Availability and Price Volatility of Rice, Potato and Onion in Bangladesh: An Inter-Institutional Study in 2020

Bangladesh Agricultural Research Council
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Preface

The unusual sharp price rise of rice, potato and onion in 2020 raises the question of the normal functioning of the market. Many people apprehend the presence of the syndicate in the market. Despite fixation of prices by government and taking initiatives to sell these commodities through Trading Corporation of Bangladesh (TCB) at lower prices, the prices in the market did not go down. Under this situation, Honourable Agriculture Minister in a meeting on 20 October, 2020 instructed to conduct a research headed by Bangladesh Agricultural Research Council (BARC) with the help of agricultural economists of different research institutes to find out the reasons for price hike of these essential commodities after consultation with field level farmers, mill owners, cold storage owners, local consumers etc. and submit a report within one month to the Ministry. Accordingly, in a meeting on 12 November, 2020 at BARC, it was decided to form inter-institutional and multidisciplinary study teams to conduct research and accordingly three study teams were set up for conducting research on three selected commodities. Each team prepared a report within one month based on both primary and secondary data and extensive Focus Group Discussion (FGD) with different stakeholders in different places of the country. Finally, the three draft reports were presented in a workshop held on 24 December, 2020 and after addressing necessary comments made in the workshop final reports were prepared.

In these reports after identifying the causes of price spiral some recommendations were made. Lower production, higher consumption, slow release of stock by different stakeholders, limited control/intervention by government in the market, creation of panic/rumor, misleading data and trade syndication are identified as the main causes of price hike. Recommendations made are: announcement of support prices for major commodities adding at least 20% profit over the cost of production; making available reliable and trustworthy data; increase in domestic production; strong monitoring by government; taking legal actions to the people involved in trade syndication, reduction of import dependency on a particular country; broadcasting the true picture of a commodity with data to counter any rumor in the market; quick procurement from home and abroad to build up sufficient stock of the government; and maintaining a required public stock throughout the year.

I really appreciate Prof. Dr. Jahangir Alam, the Coordinator, Dr. Md. Mosharraf Uddin Molla, Member Director (AERS) as well as Member Secretary and all members of the study teams for conducting the research and preparing the reports within a very short period. I extend my sincere thanks to Agricultural Economics and Rural Sociology (AERS) division, BARC for arranging this research and to Krishi Gobeshona Foundation (KGF) for financing the study. Finally, I am very much obliged to Honourable Agriculture Minister Dr. Md. Abdur Razzak MP for his initiative and inspiration for this study. I am also obliged to the heads of the participating organizations/institutions for their support in conducting this study.

I believe, the recommendations made in the reports will be helpful to policy makers to adopt appropriate policies for stabilizing prices of agricultural commodities in the future.

Dr. Shaikh Mohammad Bokhtiar
Executive Chairman
Bangladesh Agricultural Research Council

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বাংলাদেশে চালের প্রাপ্যতা ও দামের অস্থিরতাঃ একটি আন্তঃপ্রাতিষ্ঠানিক গবেষণা প্রতিবেদন-২০২০

সারসংক্ষেপ

ধান উৎপাদনে বাংলাদেশ অভূতপূর্ব সাফল্য এবং জনগণের চাহিদা ও যোগানের ক্ষেত্রে স্বনির্ভরতা অর্জন করেছে। ১৯৭২-৭৩ সালে বাংলাদেশে মোট চালের উৎপাদন ছিল প্রায় ১০ মিলিয়ন টন। ২০১৯-২০ সালে ওই উৎপাদন বেড়ে ৩৮.৭২ মিলিয়ন টনে দাঁড়িয়েছে। বিগত সময়ের তুলনায় চালের উৎপাদন প্রায় চার গুণ বেশি হচ্ছে এবং দেশের ১৭০ মিলিয়ন মানুষের চাহিদা মিটানোর পরও প্রায় তিন মিলিয়ন টন চাল উদ্বৃত্ত থাকছে। বর্তমানে ধান উৎপাদনে প্রবৃদ্ধি হার ২.৮ শতাংশ যা জনসংখ্যা বৃদ্ধির হার (২.০৪ শতাংশ) এর তুলনায় বেশি।

সাম্প্রতিককালে বাজারে চালের মূল্য অপ্রত্যাশিতভাবে বাড়তে থাকায় কৃষক, ভোক্তা, সরকার এবং নীতিনির্ধারকদের জন্য বিব্রতকর পরিস্থিতি সৃষ্টি করেছে। এই গবেষণাটি মূলত বাংলাদেশে চালের মূল্য বৃদ্ধির কারণ অনুসন্ধানের জন্য করা হয়েছে। গবেষণায় প্রাথমিক ও সেকেন্ডারি তথ্য ব্যবহৃত হয়েছে। ফোকাস গ্রুপ ডিসকাশন (FGD), কি ইনফরমেন্ট ইন্টারভিউ (KII) এবং টেলিফোনিক জরীপের মাধ্যমে নওগাঁ, শেরপুর, কুমিল্লা ও ঢাকা জেলা থেকে প্রাইমারি তথ্য সংগ্রহ করা হয়েছে। বিভিন্ন সরকারি সংস্থা এবং প্রকাশিত উৎস থেকে সেকেন্ডারি তথ্য সংগ্রহ করা হয়েছে। সংগ্রহকৃত তথ্য-উপাত্ত বিশ্লেষণের জন্য বিভিন্ন পরিসংখ্যান এবং গাণিতিক সূত্র ব্যবহার করা হয়েছে।

১৯৭৩-২০০০ এবং ২০০১-২০২০ সময়ে ধান উৎপাদনে প্রবৃদ্ধি হার নিয়তই ছিল ২ শতাংশের বেশি, ১৯৭৩-২০২০ সময়ে প্রবৃদ্ধি হার ছিল ২.৮৩ শতাংশ। ধান উৎপাদনে প্রবৃদ্ধি আরও বাড়ানোর জন্য উন্নত ধানের জাতসমূহের দ্রুত প্রসার, ধান চাষে সেচ সুবিধা বৃদ্ধি, জলবায়ু সহনশীল জেনোটাইপ উদ্ভাবন ও সম্প্রসারণ, মানসম্পন্ন বীজ এবং প্রয়োজনীয় কৃষি যান্ত্রিকীকরণ করতে হবে।

২০১১-২০১৫ এবং ২০১৬-২০২০ এ দুটি সময়ে মাথাপিছু চালের যথেষ্ট পরিমাণ উদ্বৃত্ত অর্জন সম্ভব হয়েছে। ২০০৯-২০১৭ সময়ে প্রায় ২ মিলিয়ন টন এবং ২০১৮-২০২০ সময়ে প্রায় ৩ মিলিয়ন টন চাল উদ্বৃত্ত ছিল। বিদেশ থেকে অতিরিক্ত চাল আমদানি সাধারণত জাতীয় উদ্বৃত্তকে বাড়িয়ে তুলে এবং চালের বাজার মূল্য স্থিতিশীল করতে সহায়তা করে।

১৯৭২-২০২০ সময়ে ধানের বাজার মূল্য (nominal price) প্রতিবছর গড়ে ৪ থেকে ৫ শতাংশ হারে বৃদ্ধি পেলেও এর প্রকৃত মূল্য (real price) প্রতিবছর হ্রাস পেয়েছে গড়ে ২ থেকে ৩ শতাংশ হারে। যদিও, ১৯৭২-২০২০ সময়ে আমন এবং বোরো মৌসুমে ধানের বাজার মূল্য এবং প্রকৃত মুল্যের গতিধারা (trend) অনেকাংশে একই রকম ছিল, কিন্তু আমন ধানের মূল্য বৃদ্ধি বোরো ধানের তুলনায় উচ্চ বাজার ঝুঁকি প্রদর্শন করে। ২০০৯-২০২০ সময়ে কেজি প্রতি ধান চাষের ব্যয় প্রায় ৩ শতাংশ বৃদ্ধি পেয়েছিল এবং নিট মুনাফা কমেছে প্রায় ৮ শতাংশ।

সরকারকে চাল সরবরাহ করার ক্ষেত্রে মিল মালিকগণ বলছে যে, তারা চাল প্রক্রিয়াজাতকরণ ব্যবসায় সব সময় ক্ষতিগ্রস্ত হচ্ছে। এর কারণ হচ্ছে, চালের উপজাতসমূহ (by-products) থেকে যে আয় হয় তা তারা বিবেচনায় আনে না। বিবেচনায় নিলে প্রতীয়মান হয়, বিগত আমন মৌসুমগুলোতে (২০১৭-২০১৯ সময়ে) মিলাররা প্রতি কেজি চাল প্রক্রিয়জাতকরণে ৪.৬ থেকে ৯.৫ টাকা মুনাফা অর্জন করেছিলো। অপরদিকে, ২০১৮-২০২০ সময়ে বোরো মৌসুমে প্রতি কেজিতে ৪.৭ থেকে ৮.২ টাকা মুনাফা অর্জন করেছে।

যেহেতু ধানের বাজার মূল্য সাধারণত সরকারি ক্রয়মূল্যের নীচে থাকে এবং যেহেতু সরকার স্বল্প পরিসরে ধান কিনে, তাই বেশিরভাগ কৃষক সরকারি ক্রয়মূল্যের সুবিধা পায় না। তবে ২০২০ সালে আমন মৌসুমে ধানের ভাল মূল্য পেয়ে কৃষকরা খুশি ছিলো।

চালের ঐতিহাসিক মূল্যের গতিধারা (trend) থেকে দেখা যায়, সরকার ঘোষিত চালের মূল্য পাইকারি বাজারে চালের মূল্যের প্রায় কাছাকাছি ছিল। বার্ষিক চালের উদ্বৃত্ত এবং দামের মধ্যে সামগ্রিক সম্পর্ক থেকে দেখা যায় যে, চালের মূল্য নির্ধারণে প্রচলিত বাজারে সরবরাহ ও চাহিদা শক্তির পরিবর্তে অন্য কোনো তৃতীয় শক্তি কাজ করছে অথবা অন্য কোনো বাজার এক্টরের নিকট বাজার নিয়ন্ত্রণের ক্ষমতা থাকতে পারে। চালের মূল্য বিস্তার (price spread) বিশ্লেষণ থেকে বাজারের মধ্যস্বত্বভোগী বিশেষ করে মিলার, আড়ৎদার এবং পাইকাররা অতি মুনাফা অর্জন করে থাকে বলে অনুধাবন করা যায়।

২০১৬ সালে, বাংলাদেশ এবং প্রতিবেশী দেশগুলোর মধ্যে চালের দামের বিপরীতমুখী প্রবণতা লক্ষ্য করা যায়। তবে ২০১৭ থেকে ২০১৮ সময়কালের মধ্যে প্রায় একই ধরনের দামের প্রবণতা উপস্থিত ছিল। সেই সময়ের পরে, বাংলাদেশে চালের দাম প্রতিবেশী দেশগুলোর আমদানি সমতা দামের তুলানায় কম ছিল। তবে, ২০২০ সালে বাংলাদেশে চালের মূল্য আবারো বেড়েছে।

বাংলাদেশে সরকারি চালের মজুদ মারাত্মকভাবে ওঠানামা করে এবং কখনও কখনও তা ব্যাপকভাবে কমে যায়। তাতে দ্রুত মূল্য বৃদ্ধি পায়। উৎপাদন পরিস্থিতি, আমদানির সিদ্ধান্ত এবং সরকারি পর্যায়ে ধান ও চালের সংগ্রহের পরিমাণের ভিত্তিতে, চাল বাজারের মধ্যস্বত্বভোগীরা (মিলার এবং ব্যবসায়ী) ধান ও চালের বাজার মূল্য বহুলাংশে নিয়ন্ত্রণ করে।

২০১৬ থেকে ২০২০ সময়ে চালের মূল্যসূচক আগস্ট থেকে অক্টোবরের মধ্যে উচ্চতর এবং অনির্দেশ্য (unpredictable) প্রবণতা দেখায়। বাজারে চালের দাম নিয়ন্ত্রণ রাখতে সরকারকে সর্বদা কমপক্ষে ১২.৫ লক্ষ টন চালের মজুদ এবং সর্বনিম্ন ২৫ লক্ষ টন চাল সংগ্রহ নিশ্চিত করতে হবে।

চালের মূল্য বৃদ্ধির কারণসমূহ

- প্রায় সকল কৃষকই ধান কর্তনের প্রথম মাসের মধ্যে বাজারজাতযোগ্য উদ্বৃত্তের একটা বড় অংশ বিক্রি করে দেয়।
- গত বোরো মৌসুমে ধান বিক্রির ধরনটি পরিবর্তিত হয়েছে। এ মৌসুমে কৃষকরা তাদের ধান মজুদ থেকে ধীরে ধীরে বিক্রি করেছে।
- ব্যবসায়ী ও মিল মালিকরা করোনা পরিস্থিতিতে খাদ্য ঘাটতির আশঙ্কা করেছিলো এবং মজুদ ধরে রেখেছিলো।
- সরকার কর্তৃক কম চাল সংগ্রহ ও আমদানি বিলম্বিত হওয়া এবং প্রয়োজনীয় বাজার হস্তক্ষেপের অভাব মূল্য বৃদ্ধির কারণ ছিল।

২০২০ সালে ধানের বাজার মূল্য বৃদ্ধির অন্যান্য কারণসমূহ

- বড় মিল মালিক ও ব্যবসায়ীদের আধিপত্য এবং অসম প্রতিযোগিতা।
- আমন মৌসুমে ধান উৎপাদনে ঘাটতির আশঙ্কা।
- ধান চাষের ব্যয় ও প্রক্রিয়াজাতকরণের খরচ বৃদ্ধি।
- ধানের জমি ও উৎপাদন তথ্যের অসামঞ্জস্যতা।
- মৌসুমী ব্যবসায়ীর সংখ্যা বৃদ্ধি।
- প্রাকৃতিক দুর্যোগের কারণে উৎপাদন হ্রাস।

মৌসুমী মূল্যবৃদ্ধি রোধে করণীয়সমূহ

- ধান/চাল সংগ্রহ পদ্ধতির আধুনিকায়ন করা। কৃষকের নিকট থেকে সরাসরি ধান সংগ্রহ করা এবং মিলারদের মাধ্যমে তা চালে পরিণত করা।
- চিকন ও মোটা দানার চালের জন্য পৃথক নুন্যতম সহায়তা মূল্য (এমএসপি) ঘোষণা করা।
- নুন্যতম ২৫ লক্ষ টন চাল সংগ্রহ করা এবং মোট উৎপাদনের প্রায় ১০ শতাংশ সংগ্রহ করার সক্ষমতা অর্জন করা।
- বাফার স্টক হিসেবে সরকার কর্তৃক প্রতি মাসে কমপক্ষে ১২.৫ লক্ষ টন চাল মজুদ নিশ্চিত করা।
- উৎপাদন ব্যয়ের উপর কমপক্ষে ২০ শতাংশ মুনাফা বিবেচনা করে ধান-চালের সংগ্রহ মূল্য নির্ধারণ করা।
- ধান উৎপাদনে আরও বেশি উপকরণ সহায়তা কর্মসূচি গ্রহণ করা এবং প্রয়োজনে নগদ সহায়তা প্রদান করা।
- ধান উৎপাদন বৃদ্ধির জন্য নিবিড় কর্মসূচি গ্রহণ করা।
- চাল উৎপাদনে ব্যয় কমানোর কৌশল, নিবিড় বাজার নিরীক্ষণ, ধান প্রক্রিয়াজাতকরণ শিল্পের নিয়ন্ত্রণ এবং সময়মতো সরকারি হস্তক্ষেপ বাজারে স্থিতিশীলতা নিশ্চিত করার জন্য সহায়ক হতে পারে।
- কৃষি যন্ত্রায়নের ব্যাপক সম্প্রসারণ করা।
- কৃষি মূল্য কমিশন গঠন করা।

বাংলাদেশে আলুর প্রাপ্যতা ও দামের অস্থিরতাঃ একটি আন্তঃপ্রাতিষ্ঠানিক গবেষণা প্রতিবেদন-২০২০

সারসংক্ষেপ

মুক্ত বাজার অর্থনীতিতে কোন পণ্যের দাম "অদৃশ্য হাত" অর্থাৎ পণ্যের যোগান ও চাহিদার দ্বারা নির্ধারিত হওয়ার কথা। এ কারণে ওই অদৃশ্য হাতের পেছনের কারণগুলোও চিহ্নিত করা প্রয়োজন যাতে বাজারে অপ্রয়োজনীয় দামের ওঠানামা নিয়ন্ত্রণ করতে পদক্ষেপ গ্রহণ করা যায়। এ বছর (২০২০) আলুর দাম যখন গত বছরের তুলনায় প্রায় দ্বিগুণ হয়ে কেজিপ্রতি ৫০-৫৫ টাকায় দাঁড়ায়, তখন ব্যবসায়ীরা এর কারণ হিসেবে গত বছরের তুলনায় আলুর উৎপাদন কম হওয়া, পরপর বন্যার কারণে সবজির দাম বৃদ্ধি পাওয়া এবং কোভিড-১৯ মহামারীর প্রাদুর্ভাব প্রভৃতিকেই দায়ী করে। তবে কৃষি সম্প্রসারণ অধিদপ্তরের মতে, এ বছর প্রায় ৩.৪ মিলিয়ন টন খাওয়ার আলু উদ্বৃত্ত থাকায় আলুর দাম বৃদ্ধির কোনো যৌক্তিক কারণ নেই। এই গবেষণার উদ্দেশ্য হলো আলুর সরবরাহ, চাহিদা এবং দাম বৃদ্ধির প্রকৃত কারণগুলো খুঁজে বের করা এবং বাজারে সিন্ডিকেটের অস্তিত্ব সন্ধান করা।

গবেষণাটি মূলত বিভিন্ন উৎস থেকে প্রাপ্ত মাধ্যমিক তথ্যের উপর ভিত্তি করে করা হয়েছে। এছাড়াও বগুড়া, রংপুর, মুন্সীগঞ্জ এবং ঢাকা জেলায় ফোকাস গ্রুপ ডিস্কাশন (FGD) এবং কি ইনফরমেন্ট ইন্টারভিউ (KII)-এর মাধ্যমে সরবরাহ চেইনে বিভিন্ন ষ্টেকহোল্ডারদের নিকট থেকে গুণগত প্রাথমিক তথ্য-উপাত্ত সংগ্রহ করা হয়েছিল।

গবেষণায় দেখা যায়, স্বাধীনতার পর থেকে প্রতিবছর আলুর জমির পরিমাণ, উৎপাদন ও ফলন যথাক্রমে ৪.৫৮%, ৬.৬১% এবং ১.৯৫% হারে বৃদ্ধি পেয়েছে। তবে প্রবৃদ্ধির এই হার স্থানীয় জাতের আলু অপেক্ষা উন্নত জাতের আলুর ক্ষেত্রে অনেক বেশি ছিল। ১৯৭৯-৮০ সালে মোট আলুর উৎপাদনে উন্নত জাতের অংশ ছিল ৪৬%, অথচ ২০১৯-২০ সালে এটি বৃদ্ধি পেয়ে হয়েছে ৯১%। উপাত্ত থেকে আরও দেখা যায়, তিন বছর চক্রে (Cycle) আলুর উৎপাদন দ্রুত উঠানামা করেছে- যা সাম্প্রতিক অতীতে দ্রুত হ্রাস পেয়েছে। আলুর দামের ক্ষেত্রে চলতি বাজার মূল্যে (Nominal price) এর ঊর্ধ্বমূখী প্রবণতা এবং প্রকৃত দাম (Real price) এর নিম্নমূখী প্রবণতা লক্ষ্য করা যায়। আলুর মৌসুমী দামের ব্যাপক বৈচিত্র্য দেখা যায়- মার্চ মাসে আলুর দাম থাকে সর্বনিম্ন এবং ডিসেম্বর মাসে থাকে সর্বাধিক। আলুর বাজার আপাতঃদৃষ্টিতে সুসংহত (Integrated) বলে প্রতীয়মান হয় যেহেতু সকল পর্যায়ের দাম একসাথে ওঠানামা করে। ২৭ অক্টোবর, ২০২০ এ সরকার কর্তৃক আলুর দাম পুনঃনির্ধারণের পরে দাম বৃদ্ধির প্রবণতা থেমে যায় বলে প্রতীয়মান হয়। দাম অস্থিরতার সূচক ৭৩.১৬% হওয়ায় প্রকৃত দামের ব্যাপক বিস্তৃতি পরিলক্ষিত হয়।

মোট সরবরাহ ও চাহিদার উপর ভিত্তি করে ২০২০ সালে আলুর মোট উদ্বৃত্ত দাঁড়িয়েছে ৩.৪০ লাখ টন যা আগের বছরের তুলনায় বেশ কম। প্রতি কেজি আলুর উৎপাদন ব্যয় ছিল ৮.২৫ টাকা এবং উৎপাদনকারীরা হেক্টরপ্রতি প্রায় ১.১ মিলিয়ন টাকা আয় করেছেন। চলতি বছরে হিমাগারে ২০ লাখ টন আলু সংরক্ষণ করা হলেও গত বছর এর পরিমাণ ছিল ৩০ লাখ টন। এ বছর ৩৯২টি চালু হিমাগারের ৭৩% ধারণ ক্ষমতা ব্যবহার করা হয়েছে। মার্চ মাসে সর্বোচ্চ ৬৫% আলু প্রচলিত মজুত থেকে বিক্রয়ের জন্য বের করা হয়। এরপর এপ্রিল মাসে ২৫% এবং জুন মাসে সর্বনিম্ন ৪% বের করা হয়। অন্যদিকে হিমাগার হতে সর্বোচ্চ ৩০% আলু অক্টোবরে এবং সর্বনিম্ন ২% আলু ডিসেম্বর মাসে বের করা হয়। কৃষকদের মতে খাওয়ার আলু ও বীজ আলু একসাথে হিমাগারে রাখা হয় এবং সেখানে প্রয়োজনীয় তাপমাত্রা নিয়ন্ত্রণ করা হয় না বিধায় বীজ আলুর একটা বিরাট অংশ বিভিন্ন রোগে আক্রান্ত হয়।

আলুর মূল্য বৃদ্ধির কারণসমূহ

- ভবিষ্যতে মূল্য বৃদ্ধির আশায় কৃষক ও ব্যবসায়ী পর্যায়ে আলুরমজুদ এবং হিমাগার থেকে কম আলুর সরবরাহ।
- হিমাগারে মজুদকৃত আলুর রশিদ পুনঃ পুনঃহস্তান্তর ।
- পার্শ্ববর্তী কয়েকটি দেশে আলু রপ্তানি।
- মৌসুমী ব্যবসায়ী কর্তৃক আলুর বিপুল মজুত এবং কৃত্রিম সংকট তৈরি।
- আলুর বাজারে সরকারের সীমিত নিয়ন্ত্রণ এবং বাজারের প্রকৃত অবস্থা সম্পর্কে তথ্যের অভাব।
- অসাধু ব্যবসায়ী এবং প্রিন্ট ও ইলেকট্রনিক মিডিয়া কর্তৃক আলুর উৎপাদন, সরবরাহ ও দাম সম্পর্কে গুজব ছড়ানো।
- অসাধু ব্যবসায়ী সিন্ডিকেট কর্তৃক আলুর বাজার নিয়ন্ত্রণ।
- অসাধু ব্যবসায়ীদের বিরুদ্ধে শাস্তিমূলক ব্যবস্থার অনুপস্থিতি।
- গত কয়েক বছরের তুলনায় এ বছর (২০২০) আলুর তুলনামূলক উৎপাদন হ্রাস ।
- বর্ষা মৌসুমের ব্যাপ্তি দীর্ঘতর হওয়ায় সবজির উৎপাদন হ্রাস এবং আলুর চাহিদা বৃদ্ধি।
- হিমাগারে আলুর সংরক্ষণের পরিমাণ কম।
- টিসিবি কর্তৃক আলুর বিতরণ অপ্রতুল।

আলুর মূল্য স্থিতিশীল করার জন্য সুপারিশসমূহ

- কৃষি মূল্য কমিশন গঠন করে সর্বোচ্চ ও সর্বনিম্ন সহায়ক মূল্য ঘোষণা করা।
- উৎপাদন, চাহিদা, সরবরাহ এবং বাজার মূল্যের তথ্যাবলিতে অস্পষ্টতা দূরীকরণ।
- হিমাগারে আলুর সংরক্ষণ ও অবমুক্তকরণ সরকার কর্তৃক নিয়ন্ত্রণ এবং নজরদারির মধ্যে রাখা।
- আলুর বাজারে অস্থিরতা সৃষ্টিকারীদের সনাক্তকরণ এবং তাদের বিরুদ্ধে দৃষ্টান্তমূলক শাস্তি নিশ্চিতকরণ।
- সরকার কর্তৃক আলুর উৎপাদন, চাহিদা, সরবরাহ ও মূল্য সংক্রান্ত তথ্য সঠিকভাবে উপস্থাপন করা এবং তা হালনাগাদ রাখা।
- আলুর উৎপাদন, চাহিদা, সরবরাহ ও মূল্য সংক্রান্ত তথ্য নিয়ে গুজব সৃষ্টিকারীদের দৃষ্টান্তমূলক শাস্তি নিশ্চিতকরণ।
- আলু ও আলু দ্বারা তৈরি বিভিন্ন পণ্যের রপ্তানি বৃদ্ধির ব্যবস্থা করা।
- প্রক্রিয়াজাতকরণ শিল্পে ব্যবহারের উপযোগী আলুর জাত উদ্ভাবন এবং উৎপাদন বৃদ্ধির ব্যবস্থাকরণ।
- সংকটকালে ওএমএস এর মাধ্যমে আলুর বিক্রয় কার্যক্রম বৃদ্ধি করা।
- সরকারিভাবে আলুর মজুদ গড়ে তোলা।

বাংলাদেশে পেঁয়াজের প্রাপ্যতা ও দামের অস্থিরতাঃ একটি আন্তঃপ্রাতিষ্ঠানিক গবেষণা প্রতিবেদন-২০২০

