh. Labour leaders reported that paddy sharing was the most preferred basis of payment to them because they would like to supplement rice security for their family consumption for about six months through harvesting paddy for a month in the *haor* areas. They also reported that the estimated price of their home processed rice including parboiling, drying, husking and transporting cost was 30%-40% lower than the market price of milled rice. The migrant wage workers during the interviews reported that they would be able to earn paddy/rice only for about 3 – 4 months instead of six months due mainly to a shortening of the duration of paddy

harvest period by about 20% – 25%, compared to the last year. Besides, decrease in in-kind wages from 11.25 – 11.8 mounds of paddy/acre in 2019 to 10.1 – 10.5 mounds of paddy/acre in 2020 also reduced their total paddy earning. It was observed that there was no notable variation in the per-acre cost of harvesting and carrying of Boro paddy among the different modes of payment for harvesting by labour (Table 8).

It is not surprising that the cost of harvesting Boro paddy (BDT 6,309 - 6,944/acre) by combine harvester was 31% - 39% lower than manual harvesting, and carrying including the cost of threshing by power thresher. It was also the case that per acre cost of harvesting by reaper including manual carrying and power threshing was 13% - 18% higher than harvesting by combine harvester, but 12% - 18% lower than harvesting and carrying by manual labour including threshing by power threshers. Moreover, mechanical harvesting reduces the harvesting time largely, which facilitates to avoid uncertain damage of paddy by sudden flash-floods. However, the respondent farmers also mentioned that although harvesting by combine harvesters is cost-effective, farmers pointed out one weakness of combine harvesting as it involves additional costs of collecting and carrying the straw from fields to home. Besides, the quality of the hay becomes unsuitable for feeding cattle if it rains during 2-3 days when farmers leave the straw in the fields for drying. Landless marginal people usually collect the leftover paddy straw from the fields for use as fuels. However, Boro paddy straw is the main source of cattle feed and cooking fuel for many farm families in the *haor* areas. The estimated opportunity cost of the paddy straw was in the range of BDT 2,500 – 3000 per acre. According to opinions of some farmers, market price of paddy harvested by combine could deteriorate in quality if it is not possible to dry and market paddy within 2-3 days of harvesting by combines. As they reported, one of the reasons for somewhat deterioration of paddy quality is that the harvested paddy becomes hot because of shifting the paddy to the storage chamber of combine harvester by power presser from the threshing section. This is one issue that the BRRI research could take it up for empirical verification. Even if it is true that the quality of the rice grains harvested manually or by reapers does not deteriorate despite heaping the harvested

paddy at farm-yard for 3-5 days before threshing by power thresher, one should not however underestimate the time and cost of completing harvesting of paddy by labour or reaper and the risk of losing the crop if it cannot be harvested well ahead of the onset of rains and early floods in *haors*.

Table 8. Boro harvesting, carrying and threshing cost under different modes of payment for labour and machine in the *haor* areas of Bangladesh.

Harvesting methods, mode of payment & estimated costs	Sunamganj (n=120)	Kishoreganj (n=30)	Netrakona (n=30)
A. Combine harvester (BDT/acre):	6,309	6,944	6,542
Harvesting, threshing & bagging (by combine)	4,659	5,294	5,102
Carrying straw and grain (by labour/ trolley)	2,200	2,200	1,920
B. Reaper (BDT/acre):	7,442	7,865	7,635
Harvesting	4,067	4,250	4,220
Carrying harvested paddy from fields	1,750	1,690	1,740
Power threshing	1,625 (2.5 mounds)	1,925 (2.75 mounds)	1,675 (2.5 mounds)
C. Labour cash contract and power thresher (BDT/acre):	8,150	9,474	8,583
Cash contract: Harvesting and carrying paddy	6,525	7,549	6,908
Power threshing	1,625	1,925	1,675
D. Labour paddy share and power thresher (BDT/acre):	8,765	9,205	8,644
Paddy share (mounds/acre)	10.5 (BDT 7,140)	10.4 (BDT 7,280)	10.1 (BDT 69,69)
Power thresher	1,625	1,925	1,675
E. Daily wage Labour and power thresher: BDT/acre:	8,305	8,605	7,915
Daily wage (BDT/man-day	550 (BDT 6,680)	550 (BDT 6,680)	520 (BDT 6,240)
Power thresher BDT/ acre	1,625	1,925	1,675

Source: Telephone survey, 2020.

