



The COVID-19 Pandemic Impact on Agricultural Higher Studies in Bangladesh

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Abstract

Developing agricultural manpower, for the scientists in 13 research institutes within the National Agricultural Research and Extension System (NARES) of Bangladesh together with associated agencies under the supporting ministries is essential for sustainable technology generation and adoption. They often operate with limited skills and expertise. In order to address the issue, the Government of Bangladesh undertook a signature PhD program under the National Agricultural Technology Program Phase II (NATP-2) awarding 140 fellowships, 80 in-country and 60 overseas. The NATP-2 PhD program started in 2018 and passed through the COVID-19 pandemic facing severe academic disruptions. A survey was conducted via email among the awardees during January-March 2021 to assess the impact of the pandemic on academic courses research, as well as the measures undertaken to adapt to the unprecedented stress. The results indicate that awardees at both in-country studied and international overseas universities faced disruptions in their mandatory academic courses and research. Most of the fellows required extension of the PhD program duration up to 6 months. In addition to change in schedule, extra funding also required which was allocated case-by-case. Through those coping mechanisms, on one hand, the NATP-2 PhD program successfully completed, on the other, agencies of the awardees lost access to their services.

Keywords: Academic disruptions, Agricultural scientists, Bangladesh, COVID-19 pandemic, NATP-2 PhD program

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Introduction

Bangladesh, with a population of 165.16 million as of 2022 (BBS, 2022), is one of the most densely populated countries globally, and its economy heavily relies on agriculture. With projections suggesting the population will reach 215.4 million by 2050 (Kabir et al., 2015) and agricultural land decreasing by 0.24% annually for non-agricultural uses (Bakhtiar and Samsuzzaman, 2023), it is essential to develop smart, sustainable agricultural technologies to achieve food self-sufficiency. The Agricultural Research Institutes (ARIs) under NARS in Bangladesh focus on the development of crop variety and technology. Thirteen ARIs, along with agricultural universities, conduct this research, with separate institutes for livestock, fisheries, and forestry (BARC, 2020). For ARIs to achieve their goal of increasing agricultural production, capacity development for efficient research and resource management is crucial. Bangladesh Agricultural Research Council (BARC) has been instrumental in supporting the capacity development of scientists since its inception.

Human resources are vital for national development. The development of a nation is often measured by its human resource capabilities (Rashid et al., 2023). Developing agricultural manpower, particularly research scientists, is essential for sustainable technology generation and adoption. Addressing the significant skill gap in NARS, where only 41.2% of scientists had PhDs as of June 2022 compared to 77.5% in India (Rashid et al., 2023; ASTI, 2022), the Government of Bangladesh implemented the National Agricultural Technology Program Phase II (NATP-2) with support from the World Bank and the International Fund for Agricultural Development. The PhD programs under NATP-2, initiated in 2018, aimed to enhance the expertise of scientists both domestically and internationally.

The COVID-19 pandemic, which began in Wuhan, China, in December 2019, caused unprecedented disruptions of day-to-day activities globally, including academic atmosphere. The World Health Organization declared it a pandemic, leading to the closure of educational institutions in 175 countries, affecting millions of students (UNESCO, 2020; The World Bank, 2020; UNICEF, 2020). Travel restrictions further complicated the situation for international students (Marinoni and Land, 2020). The sudden shift from face-to-face to online education posed challenges, including poor network connections and difficulties in adapting to the new delivery method (Tari and Amonkar, 2021; Owusu-Fordjour et al., 2020; Al-Amin et al., 2021). While some institutions managed the transition effectively, others struggled, impacting the finances of higher education providers and research initiatives (Atherton, 2020). The NATP-2 PhD program in Bangladesh was similarly affected. Thus, the study was conducted to evaluate the impact of COVID-19 on the NATP-2 PhD program in Bangladesh and record the measures undertaken towards successful completion of the signature program.

Methodology

NATP-2 PhD program

The NATP-2 initiative facilitated 140 PhD programs, with 80 slots designated for local universities and 60 for international universities or institutions. Out of the 80 in-country studied PhD opportunities, 60 were allocated to NARS scientists, while the remaining 20 were distributed among mid-level civil servants from the Department of Agricultural Extension (10), the Department of Livestock Service (5), and the Department of Fisheries (5). All overseas PhD fellows were NARS scientists (Table 1). Both domestic and international fellows secured admission to various public universities. Among the 60 overseas PhD candidates, 10 enrolled in universities in developed countries (USA, Germany, UK, Australia, and Japan) and 50 in developing countries (Malaysia, the Philippines, Thailand, China, and India). The majority of domestic PhD programs were conducted at the Bangladesh Agricultural University (Table 2). The fellowship duration was set at 42 months. Unfortunately, two in-country studied fisheries fellows passed away, one early and the other later in their PhD studies.