সারসংক্ষেপ

বাংলাদেশে পেঁয়াজ সাধারণত মশলা জাতীয় খাদ্য হিসেবে ব্যবহৃত হয়। উৎপাদনের তুলনায় পেঁয়াজের চাহিদা বেশি হওয়ায় ভারতসহ অন্যান্য দেশ থেকে তা আমদানি করতে হয়। বাংলাদেশ ও প্রতিবেশী দেশগুলোতে উৎপাদনের ওঠানামা পেঁয়াজের বাজারকে ব্যাপকভাবে প্রভাবিত করে। যেহেতু বাংলাদেশ ভারত থেকে পেঁয়াজের চাহিদার সিংহভাগ আমদানি করে, সেহেতু ভারতের পেঁয়াজ তাৎক্ষণিকভাবে বাংলাদেশের বাজারকে প্রভাবিত করতে পারে। বাংলাদেশে পেঁয়াজের দাম গত কয়েক বছরে বেশ অস্থিরতার মুখোমুখি হচ্ছে। সময়ের সাথে সাথে দেশে মৌসুমী পেঁয়াজের দাম তীব্র হয়ে উঠছে, কারণ আমদানিকৃত মূল দেশ ভারত যখন তার রপ্তানিকে নিষিদ্ধ করে তখন বাংলাদেশে পেঁয়াজের সঙ্কট দেখা দেয়। পেঁয়াজের সরবরাহ পরিবর্তনের সাথে ছোট এবং প্রান্তিক ব্যবসায়ীদের মজুদ করার প্রবণতাই হলো দাম বৃদ্ধির গুরুত্বপূর্ণ কারণ। পেঁয়াজের অস্বাভাবিক মূল্যবৃদ্ধি নিয়ন্ত্রণ বা প্রশমিত করার জন্য নীতিগতভাবে পেঁয়াজের উৎপাদন, বাণিজ্য, আয়-ব্যয় এবং মূল্য সম্পর্কিত বিভিন্ন মাত্রা বিশ্লেষণের জন্য বর্তমান গবেষণা পরিচালিত হয়।

গবেষণাটি মূলত একটি আন্তঃপ্রাতিষ্ঠানিক গবেষক দল দ্বারা এফজিডির মাধ্যমে প্রাপ্ত প্রাথমিক তথ্য এবং বিভিন্ন উৎস থেকে মাধ্যমিক তথ্যের উপর ভিত্তি করে করা হয়। বাংলাদেশের শীর্ষ পাঁচটি নিবিড় উৎপাদন অঞ্চলকে পেঁয়াজর প্রাথমিক বাজার হিসেবে চিহ্নিত করা হয়। পেঁয়াজের বিভিন্ন দেশীয় বাজার এবং আমদানিকৃত দামের উপর ভিত্তি করে দামের সংক্রমণ বিশ্লেষণ করা হয় । ঢাকা সহ পাবনার কাশিনাথপুর বাজার, ফরিদপুরের রসুলপুর বাজার এবং নাটোর জেলার বনপাড়া বাজারে পেঁয়াজ উত্তোলনের পর পেঁয়াজের সরবরাহ, মজুদ এবং দামের তথ্য ব্যবহার করে বাজারের আচরণ এবং এর গতিপ্রকৃতি সম্পর্কে গবেষণা করা হয়।

বাংলাদেশে গত কয়েক বছরে পেঁয়াজের আবাদ, উৎপাদন ও উৎপাদনশীলতা উল্লেখযোগ্যভাবে বৃদ্ধি পেয়েছে। বিশেষ করে ২০১০-১১ সালের পরের এক দশকে পেঁয়াজের উৎপাদনশীলতা প্রায় ৬০ শতাংশ বেড়েছে। পেঁয়াজের আবাদ ও ফলন পাবনা, ফরিদপুর ও রাজশাহী জেলায় উল্লেখযোগ্য পরিমাণ বৃদ্ধি পেয়েছে, যারমধ্যে প্রায় ৪২ শতাংশ উৎপাদন হয় পাবনা জেলায় ।

বাংলাদেশে সাম্প্রতিক পেঁয়াজের দাম বৃদ্ধির জন্য বেশ কয়েকটি কারণ দায়ী যার মধ্যে উল্লেখযোগ্য হলো

- দেশীয় অসাধু বাণিজ্য সিন্ডিকেট দ্বারা বাজারে কারসাজি; এবং
- ভারতীয় রপ্তানি নিষেধাজ্ঞা অথবা অতিমাত্রায় ভারতের উপর পেঁয়াজ আমদানির জন্য নির্ভরতা।

উপরোক্ত কারণে দেশীয় বাজারে পেঁয়াজের সরবরাহ ব্যাপকভাবে কমে যায়। পাশাপাশি গ্রাহকরা দাম বৃদ্ধির সূচনায় পেঁয়াজ কেনা ও মজুদ করার জন্য প্রচেষ্টা চালায়- যা বাজারে পেঁয়াজের দাম বৃদ্ধির সুযোগ করে দেয়।

তাছাড়া, বাংলাদেশে পেঁয়াজের দাম বৃদ্ধির আরও কয়েকটি গুরুত্বপূর্ণ কারণ নিম্নরূপ

- সরকারের ব্যবস্থাপনা সমস্যা ও বাজার নিয়ন্ত্রণে কম সক্ষমতা;
- আমদানির জন্য পেঁয়াজের বিকল্প উৎসের সন্ধানে দ্রুত কার্যক্রম গ্রহণের অভাব;
- গ্রীষ্মকালীন পেঁয়াজ এবং মুড়িকাটা পেঁয়াজের সীমিত উৎপাদন; এবং
- সঠিক তথ্যের প্রচারাভাব ও বিভ্রান্তকর তথ্যের বিস্তার।

গবেষণার সুপারিশমালা নিম্নরূপ

- অসাধু বাণিজ্য সিন্ডিকেট সনাক্ত করে তাদেরকে বিচারের মুখোমুখি করা।
- সঙ্কটকালীন সময়ে পেঁয়াজ আমদানির জন্য দ্রুত একাধিক রপ্তানিকারক দেশের সন্ধান করা।
- অভ্যন্তরীণ উৎপাদন বৃদ্ধির মাধ্যমে আমদানি নির্ভরতা হ্রাস করা।
- নিয়মিত পেঁয়াজ উৎপাদনের সঠিক তথ্যের প্রচার এবং বিভ্রান্তকর তথ্যের বিস্তার বন্ধ করা।
- কৃষি মূল্য কমিশন গঠনের মাধ্যমে সারা বছর বাজারে পেঁয়াজের দাম নির্ধারণ ও তদারকি করা।
- হঠাৎ মূল্য বৃদ্ধি নিয়ন্ত্রণের জন্য অভ্যন্তরীণ সরবরাহ ও মজুদের অগ্রিম ব্যবস্থাপনা এবং সুচিন্তিত পরিকল্পনা অনুসরণ করা।

Availability and Price Volatility of Rice in Bangladesh: An Inter-Institutional Study in 2020

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Executive Summary

Bangladesh has made remarkable progress in rice production and achieved self-sufficiency for feeding the people of Bangladesh. Total rice production in Bangladesh was about 10 million tons in 1972-73, which increased to 38.72 million tons in 2019-20. It is about four times higher than the previous production. The growth of rice production (2.83%) was much higher than the growth of population (2.04%).

In most recent days, market prices go up unexpectedly that poses threat to farmers and consumers, which is most embarrassing for the government and policy makers. Therefore, this research was recommended to find out the major drivers for rice price hikes in Bangladesh. Primary and secondary data were used in the analyses. The primary data were collected by conducting Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) in Naogaon, Sherpur, Cumilla and Dhaka districts. In addition, a telephonic survey was conducted to get much responses about the reasons for recent paddy and/or rice price hike from different value chain stakeholders. Secondary data were gathered from different organizations and the published sources. Suitable statistical and mathematical tools were employed to analyze the data.

The growth rate of national rice production was always more than 2 percent in 1973-2000 and 2001-2020 while the growth rate over the period of 1973-2020 was 2.83 percent. To drive the growth of rice production upward, a package of intervention such as rapid spread of superior varieties, increment of irrigation areas under rice cultivation, adoption of climate resilient genotype, and better resource management and use of superior technologies, quality seeds and mechanization is required.

During the two intervals of 2011-2015 and 2016-20, a substantial surplus of rice per capita was achieved. Almost 2 million tons remained surplus over the period 2009-2017 and more than 3 million tons over the years 2018 to 2020. The additional stock through import of rice usually increased the national surplus and helped stabilize the market price of rice.

Nominal price of rice increased, on average, at the rate of 4 to 5 percent whereas the real price decreased, on average, at the rate of 2 to 3 percent over the reference years (1972-2020). Even though the slope of nominal price in both T. Aman and Boro seasons was similar at all actor's level, adjustment of inflation in price of T. Aman paddy exhibits the higher market risk compared to that of Boro paddy. Cost of paddy cultivation increased by about 3 percent over the period of 2009–2020 while net profit (Tk/kg) decreased by about 8 percent over that period.

The millers thought that they are the losers in rice processing business but they did not take the value of its by-products in their calculation. With valuation of by-products, millers usually made the profit per kg ranging from Tk. 4.6 in 2019 to 9.5 in 2017 in T. Aman while they made profit, from Tk. 4.7 in 2020 to 8.2 in 2018 in Boro season.

Although market price of paddy usually exists below the procurement price, most of the farmers do not get the benefit of that price and government bought only a small quantity of paddy. However, farmers were happy to receive a good price of T. Aman paddy in 2020. Historical trend of wholesale price was similar to that of procurement price of milled rice. The overall relationship between marketed surplus and price showed that someone might have power to regulate the determination of price in the market instead of market forces of supply and demand. Price spread reveals that midstream actors particularly millers, aratdars, and wholesalers harvested a super normal profit.

In 2016, a reverse trend of price between Bangladesh and neighboring countries was observed. But almost a similar price trend appeared between 2017 and 2018. After that period, rice price in Bangladesh fell down lower than the import parity price of neighboring countries. However, the price increased in 2020.

Public stock of rice drastically fluctuates and highly declines sometimes that gives an important signal of retention of minimum stock and increasing it to a minimum of 2500 thousand tons annually with a retention of at least 1250 thousand tons monthly. The highest prices in wholesale market of T. Aman were recorded in the month of January, February, June and October for the years 2016 through 2020 while for Boro, the highest prices were recorded in January, March, September, October and December.

Based on production situation, import decision, and domestic procurement, the value chain actors (millers and traders) make a gambling role to control price of paddy and rice in the market.

The indices during the period from 2016 to 2020, showed higher and unpredictable trend of paddy price from August to October. To control market prices during that period, the government should always maintain a large reserve of at least 12.5 lac tons of rice each month that would smoothen the impacts of large swings of rice prices.

Almost all of the farmers used to sell major portion of marketable surplus within the first month of harvesting. The pattern of paddy sale changed substantially between the last two consecutive Boro seasons. In Boro 2020, farmers released their paddy stock a bit slowly in the market. The traders and millers, apprehending a panic of food shortage during pandemic, failure of achieving rice procurement target and delay in import by the government, and speculation for higher price, retained a part of their stockpiles of rice, which were the main reasons for the price hike.

The other reasons for price hike in rice market during 2020 includes supremacy and unequal competition of large millers and traders, delayed harmonization of data that led to the panic of shortage of paddy production, delay in rice import decision, increasing cost of paddy cultivation and rice processing, increasing number of seasonal traders and production loss from the disaster. Also the government stayed away from large intervention in the market during the stressed period.

To overcome the seasonal price hikes; an up-gradation of paddy/rice procurement system is necessary. Government should declare separate minimum support prices (MSP) for fine and coarse grains of paddy and rice that will help farmers to get higher price at the harvesting time. The government should procure about 10 percent of total production with no less than 25 lac tons of rice so that intervention in the market can be made effectively. Government should retain at least 12 lac and 50 thousand tons of rice every month as buffer stock. Procurement price should be determined considering at least 20 percent profit over the production cost. Millers and traders should have trust on government data and should adjust their business strategy with the policy intervention of the government. Concerned ministry and department should have a policy to communicate with the rice millers and traders on regular basis so that a fair business environment prevails in this market. Finally, cost minimization strategy, intensive market monitoring, regulation for rice processing industries and timely government interventions are the important factors for ensuring stability in the market.

1. Introduction

1.1 Importance of rice in Bangladesh

Bangladesh is a densely populated small agrarian country. Agriculture has been the mainstay of Bangladesh economy, contributing 13.38% to the gross domestic product (GDP) and generating employment for about 41% of the total labour force (BER, 2019; Rahman et al., 2020; Rahaman et al., 2020). Rice is the main crop and staple food of people in the country. It supplies about 92% of total food grain production and covers about 76% of the total cropped area in Bangladesh (BBS, 2016). Rice contributed about 7.58% to the national GDP (Khan et al., 2013). The country has made a remarkable progress in agriculture in terms of adoption of modern technologies and rice production after independence in 1971. Bangladesh has a long history of rice cultivation and contribution of rice to the livelihood of rural people is significant. Rice is grown throughout the country except in the southeastern hilly areas. The agro-climatic conditions of the country provide a warm habitat for growing rice year-round. The national average rice yield is much lower (2.96 t/ha) than that of other rice-growing countries (USA: 5.71 t/ha; China: 4.62 t/ha; Vietnam: 3.96 t/ha; Indonesia: 3.22 t/ha) (WRS, 2020). However, Bangladesh has the highest average rice yield in South Asia (Salam et al., 2019). Due to urbanization, food habits tend to change, demanding the cultivation of new crops that must share land used for rice cultivation (Shelley, 2016). Almost all of the 13 million farm families of the country grow rice. Rice is grown on about 11 million hectares which has remained almost stable over the past three decades. About 75% of the total cropped area and over 80% of the total irrigated area is devoted to rice. Thus, rice plays a vital role in the livelihood of the people of Bangladesh (BRKB, 2020, http://www.knowledgebank-brri.org/riceinban.php dated on 10/12/2020).

Total rice production in Bangladesh was about 10.1 million tons in the year 1971 when the country's population was only 7.88 million. Moreover, the country is now producing (about 38.72 million tons) more than three times to feed her 170 million people (BBS, 2019). This indicates that the growth of rice production (2.83%) was much faster than the growth of population (2.04%). The increased rice production has been possible largely due to the adoption of modern rice varieties on around 66% of the rice land which contributes to about 73% of the country's total rice production. However, there is no reason to be complacent. The population of Bangladesh is still growing by two million every year and may increase by another 30 million over the next 20 years. During this time total rice area will also shrink to 10.28 million hectares. Rice yield therefore, needs to be increased from the present 2.74 to 3.74 t/ha (BRKB, 2020). To combat the future situation, we will need to consider the following:

- Replacement of traditional and old varieties by superior inbred, hybrid and super high yielding varieties where possible.
- Development of irrigation water management.
- Bring the unexplored areas under cultivation
- Application of superior resource management technologies.
- Ensure quality seed usages.
- Put emphasis on synchronized mechanization of rice cultivation.

1.2 Justification of the study

Bangladesh has been increasing rice production over many years and is now relatively self-sufficient in rice production. The country’s rice imports declined from about 1 million tonne in 1995 to a mere 0.017 million tons in 2009 but increased to 0.66 million tons in 2010. Exports of rice began in the 2000s. Some rice is still imported, however, mainly to control domestic prices. The government to increase production and to reduce imports has implemented many rice policies. Subsidy support for rice producers is provided on different agricultural inputs to keep their price within the purchasing capacity of the rice farmers. In 2010, the equivalent of $712 million was disbursed for subsidy assistance. The government provided cash subsidies to small and marginal farmers through an input distribution card that could be used to obtain cash subsidies for electricity and fuel for irrigation, fertilizer, and other forms of government support. The government has attempted to stabilize rice prices through open market sales since 2004. This was established when the cost of food in Bangladesh began to increase sharply as a result of global price increases. This allowed people to buy rice

at reduced prices from thousands of centers in district towns and union-level dealers across the country (http://ricepedia.org/bangladesh). However, in most recent days, market prices go beyond the control that poses threat to farmers and consumers. There is a scanty of insightful research that highlights on the recent rice price hikes in Bangladesh. Therefore, the piece of this research was undertaken to find out the major drivers of rice price hikes in Bangladesh.

1.3 Specific objectives

- Long term trend of production, import and export of rice in Bangladesh;
- Demand and supply situation and price trend over time;
- Cost of productions, profitability and appropriateness of market prices;
- Reasons for price spiral in 2020; and,
- Recommend policy measures for price stability.

2. Methodology

2.1 Growth rate measurement

The growth rates of area, production, and yield of rice in different seasons (Aus, Aman, and Boro) were estimated by fitting a semi-log function (exponential growth function) of the following type adopted from Islam et al., 2020:

$$y = e^{(\alpha+\beta t)}$$

or $$lny = \alpha + \beta t \ldots\ldots\ldots(1)$$

Where, ln = Natural logarithm;

y = Area in thousand hectare (ha) or production in thousand metric ton or yield (t/ha);

β = Regression coefficient, i.e., growth rate (in ratio scale);

t= Time period (year). Considered three different forms of period, such as, 1972-1973 to 1999-2000; 2000-2001 to 2019-2020; and 1972-1973 to 2019-2020.

α = Intercept; and,

e = Euler number used for exponential function.

2.2 Demand and supply estimation

The total rice demand was estimated by accounting for human and non-human consumption requirements per annum in Bangladesh using the formula and method from Kabir et al., 2020.

Table 1: Non-consumption usages of rice in Bangladesh

Sources	Explanation	Percentages
Seed	Farmers' recommended practices, field loss, damages of seed and additional safety for crisis period	1.52
Feed and other losses	Livestock, poultry and fish feed as well as usages of 'rice starch' in textile industries and tourists' consumption	5.15
Harvest operations	Harvest operations (cutting, field drying & bundling) and transporting from field to farm yard/threshing yard	5.20
Post-harvest operations	Threshing, winnowing, drying, in-store, out-store, transportation, marketing etc.	7.10
Processing	Milling, over-polishing, storage and transportation operations	7.25*
Total non-consumption	Summation of all sources	26.22

* Ratio of paddy to rice is 0.66 at government calculation but millers calculated at 0.60 rate based on head rice during processing which is considered in this calculation. There is difference of 0.06 which eventually affect national production of milled rice in Bangladesh.

Source: Adopted from BRRI.

The human consumption demand is the sum of per capita annual requirement of the total population of the country. The non-human consumption demand is the sum of the requirement for seed, feed, industrial use, and wastage for harvest operation, post-harvest losses, and processing losses per annum (Table 1).

The total rice demand was estimated based on the equations below:

$$TRD_i = HC_i + NHC_i \ldots\ldots\ldots\ldots (2)$$

Where, TRD is total rice requirement, HC is human consumption and NHC is the non-human consumption. Notably the human consumption was calculated from the form of milled rice for daily intake, puffed rice, flattened rice, pop rice, and in some extend making the cake. The rice supply has been estimated by adding the imported amount with domestic total production. The data period for demand and supply estimation is 1991 to 2020.

2.3 Profitability equation

To determine per hectare profitability for each of the selected paddy farming from the viewpoint of individual farmers, the following algebraic equation was followed:

$$\Pi_i = \sum Q_{yi} \,.\, P_{yi} + \sum Q_{bi} \,.\, P_{bi} - \sum_{j=1}^{m} (X_{ij} . P_{xij}) - TFC_i \ldots\ldots\ldots\ldots\ldots (3)$$

Where,

$\prod$= Net returns from Aman paddy (Tk/ha);

Q_y = Total quantity of (paddy) outputs (kg/ha);

P_y = Per unit prices of the paddy (Tk/kg);

Q_b = The total quantity of the concerned byproduct (kg/ha);

P_b = Per unit prices of the relevant byproduct (Tk/kg);

X_i = Quantity of the concerned i^{th} inputs;

P_{xi} = Per unit price of the relevant i^{th} inputs;

TFC = The total fixed cost involved in production;

$i = 1,2,3,\ldots,n$ (Number of farms)

$j = 1,2,3,\ldots,m$ (Number of inputs)

In order to estimate the per kg production cost of paddy, the value of the straw has been deducted from the total costs of cultivation. Moreover, transportation, processing, and milling costs have been considered to estimate the production cost of clean rice in Bangladesh. The profitability was shown for the period of 2009 to 2020 based on the data obtained from FPMU, 2020 and from Agricultural Economics Division, BRRI, 2020.

2.4 Seasonal trend and indices

For estimating seasonal price variation, a multtiplicative model is considered. Trend was estimated by simple 12 months moving average method and seasonal indices were worked out by averaging the detrended series.

2.5 Reasons for rice price hike

The section was covered by Focused Group Discussion (FGD) and Key Informant Interviews (KII). FGDs and KIIs were done in Naogaon, Sherpur, Cumilla and Dhaka districts for identifying the reasons for rice price hike in 2020. Besides, a total of 280 farmers and other value chain actors from 14 agricultural regions were interviewed through a telephonic survey. To get a quick response from different value chain actors of paddy and rice market, sample size and number of FGDs and KIIs conducted were kept limited in selected areas.

2.6 Data

The data on total population has been obtained from the Food Planning and Monitoring Unit (FPMU) of the ministry of food. The rice import data has been adopted from Ministry of Food covering the period 1991-2020. The historical season-wise rice production, area, and yield data was available in the various reports of the Bangladesh Bureau of Statistics (BBS) the World Rice Statistics (WRS) and Department of Agricultural Extension (DAE). The information on inputs use, and costs and return of paddy and rice has been obtained from FPMU and the agricultural economics division of the Bangladesh Rice Research Institute (BRRI).

3. Results and Discussion

3.1 Trend of area, production and yield of rice

Figure 1 shows the increasing trend of rice production and yield, while the area becomes stagnant. Using time-series data, the growth rate of rice area, production and yield in Bangladesh were estimated. At the beginning of the estimation, the whole period of 1972-2020 was divided into three sub-periods such as first period (period-I): 1972-1973 to 1999-2000, second period (period-II): 2000-2001 to 2019-2020 and third period (Period-III): 1972-1973 to 2019-2020.

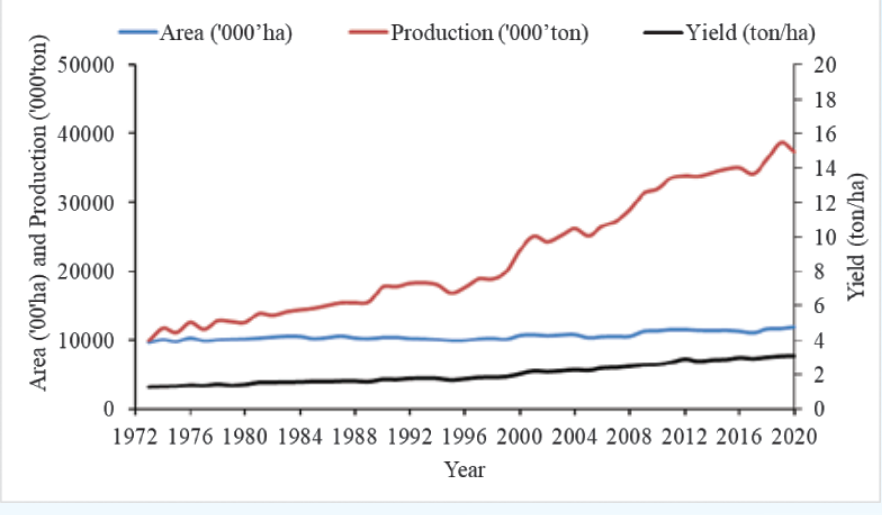


Fig. 1: Scenario of area, production and yield of rice in Bangladesh during 1972 to 2020

Table 2: Growth rates of area, production, yield and total production of rice for different periods

Season	Parameter	Period-I 1972-1973 to 1999-2000	Period-II 2000-2001 to 2019-2020	Period-III 1972-1973 to 2019-2020
Aus	Area	-2.92***	-0.62ns	-2.22***
	Production	-1.67*	2.72***	0.05ns
	Yield	1.17***	3.44***	2.39***
T. Aman	Area	-0.11ns	0.13ns	-0.11**
	Production	1.49***	1.83***	1.73***
	Yield	1.63***	1.60***	1.83***
Boro	Area	4.98***	1.38***	3.62***
	Production	6.51***	2.88***	5.36***
	Yield	1.51***	1.52***	1.76***
Total rice	Area	0.14ns	0.55***	0.35***
	Production	2.40***	2.41***	2.83***
	Yield	1.49***	2.02***	1.92***

Source: Authors calculation using semi-log model based on data from various issue of BBS. *, **, *** and ns denotes level of significance at 10%, 5%, 1%, and not significant.

To do the growth analysis a semi-log model, which can be obtained from the log transformation of exponential regression model was used. Remedy measure was taken for removal of autocorrelation and heteroscedasticity in order to calculate undisturbed growth rate of area, yield and production. Growth rates of the area, production and yield for Aus, Aman, Boro as well as total rice production are shown for three different aforesaid periods in the Table 2.

In Aus season, the area growth rate was estimated to be -2.93 for the period of 1972-1973 to 1999-2000 implying that area under Aus shifted to other crops at the rate 2.93 percent. After first period growth rate of Aus area was enormously improved to -0.62 for the second period of 2000-2001 to 2019-2020. The area under Aus rice has been declining at the rate -2.22 percent over the entire period of 1972-1973 to 2019-2020. The growth rate of Aus yield (T/ha) was relatively low (1.17 percent) in the first period (1972-1973 to 1999-2000) and that was 3.44 in the second period (2000-2001 to 2019-2020) and 2.40 over the entire period (1972-1973 to 2019-2020). The second period was dominated by wider spread of green revolution technologies. Production of seasonal rice was contributed by area and yield multiplicatively. Therefore, growth rate of Aus production decreased by-1.67 percent for the first period and after that, substantially improved at 2.72 percent with the advancement and up-scaling of the modern rice cultivars as well as improved agronomic practices during second period. However, the growth of Aus production (0.05) is not much satisfactory over the entire period of 1972-1973 to 2019-2020 that was happened due to the declining trend during first period.