Note: Out of total respondents (n) in each location, labour leaders and farmers represent equal numbers. The daily wage was calculated for 8 hours per work-day including foods. The figures inside the brackets under power threshing show amount

of paddy paid in kind for threshing paddy. The figures inside the brackets under paddy sharing payment indicate the current price of the amount of paddy paid in kind for harvesting and carrying paddy home. The figures inside the brackets under the daily wage payment indicate the cost of harvesting and carrying harvested paddy per acre through hiring labour on a daily wage basis.

3.2 Health risk management strategies

3.2.1 Social distance and food intake

Maintaining social distance and having a healthy diet for increasing body immunity are the most important health risk management strategies to minimize the transmission of the COVID-19 virus. Table 9 presents the social distance status of the migrant Boro harvest labour in the vehicles used for travelling to *haor* areas of Bangladesh. Trucks, engine boats and pickup vans were mainly used for transporting Boro harvesting labourers. Some labourers used buses for travelling to *haor* areas from their places of residence. Besides, battery and CNG operated auto-rickshaw and motorbikes were also used for their transportation (Table 4). Some of the labour walked long distance on feet to reach the destination. The labour leaders responded that the majority of them wore a mask in the vehicles, but none of them could maintain the suggested social distance from each other due to shortage of space in the vehicles. Although these vehicles were specially arranged in emergency conditions for transporting the harvest labour in compliance with WHO Covid-19 health regulations, it was not always possible in practice.

Table 9. Social distancing status of migrant labour when travelling by vehicles to *haor* areas of Bangladesh.

Mode of transportation	Kishoreganj		Netrakona		Sunamganj	
	% of total migrant group	Maintain social distance (yes/no)	% of total migrant group	Maintain social distance (yes/no)	% of total migrant group	Maintain social distance (yes/no)
Pickup van	22	No	40	No	25	No
Truck	19	No	47	No	23	No
Engine boat	52	No			18	No
Auto rickshaw	7	No	13	No	11	No
Bus					18	No
Motorbike					5	No
Total	100		100		100	

Source: Telephone survey 2020.

Table 10 presents the status of social distancing by the migrant labour at their accommodation and paddy fields, and when eating foods in the *haor* areas in Bangladesh. The wage workers reported that in the current year they were requested to maintain social distance from the community people during their stay in the village. Most harvest labour groups were asked to make temporary accommodation in an isolated place from the residential areas the villages where they migrated to, but it was not always possible because of scarcity of suitable locations. The labour leaders were allowed to go to the local market for buying essential commodities. Besides, other members of the labour groups were not allowed free gathering in the public places or exchanging views with the dwellers in the migration village.

Most labour groups constructed tents by a plastic sheet or rice straw or aluminium sheet and bamboo on the bank of rivers/canals and in the paddy fields of *haor* areas. Most labour leaders reported that they brought the necessary goods including plastic and aluminium sheets, ropes and bamboo for constructing temporary accommodation for them. It was observed that the majority of labour groups (63% – 86% of the total labour groups) stayed in the tents in the isolated places from the village residential areas. In Kishoreganj, about 27% of

total migrant groups stayed in the engine boats that they used for travelling from their villages to the *haor* areas. Besides, in all locations some labour groups stayed in the school buildings. In Sunamganj, a few stayed in the employers' guest rooms or through constructing tents outside the main house compounds at farmers' place.