Table 1. Institute-wise awards of NATP-2 PhD program under placement category of in-country studied and overseas fellows

Sl. No.	Name of Institute	No. of fellows		
		In-country	Overseas	Total
1.	Bangladesh Agricultural Research Institute (BARI)	21	19	40
2.	Bangladesh Rice Research Institute (BRRI)	06	10	16
3.	Bangladesh Institute of Nuclear Agriculture (BINA)	04	05	09
4.	Bangladesh Jute Research Institute (BJRI)	05	04	09
5.	Bangladesh Sugar Crop Research Institute (BSRI)	05	04	09
6.	Bangladesh Tea Research Institute (BTRI)	01	01	02
7.	Soil Resources Development Institute (SRDI)	04	03	07
8.	Bangladesh Sericulture Research and Training Institute (BSRTI)	03	00	03
9.	Bangladesh Fisheries Research Institute (BFRI)	06	05	11
10.	Bangladesh Livestock Research Institute (BLRI)	02	04	06
11.	Bangladesh Forest Research Institute	02	02	04

Sl. No.	Name of Institute	No. of fellows		
		In-country	Overseas	Total
	(BFRI)			
12.	Cotton Development Board (CDB)	01	01	02
13.	Ministry of Agriculture (MoA)	00	02	02
14.	Department of Agricultural Extension (DAE)	10	00	10
15.	Department of Livestock (DLS)	05	00	05
16.	Department of Fisheries (DoF)	05	00	05
Total		80	60	140

Table 2. Institute-wise placement of NATP-2 PhD fellows under in-country studied and overseas categories

In-country		Overseas		
Name of university	No. of fellows	Country	Name of university	No. of fellows
Bangladesh Agricultural University	50	Malaysia	University Putra Malaysia	29
Gazipur Agricultural University	03	Malaysia	Universiti Malaysia Sabah	02
Sher-e-Bangla Agricultural University	06	Malaysia	Universiti Kebangsaan Malaysia	01
Patuakhali Science and Technology University	01	Malaysia	Universiti Malaysia Terengganu	01
Hazi Danesh Science and Technology University	02	Thailand	Asian Institute of Technology	06
Shahjalal Science and Technology University	01	USA	North Dakota State University	01
Jahangirnagar University	01	Australia	University of Southern Queensland	01
Dhaka University of Engineering and Technology	01	Australia	University of Newcastle	01
Dhaka University	04	Japan	Ehime University	01
Rajshahi University	06	UK	University of Leeds	01
Sylhet Agricultural University	02	UK	University of Reading	01
Gazipur Agricultural University	01	China	Chinese Academy of Agricultural Sciences	01

In-country		Overseas		
Chattogram Veterinary and Animal Science University	1	China	Huazhong Agricultural University	1
Khulna University	1	Germany	University of Bonn	1
		Germany	University of Hohenheim	2
		Germany	University of Berlin	1
		India	Indian Agricultural Research Institute	1
		Philippines	University of the Philippines Los Banos	8
Total= 80		60		

The PhD program tailored to meet the needs identified by the National Agricultural Research and Extension System (NARES), focusing on current agricultural demands, improving productivity, and marketing perishable crop products for marginal and small farmers. Given this national priority, the majority of PhD fellowships were awarded in areas such as varietal improvement (20%), stress physiology (13%), addressing various stresses like salinity, drought, water logging, and shorter-duration crops, crop protection, and natural resource management, post-harvest loss, vaccine development, and more (Table 3). The research conducted by NARS institute fellows and extension agency professionals was directly aimed at enhancing the productivity and production of crops, livestock, and fisheries.

Table 3. Distribution of NATP-2 PhD awardees by thematic areas

Sub-sector	Total Number of Awardee	No. of fellows	
		In-country	Overseas
Crops	Varietal Development	2	8
	Crop Improvement	8	1
	Stress Management	8	8
	Cropping Pattern	2	1
	Biotechnology	5	5
	Pest Management	9	9
	Soil and Nutrient Management	7	7
	Irrigation and Water Management	1	0
	Post-Harvest Management	3	3
	Agricultural Economics, Policy and Marketing	5	2

Sub-sector	Total Number of Awardee	No. of fellows	
		In-country	Overseas
	Crop Modeling and GIS	4	2
	Climate Change	3	1
	Forestry	0	2
Livestock	Disease Management	4	2
	Feed and Fodder	1	1
	Vaccine Development	1	0
Fisheries	Fisheries Management	3	0
	Aquaculture	0	4
	Mariculture	2	0
	Fisheries Biology and Genetics	1	0
	Vaccine Development	0	1
	Biotechnology	01	0
	Climate Change	1	0
Others		5	2

Assessment of the COVID-19 pandemic effect on the PhD program

Study sample

The NATP-2 project supported 180 PhD candidates, of which two in-country fellows unfortunately passed away. The assessment included all the remaining PhD fellows, with 78 enrolled domestically and 60 internationally.