In Aman season, the growth rate of area was -0.12 percent for the first period of 1972-1973 to 1999-2000 and increased to 0.14 percent for the second period of 2000-2001 to 2019-2020. The growth rate was negative (-0.11 percent) over the entire period of 1972-1973 to 2019-2020. On the other hand, growth rate of production was 1.49 percent for the first period of 1972-1973 to 1999-2000 and increased to 1.83 percent for the second period of 2000-2001 to 2019-2020. The overall growth rate of Aman production during the whole period of 1972-1973 to 2019-2020 was 1.73 percent. The growth rate of yield was almost similar for both first and second period (1.63 and 1.61 percent, respectively) that led to positive growth rate (1.83 percent) in the whole period of 1972-1973 to 2019-2020.

In Boro season, the growth rate of area rapidly attained at 4.98 percent for the period of 1972-1973 to 1999-2000 because area from Aus season and other crop shifted to Boro rice cultivation but drastically decreased to 1.38 percent for the second period of 2000-2001 to 2019-2020. The growth rate of Boro area (3.62 percent) was almost adequate over the whole period of 1972-1973 to 2019-2020. On the other hand, growth rate of Boro production was much higher (6.51 percent) compared to that in two other rice seasons for the first period of 1972-1973 to 1999-2000 and decreased to less than half (2.89 percent) for the second period of 2000-2001 to 2019-2020. The lower growth indicated that improvement of production growth in Boro season needs intensive intervention now but the overall growth rate of Boro production appeared to be impressive (5.36 percent) during the period of 1972-1973 to 2019-2020. Besides, the growth rate of yield (t/ha) was almost the same (1.51 and 1.53 percent, respectively) for both first and second period and a slightly higher growth (1.76 percent) appeared in the whole period of 1972-1973 to 2019-2020.

The growth rate of total rice area was lower but positive (0.14 percent) for the first period and increased to 0.55 percent for the second period but growth rate in the whole period of 1972-1973 to 2019-2020 was lower (0.35 percent) than that appeared during the two periods. Growth rate of yield was 1.49 and 2.02 percent for the first period and second period, respectively and 1.92 percent in the whole period. The growth rate of total rice production was always more than two percent for both the first period (2.40 percent) and the second period (2.41 percent) but the growth rate in the whole period appeared to be satisfactory (2.83 percent). While comparing growth estimation in three different periods, growth under the second period in particular yield and production appeared to be higher in all seasons than the first and the whole period. The second period received most intervention, and technological advancement and up scaling of the modern rice cultivars as well as modern agronomic practices. To drive up the growth of rice production upward, a package of intervention such as rapid spread of superior inbred, hybrid and super high yielding varieties, increment of irrigation areas under rice cultivation, adoption of climate smart and stress resilient genotype, application of superior resource management technologies, use of more quality seeds and rapid adoption of mechanization is required.

3.2 Supply and demand situation of rice

Major pillar of agriculture policies of the government of Bangladesh is to increase rice production and reduce the expenditure of foreign currencies for rice imports (FAO, 2014). To ensure food security of the people, there is no alternate way other than availability of food through domestic production as well as import. However, historical evidences showed that adequate supply of foodgrain through domestic production or import does not eventually achieve food security for all people. Easy access to food through income or purchasing power or social access in the form of public distribution or private charity must be provided (Talukder, et al., 2019). As discussed in growth analysis, during the period of 2001-2019, rapid advancement and dissemination of modern technologies paved the way of the attainment of self-sufficiency in rice production in this country. Appendix table 2 shows the surplus/deficit situation of rice production and requirement in Bangladesh over the period of 1991-2020.

Domestic production, rice import, and exports records and per capita consumption over the periods are considered to calculate the supply and demand balance or surplus or deficit. After 2008, implementation of structural policies headed the country to achieve a good amount of surplus of rice production up to the year 2019-20. Figure 2 shows the five year average of per capita availability and requirement of rice. During the two interval of 2011-2015 and 2016-20, substantial surplus of rice per capita was achieved. The share of rice import to rice surplus created ambiguity that can be clarified only through calculation of domestic production and requirement without import amount. Only slight shortage (0.75 million ton) was appeared in 2008. Almost 2 million tons remained surplus over the period 2009-2017 and more than 3 million tons over the years 2018 to 2020. The additional import of rice usually increases the national surplus of rice figures. Therefore, rice import is not necessary for current balance of domestic production and requirement.

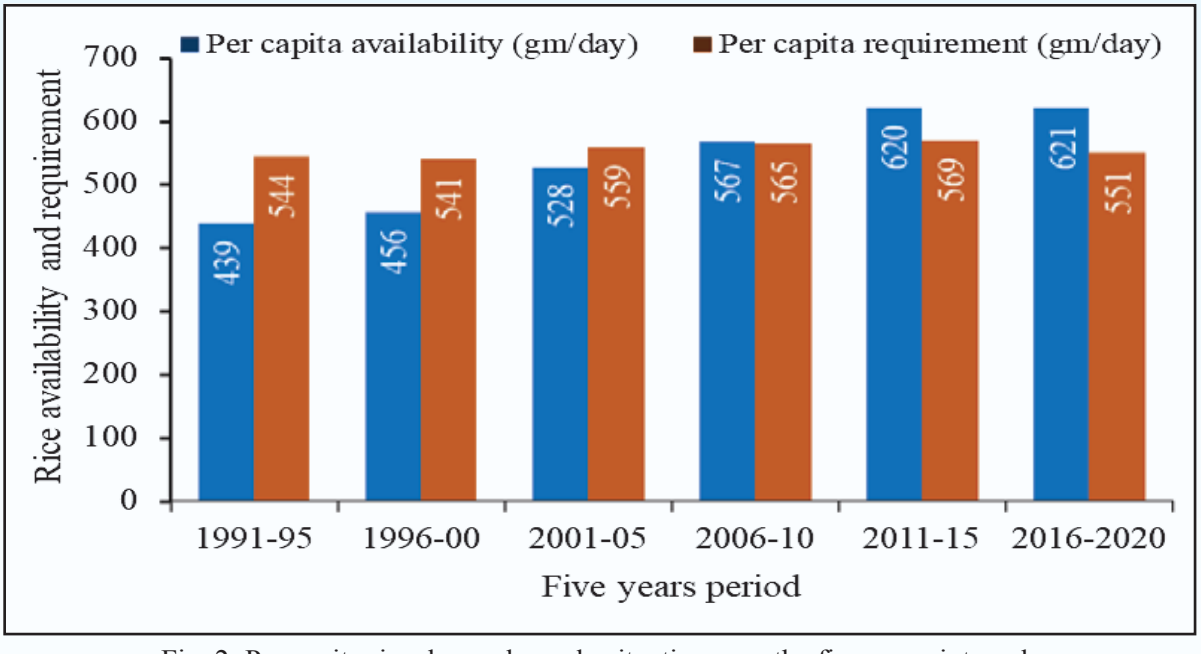


Fig. 2: Per capita rice demand supply situation over the five years intervals.
Source: Authors' calculation based on appendix table 2 from FPMU

3.3 Economics of paddy production: producer perspectives

3.3.1 Input use pattern in T. Aman and Boro season over the years of 2009-2020

According to Ministry of Agriculture, application of input level per acre in Aman cultivation remains almost the same from 2009 to 2017. As for example, application of seed, chemical fertilizer, and human labour are the same over that period. Slight increase of seed and chemical fertilizers was reported after 2018 but the increase is not so much per acre. Farmers' rate of nitrogen application as Urea and DAP was moder ately higher than the recommended dose. Similarly, application of MoP, TSP and DAP was also higher than

the recommendation. However, use of organic fertilizer especially manure decreased in rice field after 2010 due to reduction of homestead cattle rearing and its unavailability (Appendix Table 4).

Moreover, application of chemical fertilizer and human labour had been in same line in Boro season from 2009 to 2020. Slight change in use of hired labour was appeared in Boro season in 2020. Fertilizer application in this season, such as Urea, TSP, MoP and DAP was also higher than recommendation. Extensive subsidy on chemical fertilizer enabled the farmers to use more fertilizer in rice cultivation (subsidy of Tk. 10 to 20 per kg fertilizers). Providing continuous subsidy after 2009 over the price of Urea, TSP, MoP and DAP was expected to sustain rice production as well as reduce the cost of rice cultivation and increase the farm profit (Appendix Table 8).

3.3.2 Profitability of T. Aman and Boro paddy over the years of 2009-2020

Even though constant pattern was observed in quantity of input, per acre cost of rice cultivation varied over the period due to input price. The growth of nominal cost of rice cultivation in Aman season was 2.92 percent meaning that cost of production (Tk/kg) increaased by 2.92 percent over the period of 2009–2020 though government used to provide more subsidy on production inputs. The nominal growth of net profit (Tk/kg) from Aman season was negative 7.7 percent meaning that farmers used to suffer a loss of Aman rice cultivation by 7.7 percent over the period (appendix table 6 and Figure 4). Similarly, the growth of nominal cost of Boro rice cultivation (Tk/kg) was positive 3.15 percent and the growth of net profit (Tk/kg) was negative 8.50 percent over the period (Figures 3 and 4).

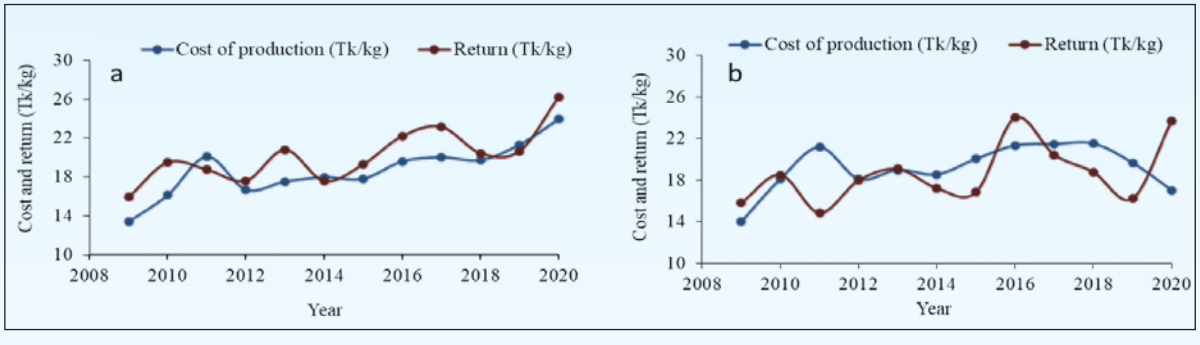


Fig. 3: Unit cost of production and return from paddy in both *T. Aman* and *Boro.*
Notes: 'a' indicates *T. Aman* and 'b' indicates Boro.
Source: AED, BRRI (various issues)

In this decade, continuous declining trend of profit impoverish the famers and pushed them to shift their acreage to non-rice crops. It can be noted that producer price of paddy had been higher than unit cost of production from 2016 to 2018 but the net unit cost (Tk/kg) was observed higher than producer price in 2019 and thereby resulting in negative profit (Figure 4). It appears in the Figure 3 that per unit return from both T. Aman and Boro could not compensate per unit cost of production due to unpredictable pattern of paddy price during peak harvest over the years 2009-2020.

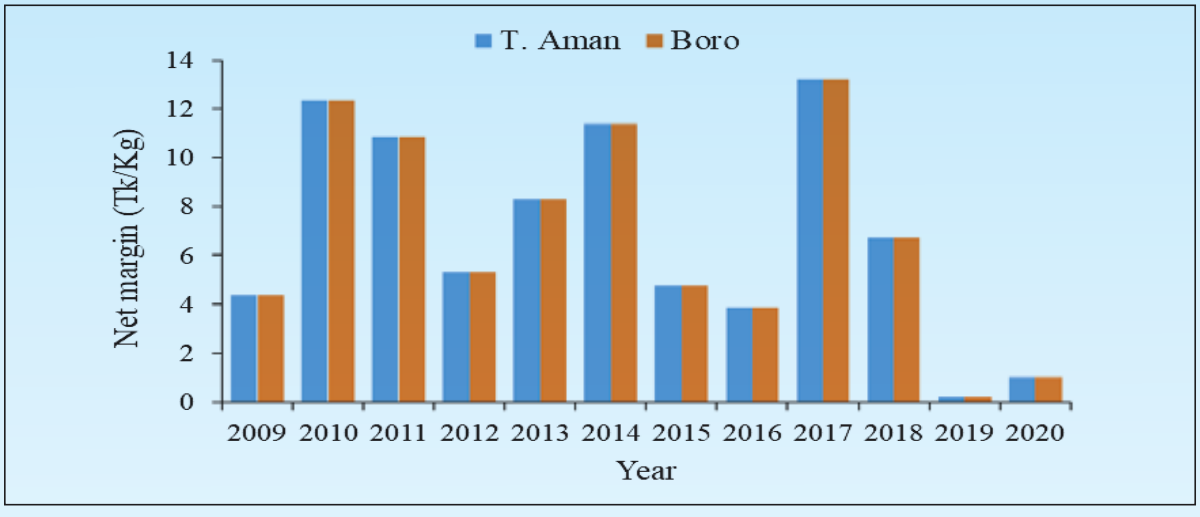


Fig. 4: Net margin in T. Aman and Boro cultivation over the years of 2009-2020.
Source: Authors' calculation based on data from FPMU

3.3.3 Disposal pattern and marketable surplus in 2019 and 2020

Average marketable surplus of paddy at the farmers' level during Boro season was about 60 percent of total paddy production in 2019 while it decreased to 54 percent in 2020 due to panic of future food crises in the wake of COVID-19 pandemic (Figure 5).

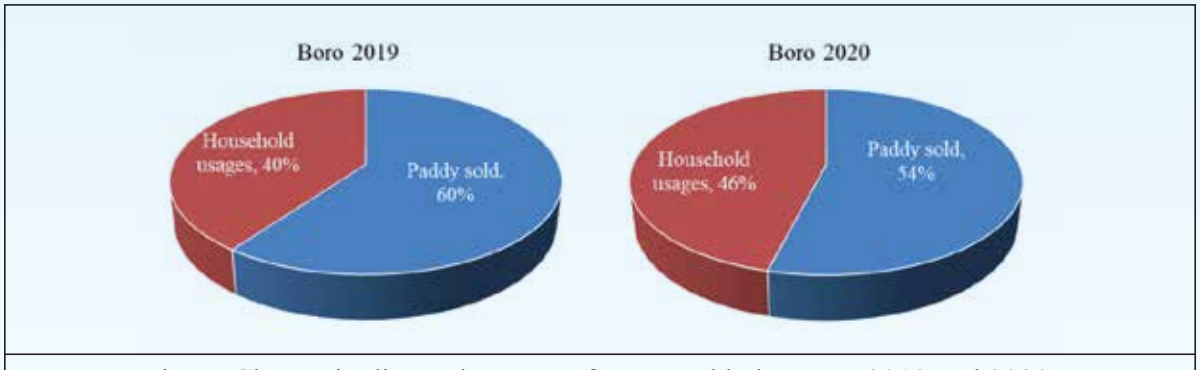


Fig. 5: Change in disposal pattern of Boro paddy between 2019 and 2020.
Source: FGD, 2020

Almost all of the farmers used to sell major portion of marketable surplus within the first month of harvesting. Pattern of paddy sale changed substantially between two consecutive Boro seasons. In Boro 2020, farmers released their paddy stock slowly in the market (Table 3). The traders, apprehending the panic of food shortage during COVID-19 pandemic, failure of achieving rice procurement target and delay in import by the government speculated for higher price, retained their stockpiles of rice that reduced the volume of market supply resulting in increased prices.

Table 3: Selling behavior at farm level in 2019 and 2020

Months	Paddy sold (% of marketable surplus)	
	Boro 2019	Boro 2020
Within one month of harvesting	65	52
Two months after harvest	20	25
Three months after harvest	13	18
Four months or above after harvest	2	5

Source: Field survey, 2020

3.4 Economics of rice production: processors and traders perspective

3.4.1 Cost of rice processing at mill gate over the period of 2009-2020

Figure 6 shows the increasing trend of rice processing cost over the period of 2009-2020. Increase in cost of transportation, higher price of spare parts, labour wages and electricity cost were the main factors to increase the processing cost of rice. To hire the labor during peak season, millers have to pay in advance to the labor as security money.

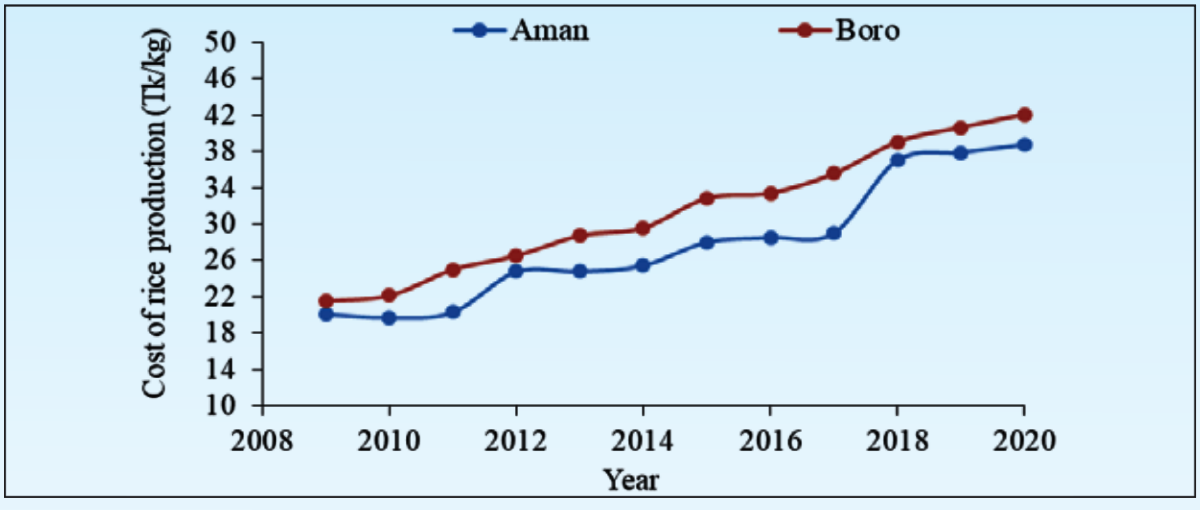


Fig. 6: Cost of rice production in T. Aman and Boro over the year of 2009-2020.
Source: Authors' calculation based on data from FPMU

3.4.2 Margin of millers from rice processing over the period of 2017-2020

Figures 7 exhibits that valuation of rice production with the by-products using procurement price of rice is profitable and magnitude of the profit per unit ranges from Tk. 4.6 in 2019 to Tk. 9.5 in 2017 in T. Aman. In same situation, profit per unit of rice production ranges from Tk. 4.7 in 2020 to Tk. 8.2 in 2018 in Boro season. Moreover, the millers gained more profit at market price since it was always higher than procurement price. On the other hand, the millers thought they incurred loss of rice production, but the fact was that they did not take into account the value of by-products in calculating profit.

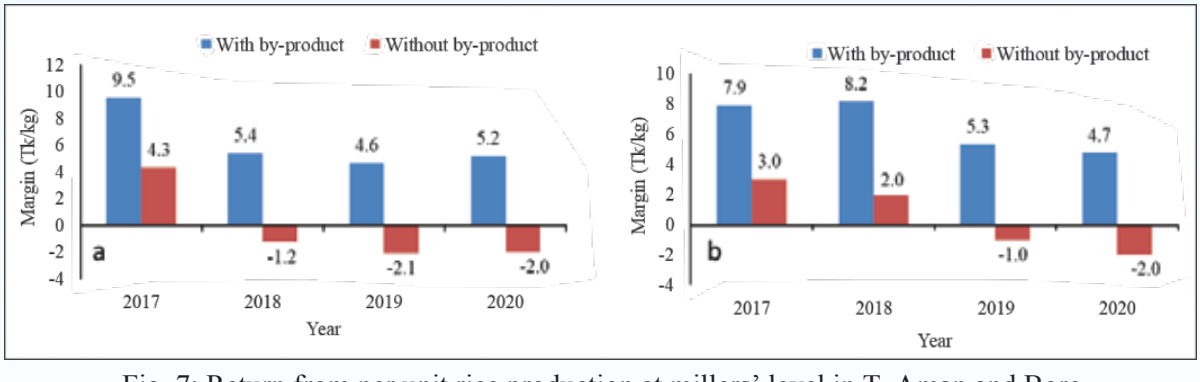
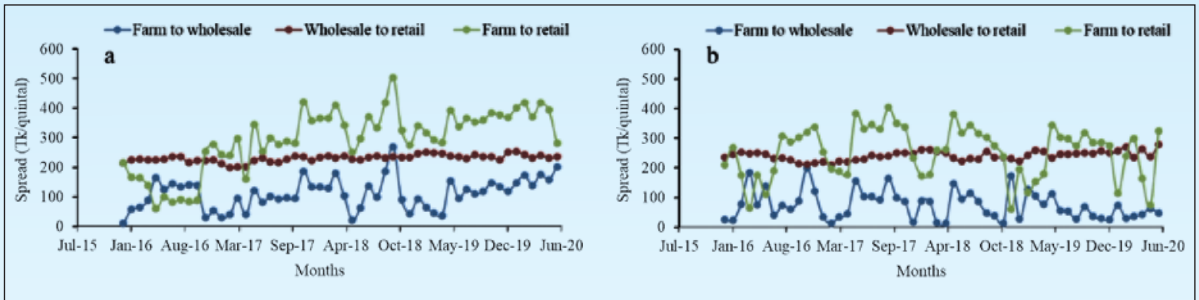


Fig. 7: Return from per unit rice production at millers' level in T. Aman and Boro.
Notes: 'a' indicates T. Aman and 'b' indicates Boro. By-product includes husk, bran, broken rice, dead rice, etc.
Source: Field survey, 2020

3.4.3 Marketing margin among midstream actors over the period of January 2016 to June 2020

The price data of rice from January 2016 to June 2020, depicting marketing margin from wholesale to retail shows consistent trend while the CV of price spread from farm gate to wholesale is higher followed by that of farm gate to retail. It seemed that midstream actors particularly millers, aratdar and wholesalers harvested super normal profit over the period.

However, the recent price hike of rice mainly happened due to stockpiling affinity of the millers that truncated the marketed surplus or disrupted the smooth market supply (Figure 8).



Seasons	Coefficient of variation (CV)		
	Farm to wholesale	Wholesale to retail	Farm to retail
T. Aman	63.73	5.06	39.87
Boro	64.19	6.29	33.81

Fig. 8: Trend of price behavior in T. Aman and Boro season during January 2016 to June 2020
Notes: 'a' indicates T. Aman and 'b' indicates Boro.
Source: Authors' estimation based on data from DAM

3.5 Price variation of paddy and rice

3.5.1 Annual trend and growth of nominal and real prices

Average market price of paddy was deflated using consumer food price index (CPI) of the base year 2005-06 in order to obtain the real price. It appears that nominal average market price at the farm level was in upward trend whereas real price in both T. Aman and Boro paddy was in declining trend at all actors level (Figures 9a-c).

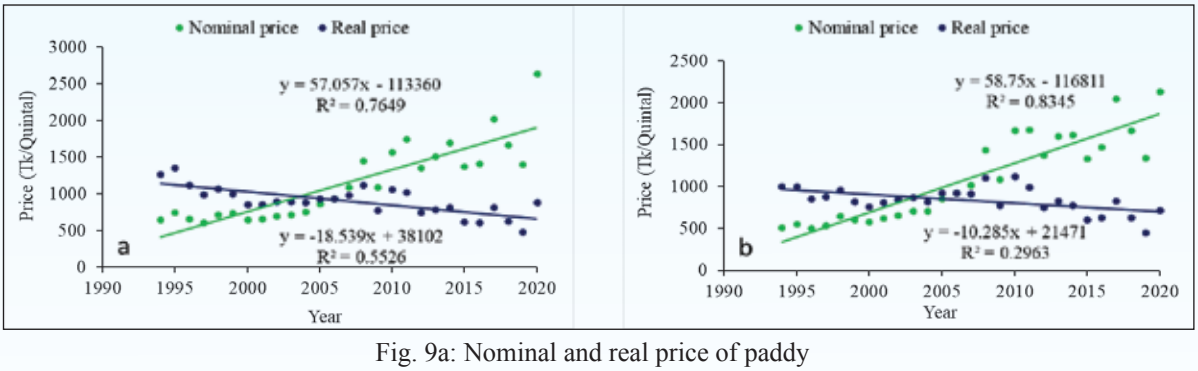


Fig. 9a: Nominal and real price of paddy

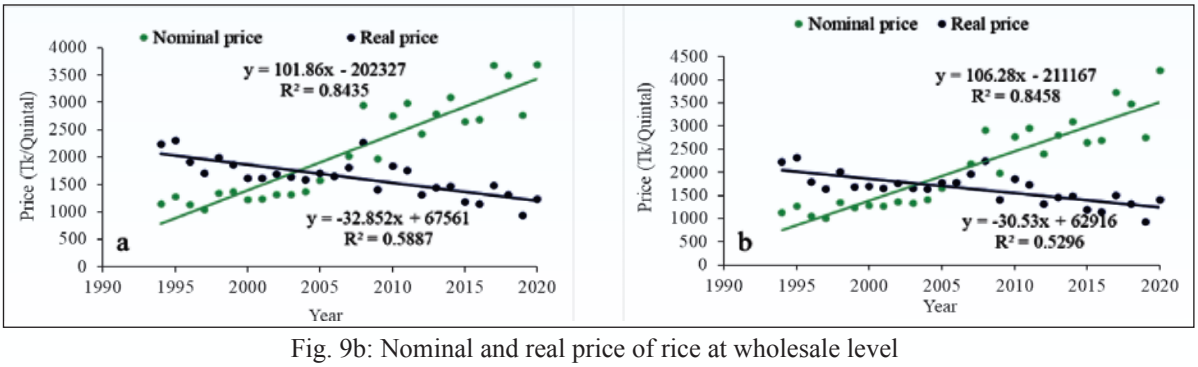


Fig. 9b: Nominal and real price of rice at wholesale level

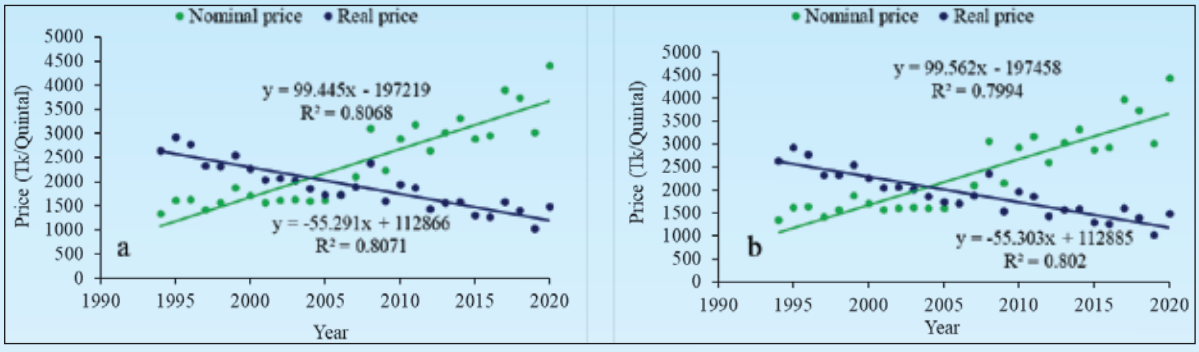


Fig. 9c: Nominal and real price of rice at retail level
Notes: 'a' indicates T. Aman and 'b' indicates Boro
Source: Author calculation based on data from DAM

Negative trend of real paddy price implied that farmers continued losing resources entitlement over the period of 1990-2020 even though nominal price was increasing. Nominal price increased on average at the rate of 4 to 5 percent whereas real price decreased on an average rate of 2 to 3 percent in the market (Table 4). Even though the slope of nominal price in both T. Aman and Boro season was similar at all actor's level, adjustment of inflation in price of T. Aman paddy exhibits the higher market risk compared to that of Boro paddy.