It was observed that the migrant Boro harvest labourers maintained social distance between themselves and from the dwellers of the in-migration villages. However, 85% – 93% of most labour groups could not maintain social distance properly while they were staying in their accommodation. Normally, an average of 14 – 26 persons had to live in a tent and/or a boat and 10 – 12 persons in a room. It can be noted that most of the harvest labourers were fully aware of COVID–19 issue because they were briefed by the DAE personnel before they left for *haor* areas for harvesting Boro paddy. As it was reported, most of the labour group members did properly maintain social distance while harvesting rice in the fields and carrying rice from the fields to farmers' place (Table 10).

Consumption of a balanced diet consisting of protein, vitamins and minerals for increasing body immunity is an important health risk management strategy to protect infestation from the COVID-19 virus. But most of the harvest labourers reported that they could not generally afford eating healthy diets because they had to buy on credit from local shop keepers essential items including rice, potatoes, pulses, edible oil and spices for cooking foods themselves. About 85% – 93% of the total labour groups lived on the food they cooked by themselves (Table 10). Each group hired a cook for preparing foods for them. They reported that potatoes were the major vegetables, while pulses and dry fish were the sources of protein diet for them. They said there was no mola-fish or carp fish in the local market of *haor* areas. On the other hand, animal protein was completely beyond their purchasing abilities. Most of them did not eat fresh fruits and vegetables.

Table 10. Social distance status of the migrant labour at accommodation and eating places sources in the *haor* areas of Bangladesh.

Items	Sunamganj (n=120)	Kishoreganj (n=30)	Netrakona (n=30)
Accommodation (%): Tent	81	53	86
: School	12	20	14
: Boat		27	–
:Farmers' house	7	–	–
Number of persons live in a tent and boat	14	26	17
Number of persons live in a room	12	11	10
Risk management strategies:			
Maintain social distance at accommodation (%)	15	7	7
Do not maintain social distance at accommodation (%)	85	93	93
Maintain social distance while harvesting the rice (%)	10	93	73
Do not maintain social distance while harvesting rice (%)	–	7	27
Source of foods (%):			
Cooked by themselves	85	93	93
Farmers	15	7	7

Source: Telephone survey, 2020.
Note: Out of total respondents (n) of each location, half are labour leaders and the rest are farmers

However, a few of the labour groups also lived on food provided by employer farmers, but the foods were served in the fields outside the farmers' place to maintain social distance from the village dwellers. The results indicate that most wage workers could not afford or manage intake of balanced foods to combat the COVID-19 virus.

3.2.2 Sanitization status

Sanitization is also an important health risk management strategy to avoid infestation from the COVID-19 virus. Table 11 presents the sanitization status of migrant labour in the haor areas of Bangladesh. The harvest labour groups reported that most of them were aware of the importance of sanitization including social distancing and wearing a mask to remain safe from COVID–19 virus infestation. However, they were not able

to maintain all the sanitization requirements always because of some practical reasons. Firstly, they should have stayed at home but they had to go out for livelihoods. Secondly, although most migrant labourers had the mask, they could not bear with wearing the mask while harvesting paddy because of very hot and humid conditions under the scorching sunlight in the summer months. Therefore, they wore mask while they walked to the fields for harvesting paddy and went to market for buying essential commodities for them (Table 11). It can be noted again that only labour leaders were allowed to go to the local markets only once or twice a week by wearing a mask for buying necessary commodities. Thirdly, most of the labourers could not wash hands frequently while harvesting paddy because of the unavailability of water in the paddy fields. Therefore, they mainly washed their hands only before and after having meals as well as after finishing work. Sometimes, they used water from the canals and rivers closer to their accommodation and work fields for washing hands. Some of the labour leaders mentioned that they drank raw tea with spices in the morning and evening so as to improve their immunity for protecting from the CIVID–19 infestation.

Table 11. Sanitization status of the migrant labourers in the *haor* areas of Bangladesh.

Risk management strategies	Sunamganj (n=120)	Kishoreganj (n=30)	Netrakona (n=30)
Wear a mask while in the marketplace (%)	100	100	100
Without a mask while harvesting paddy (%)	100	100	100
Not adequate hand washing facilities in fields (%)	100	100	100
Adequate water for hand washing at accommodation (%)	98	100	100
How often they wash their hands: Seldom (%)	100	100	100
Drink raw tea with spices (%)	16	23	18

Source: Telephone survey, 2020.