Data collection

The NATP-2 PhD fellows started their studies in early 2018, but their progress was hindered by movement restrictions and the shutdown of field research and university laboratories for an extended period due to the pandemic. To evaluate the impact of these disruptions on their coursework and research and to determine the necessary measures for completing their PhD programs within the project timeline, a structured and pre-tested questionnaire was used. This questionnaire was distributed via email to all PhD fellows, both domestic and overseas, and responses were collected in the same manner between January and March 2021. The collected data and proposed coping measures were validated between April and June 2021.

Intervention for PhD program completion

The detailed analysis of the data was presented to the PhD Management Committee for guidance on ensuring the completion of the PhD programs within the project period. Following the committee's guidance, proposed coping strategies suggested by

the fellows were validated on a case-by-case basis through online meetings. These meetings included PhD fellows and their supervisors, representatives from the fellows' organizations, PhD Management Committee members from BARC, and relevant NATP-2 project officials. Based on the recommendations from these meetings, the duration of the PhD programs was extended, and research funding was increased wherever possible.

Data analysis

The collected data was exported to Microsoft Excel for analysis, where frequency distribution analysis was performed to understand the impact and necessary interventions for completing the PhD programs within the life of the project.

Results and discussion

Fellows affected by COVID-19

A total of fifteen fellows reported being physically affected by COVID-19. Among the 78 in-country PhD fellows, 10 including five females, were impacted. Additionally, five overseas fellows, including one female, were affected. This led to disruptions in their coursework, laboratory, and fieldwork.

The COVID-19 pandemic disrupted education globally like never before, significantly impacting learners and educators reported by Ebner et al. (2020). In case of our study fellows' studies, along with their physical and mental health, were notably affected. About 10% of our fellows were physically impacted by COVID-19, and all faced mental health challenges. Many students reported inadequate support for their mental health during the pandemic. The additional burdens brought by the pandemic, such as academic deadlines, tuition fees, workloads, and class schedules, were often not addressed by the universities (Singh et al., 2022). Students faced multiple pressures, including financial crises, restricted access to labs and fieldwork, increased mental stress, internet connectivity issues, unequal access, and unstable academic calendars (Mosharrof et al., 2022).

Delayed Course and Research Work

Among the 78 in-country fellows, 43 were under both coursework and research modality, while the remaining 36 were solely on research modality. By December 2020, fellows had completed an average of 71.86% of their coursework, compared to the planned 84.19%. The assessment indicated that COVID-19 caused a 12.33% delay in progress (Table 4). For the overseas PhD programs, 56 fellows were involved in both coursework and research modality, while four were in research-only modality. On average, these fellows completed over 89% of their coursework, with 80.61% completion in developed countries and 91.30% in developing countries, against the planned 90.10% and 96.23%, respectively. The pandemic caused coursework delays of 9.49% in developed countries and 4.93% in developing countries (Table 4).

Table 4. Completion of course works of in-country and overseas NATP-2 PhD program leading to post six month of the project closure

Achievement	Overseas		In-country
	Developed Country	Developing Country	
Planned (%)	90.10	96.23	84.19
Achieved (%)	80.61	91.30	71.86
Affected by COVID-19 (%)	9.49	4.93	12.33

In terms of research work, in-country fellows completed 45.46% of their planned research by December 2020, compared to the planned 70.13%. Overseas fellows completed 38.43% of their research in developed countries and 34.00% in developing countries, against the planned 71.67% and 59.05%, respectively. The research work was hampered by 33.24% for in-country fellows and 25.05% for overseas fellows due to the COVID-19 pandemic (Table 5). Additionally, 5.06% of in-country and 63.33% of overseas fellows reported that their research experiments were damaged due to movement restrictions. The pandemic significantly slowed down both coursework and research activities, necessitating extended time for PhD program completion.

Table 5. Completion of research work of in-country and overseas NATP-2 PhD program leading to post six-month of the project closure

Achievement	Overseas		In-country
	Developed Country	Developing Country	
Planned (%)	71.67	59.05	70.13
Achieved (%)	38.43	34.00	45.46
Affected by COVID-19 (%)	33.24	25.05	24.67

The academic courses of 5-12% fellows in Bangladesh and other countries were affected by the COVID-19 pandemic. Despite the rapid shift to online teaching, the quality and availability of facilities varied (Atherton, 2020). Practical subjects requiring hands-on experience and external cooperation were particularly challenging. A global survey across Africa, America, Asia, and Europe by Sultanova et al. (2021) found that almost all higher education institutions were affected, with more than half ceasing operations or moving to distance learning. The most common consequence for overseas fellows was the cancellation of international travel, forcing

them to stop their studies or remain in a foreign country during quarantine. In our case, PhD research activities were hampered by 25-33% due to the pandemic. While movement restrictions slightly affected research experiments in Bangladesh, about two-thirds of overseas experiments were damaged. In-country research involved more field experiments, whereas overseas research relied heavily on lab work. The mandatory social distancing requirements posed significant challenges, especially, for research involving bench work, human subjects, and fieldwork (Rashid and Yadav, 2020).