Table 4: Growth rate of nominal and real price of rice (farm gate, wholesale and retail levels)

Seasons	Nominal price			Real price		
	*Farm Price**	*Wholesale price ***	*Retail price ***	*Farm price **	*Wholesale price ***	*Retail price ***
T. Aman	*4.9*	*5.03*	*4.18*	*-2.2*	*-2.1*	*-3.0*
Boro	*5.7*	*5.18*	*4.18*	*-1.4*	*-2.0*	*-3.0*
Average	*5.3*	*5.11*	*4.18*	*-1.8*	*-2.05*	*-3.0*

Source: Authors' calculation based on data from Department of Agricultural marketing (DAM)
*Note: ' *' and '**' denotes price of paddy and rice, respectively*

3.5.2 Seasonality of prices over the period of 2016-2020

To analyses the seasonal trend and indices of domestic and international prices of rice, 5 years of period (January 2016 to October 2020) was selected for the study. The data were collected from department of agriculture marketing. Widest using method of measuring seasonal fluctuations was moving average that was applied to calculate more useful seasonal indices. To figure out the insight of the price behavior, seasonality was measured as any single month deviation from the average value of 100. The analysis of seasonal variations of rice markets was portrayed. It indicated that, the values of Grand seasonal index (GSI) of all the calendar months for the rice prices had a deviation from hundred (100) implying that seasonality existed in the paddy market. These indices described the recurrent seasonal pattern in the original prices. The Grand seasonal index (GSI) represents the typical seasonal behavior of time series. A Grand seasonal index for January (2016–2020) was found to be 98.626, which means that the price in this month on an average is 1.374 percent lower than the average of the entire period. Figure 10 showing GSI+SE (upper line) and GSI-SE (lower line) indicated that fluctuations are irregular and random. The indices for the month of January to February, April to June and October to December had been above the annual average of 100 while March, July, August and September (2016–2020) were below the 100 annual averages. The GSI of Boro season indicated that the trend in seasonal prices uncovered an evident, but not constant at all.

The indices for the month of February to March and July to October had been above the annual average of 100 while January, April to June, November to December (2016–2020) were below the 100 annual average (Figure 10). During the whole period of 2016 through 2020, higher and unpredictable trend of paddy price was observed from August to October which will have important policy implication for the governments to keep and manage larger reserves (at least 25 lac tons of rice) that would smoothened the impacts of large swings on rice prices in domestic market. Special consideration for one or two month before and after harvest must also be given to stabilize price within consumers' ability and also ensure price above cost of producers. To do the same, government must procure paddy from domestic market (at the rate of 10% of national rice production) and continue to retain at least 12.5 lac tons stock every month. During harvest time, discussion regarding rice import was rejected even from media; traders and millers to protect fall of paddy price. Highly rigid policy or conservative policies should be taken for imports to save both farmers and millers inside country (Appendix Tables 15 & 16).

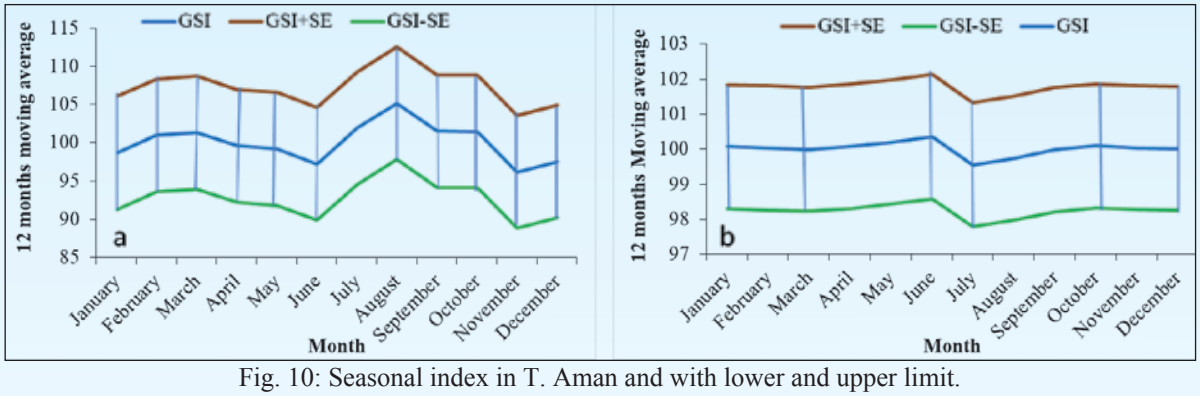


Fig. 10: Seasonal index in T. Aman and with lower and upper limit.
Notes: 'a' indicates T. Aman and 'b' indicates Boro, GSI denotes grand seasonal index and SE denotes standard error.
Source: Authors calculation based on data from DAM.

3.5.3 Monthly price trend over the period of 2016-2020

Paddy price increased due to damage of paddy in Haor areas during 2017 but delayed implementation of rice import in large quantity decreased the paddy price in 2018 and 2019. Delay in rice import during COVID-19 pandemic and damage of paddy by prolonged flood led the rice price to go up in 2020 (Figure 11).

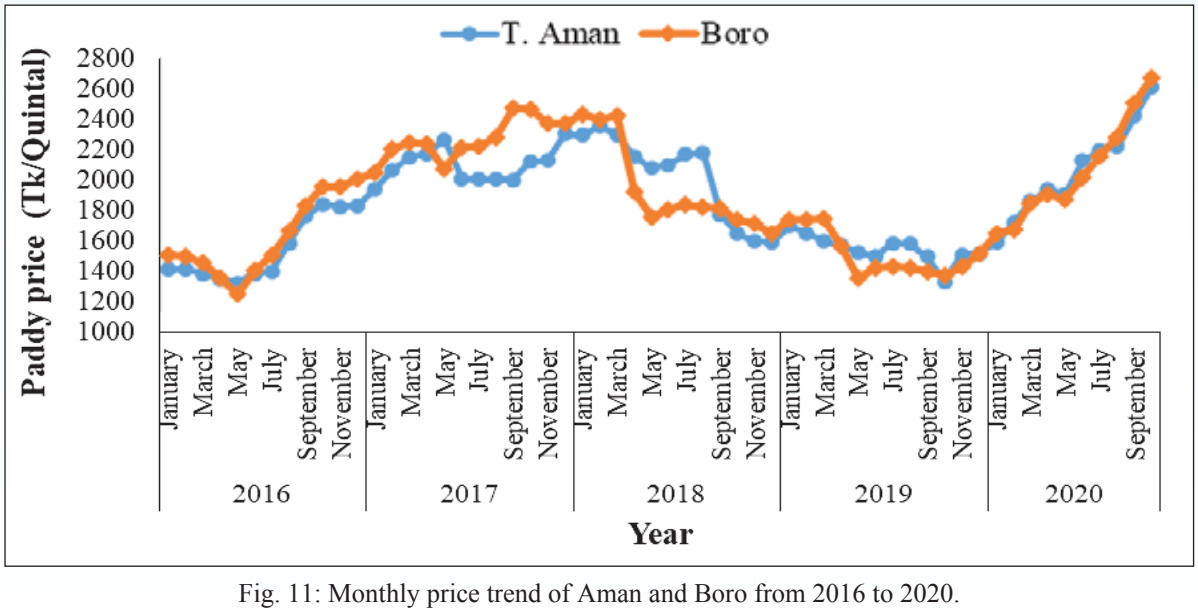


Fig. 11: Monthly price trend of Aman and Boro from 2016 to 2020.
Source: Authors' calculation based on the data from DAM

3.5.4 Examination of price fluctuation of paddy and rice over the period of 2016-2020

An analysis of the farmers' price of paddy displaying the coefficient of variations as well as the month of lowest and highest point is presented in Table 5. It can be viewed that, coefficients of variation of the paddy price at farmers' level were higher in the years 2016, 2018 and 2020 and were relatively low in the years 2017 and 2019. The higher price variations of rice were observed between the harvest and the lean periods in each year. Simply, the level of fluctuation was computed between peak and lean period price of paddy over the years. The result indicated that price variability had been irregular and unpredictable throughout the 2016 through 2020. This was happened due to the fluctuation in production of rice for the floods and plenty of import due to lowering import duty in 2017. The severe outbreak of blast disease was also a disaster to rice production in 2018 as well as holdings huge stock of rice by farmers, traders and millers and no import of rice during pandemic period in 2020 ultimately affected the market price of rice.

The law of demand applied wherein, prices fall during the harvest season and rises during the lean period (Makama et al, 2016). The exception is happening during Aman, 2020 due to lower yield from frequent flood and irregular heavy rainfall, which led to competitive buying of paddy by the millers, and pushed the market price to be high. The uprising situation of paddy price and inflexible fixation of procurement price, which remains lower than the market price, may again affect the achievement of the paddy and rice procurement during Aman, 2020.

Even though the years of 2017 and 2019 showed relatively low fluctuations in price of Boro paddy as compared to other periods, the magnitude of fluctuation remained beyond the normal value. The maximum and minimum price of paddy showed reversing within the period of 2016 through 2020. As for example, maximum price was recorded in January 2019 but minimum price was identified in January 2020. The opposite was happened in October during 2019 and 2020. In both Aman and Boro season, price fluctuation and coefficient of variation was noticed higher in 2016, 2018 and 2020. Price of paddy became higher in January, September, October, and December during the period of 2016 through 2020. Lowest price was recorded in May in Boro season when farmers started or were about to start harvesting and was high in the month of September or October or when the season was lean (Table 5 and 6).

Since upstream transmission of price in rice market was a common phenomena, change in paddy price directly affected the wholesale price of cleaned rice. Reverse change in price from rice market to paddy market was very slow and sometimes was not observed at all. That is why, the pattern and trend of price variation in wholesale market of rice was similar to paddy market. Moreover, the prices showed instable pattern and unpredictable over the period of 2016 through 2020 (Tables 7 and 8). Highest prices in wholesale market during Aman were recorded in the month of January, February, June, and October for the years 2016 through 2020 (Table 7) while in the same period of Boro, highest prices were recorded in January, March, September, October, and December (Table 8). Lowest prices were however mostly recorded in January, May, and December in the years of 2016 through 2020 for both Aman and Boro season (Tables 7 and 8). Based on production situation and government policies of import and domestic procurement of both Aman and Boro, market players, in particular millers and paddy Aratdar made a gambling role to control price level in paddy and rice market.

Table 5: Fluctuation of paddy price in T. Aman season during 2016 to 2020

Year	Fluctuation (%)	Coefficient of variation	Maximum	Minimum	Maximum	Minimum	Average	STD
2016	38.76	13.17	1840	1326	October	May	1543	203
2017	18.65	5.18	2303	1941	December	January	2097	109
2018	48.02	13.66	2352	1589	February	December	2020	276
2019	26.91	5.64	1693	1334	Janury	October	1545	87
2020	64.80	14.61	2617	1588	October	January	2060	301

Source: Authors' calculation based on the data from DAM.

Table 6: Fluctuation of paddy price in Boro season during 2016 to 2020

Year	Fluctuation (%)	Coefficient of variation	Maximum	Minimum	Maximum	Minimum	Average	STD
2016	60.66	15.37	2005	1248	December	May	1616	248
2017	21.09	5.73	2475	2044	September	January	2266	130
2018	47.96	14.57	2431	1643	January	December	1943	283
2019	28.76	9.55	1746	1356	March	May	1511	144
2020	62.20	15.80	2673	1648	October	January	2056	325

Source: Authors' calculation based on the data from DAM.

Table 7: Fluctuation of wholesale price in Aman season during 2016 to 2020

Year	Fluctuation (%)	Coefficient of variation	Maximum	Minimum	Maximum	Minimum	Average
2016	41.43	13.24	3233	2286	October	May	2678
2017	24.11	10.04	3989	3214	June	January	3677
2018	28.75	7.05	3780	2936	February	December	3486
2019	14.85	5.63	3032	2640	January	October	2745
2020	53.99	13.84	4153	2697	October	January	3464

Source: Authors' calculation based on the data from DAM.

Table 8: Fluctuation of wholesale price in Boro season during 2016 to 2020

Year	Fluctuation (%)	Fluctuation (%)	Maximum	Minimum	Maximum	Minimum	Average	STD
2016	48.60	48.60	3299	2220	December	May	2680	402
2017	24.30	24.30	4113	3309	September	January	3718	258
2018	26.15	26.15	3816	3025	January	December	3469	249
2019	19.61	19.61	3080	2575	March	May	2745	155
2020	108.20	108.20	4139	1988	October	January	3320	649

Source: Authors' calculation based on the data from DAM.

3.5.5 Price change and volatility in 2019 and 2020

Figure 12 indicates the rate of paddy and rice price change in 2020 over 2019. Trend of paddy price change increased from March onward but speed of price increase was higher from September onward. A similar pattern was observed in rice market. The paddy price volatility was noticed to be 32% in 2020, higher than in 2019 (28%) (Table 9).

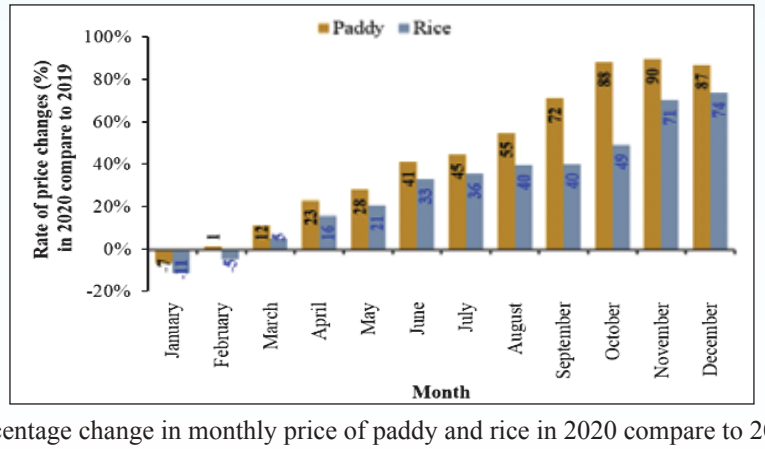


Fig. 12: Percentage change in monthly price of paddy and rice in 2020 compare to 2019.
Source: Authors' calculation based on the data from DAM

Table 9: Price volatility of paddy and rice (Standard devitation) in 2019 and 2020

Types	Volatility (%)	
	2019	2020
Paddy	28	32
Rice	11	37

Source: Authors' calculation based on the data from DAM

3.5.6 Comparison of domestic and world market prices of rice over 2016-2020

The trend of actual price of rice in domestic market was compared with the price in rice markets of neighboring countries (Figure 13). It is noted that price of rice in domestic market in the years 2016 and 2019 was relatively low than their international price whereas domestic price of rice in 2020 was higher than neighboring countries. But almost similar price trend appeared between 2017 and 2018 among the countries. After that period, rice price in Bangladesh and Vietnam gradually fell down lower than the import parity price in neighboring countries. The major reasons of downward movement of rice price in Bangladesh were the effect of delayed and unauthorized import quantity (about 38.9 lac ton) (FPMU, 2019) and good harvest in Aman and Boro 2019. Once more, rice price in Bangladesh surges upward from April 2020, which has been more than import parity price of rice of India and Pakistan. Indian price showed almost average trend among the rice markets of neighboring countries. To articulate policy choice, level of rice production and price behavior throughout the year with a seasonal diversity in Bangladesh played an important role. Variation between international and domestic price of rice is a driving key that regulates domestic production, import and export policy. The pattern of variation in price within a year is revealed by absolute value in Bangladeshi currency for both domestic and neighboring countries, computed for each month from 2016 to 2020. The extent of seasonal variations in prices for both domestic and international prices is presented in Appendix Table 17.

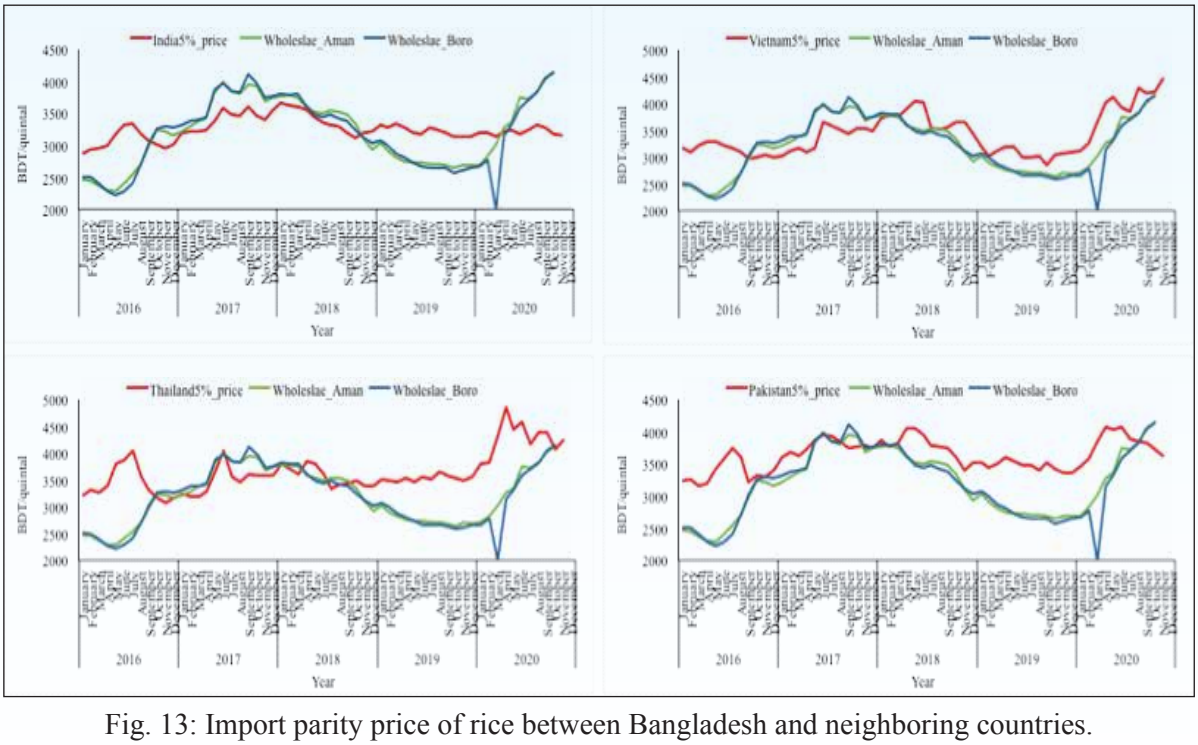


Fig. 13: Import parity price of rice between Bangladesh and neighboring countries.
Source: Authors' calculation based on the data from DAM and WASDE

3.6 Does the marketable surplus influence the market prices?

In theoretical notion, interactions of supply and demand lead to fix the farm-gate price under the perfect market condition. To support this common phenomena, we analyzed the historical relationship between marketed surplus and market price. In the period of 1991-2009, there has been inverse relationship between marketed surplus and price, meaning that 1% increase in marketed surplus led to decrease the market price at 0.123% per annum. After 2010, a reverse scenario existed in the market where marketed surplus did not have influence on the determination of price in the market (Table 10). The similar scenario was found in the trend line assessment where the relationship between marketed surplus and price has been in the same direction (Figure 14). The analysis proved the misperception of conventional phenomena because someone from behind scene regulated the determination of price in the market instead of market forces of supply and demand.

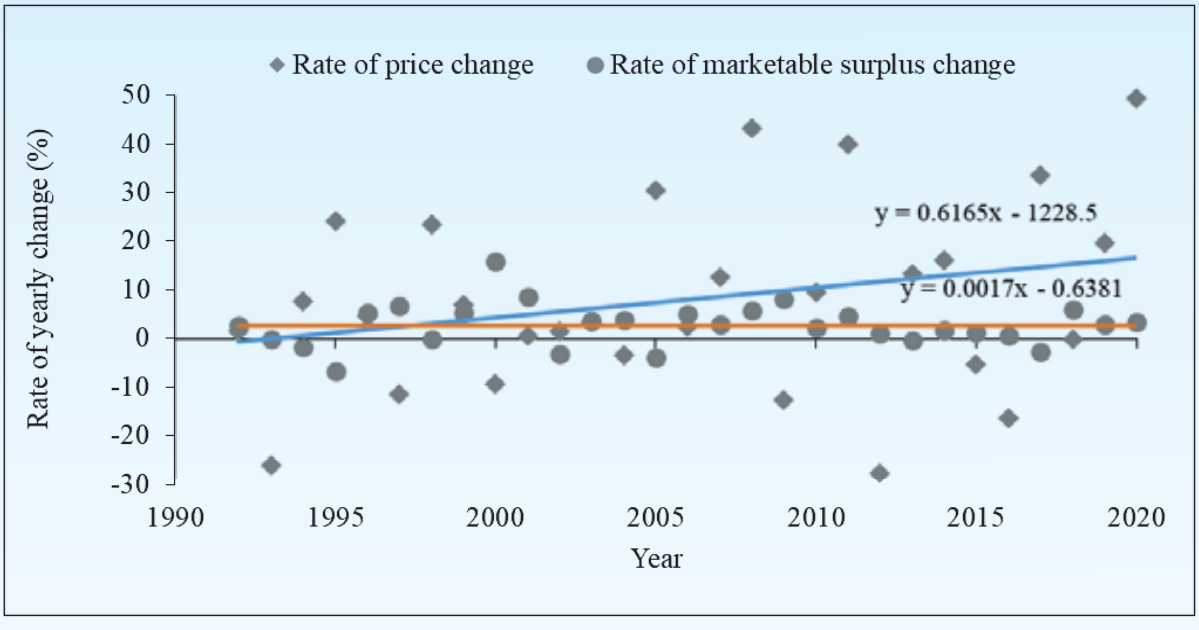


Fig. 14: Relationship between change in marketable surplus and market price of rice over the years 1991-2020.
Source: Authors' calculation based on the data from DAM and FPMU

Table 10: Cause and effect relationship between marketed surplus and price during 1991 to 2020

Equation	Period	
	1991-2009	2010-2020
Price	-0.123*marketed surplus	0.055*marketed surplus

Source: Authors' estimation.

3.7 Procurement and its effect on value chain actors

3.7.1 Procurement price of paddy and rice

The main purpose of procurement price declaration is to ensure price incentive to farmers so that they are not affected by the frequent market price fall during full swing harvest. The historical comparison exhibits that farmers used to obtain the benefit of the higher procurement price from 1990 to 2010. After that, market price of paddy below procurement price shows pivotal divergence meaning that farmers did not touch the ceiling of the incentive prices until 2019. As procurement price of paddy in T. Aman and market price converged, farmers were happy to receive the good price of paddy in T. Aman, 2020 whereas they did not get a good price during Boro harvest, 2020. After two or three months of Boro harvest, paddy price in the market was higher than procurement price (more than Tk. 26 per kg) when most of the farmers did not have marketable

surplus (Table 3). That is the reason behind the failure of achieving government procurement target from Boro 2020 (Figure 15).

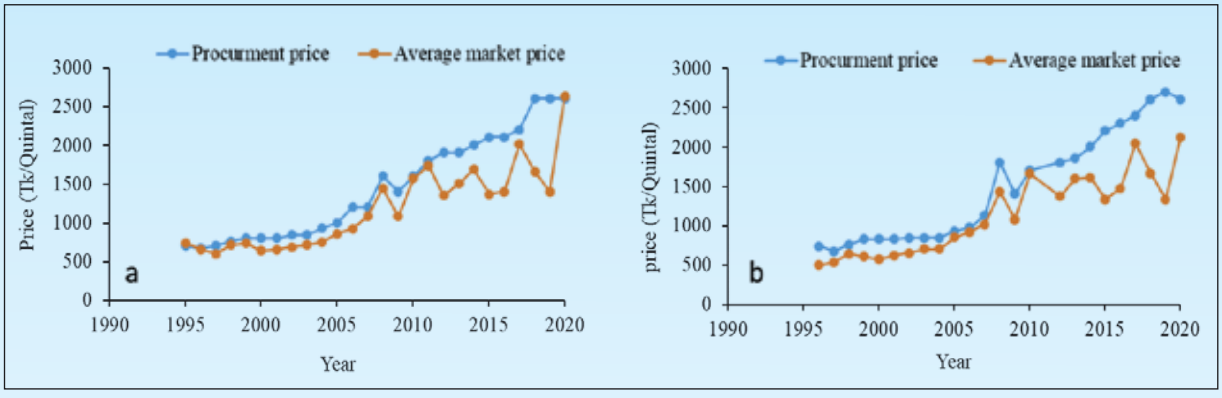


Fig. 15: Procurement and average market price of paddy over the years of 1996-2020.
Notes: 'a' indicates T. Aman and 'b' indicates Boro.
Source: Authors' calculation based on the data from FPMU and DAM.