Note: Out of total respondents (n) in each location, labour leaders and farmers are of equal numbers.

3.3 Biophysical and market performance of Boro paddy

Table 12 presents the biophysical performance of major Boro paddy varieties in *haor* areas of Bangladesh. The average paddy yields were 54 – 60 mounds/acre for BRRI dhan28, 64 – 67 mounds/acre for BRRI dhan29 and 70 – 72 mounds/acre for hybrids. The average yield of BRRI dhan28 in the *haor* areas in 2020 was 69% – 82% higher than in 2019. Similarly, per acre yield of BRRI dhan29 and hybrids were 20% – 33% and 20% – 30% higher in 2020 than that of 2019, respectively (Table 12). It was observed that the mean yields of BRRI dhan28, BRRI dhan29 and hybrid in 2020 were significantly (P0.01) higher than in 2019 (Table 13). Farmers reported that the best seasonal weather condition in terms of less infestation of pests and diseases were the key factor for the higher grain yield of Boro paddy in 2020. Other factors that favoured crop growth and higher yields this year included no cold at panicle initiation, heading and grain filling stages, no moisture stress during the reproductive stage along with no heavy rainfall and no hailstorms. On the other hand, there was severe grain sterility in 2019 because of unfavourable weather conditions as mentioned by the farmers. Boro season in 2019 was treated as the worst growing season because of (i) drought or no rainfall at panicle initiation stage which was accompanied by scant irrigation due to little reserved water for use, and, (ii) drizzling at panicle emerging stage, consequently severe infestation of the blast in BRRI dhan28 and even in the early planted BRRI dhan29 and (iii) heavy rainfall and hailstorms at flowering and grain filling stages for several days.

Table 12. Biophysical performance of major Boro paddy in *haor* areas of Bangladesh.

District	Grain yield (mounds/acre)					
	BRRI dhan28		BRRI dhan29		Hybrid rice	
	2019	2020	2019	2020	2019	2020
Kishoreganj	34	58	54	65	56	73
Netrakona	33	60	55	67	60	72
Sunamganj	32	54	48	64	58	70

Source: Telephone survey, 2020.
Note: 1 Mound= 40 kg, the yield was estimated based on 10%-14% moisture content.

Table 13. Mean test of biophysical performance of major Boro paddy in *haor* areas between 2019 and 2020.

Varieties grown	Kishoreganj Yield (mounds/acre)		Mean diff. (t- test)
	2019	2020	
BRRI dhan28	33.600	57.533	-23.933***
BRRI dhan29	53.533	64.600	-11.067***
Hybrid	56.467	73.067	-16.600***
Sample size	15	15	
Varieties grown	Sunamganj Yield (mounds/acre)		Mean diff (t test)
	2019	2020	
BRRI dhan28	32.320	53.733	-21.412***
BRRI dhan29	47.768	64.122	-16.354***
Hybrid	58.200	69.922	-11.722***
Sample size	60	60	
Varieties grown	Netrakona Yield (mounds/acre)		Mean diff. (t- test)
	2019	2020	
BRRI dhan28	32.667	59.600	-26.933***
BRRI dhan29	54.867	66.000	-11.733***
Hybrid	60.067	72.467	-12.400***
Sample size	15	15	

Source: Calculations based on data from telephone survey 2020.
Note: ***p< 0.01 percent level of probability, 1 Mound= 40 kg, the yield was estimated based on 10-14% moisture content.

Table 14 presents the mean test of the biophysical performance of Boro paddy in 2020 in Kishoreganj, Netrakona and Sunamganj. It was observed that the mean yield of BRRI dhan28 in Kishoreganj was significantly higher than in Netrakona and Sunamganj at 10% and 1% level of significance, respectively. Similarly, the mean yield of BRRI dhan28 in Netrakona was significantly higher than that in Sunamganj at a 1% level of significance. Likewise, the mean yield of hybrid in Kishoreganj was also significantly higher than in Sunamganj at a 10% level of significance. There was no significant yield difference of BRRI dhan29 between the *haor* Districts.