Coping with the COVID-19

Among the in-country PhD fellows, 32.91% did not request a time extension as they were confident in their ability to complete their activities within the 42-month period (Table 6). However, about 66% applied for a six-month extension along with a monthly stipend, and one fellow requested a 12-month extension. Conversely, all overseas fellows in developed countries applied for a six-month extension. Among those in developing countries, 77.78% requested a six-month extension, and 22.22% requested a 12-month extension. Additionally, 5.12% of in-country fellows, 58.9% of fellows in developing countries, and 83.3% in developed countries reported damaged experiments and sought compensation for research costs. All PhD fellows in developed countries also requested a six-month extension with an increased monthly stipend.

Table 6. Undertook coping options by the PhD fellows for completion of PhD within the project period, June 2023

Coping option	Number of fellows opined/applied		
	Overseas		In-country
	Developed country	Developing country	
No time extension needed	0	0	26
Time extension for 6 months	6	42	52
Time extension for 12 months	0	12	1
Compensation for research costs for damaged experiments	5	33	4
Increase of monthly stipend	6	0	0

Intervention for PhD completion within the project period

Following the guidance of the PhD Management Committee and the funding authority, the project implementation unit conducted online meetings for 28 days—

14 days each for in-country and overseas studied fellows totalling 234 and 232 person-hours, respectively. These meetings validated the coping strategies for completing the PhD programs within the project period. Extensions of two to six months, along with monthly stipends, were approved for 48 in-country and 48 overseas fellows. Additional financial support was provided for seven overseas fellows to compensate for damaged experiments. However, the request for increased monthly stipends by overseas fellows in developed countries was not approved.

Despite 32.91 % of in-country studied fellows not initially requesting an extension, only 14.10 % completed their activities within the 42 months due to delays caused by the COVID-19 pandemic, which affected the evaluation of PhD dissertations. Seventy-seven percent of fellows completed their PhD programs within 48 months (including a six-month extension), and the remainder took longer than 48 months. No overseas fellows completed their PhD activities within the stipulated time (Table 7). Among overseas fellows, 33.3% in developed countries and 82.1% in developing countries completed their PhDs within 48 months, with the rest taking longer. Only 1.28 % of in-country studied and 8.33 % of overseas fellows failed to submit their PhD dissertations within the project period.

Table 7. Completion of PhD at home and abroad during stipulated and extended time

Time required for completion	No. of fellows		
	Overseas		In-country
	Developed country	Developing country	
Up to 42 months	0	0	11
Up to 48 months	2	46	60
More than 48 months	4	8	7

The planned costs for in-country and overseas PhD programs were 107.5 million BDT and 449.5 million BDT, respectively, with research costs accounting for 20.0 million BDT and 53.5 million BDT. The extensions required an additional 7.2 % in stipends and tuition fees. No additional research costs were provided for in-country PhD awardees, while overseas fellows required 4.11 % additional research costs.

The COVID-19 pandemic slowed coursework and research activities, necessitating extended time for PhD program completion. Many universities and colleges struggled to provide financial support due to lost tuition revenue and other funding streams (Singh et al., 2022). The NATP-2 project aims to complete PhD programs by June 2023. As the pandemic affected academic courses and research activities globally, fellows proposed different coping strategies. Most fellows suggested extending PhD programs by at least six months with additional stipends and tuition fees. Fellows in developed countries have requested increased stipends due to rising food prices.

Following the PhD Management Committee's guidelines, extensions of two to six months with monthly stipends were approved on a case-by-case basis, involving supervisors. Additional financial support was provided to some overseas fellows to compensate for damaged experiments. While fellows in developed countries did not receive increased stipends due to budget limitations, justified cases for overseas fellows received additional support. Research costs for in-country studied fellows were not increased.

Conclusion

This study examined the impact of COVID-19 on the completion of academic courses and dissertation research for the agricultural PhD program under the NATP-2 project. It also assessed the effectiveness of mitigating measures. The pandemic caused significant disruptions, forcing the closure of university labs and hindering coursework and research activities. Most PhD programs required extensions of two to six months, along with increased tuition fees and stipends. Some research activities needed repetition, requiring additional costs. The affiliated research institutes lost fellows' services for an extended period. To better prepare for future crises, flexible functional plans and budget proposals are essential for all stakeholders.

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