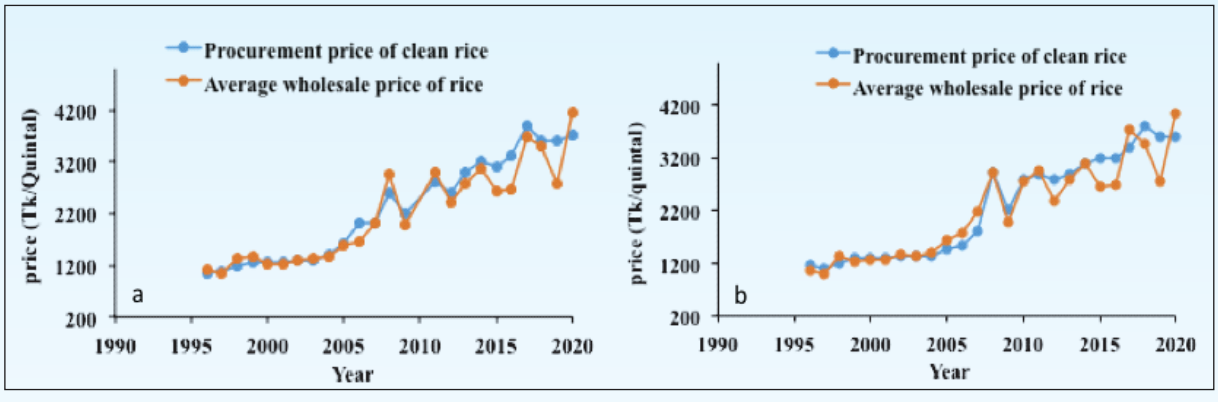


Fig. 16: Procurement and average wholesale price of rice over the years of 1996-2020
Notes: 'a' indicates T. Aman and 'b' indicates Boro
Source: Authors' calculation based on the data from FPMU and DAM

Historical trend of wholesale price was similar to that of procurement price of rice whereas an opposite direction appeared in paddy market. It implied that procurement price of paddy could not achieve the main purpose to benefit the paddy farmers (Figures 15 and 16). On the other hand, setting procurement price of rice is business orientated since all benefits go in favour of millers and traders. Rationality of price setting was not achieved with the fullest extent in paddy market but government performed rationalized behavior in the fixation of price of rice market.

3.7.2 Historical scenario of the procurement

Figure 17 indicates that government could not achieve the procurement targets in most of the years over the period of 1996-2020. Public procurement achieved only 37.57% of the target in 2020. Due to this the government was not able to play a role as a potential actors in the market. With this opportunity, some unscrupulous traders and millers were controlling the market.

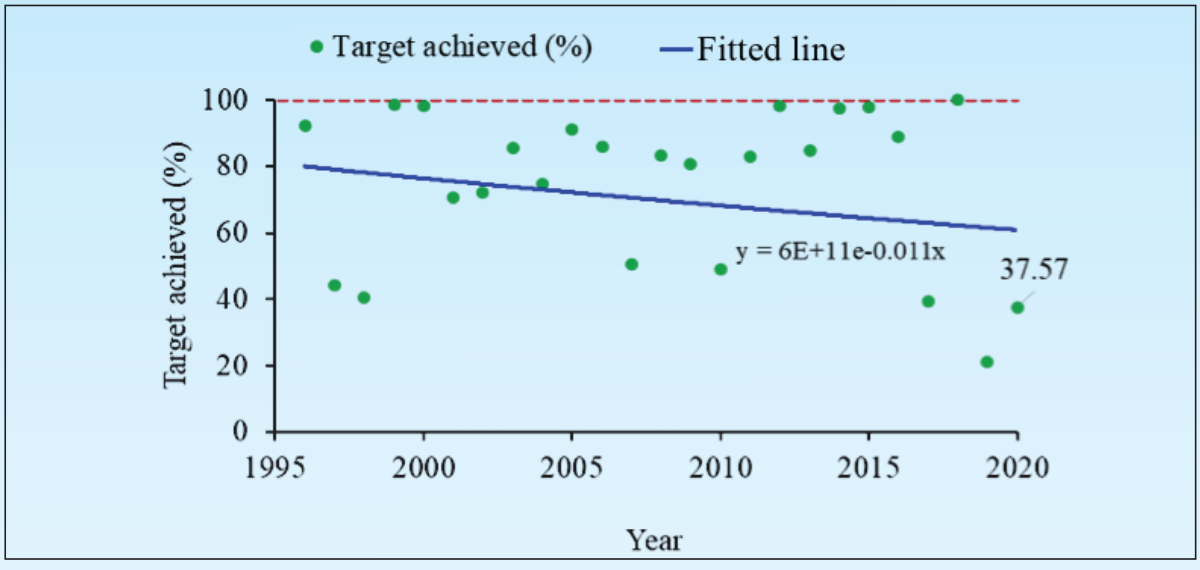


Fig. 17: Target and achievement of rice procurement in Bangladesh.
Source: Authors' calculation based on the data from FPMU

3.7.3 Constraints to procurement

According to farmers, they experienced several problems to supply paddy to government procurement center, which include the percentage of moisture contents, number of unfilled grain per fist of paddy and giving illegal money (about Tk. 50 per mound of paddy) to the local officials engaged in procurement. According to millers, they are forced to be enlisted in the procurement program and 2% security payment is a burden for rice processing.

3.7.4 Effect of procurement price on the value chain actors

The determination of rice price is the basis of paddy price with market margin (transportation costs, processing cost, commission as well as profit) of the actors in the chain. Paddy price is also fixed considering the cost of cultivation with considerable margin of the producers (Figure 18). Looking at the Boro and T. Aman, 2020 as a case study, the cost of Boro and T. Aman cultivation is Tk. 17.08 and 23.96 per kg paddy, respectively. Procurement price was determined irrationally over the cost of Boro cultivation whereas market price per kg was Tk. 21. Upward market price and over pricing of the procurement was caused by rumors of the supply shortage, which gave the rice growers an incentive profit in this year. Trader and millers were buying paddy from the market at lower prices, but showed higher point of paddy price when determining the rice price. This type of rice pricing makes the super normal profit to them. Eventual consequences of the price hikes declined the purchasing power of the consumers (Figures 18). In T. Aman season, unit cost of production was comparatively high due to re-transplanting and significant losses of production for five to six spell of floods. Besides, trend of higher market price and information of production losses in *T. Aman* resulted in higher paddy price in the market during November-December, 2020. On the other hand government declared procurement price was lower than the market price. As a result, both consumers and public procurement were adversely affected. To minimize such market anomalies, government should play a rational role for the fixation of procurement price and make necessary market intervention.

Season, 2020	Costs (Tk./kg)	Procure price (Tk./kg)	Market price	Effect
Boro	17.08	26.00	21.00	Consumer
T. Aman	23.96	26.00	28.50	Government + Consumer

Fig. 18: Effect of determination of procurement price on the value chain actors'.
Source: Authors' calculation based on data from field survey, 2020 and FPMU, 2020

3.8 Public stock situation of rice in Bangladesh

Historical stock of rice highly fluctuated and declined in some years that gives an important signal for retention of minimum stock accounting for 12.5 lac tons and increasing the procurement to a minimum of 25 lac tons annually. Minimum stock capacity of rice should immediately be developed at 38 lac tons with a view to procure at least 10 percent of the total rice production each year (Figure 19). Similar findings have been shown by Salam et al., 2016.

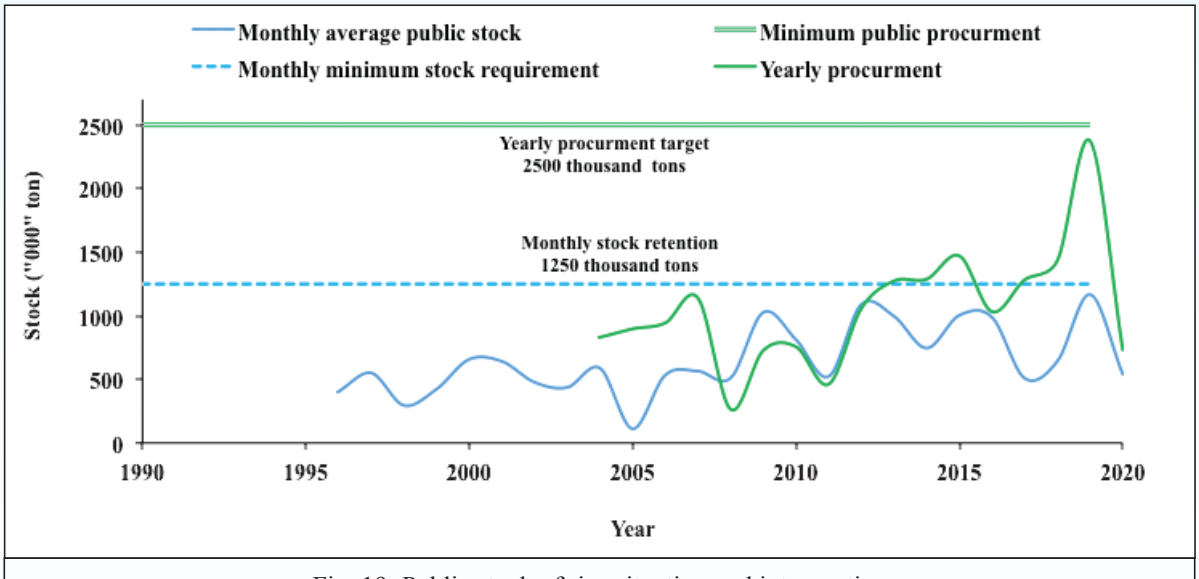


Fig. 19: Public stock of rice situation and intervention
Source: Authors' calculation based on data from FPMU, 2020

3.9 Reasons for price hike in paddy and rice market during 2020

i. Supremacy and unequal competition of large millers and traders

- According to small rice mill owners, large millers and Aratdar hoarded huge quantity of paddy and rice in their storage and thereby disrupting supply flow in both paddy and rice market. Fearing food shortages, they stockpiled the purchased paddy in the name of various warehouse keepers and traders. In return, stockiest and paddy traders were getting fixed rates of profit from auto rice mill owners.
- The rice market power is entirely under the control of large millers and traders who are controlling the rice market in any way for ensuring higher profits. Moreover, the large stockiest and millers are manipulating the market price by applying the policy of supply contraction. As a result, an artificial supply crisis or supply bottleneck exists in the market.

ii. Delayed harmonization of data

- According to traders and auto millers, there are substantial data gap in the estimation of area, production, population and demand for rice among DAE, BBS, Ministry of Food and millers and traders. The delayed harmonization of BBS data lost the trust of the actors in the value chain (especially millers and traders).
- The millers and traders said that the supply of rice was less due to lower harvest during the Boro season. A rumor has been spread over the country after the flood that all the paddy production in 35 districts has been damaged. But during the cross check in FGD, the farmers opined that the harvest was better in Boro season 2020 than the previous year.
- Influential actors in the market take the advantage of data error to create artificial crises in the paddy and rice market in order to exploit the super normal profit.

iii. Delayed implementation of rice import decision

- According to all traders and millers the price of paddy increased in the domestic market due to delay in rice imports in 2019-2020.
- Time lapse between policy decision and implementation provides an opportunity of price volatility. Millers generate the information about an artificial deficit when government announces the import decision. For an example, import decision in 2017 was implemented in far delay. As a consequence, the paddy price substantially increased. Again in the year 2020, the delay in rice import helped market price to rise.

iv. Stockpiling tendency in 2020

- According to the perceptions of the participants of FGD, the higher tendency of stockpiling of paddy and rice at farmers, traders and consumers level was noticed in the country during the panic of global pandemic COVID-19 (possibility of the famine in the world predicted by the national and international development agencies and think tanks). Due to the panic, the stock demand for Boro rice pushed up the market price. In addition, large farmers-cum-traders kept a substantial portion of their Boro paddy in the stock for obtaining a higher market price in future.

v. Increase in cost of paddy cultivation and rice processing

- According to farmers, labour shortage is getting severe day by day during transplanting and harvesting. Evidences show that higher labour (45%) and irrigation (15%) cost shared about 60% to total cost of production (AED, 2019). For this reason, paddy prices increase due to increasing cost of paddy cultivation.
- Rice mill owners opined that they have increased the price of rice to offset the additional cost since the cost of rice processing has gone up due to increase in cost of transportation, higher price of spare parts, labour wages and electricity cost. That is why, they earnestly sought various supports from the government.

vi. Seasonal traders increased

According to mill owners, seasonal paddy traders increased in recent days than the previous period. They maintained a stock for generating high profit. Thus, supply flow of paddy in the value chain was squeezed.

vii. Production loss from the disaster

It appears from Table 11, Aus and Boro production has increased in 2020 by 9.63 and 3.17 percent respectively compared to that in 2019 whereas Aman production has decreased by 10.06 percent. All together the national production was decreased by 1.71 percent. Loss of paddy production from amphan, prolonged flood and excessive rainfall affected the normal supply in the domestic market.

Table 11: Production scenario in 2020 compared to 2019.

Rice season	2019	2020	Rate of change (%)
Aus	3.01	3.30	9.63
Aman	15.50	13.94	-10.06
Boro	19.56	20.18	3.17
Total rice	38.07	37.42	-1.71

Source: DAE, 2020 and BRRI, 2020

viii. Grouping and political influence of the millers

It is observed that there are many groups or associations of the millers and traders, and has political affiliation among them which affect the paddy and rice market.

ix. Free and open market economy

Thinking "Leave the market alone" (Laissez-faire economics as Adam Smith mentioned) to better off the business, government should stay away from the market intervention. By taking advantage of this concept, the big traders and millers are creating business margin violently. This situation was repeatedly observed in the stressed years.

4. Conclusion and Recommendations

Bangladesh achieved self-sufficiency in rice production after 2008, but the market structure is still unorganized. National policy was production oriented and the market did not organize perfectly to accommodate the higher production. The value chain actors regulate the market in their own way and sometime earned super normal profit by creating artificial crises. Over the years, the cost of production has been increasing; farmers are not getting price incentives for their produce. Even though the nominal price of paddy and rice has been increasing, but the real price has sharply declined by about 2 percent over the time period. In recent days (after 2010), the increase in market price and import decisions does not seems to have a relation with the increase in marketed surplus as well as total rice production in Bangladesh. Government could not achieve the procurement targets from the beginning of the Boro production season. The main reasons for paddy and rice price hikes in 2020 are the panic of food shortage due to COVID-2019 pandemic, stockpiling affinity of the profit seekers, national data error and market manipulation by the big traders and millers. To overcome the price hike, the following are recommended:

i. Millers and traders should be service oriented and business professionals

- Concern ministry and department should have a policy to communicate with the rice millers and traders on regular basis so that a fair business environment prevails in this market.

ii. Achieving trust on data

- Database of rice farmers, millers and traders should be properly developed and regularly updated.
- Data error in rice production, population and food requirement should be properly acknowledged and minimized as early as possible.

- Trust at all level should be achieved through timely and effective harmonization of all dataset by using digital tools.

iii. Import decision

- Government should assess the market carefully well ahead before announcing any import related decision.
- Import decision for rice should be made within one month before and two months after harvest.
- In this case market calendar can be developed and followed based on seasonal rice production.

iv. Up-gradation of procurement system

- Farmers and millers friendly procurement systems should be developed.
- Introducing online trading system in the paddy-rice market is time demanding.
- BRRI developed triangle procurement system can be implemented to ensure equal opportunity in the market.
- Government should declare separate minimum support prices (MSPs) for fine and coarse grain of paddy and rice.
- Government should procure at least 25 lac tons of rice so that market actors can realize that the government is an important actor for intervening market anytime.
- Government should retain at least 12 lac 50 thousand tons of rice every month as buffer stock. Procurement price should be determined considering 20% profit over the production cost.
- Procurement price should be declared before the transplanting of a season.

v. Cost minimization strategy

- Labour wage rate should be fixed at a certain level where the minimum and maximum limits will be mentioned.
- Irrigation subsidy should be extended generally.
- Mechanization should be speeded up.
- Subsidy should be spread out so that all famers get benefit from it.
- Cash incentive and/or loan should be provided to the farmers for the development of mini-silo.

vi. Intensive market monitoring

- Production and marketing system should be modernized through state of art technologies.
- An agricultural price commission can be formed and declaration of a price policy for agricultural commodities should be the main function of this commission.
- Hidden cost (illegal payment in transportation and market) at all levels should be stopped anyway.

vii. Regulation for rice processing industry

- Announcement of auto, major and husking mills of rice as agroindustry is a need.
- More practical policy and regulations for the said agroindustry should be developed.
- Milling outrun (ratio of paddy and rice) should practically be re-determined.
- Incentive in pricing for electricity (Tk 3 per kwh), bank interest (4%) and taxation can be declared for auto rice millers.
- Simplification of Bank loan for agroindustry should be ensured.
- Equity and entrepreneurship fund (EEF) should be available for all the paddy-rice traders and millers.

viii. Government intervention

As and when necessary, government should intervene in the market. Especially during the stressed year, the government should intervene in the market effectively to some extend overlooking the concept of open market economy.

Further research scope

This study was accomplished by conducting a very quick survey in the field and using time series data from secondary sources. Many important insights could not be touched within that short period of time. Therefore, a comprehensive study should be undertaken in order to dig out the root causes of price hike and functions of the value chain actors in the market. The demand and supply analysis in details is necessary for national policy formulation.

References

BBS (2012, 2016 and 2019). Statistical Yearbook of Bangladesh 2016. Bangladesh Bureau of Statistics (BBS), Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.

BER (2019). Bangladesh Economic Review (BER) 2017. Ministry of Finance, Government of the People's Republic of Bangladesh, Dhaka, Bangladesh.

BRKB (2020). //%//http://www.knowledgebank-brri.org/riceinban.php (accessed on 20/12/2020).

BRRI (2020). Effects of flood and excessive rainfall on Aman rice production: Is food security interrupted in Bangladesh?. Working paper, Bangladesh Rice Research Institute, Gazipur-1701, Bangladesh.

DAE (2020). Weekly crops situation report. Department of Agricultural Extension, Ministry of Agriculture, Government of the People's Republic of Bangladesh, Dhaka.

FAO (2014). Report on in-depth capacity assessment of Bangladesh to produce agricultural and rural statistics. Food and Agriculture Organization (FAO). Available at: http://www.fao.org/3/a-az471e.pdf (accessed on January 03, 2021).

Flaskerud, G. and Johnson, D. (1993). Seasonal Price Patterns for Crops (Bulletin 61). Fargo: North Dakota State University Extension Service.

FPMU (2019). Food Situation Report, Food Planning and Monitoring Unit, Ministry of Food, Government of the People's Republic of Bangladesh, volume-116. Available at http://fpmu.gov.bd/agridrupal/sites/default/files/FSR_116.pdf (Accessed on 29/12/2020).

FPMU (2020). Foodgrain availability and requirement. Food Planning and Monitoring Unit, Ministry of Food, Government of the People's Republic of Bangladesh. Available at: http://fpmu.gov.bd/fpmu-database/0101.htm (Accessed on December 10, 2020).

Islam, M. A., Rahaman, M. S., Sarkar, M. A. R. and Rahman, M. C. (2020). A Time Series Analysis for Supply Response Scenario of Food Grains in Bangladesh: The Quest of Structural Changes. Journal of Agriculture, Food and Environment, 1(3), 6-13. DOI: ..http://dx.doi.org/10.47440/JAFE.2020.1302

Kabir, M. S., Salam, M. U., Islam, A. K. M. S., Sarkar, M. A. R., Mamun, M. A. A., Rahman, M. C., Nessa, B., Kabir, M. J., Shozib, H. B., Hossain, M. B., Chowdhury, A., Nasim, M., Iftekharuddaula, K. M., Hossain, M. S., Bhuiyan, M. K. A., Karmakar, B., Rahman, M. S., Haque, M. M., Khatun, M. T., Ali, M. P., Rabbi, S. M. H. A., Biswas, P. L., Rashid, E. S. M. H. and Rahman, N. M. F. 2020. Doubling rice productivity in Bangladesh: A way to achieving SDG 2 and moving forward. Bangladesh Rice Journal, 24(2): in press.

Khan, A. M., Karim, A. S. M .Z., Jeong, K. H., Kim, E. J. and Rahman, M. (2013). Adopter Categories in Respect to a Transplanted Monsoon Rice Variety in Two Selected Villages of Bangladesh. Journal of Agricultural Science, 5(3), 200-216.

Rahaman, M. S., Kabir, M. J., Sarkar, M. A. R., Islam, M. A., Rahman, M. C. and Siddique, M. A. B. (2020). Factors Affecting Adoption of BRRI Released Aus Rice Varieties in Mymensingh District. Agricultural Economics, 5(5), 210-217.

Rahman, M. C., Pede, V., Balie, J., Pabuayon, I. M., Yorobe, J. M. and Mohanty, S. (2020). Assessing the market power of millers and wholesalers in the Bangladesh rice sector. Journal of Agribusiness in Developing and Emerging Economies.

Riceperdia (2020). Basic Statistics. Available at: http://ricepedia.org/bangladesh (accessed on 10/12/2020).

Salam, M. A., Furuya, J., Alamgir, M. S. and Kobayashi, S. (2016). Policy Adaptation Cost for Mitigation of Price Variation of Rice under Climate Change in Bangladesh. In Papers on Environmental Information Science Vol. 30 (The 30th Conference on Environmental Information Science) (pp. 13-18). Center for Environmental Information Science.

Salam, M. U., Mahalder, B. K., Bhandari, H., Kabir, M. S., Sarkar, M. A. R., Nessa, B. and Ali, M. A. (2019). Policy directions toward increasing rice productivity – Lessons from Bangladesh. In: Advances in Rice Research for Abiotic Stress Tolerance. Elsevier Inc. Pages 895-913. DOI: .----.-https://-doi.org/10.1016/B978-0-12-814332-2.00044-7.

Shelley, I. J., Nosaka, M. T., Nakata, M. K., Haque, M. S. and Inukai, Y. (2016). Rice Cultivation in Bangladesh: Present Scenario, Problems, and Prospects. Journal of International cooperation for Agricultural Development, 14: 20–29.

Sutradhar, T., Hazari, S. and Nagpure, S. C. (2019). Effect of Seasonal and Cyclical Variation in Prices of Natural Rubber in India. International Journal of Horticulture & Agriculture, 4(1): 1-4. DOI: ./-///http://dx.doi.org/10.15226/2572-3154/4/1/00127

Talukder, R. K., Kabir, W., Sarker, S. R. and Hasan, M. (2019). Assessment of Foodgrain Procurement System in Bangladesh: Implications for Policy. Published report, Krishi Gobeshona Foundation (KGF):1-21.

WRS (2020). World rice statistics online query facility [Paddy yield]. World rice statistics, International Rice Research Institute. Available at: http://ricestat.irri.org:8080/wrs (accessed on January 04, 2021).