Table 14. Mean test of biophysical performance of Boro paddy in 2020 between Kishoreganj, Netrakona and Sunamganj.

Variety	Kishoreganj	Netrakona	Mean diff (t test)
	Yield (mounds/acre)		
BRRI dhan28	57.5	59.6	-2.067*
BRRI dhan29	64.6	66.6	-2.000^{NS}
Hybrid	73.1	72.5	0.600^{NS}
Sample size	15	15	
Variety	Kishoreganj	Sunamganj	Mean diff (t test)
	Yield (mounds/acre)		
BRRI dhan28	57.5	53.7	3.801***
BRRI dhan29	64.6	64.1	0.478^{NS}
Hybrid	73.1	69.9	3.145*
Sample size	15	60	
Variety	Netrakona	Sunamganj	Mean diff (t test)
	Yield (mounds/acre)		
BRRI dhan28	59.6	53.7	5.867***
BRRI dhan29	66.6	64.1	2.478^{NS}
Hybrid	72.5	69.9	2.545^{NS}
Sample size	15	60	

Source: Calculations based on data from telephone survey 2020.
Notes: ***p< 0.01 and *p < 0.1 percent level of probability. NS = Not significant. 1 Mound= 40 kg, the yield was estimated based on 10%-14% moisture content.

3.4 Market performance of Boro paddy

Table 15 presents the market performance of paddy in the *haor* areas of Bangladesh. Farmers reported that the price of wet rough BRRI dhan28 in the third week of April was in the range of BDT 706 – 783 per mound and decreased to BDT 683 – 729 per mound when BRRI dhan29 was harvested. Farmers mentioned that the price of wet hybrid Boro paddy was BDT 60 – 100 lower per mound than BRRI dhan28 and BRRI dhan29. The price of paddy in Kishoreganj was higher than in Sunamganj and Netrakona, which may be due to the higher demand of BRRI dhan28 for local consumption. It can be also noted that Boro area in the survey villages decreased by about 15% – 20% of the total area in 2020, compared to 2019, which may have affected Boro paddy price. DAE of Kishoreganj reported a decrease of about

3255 ha (3% of total Boro area) in 2020, compared to 2019 (DAE, 2020), mainly because of replacement of Boro area by profitable cash crops, particularly maize and in some arable area remained fallow as Boro rice was not profitable in 2019.

If we convert the price of wet paddy in the fourth week of April to the price of dry paddy, the price of BRRI dhan29 would be in the range of BDT 781 – 833 per mound. The price of dry paddy was estimated through considering 5 kg wet loss per mound of wet paddy. Farmers said that the price of Boro paddy in 2020 was considerably higher than in 2019. They also expressed their opinions that the price Boro paddy as prevailed in end of April 2020 was 20% – 30% lower than the prices they expected.

Table 15. Price of wet Boro paddy in the last two weeks of April 2020 in *haor* areas of Bangladesh.

Item	Sunamganj (n=120)	Kishoreganj (n=30)	Netrakona (n=30)
Price in third week of April (BDT/mound)	706	783	750
Price in fourth week of April (BDT/mound)	683	729	687

Source: Telephone survey 2020.
Note: Out of total respondents (n) in each location, labour leaders and farmers are equal in numbers.
1 mound= 40 kg, the wet of 40 kg wet paddy decreased to 33–35 kg after drying.

Tables 16 and 17 present the mean test results of the price of Boro paddy in the third and fourth weeks of April between Kishoreganj and Sunamganj and between Kishoreganj and Netrakona. The mean price of Boro paddy in the third week of April in Kishoreganj was significantly higher at a 1% level of probability than in Sunamganj. The mean price in the fourth week of April in Kishoreganj was significantly higher at a 5% level of probability than in Sunamganj (Table 16). It was also found that the mean price of Boro paddy in the third week of April in Kishoreganj was significantly higher at a 10% level of probability than in Netrakona. On the other hand, there was no significant variation in the mean price of Boro paddy between Kishoreganj and Netrakona in the fourth week of April (Table 17).