Table 1: Area, production and yield of cleaned rice in Bangladesh over the years 1972-2020

Year	Area (000'ha)				Production (000'ton)				Yield (ton/ha)		
	Aus	Aman	Boro	Total	Aus	Aman	Boro	Total	Aus	Aman	Boro
1972-73	2930	5713.8	1002.6	9646.4	2243	5587	2071	9901	0.77	0.98	2.07
1973-74	3107.9	5718.7	1222.7	10049.3	2801	6699	2220	11720	0.9	1.17	1.82
1974-75	3179.1	5449.9	1161.2	9790.2	2859	6000	2250	11109	0.9	1.1	1.94
1975-76	3419.9	5759.9	1147.9	10327.7	3229	7045	2286	12560	0.94	1.22	1.99
1976-77	3217.1	5806.4	854.2	9877.7	3014	6905	1650	11569	0.94	1.19	1.93
1977-78	3161.7	5771.2	1093.7	10026.6	3103	7422	2239	12764	0.98	1.29	2.05
1978-79	3234.6	5805.1	1071.8	10111.5	3287	7429	1929	12645	1.02	1.28	1.8
1979-80	3036.3	5972.7	1148.4	10157.4	2809	7303	2427	12539	0.93	1.22	2.11
1980-81	3111.2	6035.8	1160	10307	3289	7964	2630	13883	1.06	1.32	2.27
1981-82	3145.6	6010.3	1301.7	10457.6	3270	7209	3152	13631	1.04	1.2	2.42
1982-83	3158.1	5993	1432.8	10583.9	3065	7516	3548	14129	0.97	1.25	2.48
1983-84	3138.7	6006.7	1401.2	10546.6	3222	7843	3350	14415	1.03	1.31	2.39
1984-85	2937.6	5710.2	1574.4	10222.2	2783	7930	3909	14622	0.95	1.39	2.48
1985-86	2844.9	6018.9	1533.2	10397	2828	8542	3671	15041	0.99	1.42	2.39
1986-87	2903.6	6052.4	1651.7	10607.7	3130	8267	4010	15407	1.08	1.37	2.43
1987-88	2788.3	5590.4	1942.6	10321.3	2993	7690	4731	15414	1.07	1.38	2.44
1988-89	2683.46	5100.8	2438.3	10222.56	2856	6857	5831	15544	1.06	1.34	2.39
1989-90	2255	5702.5	2453.6	10411.1	2475	9202	6033	17710	1.1	1.61	2.46
1990-91	2107.3	5775.3	2547.9	10430.5	2261	9167	6357	17785	1.07	1.59	2.49
1991-92	1915.9	5692.3	2634.9	10243.1	2179	9269	6807	18255	1.14	1.63	2.58
1992-93	1735.1	5843.7	2598.9	10177.7	2075	9680	6586	18341	1.2	1.66	2.53
1993-94	1649.4	5843.3	2580.8	10073.5	1850.2	9419.2	6772.2	18041.6	1.12	1.61	2.62
1994-95	1663.75	5594.17	2663.54	9921.46	1790.7	8504	6538.7	16833.4	1.08	1.52	2.45
1995-96	1541.85	5646.4	2753.57	9941.82	1676	8790	7220.6	17686.6	1.09	1.56	2.62
1996-97	1592.29	5802.49	2782.59	10177.37	1870	9551	7460	18881	1.17	1.65	2.68
1997-98	1565.88	5808.45	2888.56	10262.89	1874.6	8849.8	8137.3	18861.7	1.2	1.52	2.82
1998-99	1424.26	5165.5	3526.67	10116.43	1616.9	7735.8	10551.9	19904.6	1.14	1.5	2.99
1999-00	1351.32	5704.87	3651.89	10708.08	1734	10306	11027	23067	1.28	1.81	3.02
2000-01	1325.23	5709.96	3761.84	10797.03	1916	11249	11920.5	25085.5	1.45	1.97	3.17
2001-02	1242.18	5647.22	3771.34	10660.74	1808	10726	11766	24300	1.46	1.9	3.12
2002-03	1243.72	5682.11	3844.84	10770.67	1850.7	11118.4	12222.2	25191.3	1.49	1.96	3.18
2003-04	1202.58	5677.61	3943.5	10823.69	1831.8	11520.5	12837.1	26189.4	1.52	2.03	3.26
2004-05	1024.68	5279.92	4063.79	10368.39	1500	9819	13837.1	25156.1	1.46	1.86	3.4
2005-06	1034.27	5429.01	4065.81	10529.09	1745	10810	13975.3	26530.3	1.69	1.99	3.44
2006-07	905.71	5415.62	4250.1	10571.43	1512	10841	14965	27318	1.67	2	3.52
2007-08	918.66	5048.16	4607.85	10574.67	1507	9662	17762	28931	1.64	1.91	3.85
2008-09	1065.56	5497.77	4716.31	11279.64	1895	11613	17809	31317	1.78	2.11	3.78
2009-10	984.22	5662.89	4706.6	11353.71	1709	12207	18059	31975	1.74	2.16	3.84
2010-11	1112.87	5645.64	4770	11528.51	2132.82	12791	18616	33539.82	1.92	2.27	3.9
2011-12	1138	5580	4810	11528	2333	12798	18783	33914	2.5	2.29	3.9
2012-13	1053	5610	4760	11423	2158	12897	18778	33833	2.05	2.3	3.95
2013-14	1051	5530.2	4790	11371.2	2326	13023.3	19007	34356.3	2.21	2.36	3.97
2014-15	1045	5530	4846	11421	2328	13190.2	19343	34861.2	2.23	2.38	3.99
2015-16	1025	5590.4	4685.1	11300.5	2468	13591.4	19001.1	35060.5	2.44	2.43	4.06
2016-17	941.7	5583.3	4547.3	11072.3	2133.6	13656	18411.8	34201.4	2.27	2.44	4.05
2017-18	1075.1	5679.5	4859.4	11614	2709.7	13993.8	19575.8	36279.3	2.52	2.46	4.03
2018-19	1145.13	5621.9	4909.85	11676.88	2920.2	14054.9	20388.5	37363.6	2.55	2.5	4.15
2019-20	1152.55	5876.44	4863.92	11892.91	2930	15357	20437	38724	2.544	2.495	4.2

Source: Different issue of BBS and DAE.

Table 2: Demand and supply situation

Year	Domestic production (MT)	Import (MT)	Export (MT)	Total availability (MT)	Mid-year Population (M)	Per capita availability (gm/day)	Per capita requirement (gm/day)	Deficit/surplus (gm/day)
1991	17.8	0.010	0	17.8	108.0	451.5	541.3	-89.8
1992	18.3	0.039	0	18.3	110.4	454.2	542.1	-87.9
1993	18.3	0.019	0	18.4	112.7	446.2	545.1	-99.0
1994	18.0	0.074	0	18.1	115.2	430.9	550.3	-119.4
1995	16.8	0.814	0	17.6	117.7	411.0	538.7	-127.8
1996	17.7	1.141	0	18.8	120.2	429.3	541.1	-111.8
1997	18.9	0.034	0	18.9	122.7	422.4	543.4	-121.0
1998	18.9	1.103	0	20.0	125.2	436.9	532.3	-95.4
1999	19.9	3.067	0	23.0	127.7	493.0	538.9	-45.9
2000	23.1	0.433	0	23.5	129.0	499.1	549.0	-49.9
2001	25.1	0.561	0	25.6	131.0	536.4	550.4	-14.1
2002	24.3	0.126	0	24.4	133.0	503.2	553.9	-50.7
2003	25.2	1.556	0	26.7	135.0	542.8	565.3	-22.5
2004	26.2	0.801	0	27.0	137.5	537.6	564.2	-26.5
2005	25.2	1.295	0	26.5	139.8	518.4	560.4	-41.9
2006	26.5	0.532	0	27.1	141.8	522.9	562.6	-39.7
2007	27.3	0.720	0	28.0	142.6	538.7	567.7	-29.0
2008	28.9	2.045	0	31.0	144.6	586.9	562.3	24.6
2009	31.3	0.603	0	31.9	146.5	596.9	564.8	32.1
2010	32.0	0.088	0	32.1	148.4	591.9	567.4	24.6
2011	33.5	1.561	0	35.1	150.4	639.4	570.2	69.2
2012	33.9	0.528	0	34.4	152.3	619.6	569.7	49.9
2013	33.8	0.028	0	33.9	154.1	602.0	571.4	30.6
2014	34.4	0.375	0.025	34.7	156.0	609.5	565.7	43.9
2015	34.9	1.490	0.004	36.3	158.0	630.3	570.1	60.2
2016	35.1	0.257	0.004	35.3	160.0	604.7	562.9	41.8
2017	34.2	0.133	0.004	34.3	162.7	578.1	554.2	23.9
2018	36.3	3.893	0.004	40.2	164.7	668.2	541.9	126.3
2019	37.4	0.206	0.004	37.6	165.6	621.5	552.5	69.0
2020	38.7	0.004	0.004	38.7	167.6	632.5	541.3	91.3

Source: FPMU.

Table 3: Unit cost and return of T. Aman and Boro season

Year	T. Aman		Boro	
	Cost of production (Tk/kg)	Return (Tk/kg)	Cost of production (Tk/kg)	Return (Tk/kg)
2009	13.41	15.92	14.04	15.84
2010	16.14	19.52	18.15	18.54
2011	20.10	18.77	21.20	14.89
2012	16.71	17.62	18.15	18.01
2013	17.54	20.81	19.03	19.10
2014	18.00	17.60	18.59	17.26
2015	17.84	19.31	20.09	16.87
2016	19.61	22.22	21.37	24.03
2017	20.06	23.17	21.51	20.48
2018	19.75	20.45	21.55	18.80
2019	21.33	20.68	19.71	21.84
2020	23.96	26.25	17.08	23.75

Source: Different issues of the Agricultural Economics Division, BRRI.

Table 4: Market price of input and output in *Aman* season over the years of 2009-2020

Unit price	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Output (Tk/kg)												
- Paddy (producer price)	17.98	25.61	25.91	22.04	25.19	28	24.15	24.17	34.66	29.12	25.11	26.17
- Straw	1	1	1	1.5	2	2	2	2.3	2.3	2.3	2	2
Bran/husk	2	5	5	6	6	6	6	6.5	6.8	8	8	
Inputs												
Seed/Seedling (Tk/kg)	35	22	15	35	31	31	31	32	33	40	50	50
Fertilizer (Tk/kg)												
- Urea	12	12	12	20	20	20	16	16	16	16	16	16
- TSP	70	43	22	22	22	22	22	22	22	22	22	22
- MOP	60	35	25	15	15	15	15	15	15	15	15	15
- Gypsum	6	8	10	8	8	8	8	8	8	10	10	10
- Zinc	100	120	120	120	150	150	160	150	150	150	180	180
- Manure	1.2	1.2		2.5	2.5	3	3	3	3	5	5	5
Labour (Tk/mandays)												
Family	140	160	180	240	250	260	280	300	320	360	400	440
Hired	140	160	180	240	250	260	280	300	320	360	400	440

Source: FPMU, Ministry of Food.

Table 5: Cost structure in *Aman* season over the years of 2009-2020

Costs	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Seed/Seedling	525	330	390	525	465	465	465	480	528	800	1000	1000
Fertilizer												
- Urea	636	636	636	1060	1060	1060	848	848	848	992	992	992
- TSP	1400	860	440	440	440	440	440	440	440	550	550	550
- MOP	1440	840	600	360	360	360	360	360	360	525	450	450
- Gypsum	84	112	140	112	112	112	112	112	112	200	200	200
- Zinc	200	240	240	240	300	300	320	300	300	450	360	360
- Manure	1200	1200	1500	1500	1500	1500	1650	1650	1650	3000	3250	3250
Pesticides	700	700	750	750	750	750		800	800	1100	1250	1300
Irrigation	900	1000	1200	1200	1000	1000	1100	1100	1100	1100	1644	1700
Land Preparation	2200	2000	2200	2400	2400	2400	2700	2700	2700	3200	3300	3300

Costs	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Labour (mandays)												
- Family	3500	4000	4500	6000	6250	6500	7000	7500	8000	10800	11200	11000
- Hired (mandays)	4900	5600	6300	8400	8750	9100	9800	10500	11200	14400	14000	15400
Interest on Capital*	709	540	690	410	428	437	463	481	501	657	674	711.41
Land Rental	4500	4500	6000	6000	6000	6000	6000	6000	6000	6000	7000	7000
Total cost (Tk/acre)	22894	22558	25586	29397	29815	30424	32008	33271	34539	43774	45870	47213

* (Interest on working capital * interest rate * considerable crop period)/2. Working capital = Total cost - (Land rent + Cost of family labour). Source: FPMU, Ministry of Food.

Table 6: Profitability of Aman paddy and market prices of clean rice

Items	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Production of Paddy (Kg/acre)	1600	1580	1600	1600	1600	1600	1600	1600	1600	1625	1680	1700
Gross return from paddy (Tk/acre)	28768	40464	41456	35264	40304	44800	38640	38672	55456	47320	42185	44489
Cleaned rice (kg/acre)	1096	1082	1096	1056	1056	1056	1056	1066	1087	1073	1680	1122
Cost of paddy (Tk/acre)	22894	22558	25586	29397	29815	30424	31258	33271	34539	43774	45870	47213
Net cost of paddy (Tk/acre) (deduct value of straw)	21294	20958	23986	26997	26615	27224	28058	29591	30859	40036	42510	43853
Milling/Transport (Tk/acre)	1200	1580	2400	2400	2800	2882	4000	4320	4400	4063	3914	4250
Net cost of rice (Tk/acre) (deduct value of straw)	22494	22538	26386	29397	29415	30106	32058	33911	35259	44099	46424	48103
Unit cost of paddy (Tk/kg)	13.3	13.3	15.0	16.9	16.6	17.0	17.5	18.5	19.3	24.6	25.3	25.8
Unit cost of rice (Tk/kg)	20.1	19.7	20.3	24.75	24.8	25.4	28.0	28.5	29.0	37.0	37.9	38.8
Producer price of paddy (Tk/kg)	17.98	25.61	25.91	22.04	25.19	28	24.15	24.17	34.66	29.12	25.11	26.17
Retail price of rice (Tk/kg)	22.21	28.75	31.73	26.23	30.05	32.92	28.78	29.37	38.95	37.19	29.98	43.97
Net profit of paddy (Tk/kg)	3.77	12.33	10.92	5.17	8.56	10.99	6.15	5.68	15.37	4.48	-0.19	0.37

Source: FPMU, Ministry of Food.

Table 7: Input-output structure of Boro paddy cultivation over the years of 2009-2020

Input-output	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Paddy (kg/acre)	2250	2250	2250	2350	2350	2360	2380	2380	2380	2448	2400	2400
Straw (Kg/acre)	2250	2250	2250	2350	2350	2360	2380	2380	2380	2448	2400	2400
Inputs												
Seed/Seedling	20	20	30	20	20	20	20	20	20	20	20	20
Fertilizer												
- Urea	90	90	90	85	85	90	90	90	90	90	90	90
- TSP	35	40	40	40	40	40	40	40	40	40	40	45
- MOP	30	35	35	35	35	35	35	35	35	35	35	40
- Gypsum	20	20	20	20	20	20	20	20	23	23	23	25
- Zinc	3	3	3	3	3	3	3	3	3	3	3	3
- Manure	500	500	600	500	500	800	800	800	500	800	800	800
Labour												
- Family (mandays)	30	30	30	30	30	25	25	25	25	25	25	20
- Hired (mandays)	50	50	50	50	50	55	55	55	55	55	55	50

Source: FPMU, Ministry of Food.

Table 8: Market prices of input and output in Boro season over the years of 2009-2020

Unit price	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
- Paddy (Tk/kg)												
- Straw(Tk/kg)	0.5	0.75		1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Seed/Seedling (Tk/kg)	35	35	35	36	34	34	36	36	36	50	50	50
Fertilizer (Tk/kg)												
- Urea	12	12	12	20	20	16	16	16	16	16	16	16
- TSP	40	22	22	22	22	22	22	22	22	22	22	22
- MOP	35	25	15	15	15	15	15	15	15	15	15	15
- Gypsum	7	7	8	8	8	8	8	8	10	10	10	10
- Zinc	100	100	110	120	120	15	-	-	-	150	150	160
- Manure	1.5	1.5	2	3	3	3	4.5	4.5	5	5	5	5
Labour (Tk/mandays)												
- Family	140	160	200	240	250	260	-	-	-	400	-	450
- Hired	140	160	200	240	250	260	-	-	-	400	-	450

Source: FPMU, Ministry of Food.

Table 9: Cost structure in Boro season over the years of 2009-2020

Cost	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Seed/Seedling	700	700	700	720	680	680	720	720	720	1000	1000	1000
Fertilizer												
- Urea	1080	1080	1080	1700	1700	1440	1440	1440	1440	1440	1440	1440
- TSP	1400	880	880	880	880	880	880	880	880	880	880	990
- MOP	1050	875	525	525	525	525	525	525	525	525	525	600
- Gypsum	140	140	160	160	160	160	160	160	230	230	230	250
- Zinc	300	300	330	360	360	450	450	450	450	450	450	480
- Manure	750	750	1200	1500	1500	2400	3600	3600	4000	4000	4000	4000
Pesticides	700	800	900	750	750	750	800	800	900	1100	1100	1800
Irrigation	5000	5000	5000	5500	6500	6000	6700	6700	7000	7500	7700	8000
Land Preparation	2500	2500	2500	2600	3600	4000	4500	4500	5000	5000	5500	6000
Labour												
- Family (mandays)	4200	4800	6000	7200	7500	6500	7500	8000	8500	10000	10000	9000
- Hired (mandays)	7000	8000	10000	12000	12500	14300	16500	17600	18700	22000	22000	22500
Interest on Capital	1031	850	436	666	728	788	905	933	995	1351	1368	1302
Land Rental	5000	5000	5500	6000	6000	6000	6500	6500	6500	7000	7000	8000
Total cost (Tk/acre)	30851	31675	35211	40561	43383	44873	51180	52808	55840	62476	63193	65362

Source: FPMU, Ministry of Food.

Table 10: Profitability of Boro paddy and market prices of clean rice

Item	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Straw	1125	1688	2250	3525	3525	3540	3540	3570	3570	3672	3600	3600
Total Cost/Acre (paddy)	30851	31675	35211	40561	43383	44873	51180	52808	55840	62476	63193	65362
Milling/Transportation	2250	3375	4700	4700	4700	4720	3540	3570	3570	4896	4800	4900
Total Cost/Acre (rice)	33101	35050	39911	45261	48083	49593	54720	56378	59410	67372	67993	70262
Net Cost of paddy (deduct value of straw)	29726	29988	32961	37036	39858	41333	47610	49237	52270	58804	59593	61762
Net Cost of rice (deduct value of straw)	31976	33362	37661	41736	44558	46053	51180	52808	55840	63700	64393	66662
Paddy (kg/acre)	2250	2250	2250	2350	2350	2360	2380	2380	2380	2448	2400	2400
Rice (kg/acre)	1486	1508	1508	1575	1551	1558	1558	1580	1571	1631	1584	1584
Net cost of paddy (Tk/kg)	13.21	13.33	14.65	15.76	16.96	17.51	20.00	20.69	21.96	24.02	24.83	25.73
Net cost of rice (Tk/kg)	21.52	22.12	24.97	26.50	28.73	29.57	32.85	33.42	35.54	39.06	40.65	42.08
Net profit of paddy (Tk/kg)	4.36	12.33	10.86	5.33	8.29	11.38	4.76	3.84	13.21	6.72	0.18	1.00
Producer price of paddy (Tk/kg)	17.57	25.66	25.51	21.09	25.25	28.89	24.76	24.53	35.17	30.74	25.01	26.73
Retail price of rice (Tk/kg)	21.33	29.14	31.42	25.92	30.06	32.97	28.67	29.14	39.51	37.11	29.92	44.22

Source: FPMU, Ministry of Food.

Table 11: Cost of production of Boro season, 2020

Serial no.	Particulars	Cost and price determination			
		Unit	Unit price	Quantity per acre	Per acre price
1	Seed	Kg	50	20	1000
2	Fertilizer cost	Tk.			7760
3	Pesticides				1800
4	Labour:	Man-days			
4.1	Family	Man-days	450	20	9000
4.2	Hired	Man-days	450	50	22500
5	Ploughing (animal/power tiller		2000	3	6000
6	Irrigation				8000
7	Threshing				5000
	Working capital				52060
8	Interest on working capital				1301.5
9	Land rent				8000
10	Per total cost of cultivation				65362
11	Production:				0
	Paddy	Kg	20	2400	48000
	Straw	Kg	1.5	2400	3600
12	Per acre net cost of production				61762
13	Per kilogram (Kg) net cost of paddy production				**25.734**
14	Per kg production cost in 2019				24.83
15	Compared to 2019, change in production cost				3.64
	Rice processing				
16	Rice obtained from paddy (66%)	Kg			1584
17	Per acre rice and husk (30%)	Kg	8	800	6400
18	Milling of rice (boiled and carrying)		2	2400	4800
19	Per acre total cost (12+18)				66561.5
20	Per acre net cost (19-17)				60161.5
21	Per Kg net cost (20/16)				**37.98**

Source: Ministry of Agriculture.

Table 12: Monthly price of paddy and rice at farm, wholesale and retail level during T. Aman and Boro 2016-2020

Months	*T. Aman* paddy		*T. Aman* rice			*Boro* paddy		*Boro* rice		
	Farmers' price	Wholesale price	Farmers' price	Wholesale price	Retail price	Farmers' price	Wholesale price	Farmers' price	Wholesale price	retail price
January 2016	1391	1411	2459	2460	2674	1543	1505	2527	2502	2737
February 2016	1383	1414	2511	2453	2677	1485	1494	2474	2497	2743
March 2016	1339	1382	2436	2372	2600	1438	1457	2479	2401	2654
April 2016	1298	1350	2389	2301	2527	1359	1358	2460	2276	2524
May 2016	1370	1326	2450	2286	2511	1257	1248	2296	2220	2471
June 2016	1450	1382	n/a	2414	2642	1402	1409	2419	2281	2528
July 2016	1537	1397	n/a	2540	2776	1473	1509	2456	2415	2647
August 2016	1548	1583	n/a	2711	2947	1648	1662	2635	2709	2942
September 2016	n/a	1767	n/a	2976	3192	1870	1831	2956	3017	3243
October 2016	n/a	1840	n/a	3233	3455	1912	1955	3178	3266	3480
November 2016	1886	1826	3191	3222	3445	1915	1958	3498	3299	3510
December 2016	1818	1832	3112	3165	3389	1914	2005	3154	3275	3492

Months	*T. Aman* paddy		*T. Aman* rice			*Boro* paddy		*Boro* rice		
	Farmers' price	Wholesale price	Farmers' price	Wholesale price	Retail price	Farmers' price	Wholesale price	Farmers' price	Wholesale price	retail price
January 2017	1967	1941	3184	3214	3426	2010	2044	3276	3309	3530
February 2017	2025	2067	3260	3301	3501	2191	2204	3388	3376	3585
March 2017	2170	2151	3293	3388	3589	2199	2246	3432	3397	3620
April 2017	2222	2173	3464	3423	3625	2160	2239	3486	3442	3662
May 2017	2442	2266	3713	3835	4058	2089	2071	3713	3868	4096
June 2017	n/a	2006	n/a	3989	4220	2194	2214	3864	3967	4196
July 2017	2275	2003	n/a	3843	4062	2190	2220	3738	3842	4085
August 2017	n/a	n/a	n/a	3816	4032	2249	2278	3731	3824	4062
September 2017	n/a	2000	n/a	3947	4174	2407	2475	3948	4113	4352
October 2017	2275	2120	n/a	3931	4168	2396	2466	3870	3970	4220
November 2017	2203	2127	3505	3690	3925	2280	2370	3654	3740	3991
December 2017	2278	2303	3609	3744	3966	2251	2369	3780	3764	4013
January 2018	2299	2296	3634	3767	4000	2350	2431	3904	3816	4077
February 2018	2305	2352	3651	3780	4018	2425	2401	3880	3795	4057
March 2018	2289	2300	3573	3752	3983	2087	2426	3808	3812	4067
April 2018	2094	2156	3489	3593	3832	1934	1924	3602	3614	3864
May 2018	2538	2077	3500	3522	3750	1750	1755	3331	3478	3711
June 2018	n/a	2098	n/a	3492	3718	1767	1807	3351	3445	3668
July 2018	n/a	2172	3400	3536	3770	1802	1842	3363	3477	3708
August 2018	n/a	2184	n/a	3522	3760	1785	1826	3334	3419	3649
September 2018	n/a	1773	3050	3488	3720	1771	1810	3330	3376	3632
October 2018	n/a	1644	n/a	3346	3582	1696	1739	3209	3247	3483
November 2018	1619	1593	3008	3098	3332	1679	1713	3123	3125	3361
December 2018	1561	1589	2894	2936	3169	1592	1643	3197	3025	3257
January 2019	1758	1693	2939	3032	3278	1715	1742	3108	3080	3302
February 2019	1626	1650	2842	2906	3158	1737	1741	3122	2995	3238
March 2019	1594	1595	2772	2817	3065	1845	1746	2975	2869	3129
April 2019	1553	1569	2715	2752	2999	1526	1563	2890	2813	3069
May 2019	2261	1522	2584	2738	2975	1407	1356	2629	2740	2974
June 2019	1291	1495	n/a	2739	2974	1413	1424	2604	2660	2907
July 2019	n/a	1582	n/a	2706	2935	1420	1427	2603	2656	2902
August 2019	1450	1580	n/a	2702	2945	1480	1421	2624	2651	2899
September 2019	1450	1493	n/a	2691	2926	1391	1394	2572	2641	2891
October 2019	1456	1334	2492	2640	2875	1353	1376	2539	2575	2824
November 2019	1427	1509	2317	2694	2919	1435	1429	2573	2602	2859
December 2019	1524	1515	2562	2681	2931	1609	1510	2633	2658	2908
January 2020	1596	1588	2550	2697	2950	1745	1648	2935	2663	2920
February 2020	1725	1719	2639	2813	3056	1821	1675	2806	2776	3046
March 2020	1863	1863	2885	3024	3255	2035	1846	2924	1988	3223
April 2020	2027	1935	3094	3270	3511	2554	1905	3577	3149	3412
May 2020	1525	1909	n/a	3350	3581	1819	1869	3479	3316	3553

Months	*T. Aman* paddy		*T. Aman* rice			*Boro* paddy		*Boro* rice		
	Farmers' price	Wholesale price	Farmers' price	Wholesale price	Retail price	Farmers' price	Wholesale price	Farmers' price	Wholesale price	retail price
June 2020	1525	2130	3950	3748	3984	2122	2011	3544	3591	3869
July 2020	n/a	2193	n/a	3723	3982	n/a	2153	n/a	3701	3950
August 2020	n/a	2222	n/a	3819	4060	n/a	2279	n/a	3833	4057
September 2020	n/a	2421	n/a	4027	4261	n/a	2503	n/a	4044	4272
October 2020	n/a	2617	n/a	4153	4397	n/a	2673	n/a	4193	4422

Source: Department of agricultural marketing.

Table 13: Procurement target and achievement of rice at government storage

Year	Target ("000" ton)	Achievement ("000" ton)	Target achieved (%)	Closing stock*
1996	670	618	92.24	366
1997	555	245	44.14	538
1998	650	264	40.62	270
1999	850	839	98.71	287.6
2000	850	836	98.35	555.1
2001	850	599	70.47	715.7
2002	900	648	72.00	515.1
2003	1050	898	85.52	347
2004	1000	747	74.70	602
2005	1200	1094	91.17	79
2006	1400	1202	85.86	510
2007	1400	706	50.43	614
2008	1601	1331	83.14	479
2009	1500	1211	80.73	1076
2010	1147	563	49.08	998
2011	1170	968	82.74	574
2012	1300	1276	98.15	1170
2013	1400	1186	84.71	1080
2014	1420	1384	97.46	664
2015	1300	1270	97.69	1154
2016	500	444	88.80	1099
2017	2392	940	39.30	480
2018	2198	2195	99.86	509
2019	2210	466	21.09	1044
2020	2460	924	37.57	542**

Source: FPMU. **Closing stock is considered on December. ***as of 27 December 2020.*

Table 14: Seasonal index of Aman season

Month	Seasonal index	GSI	GSI+SE	GSI-SE
January	98.17	98.626	106.00	91.26
February	100.45	100.91	108.28	93.54
March	100.79	101.26	108.63	93.89
April	99.07	99.53	106.90	92.16
May	98.67	99.13	106.50	91.76
June	96.71	97.16	104.53	89.79
July	101.40	101.87	109.24	94.50
August	104.62	105.11	112.48	97.74
September	100.96	101.42	108.79	94.05
October	100.94	101.41	108.78	94.04
November	95.67	96.11	103.48	88.74
December	97.02	97.47	104.84	90.10

Note: GSI=Grand seasonal index, SE= Standard error.

Table 15: Seasonal index (SI) of Boro season

Month	SI	GSI	GSI+SE	GSI-SE
January	99.12	100.06	101.83	98.28
February	99.08	100.02	101.80	98.25
March	99.04	99.98	101.76	98.21
April	99.13	100.07	101.84	98.29
May	99.24	100.19	101.96	98.41
June	99.40	100.34	102.12	98.57
July	98.60	99.54	101.31	97.77
August	98.79	99.73	101.50	97.95
September	99.02	99.97	101.74	98.19
October	99.14	100.08	101.85	98.31
November	99.09	100.03	101.80	98.25
December	99.06	100.00	101.78	98.23

Note: GSI=Grand seasonal index, SE= Standard error.

Table 16: Monthly domestic, FOB, and import parity prices of rice during 2016-2020

Year	Month	Bangladesh wholesale price (BDT/quintal)		FOB price (BDT/quintal)				Import parity price (BDT/quintal)			
		Aman	Boro	Thailand 5% broken	Vietnam 5% broken	India 5% broken	Pakistan 5% broken	Thailand 5% broken	Vietnam 5% broken	India 5% broken	Pakistan 5% broken
2016	Jan	2460	2502	2795	2756	2615	2809	3215	3170	2877	3231
	Feb	2453	2497	2876	2697	2658	2825	3307	3102	2924	3249
	Mar	2372	2401	2848	2799	2684	2743	3276	3219	2952	3154
	Apr	2301	2276	2949	2855	2729	2786	3391	3283	3002	3204
	May	2286	2220	3306	2864	2882	2969	3802	3294	3171	3414
	Jun	2414	2281	3360	2805	3013	3119	3865	3226	3315	3587
	Jul	2540	2415	3528	2761	3029	3264	4057	3175	3332	3754
	Aug	2711	2709	3092	2692	2880	3139	3555	3095	3168	3610
	Sep	2976	3017	2875	2590	2801	2805	3306	2978	3082	3225
	Oct	3233	3266	2756	2615	2735	2894	3170	3007	3008	3328
	Nov	3222	3299	2674	2642	2680	2864	3075	3039	2948	3294
	Dec	3165	3275	2764	2617	2737	2949	3179	3010	3010	3391
2017	Jan	3214	3309	2811	2633	2903	3139	3233	3028	3194	3610
	Feb	3301	3376	2782	2713	2933	3204	3199	3120	3226	3684
	Mar	3388	3397	2773	2753	2927	3148	3189	3166	3220	3620
	Apr	3423	3442	2870	2686	2947	3247	3301	3088	3241	3734
	May	3835	3868	3170	2764	3078	3364	3646	3179	3386	3869
	Jun	3989	3967	3511	3180	3257	3435	4037	3657	3582	3951
	Jul	3843	3842	3092	3113	3168	3415	3555	3580	3485	3928
	Aug	3816	3824	3015	3051	3149	3349	3467	3508	3463	3851
	Sep	3947	4113	3140	2982	3274	3257	3611	3429	3601	3745
	Oct	3931	3970	3125	3062	3139	3280	3594	3522	3453	3772
	Nov	3690	3740	3109	3078	3092	3298	3576	3540	3401	3792
	Dec	3744	3764	3125	3029	3217	3264	3593	3483	3539	3754
2018	Jan	3767	3816	3311	3243	3335	3364	3808	3729	3668	3869
	Feb	3780	3795	3213	3290	3302	3276	3695	3783	3632	3768
	Mar	3752	3812	3136	3253	3274	3326	3606	3741	3601	3824
	Apr	3593	3614	3347	3382	3233	3529	3849	3889	3556	4059
	May	3522	3478	3308	3527	3131	3517	3804	4056	3444	4045
	Jun	3492	3445	3144	3497	3052	3437	3615	4021	3358	3953
	Jul	3536	3477	2909	3086	3013	3292	3346	3549	3315	3786
	Aug	3522	3419	2960	3045	2998	3275	3404	3501	3297	3767
	Sep	3488	3376	2996	3096	2907	3255	3445	3560	3198	3743
	Oct	3346	3247	3027	3172	2839	3141	3481	3648	3123	3612
	Nov	3098	3125	2949	3186	2899	2958	3391	3664	3189	3402
	Dec	2936	3025	2952	2990	2925	3062	3395	3438	3217	3522
2019	Jan	3032	3080	3054	2780	3021	3060	3513	3197	3323	3519
	Feb	2906	2995	3021	2639	2986	2998	3474	3034	3284	3447
	Mar	2817	2869	3002	2723	3037	3041	3453	3131	3340	3498
	Apr	2752	2813	3076	2782	2982	3129	3537	3199	3280	3598
	May	2738	2740	3010	2775	2900	3081	3462	3191	3190	3543
	Jun	2739	2660	3098	2611	2890	3027	3562	3003	3179	3481
	Jul	2706	2656	3052	2605	2986	3025	3510	2996	3284	3479
	Aug	2702	2651	3183	2637	2952	2958	3660	3032	3247	3402
	Sep	2691	2641	3125	2482	2909	3066	3594	2854	3200	3526
	Oct	2640	2575	3064	2648	2856	2972	3524	3046	3142	3418
	Nov	2694	2602	3038	2674	2845	2916	3494	3075	3130	3353
	Dec	2681	2658	3100	2695	2846	2913	3564	3100	3131	3350
2020	Jan	2697	2663	3297	2713	2899	3009	3792	3121	3189	3460
	Feb	2831	2776	3323	2841	2907	3109	3822	3267	3198	3576
	Mar	3024	1988	3757	3168	2852	3353	4320	3643	3138	3856
	Apr	3270	3149	4212	3506	2923	3545	4844	4031	3215	4077
	May	3350	3316	3851	3577	2939	3506	4429	4113	3233	4032
	Jun	3748	3591	3978	3419	2892	3535	4575	3932	3181	4065
	Jul	3723	3701	3621	3351	2943	3377	4164	3853	3237	3884
	Aug	3819	3833	3816	3733	3011	3339	4388	4293	3312	3840
	Sep	4027	4044	3804	3635	2986	3327	4374	4180	3284	3826
	Oct	4153	4139	3542	3674	2892	3233	4073	4225	3182	3718

Source: www.http://ricestat.irri.org:8080/wrs

Focus Group Discussion (FGD) & Key Informant Interview (KII)

Availability and Price Volatility of Potato in Bangladesh: An Inter-Institutional Study in 2020

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Executive Summary

The price is supposed to be fixed by the "invisible hand" that determines the price of a commodity in a free market. It is, therefore, needed to identify the factors behind this invisible hand so that steps can be taken to encounter unnecessary price fluctuation in the market. When potato prices in the current year shot up to Tk 50-55 a kg, about 100% rise year-on-year, traders said fall in production as well as higher prices of other vegetables arising from flood and pandemic situation fuelled up the demand for potato causing surge in potato prices. However, DAE said there is no reason for raising potato prices as there is a surplus of 3.4 million MT table potato this year. Thus the objective of the study is to find out the factors behind the supply, demand and thereby prices of potato and explore the existence of syndicate in the market.

The study is mainly based on secondary data obtained from different sources. Additionally, some quality data were collected from different stakeholders in the supply chain through Focus Group Discussion (FGD) and Key Informant Interview (KII) in Bogura, Rangpur, Munshigonj and Dhaka areas.

The area, production and yield of potato grew by 4.58%, 6.61% and 1.95%, respectively per annum since independence. The production of HYV potato rose sharply, while local one rose at a slower pace. The share of HYV in total potato increased to 91% in 2019/20 from 46% in 1979/80. Potato production exhibits high fluctuation with roughly three years' cycle, which sharply decreased in the recent past. The nominal prices of potato witnessed upward trend, while real prices experienced downward trend since independence. There exists wide seasonal price variation of potato with the lowest price in March and the highest in December. Potato market seemingly integrated as prices at all levels move together. The rising trend of potato prices seems to be halted after re-fixing prices on October 27. Real prices displayed wide price variation as volatility index stands at 73.16%.

Based on supply and demand estimates, the total surplus of potatoes in 2020 stands at 3.40 lakh MT which is much lower than the previous years. The cost of potato production was calculated at Tk. 8.25 per kg and the profit earned by the growers was estimated at around Tk 1.1 million /ha. Twenty lakh MT potatoes have been stored in cold storage this year compared to 30 lakh MT in the last year. In 2020, 73% capacity of 392 cold storages in operation is utilized. The highest 65% of potato are released from traditional storage in March followed by 25% in April and the lowest 4% in June. On the other hand, the highest 30% of cold stored potato are released in October and the lowest 2% in December. As table and seed potatoes are kept together and recommended/required temperatures are not maintained in the cold storage, a substantial portion of seed potato is affected by different diseases.

The causes of price hike of potato identified this year are: low production; high consumption; low stock in cold storage; stoppage of selling potato by different stakeholders including farmers; limited control/intervention by government in the market, and rumor on price, demand and supply of potato. Recommendations for stabilizing potato price are: announcement of maximum and minimum support prices after setting up agricultural price commission; removal of ambiguity on production, demand, supply and price data; monitoring prices and release of potato from cold storage by government; broadcasting the true picture with data by government to counter any rumor in the market; and expanding export and processing of potato.

Introduction

1.1 Preamble

Bangladesh is highly vulnerable to malnutrition and hunger and its agricultural sector accounts for 40.6% of employment (BBS, 2019). Exacerbating the situation, Bangladesh's population of currently about 170 million is expected to reach 215.4 million by 2050 (Kabir et al., 2015). It is suggested that potato can contribute to poverty reduction by improving food security and incomes of smallholder farmers, large numbers of processors and traders in Bangladesh. Potato is also highly recommended by the Food and Agriculture Organization (FAO) as a food security crop as Bangladesh faces not only an increasing demand for food with a growing population, but also for uncertainties in food supply and steady hunger rates (FAO, 2009). Potato is an important and leading food crop in Bangladesh. It is the seventh potato producing country in the world and it ranks second after rice in terms of production and is the third most important food crop after rice and wheat in terms of human consumption in Bangladesh. (FAOSTAT 2015/2020).

Nowadays, in respect of nutrient, potato has become an important crop for food security, especially during extreme flooding under the monsoon and covid-19 situation. Potato is the only crop for which seed kept in cold stores are ready for immediate planting after floods. Bangladesh experienced much progress in area, production and yield of potato in the last decade, as its area, production and yield raised to 461 thousand ha, 9605 thousand MT and 20.8 MT/ha in 2019-20 from 435 thousand hectares, 7930 thousand MT and 18.25 MT/ha in 2009-10, with growth rates 6%, 21% and 14%, during the period, respectively. It has happened due to the suitable environment and using high yielding varieties in potato production. As currently production exceeds demand, Bangladesh started exporting fresh potato in the world market and exported 45000 MT of fresh potato in 2019-20 (Hortex Foundation, 2020). Annual potato consumption per capita reached 25.66 kg in 2016 from 23.65 kg in 2010 in Bangladesh, bringing the growth rate 8.5% during the only six-year period (HIES, 2016). Domestic supply, feed, seed and losses of potato reached 10179, 1164, 375, 765 thousand MT in 2017 which is 15%, 60%, 11% and 14% higher than that in 2014, respectively.

The demand for processed potato products is increasing day by day mainly due to improved living standards, increasing urbanization, and changing preference of new generation, which is one of the reasons for higher price of potato. As a result, poor people are severely affected by the price hike. On the other hand, especially in the year of bumper harvest of potato the small and marginal growers are devoid of getting the fair price due to the higher margin taken by the middlemen. Farmers in Bangladesh sometimes do not get one half of their production cost through selling their produces during harvesting period. They are for a long time deprived of getting fair prices. A perfect potato policy will improve the situation.

1.2 Justification of the Study

A common question arises how and by whom prices are fixed in the market because of the fact that every now and then the price of essential commodities goes up without any notice. The price is supposed to be fixed by the "invisible hand", as mentioned by the renowned 18th century economist Adam Smith, which is the unobservable market force that determines the price of a commodity in a free market. It is needed to identify the factors behind this invisible hand so that steps can be taken to encounter unnecessary price fluctuation in the market. It is also important to look into the short and long-run factors behind the abnormal fluctuations in market price. We often overlook the long-term factors and take action based on immediate factors.

For instance, when the price of potato shot up to Tk 50-55 a kg, rise about two times year-on-year, traders said fall in production as well as higher prices of other vegetables arising from flood and pandemic situation fuelled up the demand for potato causing surge in potato prices. Someone mention on higher potato export in the current year for price hike. The government immediately reacted and fixed potato prices twice and also took initiatives to sell it through TCB at lower prices. But the price did not go down since the traders and cold storage personnel presume higher price in future due to shortage of potato.

According to the DAE statistics, about 9.61 million MT of potato has been produced this year against the annual demand of about 6.82 million MT, bringing a surplus of 3.40 million MT despite some amount are being exported. Consequently, there is no possibility of shortage. Besides, 3 million MT of table potatoes have been stored in 369 cold storages, of which 55% have been taken out of cold storages before fixing price (DAM, 2020). Thus, 1.3 million MT of potatoes were still in the cold storage for sale. According to this statistics, there is no reason for raising price of potato. Thus the objective of the study is to find out the factors behind the supply, demand and thereby prices of potato and explore the existence of syndicate in the market.

1.3 Objectives of Study

- To analyze the long-term trend of production of potato in Bangladesh;
- To analyze price variation over time;
- To assess demand and supply situation of potato;
- To estimate the profitability of potato production;
- To explore the reasons for price spiral in 2020; and
- To recommend policy measures for price stability.

Materials and Methods

2.1 Respondents and Study Areas

The study was mainly based on secondary data obtained from different sources, such as BBS, DAE, DAM, BARI, BADC, Bangladesh cold storage association, Trade and Tariff commission, etc. For that purpose, a series of meeting was conducted with different personnel of aforesaid institutions/organizations in order to get their opinion on recent price hike of some essential commodities including potato. Additionally, some quality data were collected from different stakeholders in the supply chain through focus group discussion (FGD) and Key Informant Interview (KII) using checklist. The stakeholders interviewed were: farmers, wholesalers, cold storage personnel, Beparis, consumers and other traders who used to keep potato in the cold storage. The locations selected for the study were: Bogura, Rangpur, Munshigonj and Dhaka. Besides, some personnel of DAE and DAM were interviewed in the study areas.

2.2 Conducting FGD

In total nine FGDs (three FGDs at each district) were conducted with different stakeholders in the potato supply chain in three districts. In each FGD session, a total of 12-14 stakeholders were selected as participants. The participants under traders group included cold storage personnel, Arathdar cum Paiker, wholesaler and retailer. A discussion guide was prepared prior to the commencement of the FGDs. The guide comprises the general format of the discussions and the techniques that were used to elicit responses. In addition to a moderator in FGD, there was a note keeper who recorded comments and observations of the FGDs. A voice recorder was also used to record the whole discussion in order to recall necessary issues. Some snapshots on FGDs are shown at the end of the report.

2.3 Analytical Techniques

Growth rate analysis: The compound growth rates of area, production, yield and price of potato were worked out by fitting exponential function of the following type:

$$Y = ae^{bt} \text{ or } \ln Y = \ln a + bt$$

Where, Y is area/production/yield/ price of potato, 't' is the time and 'a' is the constant. e^b-1 be the compound growth rate which is expressed in percentage.

Seasonal Price Variation: For estimating seasonal price variation, a multtiplicative model is considered. Trend was estimated by simple 12 months moving average method and seasonal indices were worked out by averaging the detrended series.

Calculation of DRC: Domestic resource cost (DRC) analysis attempts to provide an estimate of the value of domestic resources used in producing a particular product when all intermediate inputs are valued at world prices and all factor inputs are valued at their true opportunity cost prices. The following formula is used for calculating DRC.

$$DRC = \frac{\sum D_{ij} V_i}{B_j - \sum T_{ik} V_k}$$

Where,
D = Quantity (MT) of domestic resources and non-traded inputs used for producing a product
Vi = Price (Tk/MT) of domestic resources and non-traded inputs
B = Boarder price (Tk/MT) of that particular product
T = Quantity (MT) of tradable inputs for producing that product
Vk = Boarder price (Tk/MT) of tradable inputs for producing that product
If DRC<1, the economy can save foreign exchange by producing the i crop domestically either for export or for imports substitution. This is because the opportunity cost of domestic resources and non-traded inputs used in producing i crop is less than the foreign exchange earned or saved. In contrast, if DRC>1, domestic cost was in excess of foreign exchange or savings indicating that the i crop should not be produced domestically and should be imported instead.

Volatility Index calculation method: In this study, volatility is measured as the standard deviation of price returns, i.e. the standard deviation of changes in logarithmic real monthly prices of potato during 1999-2019. It is conventional to convert monthly volatilities at an annual rate. Monthly volatilities are annualized by multiplying by √12 (Gilbert and Morgan, 2010). That means in this study, we measure volatilities by the standard deviations of the changes in the logarithms of monthly real price averages at an annualized rate.

Results and Discussion

3.1 Area, Production and Yield of Potato

Among different types of vegetables, potato stands first by choice of farmers after setting up cold storages in Bangladesh. Bangladesh witnessed remarkable progress in potato production since independence. Its production reached 9.61 million MT in 2019/20 from only 0.75 million MT in 1972/73 (Fig.1). Thanks to BARI which developed so far 44 varieties, to DAE for promoting these varieties and to farmers who cultivated these using modern technologies. The area, production and yield of potato grew by 4.58%, 6.61% and 1.95% respectively per annum during this period (Table 1). However, after 1997/98 their growth rates increased sharply with 4.01%, 7.19% and 3.07% for area, production and yield respectively, compared with 2.17%, 2.96% and 0.77% during the earlier period. Currently, the yield of potato is 20.8 MT/ha which is very low compared to its potential yield 30-40 MT/ha due to lack of quality seed, cultivation of indigenous potato and high price of quality seed. In respect of potato production, Bangladesh ranks third in Asia and seventh in the world (Appendix table 3). The average yield of potato stands at

Fig. 1. Area, Production and Yield of Potato, 1972/73 to 2019/20

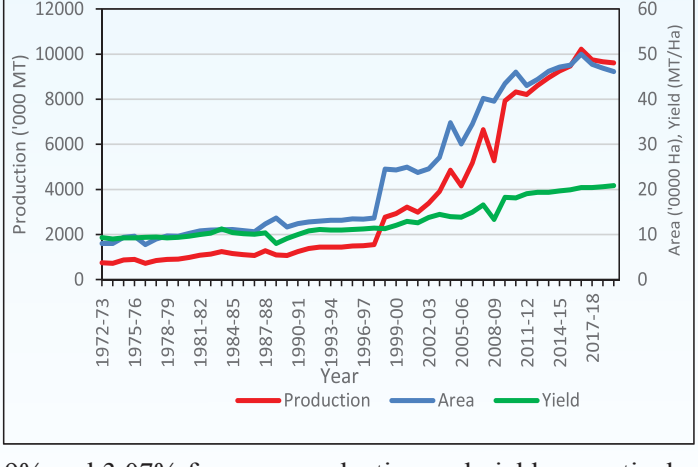


Table 1. Compound growth rates (%) of potato in Bangladesh

Period	Area	Prod.	Yield
1972/73 -2019/20	4.58*	6.61*	1.95*
1972/73 -1997/98	2.17*	2.96*	0.77*
1998/99 -2019/20	4.01*	7.19*	3.07*

* Significant at 1% level

21 MT/ha, which is lower than that of European coun tries and USA (Appendix table 4).

Two types of varieties, such as HYV and local are cultivated in Bangladesh. The production and area of HYV potato rose sharply with growth rates 8.49% and 6.42% annually during1979/80-2019/20, respectively (Table 2).

Table 2. Compound Growth Rates (%) of local and HYV Potatoes

Period	Local			HYV		
	Area	Prod.	Yield	Area	Prod.	Yield
1979/80 - 2019/20	1.68*	3.08*	1.37*	6.42*	8.49*	1.95*
1979/80 - 1997/98	-0.52	-1.75	-1.24	3.51*	4.59*	1.05*
1998/99 - 2019/20	-0.80*	2.41*	3.23*	5.50*	7.94*	2.32*

* Significant at 1% level

The yield also increased by around 2% during this period. On the other hand, local varieties' growth rates are much lower, which stand at 1.68%, 3.08% and 1.37% respectively for area, production and yield. Local potato saw negative growth during 1979/80-1997/98 period, while they are positive except area in the recent years (1998/99-2019/20). However, HYV potato experienced positive growth in both the periods although they are lower in the earlier period. The share of HYV in total potato production rose sharply in the recent years; share increased to 91% in 2019/20 from 46% in 1979/80 (Fig. 2). As potato is very much vulnerable to climate change and as its production is largely influenced by previous year's price, sharp fluctuation prevails in case of its production. Higher production in a year causes lower prices, which discourage the farmers to grow more in the next year resulting higher prices and so on. Year-to-year variation of potato production exhibits high fluctuation with roughly three years' cycle, which sharply decreased in the recent past starting from 2010/11 (Fig. 3). The standard deviation of fluctuation estimated at 0.82 during 2010/11-2019/20 against 5.39 during the rest of years.

Fig. 2 Production of Local and HYV Potato

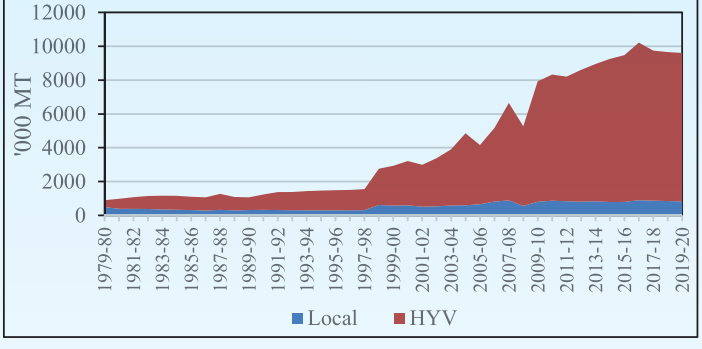
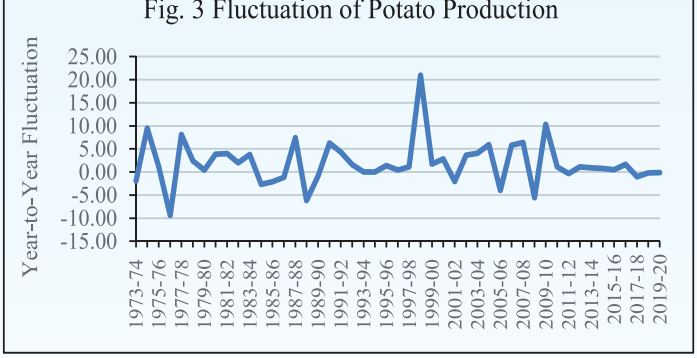


Fig. 3 Fluctuation of Potato Production

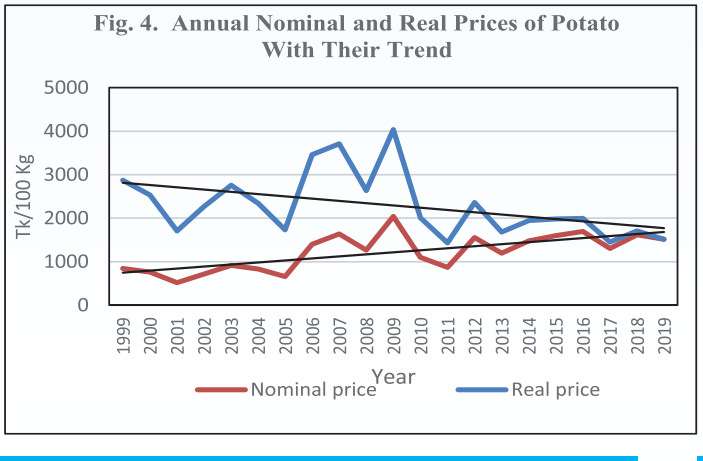


3.2 Price Variation of Potato

Annual price variation

Potato prices over the years are affected by the forces of demand and supply. Change in demand arises from the change in population, income, taste, habit, custom etc., while change in supply arising out of the development of cold storage, processing industries, marketing facilities, production technology and market arrival (Sabur, 1986). The annual nominal and real prices of potato during 1999-2019 as shown in figure 4 exhibit

Fig. 4. Annual Nominal and Real Prices of Potato With Their Trend

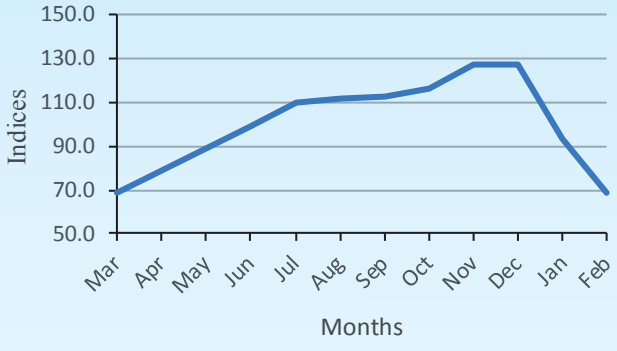


upward trend for nominal price and downward trend for real price, meaning that rise of inflation (measured by CPI) surpassed rise in potato prices. Nominal price rose by 4.5% per annum, while real price declined by 2.4% during this period. Price increased sharply in the year 2003, 2006, 2007, 2009 and 2012, whereas it declined in 2001, 2005, 2008, 2010, 2011, 2013 and 2017.