Table 16. Mean test of Boro paddy price between Kishoreganj and Sunamganj in the third and fourth week of April 2020.

Items	Kishoreganj 3rd week	Sunamganj 3rd week	Mean diff.
Group mean	783.333	706.182	77.152***
Sample	15	55	
	Kishoreganj 4th week	Sunamganj 4th week	Mean diff.
Group mean	728.667	683.455	45.212**
Sample	15	55	

Source: Calculations based on data from telephone survey 2020.
Notes: ***p <0.01,**p < 0.05 percent level of probability.

Table 17. Mean test of Boro rice price between Kishoreganj and Netrakona in the third and fourth week of April 2020.

Item	Kishoreganj 3rd week	Netrakona 3rd week	Mean diff (t test)
Group mean	783.333	750.00	33.333*
Sample	15	15	
	Kishoreganj 4th week	Netrakona 4th week	Mean diff (t test)
Group mean	728.667	686.667	42.00^{NS}
Sample	15	15	

Source: Calculations based on data from telephone survey 2020.
Notes: *p < 0.1 percent level of probability. NS = Not significant.

4.0 Summary Conclusions, Lessons Learned and Policy Recommendations

4.1 Summary and conclusions

(i). The harvest labour from Manikganj, Tangail, Netrakona, Sirajganj, Pabna and Mymensingh together with those from non-haor areas of Sunamganj, Sylhet and Habiganj migrated to *haor* areas for harvesting Boro paddy in mid- April 2020. Trucks, engine boats and pickup vans were mainly used for transporting wage workers and most of them stayed in the tents in the fields and/or on the bank of rivers/canals. On average, the number of harvest labour per group was in the range of 22 – 29, and most of them belonged to the age group of 30 – 40 years.

(ii). The availability of harvest labour for harvesting Boro paddy this year was not that difficult in all the locations due to (a) participation of local non-farm wage labour as well as family members of marginal and small farmers in Boro paddy harvesting, and (b) the number of migrant labour was higher in the majority of the *haor* villages. Some Boro areas (6% – 9%) were harvested by combine harvesters and reapers. Therefore, the total cost of harvesting of Boro paddy was 10% – 12% lower in 2020 than in 2019. The contribution of migrant labour for harvesting Boro paddy in 2019 was 74% – 80%, which decreased to 60% – 69% in 2020 mainly because of the higher participation of local labour in harvesting operations.

(iii). The most popular mode of payment of wages of migrant labourers for harvesting and carrying of Boro paddy was paddy sharing, and it was estimated as 10.1 – 10.5 mound/acre. The cost of harvesting of Boro paddy by combine harvesters was BDT 6,309 - 6,944 per acre, which was 31%-39% and 13%-18% lower than the cost of harvesting by manual labour and reapers respectively including manual carrying of harvested paddy and threshing by machine.

(iv). Despite awareness of social distancing and sanitization requirements to protect from the COVID-19 infestation, most of the harvest labourers could not perfectly adopt health risk management strategies which require (a) maintaining social distance properly while travelling by public

vehicles, (b) wearing a mask while harvesting paddy due to very hot and humid weather, and (c) washing hands frequently while in the fields for harvesting paddy due to unavailability of water in the fields. However, most of them maintained social distance while harvesting paddy in the fields, and used mask while going to market places for buying essentials. Besides, most of them lived on food cooked by themselves and some (16 – 23%) of them drank raw tea with spices to avoid health risks.

(v). Yield of BRRI dhan28, BRRI dhan29 and hybrid were 69%-82%, 20%-33% and 20%-30%, higher, respectively, in 2020 than that of 2019 due to very favourable seasonal weather conditions in 2020. The price of wet inbred Boro paddy in the third week of April was slightly higher (BDT 706 – 783/mound) than that of (BDT 683 – 729/mound) in the fourth week of April. The price per mound of wet hybrid Boro paddy was BDT 60 – 100 lower than BRRI dhan28 and BRRI dhan29. Overall, the price of Boro paddy was 20% – 30% lower than the farmers' expected price this year.

4.2 Lessons learned

(i). During the COVID- 19 pandemic when almost all the sectors of the Bangladesh economy virtually came to a standstill situation, it is only agriculture and rural economy which have remained active and the farmers continued their production activities at the cost of their health and life security. This deserves to be recorded as a proven example of farmers' extreme resilience and national strength.

(ii). Boro paddy being the main staple food crop in the *haor* regions, local communities including farmers, local leaders, labourers, traders, transporters and local administration became very active for completing harvesting operations smoothly and timely to avoid risk of crop damage due to early rains or flash flooding.

(iii). Government in general and the ministry of Agriculture in particular took the Boro paddy harvesting in the *haor* region as a top priority national food security issue. The ministry geared up processing and implementation of its machinery subsidy programme to engage the private sector companies for rapidly mobilizing combine harvesters and reapers in the *haors*. Private sector suppliers did also respond

positively to government call and quickly distributed to the farmers and local service providers of *haor* areas several hundreds of these machines many of which were sold on credit.

(iv). In a catastrophic pandemic like COVID-19 outbreak, movement of harvest labour from different parts of the country to the *haor* regions was put on the highest agenda of the government. A timely effort by the Department of Agriculture Extension with coordinated support from the local civil administration, law enforcing agencies, health service departments, and emergency vehicle services with full time monitoring from the ministerial level could successfully transport migrant labour to *haor* districts for harvesting Boro paddy.

(V). In such crisis, all important stakeholders including government, farmers, research and extension personnel, students, volunteers and others put their efforts to make a good start of the Boro paddy harvesting in an extraordinarily difficult pandemic situation, which raised national confidence about putting collective efforts towards ensuring food security.

4.3 Policy recommendations

The survey implies a number of pertinent policy recommendations for improvement of Boro paddy-based farming in the *haor* regions of Bangladesh.

(i) Strong policy support is required for ensuring fair price and profitability of paddy/ rice in the local markets for sustaining stable paddy/rice production. One immediate step would be to gear up procurement of paddy/ rice at the prices declared by the government. Policy measures are also needed to ensure that any unnecessary import of rice is controlled in order to check on any fall of paddy/ rice prices in the domestic market.

(ii) Since paddy price has increased this year and government has given greater attention to *haor* agriculture, it is likely that paddy/rice production will go up in coming years both in terms of acreage and volumes. Ministry of Agriculture will have to continue its current momentum of promoting subsidized combine harvesters and other harvesting machines and transplanters for the *haor* as well as other regions.

(iii) For better mechanization of agriculture, provision of machine supplies as well as repair and mechanic service facilities will have to be promoted in the *haor* areas through the development of service providers in the private sector. BRRI's training programmes can help in this regard.

(iv). Although more machines are likely to go to *haor* regions, a substantial proportions of farming operations will continue to be done by manual labour. Given the apparent shortage of farm labour especially during the Boro harvesting period, most of the labourers will have to come from outside the region. The seasonal movement of labourers can improve significantly if the concerned government departments can make forward planning well ahead of harvesting time to facilitate easy and affordable transportation of migrant labour, improvement of their accommodation and stay, health safety measurement in post- COVID situations and favourable paddy price-labour wage ratio.

(v). Two Boro varieties- BRRI dhan28 and BRRI dhan29 dominate in *haor* regions, although BBRI has developed quite a number of varieties which promise higher yields than those two varieties. BRRI dhan28 can be replaced by BRRI dhan67, BRRI dhan74, BRRI dhan81, BRRI dhan84 and BRRI dhan88. Similarly, smart replacement for BRRI dhan29 includes BRRI dhan58, BRRI dhan89 and BRRI dhan92 which have proved to be outstanding yield performers. These varieties are suggested for *haor* as well as other regions of the country.

5. References

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Note


Note