Seasonal price variation

Seasonal price variation in prices arises from the seasonal production, poor storage facilities, and the lack of retention power of the growers. The quantity of potato arrives in the market during harvesting period is more than local need for consumption which creates glut in the market resulting in lowering down prices. This low price ultimately affects the farmers adversely. On the other hand, farmers purchase potato seed at higher price from the market during sowing period. Thus seasonal price variation plays dual role in creating uncertainty in the income level of the potato farmers. Price reached the lowest level in March during harvesting season, afterward it rose continuously up to July when potato from cold storage started releasing, then it became by and large stable till October (Fig.5). The price again started increasing after October, reached peak level in December and then declined due to arrival of new potato (early variety) in the market. It is worth mentioning that in 2020 (crisis year) the price follows the same pattern as in the earlier years but it starts rising sharply after August may be due to higher consumption arising from COVID-19 pandemic, less availability and higher prices of other vegetables, stop releasing potato from cold storage in expectation of higher price in the coming months and so on (FGD, 2020).

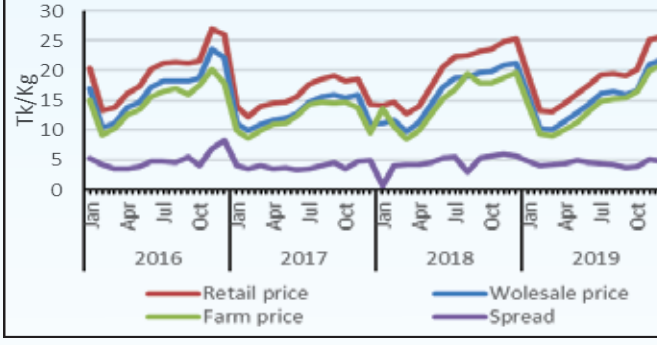
Fig. 5. Seasonal Price Variation of Potato During 1999-2019



Prices at different levels

Monthly prices during 2016-2019 shows that farm, wholesale and retail prices move parallel one another with constant spread between farm and retail prices roughly Tk 4.5/kg indicating high integration among the markets at different levels (Fig. 6). This has happened due to the fact that all stakeholders including the farmers come to know the change in prices at different markets instantly through mobile phone and other devices.

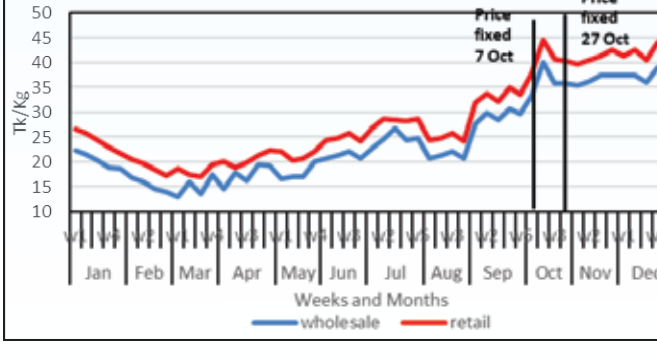
Fig. 6. Farm, Wholesale, Retail Prices and Price Spread HYV Potato



Weekly prices in 2020

The price of potatoes started surging from the middle of September and reached Tk 50 a kg in retail market. The Department of Agriculture Marketing (DAM) on October 7 fixed the price of a kg of retail potato at Tk 30 and wholesale at Tk 25. For potatoes in cold storage the price was fixed at Tk 23 a kg. But the price rose to Tk 50 and beyond at retail markets. As the prices continued to rise after fixation of prices (Fig. 7), DAM on October 27 re-fixed the retail prices at Tk 35 and

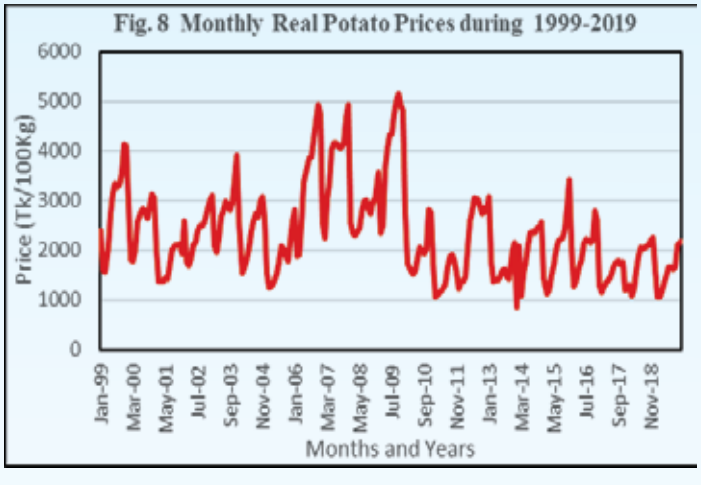
Fig. 7. Weekly Potato Prices in 2020



wholesale at Tk 30 a kg following a meeting with Bangladesh cold storage association and businessmen. As the prices of potato kept on rising, the businessmen bought potato stocks in cold storages at higher rates hoping to make a hefty profit. This year, the ownership changed more frequently as a section of businessmen sensed that a crisis was coming (FGD, 2020). According to DAM, the price of potato has gone up to Tk 41 per kg in October against Tk 20 at the same time last year, meaning that prices has doubled this year. These was, however, a positive impact on potato prices after the second intervention made by DAM on October 27 and after that intervention prices remained more or less stable.

Volatility of potato prices

Agricultural prices vary because of variation in production and consumption. Economists distinguish between predictable and unpredictable variability; the latter is known as shocks. Shocks to production and consumption cause price variability. Production can vary either because of variations in area planted or because of yield variations, mainly due to weather. Consumption varies because of changes in incomes, changes in prices of substitutes and shifts in tastes. It is generally supposed that the most important source of price variability in agriculture is weather shocks to agricultural yields. Nevertheless, demand shocks, in particular income shocks (Gilbert, 2010) and policy shocks may also play an important role.



The extent to which given production and consumption shocks translate into price volatility depends on supply and demand elasticities. It is generally agreed that these elasticities are low over the short term, in particular within the crop year. Farmers cannot harvest what they have not planted and will almost invariably harvest everything that they have planted. Consumers are reluctant to revise habitual dietary patterns and, in poor countries, they may have few alternatives. Stockholding causes volatility to bunch. When stocks are low, relatively small production or consumption shocks can have large price impacts but when they are high, the reverse is the case. Moreover, once stock levels become high, they will remain high until consumption has exceeded production for sufficient time to absorb past surpluses. Stockholding therefore results in a cyclical pattern in prices and volatilities even if supply and demand shocks are independent over time.

Real prices during 1999-2019 exhibits wide price variation in potato prices (Fig. 8). The price volatility as measured by volatility index rose from 63.61% in period I (Jan 1999-Dec2005) to 71.56% in period II (Jan2006-Dec2011) and 82.18% in period III (Jan2012-Dec2019) with average index 73.16% during the whole period (Table 3). However, equality test shows that although rise in volatility is significant between periods I and III, but it is insignificant in other cases. This rise in price volatility may be due to production shock arising from change in weather/climatic condition in different years.

Table 3. Price volatility (%) of potato during different periods in Bangladesh

Whole period (Jan1999-Dec2019)	Period I (Jan 1999-Dec2005)	Period II (Jan2006-Dec2011)	Period III (Jan2012-Dec2019)
73.16	63.61	71.56	82.18
Equality test (F value)	Between periods I & II	Between periods II& III	Between periods III & I
	1.27 Insignificant rise	1.32 Insignificant rise	1.67* Significant rise

* Significant at 1% level

3.3 Demand and Supply Situation of Potato

Annual supply of potato

Domestic production is the main source of the availability of potato in the country. The domestic production of potato in 2020 stands at 9605.62 thousand MT. The production/supply of potato in 2020 is 0.51%, 1.42% and 5.97% lower than the productions in 2019, 2018 and 2017 respectively (BBS, 2017 & 2019). This less production is strongly supported by farmers, traders and cold storage owners during FGD sessions. As potato is a perishable crop, a significant portion is wasted along the supply chain that starts from farmers to consumers. A study (Hossain and Miah, 2011) showed that about 26% of production was lost at different stages of supply chain. After deducting the loss, the quantity of usable potato stands at 7147.54 thousand MT in 2020 compared to 7184.35 MT in 2019. Another study (Hossain and Miah, 2009) revealed that growers sold 62% potato in the harvesting period. While, they stored 23% in cold storage as table potato and 13% as seed. Home storage accounted for only 3%. The results are mostly supported by the recent FGD conducted in 2020.

As the domestic production of seeds is not sufficient, some seeds are imported every year. In 2020, Bangladesh has imported 2000 MT potato seeds from the Netherlands. Additionally, the country imported 10 thousand MT fresh or chilled potato seeds during 2019-20. The net availability of potato for human consumption is estimated at 7157.54 thousand MT in 2020, which rose from 7055.32 thousand MT in 2016. While the per capita availability of potato is calculated at 43.20 kg/year in 2020 (Table 4).

Table 4. Annual supply of potato in Bangladesh

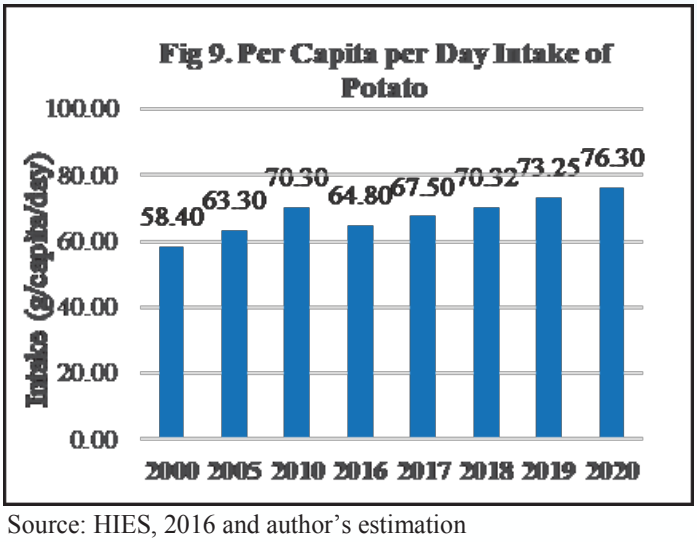
Sl. No.	Source of supply	Amount of supply ('000' MT)				
		2016	**2017**	**2018**	**2019**	**2020**
1	Total domestic production[1]	9474.10	10215.96	9744.42	9655.08	9605.62
	HYV potato	8675.86	9318.41	8870.81	8803.28	8777.25
	Local potato	798.24	897.55	873.61	851.80	828.37
2	Post-harvest loss[2]	2424.42	2614.26	2493.60	2470.74	2458.08
3	Usable net production (1 -2)	7049.68	7601.69	7250.82	7184.35	7147.54
4	Total imports (seed and others)[1]	5.64	54.12	11.87	8.12	10.00
5	Net availability (3+4)	7055.32	7655.81	7262.69	7192.47	7157.54
6	Net availability (kg/capita /year)	44.60	47.88	44.78	43.87	43.20

Note: [1]Various issues of BBS (2017 & 2019), [2]Hossain and Miah, 2011

Annual demand for potato

Potato is used mostly for human consumption, animal feed and seed. Also, a small quantity is exported to foreign countries and some are used for processing purpose (Table 5).

About 69% of the total potatoes are used as table potatoes. The per capita daily potato consumption was 64.8 grams in 2016 (HIES, 2020). The daily potato intake has increased at the rate of 4.17% within the period from 2000 to 2016. Based on this growth rate, per capita intake in the succeeding years have been estimated (Fig. 9).



Source: HIES, 2016 and author's estimation

The total demand for potato for human consumption is estimated at 4614.4 thousand MT in 2020, which is 5% higher than in 2019 (Table 5). A large amount of potatoes is used as feed for domestic animals. Low quality and semi-damaged potatoes are usually used as

feed. The truth is exposed on this issue during conducting FGDs with potato farmers (FGD, 2020). In 2020, about 17% potatoes are used as animal feed which is slightly lower than the previous year. Both local and HYV seed are used for producing potatoes. In 2020, a total of 1006.4 thousand MT of seed potatoes are used for planting 461317 hectares of land and the shares of local and HYV seeds in the total seed potatoes are 12.4% and 87.6% respectively. The use of seed potatoes in 2020 is 1.83% less than the previous year due to the fact that less areas are devoted to potato cultivation.

In Bangladesh, a small quantity of potato is used in processing industry for preparing different processed products like crackers, chips, flakes and pellet every year. The current annual demand for processing industry is 2.53 thousand MT which is slightly lower than the previous years. Bangladesh has started exporting potatoes from a couple of years ago. In 2020, the country has exported about 45.0 thousand MT of potatoes which is nearly 23% higher than the previous year. The annual net demand for potato is estimated at 6817.40 thousand MT in 2020 which is 3.31% higher than that in previous year (Table 5).

Table 5. Annual demand for potato in Bangladesh

Type of demand	Amount of demand ('000' MT)				
	2016	**2017**	**2018**	**2019**	**2020**
1. Human consumption	3741.51	3954.18	4163.53	4380.55	4614.37
Bangladeshi people[1]	3736.48	3934.25	4140.85	4356.27	4586.52
Rohinga people	5.04	19.93	22.68	24.29	27.85
2. Used as seed[2]	1042.97	1094.73	1044.05	1025.84	1006.36
Local seed	103.51	111.38	109.69	104.80	109.78
HYV seed	939.47	983.35	934.36	921.04	896.58
3. Used as feed[3]	1113.00	1164.00	1165.76	1155.07	1149.15
4. Used in processing industry[4]	2.70	2.47	2.55	2.54	2.53
5. Quantity exported[4]	40.23	55.65	53.49	34.80	45.00
Net demand for potato (1 to 5)	5940.42	6271.03	6429.37	6598.79	6817.40
Net demand (kg/capita/year)	37.55	39.22	39.64	40.25	41.15
National surplus (Lac MT)	11.15	13.85	8.33	5.94	3.40

Sources: [1]HIES, 2016 (64.8 g/capita/day); estimated for 2017 to 2020
[2]FGD, 2020 (HYV: 2.31 t/ha); Tuber Crop Research Centre, 2020 (Local: 1.5 t/ha)
[3]FAOStat, 2020 (from 2015/16-2016/17; Estimated for 2018 to 2020)
[4]Hortex Foundation, 2020

National surplus of potato

Bangladesh produces a plenty of potatoes with a huge surplus annually. Both farmers and cold storage owners stated that a vast amount of potatoes remained unsold before the beginning of the current season because of low demand (FGD, 2020). Therefore, good harvest has sometimes turned out to be the cause of the farmer's misery. However, the total surplus of potatoes in 2020 stands at 3.40 lakh MT which is much lower than the previous years.

3.4 Profitability of Potato Cultivation

Input use pattern for potato cultivation

Potato cultivation needs different types of inputs, such as human labour, seed, manure and fertilizers, irrigation and pesticides. The average human labour used was found to be 276 man days per hectare of which 42.8% were family supplied (Table 6).

Table 6. Level of input use per hectare for potato cultivation

Input	Unit	Munshigonj	Bogura	Rangpur	All area
Human labour	Man-day	280	270	278	276
Family labour	Man-day	120	115	118	118
Hired labour	Man-day	160	155	160	158
Seed (HYV)	kg	2350	2335	2240	2308
Cowdung	kg	16220	16970	16867	16686
Urea	kg	565	555	560	560
TSP	kg	560	550	560	557
MoP	kg	375	375	378	376
ZnSO4	kg	9	9	9.0	9.0
Boron	kg	15.5	15.0	16.0	15.5
Gypsum	kg	160	155	160	158
MgSO4	kg	45	42	45	44
Pesticides	Tk	3500	3200	3500	3400
Irrigation	Tk	2000	1800	2000	1933

Source: FGD, 2020

The average quantity of seed (HYV) used by the farmers were 2.31 MT/ha. The seed rate used by the farmers was 35.1% higher

than the recommended seed rate of 1.5 MT/ha (Azad et al. 2019). On average, potato farmers used 16.69 MT of decompose cowdung, 560 kg of Urea, 557 kg of TSP and 376 kg of MoP per hectare. They used higher doses of urea, TSP and MoP than the recommended doses (325-350 kg/ha, 200-220 kg/ha and 250-300 kg/ha) (Azad et al., 2019). Besides they also used other fertilizers like ZnSO4, MgSO4, Boron, and gypsum (Table 6). A lot of pesticides was also applied for controlling the attack of insects and diseases. Farmers irrigated potato field 4-5 times per season.

Cost of potato cultivation

Both fixed and variable costs are considered for calculating the cost of cultivation of potato. Variable costs include human labour, land preparation, seed, manures, fertilizers, insecticides, irrigation, and interest on operating capital. The fixed cost includes the cost of land use and family labour. The cost of land use was calculated on the basis of leasing value of land. The total cost of potato cultivation was estimated to be Tk. 2,98,558 of which 74% were variable cost and the rest 26% was fixed cost. The major share in the total cost was human labour (41.3%) followed by seed (25%), TSP fertilizer (4.5%) and land preparation (3.1%) (Table 7). The average cost of producing per kg of potato was Tk. 8.25.

Table 7. Per hectare cost of potato cultivation

Particular	Munshigong	Bogura	Rangpur	All area	% of cost
Variable cost	**222178**	**218257**	**219190**	**219875**	**73.6**
Land preparation	9730	9000	8982	9237	3.1
Hired labour	72000	69750	72000	71250	23.9
Seed	75200	74720	73920	74613	25.0
Cowdung	19464	20364	18554	19461	6.5
Urea	9605	9435	9520	9520	3.2
TSP	13440	13200	13440	13360	4.5
MoP	7125	7125	7182	7144	2.4
ZnSo4	1800	1800	1800	1800	0.6
Boron	1860	1647	1888	1798	0.6
Gypsum	1600	1550	1600	1583	0.5
MgSO4	1215	1092	1215	1174	0.4
Pesticides	3500	3200	3500	3400	1.1
Irrigation	2000	1800	2000	1933	0.6
Inter. on operating capital	3639	3574	3590	3601	1.2
Fixed cost	**79800**	**77350**	**78900**	**78683**	**26.4**
Family labour	54000	51750	53100	52950	17.7
Land use cost	25800	25600	25800	25733	8.6
Total cost	**301978**	**295607**	**298090**	**298558**	**100.0**
Cost of production (Tk/kg)	8.23	8.48	8.05	8.25	

Source: FGD, 2020

Financial profitability of potato cultivation

The average yield of potato was recorded 36.21 MT/ha in the study areas. The average yield was reported to be higher in Rangpur followed by Munshigonj and Bogura districts. The average gross return, gross margin and net return of potato were found to be Tk 4,04,245/ha, Tk 1,84,370/ha, and Tk 1,05,6871/ha, respectively. Average benefit cost ratio was found to be 1.35 on the basis of total cost (Table 8).

Table 8. Per hectare returns from potato cultivation

Particular	Munshigonj	Bogura	Rangpur	All area
Yield (kg/ha)	36697	34875	37050	36207
Selling price (Tk/kg)	11.25	11.25	11.00	11.17
Gross return (Tk/ha)	412841	392344	407550	404245
Gross margin (Tk/ha)	190664	174087	188360	184370
Net return (Tk/ha)	110864	96737	109460	105687
Benefit cost ratio				
over variable cost	1.86	1.80	1.86	1.84
over total cost	1.37	1.33	1.37	1.35

Source: FGD, 2020

Economic profitability of potato production

Domestic resource cost (DRC) indicates whether there is comparative advantage of producing potato in the country for export or not. If the value of DRC is greater than one, it implies that the economy loses foreign exchange through domestic production of potato, while a DRC value is less than one implies that the production is efficient and make positive contribution to domestic value addition. The estimates of DRCs for potato for the year 2019-20 as presented in (Table 9) is found to be less than unity (0.23) implying that Bangladesh had comparative advantage in potato production for export promotion.

Table 9. Domestic resource cost (DRC) for potato

Particulars	Mugnshigonj	Bogura	Rangpur	All area
A. Traded input (Tk/MT)	**1416**	**1469**	**1400**	**1427**
Urea	495	511	485	497
TSP	621	641	615	625
MoP	301	316	300	305
B. Non-traded inputs (Tk/MT)	**7407**	**7623**	**7232**	**7417**
Human labour	3434	3484	3377	3430
Land preparation	265	258	242	255
Seed	2049	2143	1995	2061
Other fertilizers	176	175	176	176
Manure	530	584	501	537
Pesticides	95	92	94	94
Irrigation	55	52	54	53
Int. on operating capital	99	102	97	99
Land use	703	734	696	711
C. Output price (Tk/MT)	**34150**	**34150**	**34150**	**34150**
D. Value added (C-A)	**32734**	**32681**	**32750**	**32723**
DRC (B/D)	**0.23**	**0.23**	**0.22**	**0.23**

Constraints to potato cultivation

Although the farmers in the study areas are cultivating potato, but there are several problems that are the barriers of its higher production. The first and the foremost problem of potato cultivation was low market price at harvesting time (61%). They also mentioned that due to severe infestation of insects (19%) and diseases (27%), potato yield drastically reduced and it led to heavy loss to the growers. The other problems were higher price of potato seed (39%) and adulterated fertilizer (15%), shortage of labour at harvesting time (15%) and high wage rate (Table 10).

Table 10. Problems in potato cultivation

Type of problem	% of respondent
Higher price of seed	39
Adulteration of fertilizer	15
Higher price of fertilizer	15
Disease infection (late blight)	27
Insect-pest infestation	19
Unavailability of labour in time	15
Higher wage rate	13
Unavailability of bank loan	19
Low market price at harvesting time	61

Source: Annual report of AED, 2019-20

Remedial measure for increasing potato cultivation

- Government should take initiatives regarding reasonable price of potato at harvesting time.
- Government should ensure reasonable potato seed price to the growers.
- DAE personnel (with the help of Entomological & Plant Pathological Scientist) should make frequent visit to the farmers' field.
- Mechanization should be introduced in potato cultivation for overcoming labour crisis.

3.5 Storing of Potato

Potatoes are stored by two methods, such as traditional method and cold storage. Under traditional method potatoes are generally stored on the bamboo or brick built made platform, or on katcha floor, and spread on jute sack at farmers' house. Farmers start storing of potato in February/March and complete selling by June. Storing of potatoes in the cold storage is mainly done by traders, farmers and in some cases by cold storage owners themselves. Cold storage owners stored potato in their storage in order to fill up their storage capacity and in some cases for getting the benefit of higher prices. Hiring facility is made available both to the growers and the traders. Growers hire the cold storage spaces only to preserve seed potato. The rate of storage charge is fixed by the Bangladesh Cold Storage Association (BCSA) at Tk. 230 per 50 kg bag in 2020. But this rate was not followed at all rather it varied from Tk.180 to Tk. 220 per bag. Generally wholesale traders got the privileges of reduced rate from the cold storage owners. The rate of charge is usually declared before the beginning of storage period. Potato growers preserved 10-25% of the total stored potato in the cold storage. Usually, farmers sell 60-80% of their total potato during harvest time, 5% retain for family consumption and 5% store at home under traditional system (FGD, 2020). Traders and cold storage owners purchase potato through Faria from the farmers by paying fixed commission to them. The cold storage owners start selling potato in June and continued up to December. Table potatoes are sold every month while seed potatoes are sold during the period from September to mid-November. Potato sold in October was the highest and the lowest in December which is also supported by Hajong et al., (2014). In 2020, the disposal of stored potatoes is shown in (Table 12).

Table: 11. No. of cold storage in operation and their capacity utilized

Year	No. of cold storage in operation	Capacity Utilized
2010	315	60%
2011	374	80%
2012	356	85%
2013	370	98%
2014	371	106%
2015	380	72%
2016	385	85%
2017	376	96%
2018	401	82%
2019	392	95%
2020	392	73%

Source: Cold storage association

According to the information provided by BCSA, 20 lakh MT potatoes have been stored in cold storage this year compared to 30 lakh MT in the last year. In 2020, 73% capacity of 392 cold storages in operation is utilized (Table 11), which was the highest, 106%, in 2014 and the lowest, 60%, in 2010. This low capacity utilization in 2020 may be due to low production in 2020.

In 2020, the highest 65% of potato are released from traditional storage in March followed by 25% in April and the lowest 4% in June (Table 12). Under this method, potatoes start releasing from March and end in June. On the other hand, potatoes stored in cold storage begin releasing from June and completed by December when new potatoes start arriving in the market. The highest 30% are released in October and the lowest 2% in December. The selling price was the lowest Tk 470/40kg in March followed by Tk 580 in April, then started rising and reached the peak level at Tk 1650 in November. It started declining in December. Farmers mention some problems in keeping seed potato in the cold storage. As table and seed potatoes are kept together and recommended/required temperatures are not maintained in the cold storage, a substantial portion of seed potato is affected by different diseases. It is worth mentioning that farmers do not disclose the quantity of seed potato kept for fear of theft and possibility of interchange with table potato (FGD, 2020).

Table 12. Disposal of stored potatoes in 2020

Month	Traditional storage	Cold storage	Selling price (Tk/40kg)
January	--	--	--
February	--	--	--
March	65%	--	470
April	25%	--	580
May	6%	--	825
June	4%	8%	870
July	--	10%	1200
August	--	10%	1260
September	--	20%	1400
October	--	30%	1600
November	--	20%	1650
December	--	2%	950

Source: FGD, 2020

3.6 Causes of Price Hike During 2020

In this study, the following causes of price hike of potato are identified:

- Supply of potato was low because of lower production in 2019-20 compared to 2018-19.
- Potato consumption increased due to non-availability of sufficient vegetables that were affected by prolonged flooding and long lasting rainy season.
- The stock of potato in cold storages was low due to the lower production in this year. This also created potato price hike this year.
- Export of potato to the neighbouring countries especially in Nepal keep pressures on the availability of potato. As potato production was low, so export put extra pressures on the supply of potato in the market.
- As production was low, farmers presume higher prices in future. For that reason, they limited the sale of potato in the market. Instead, they stock for future selling with the expectation of higher price.
- Potato storage ownership document (locally called potato card/deed/receipt) changed frequently rather than supplying potato in the market, which was also another important reason for potato price hike in 2020.
- Seasonal potato businessmen from different districts of Bangladesh stocked a large quantity of potato in the cold storage. They stocked it for selling at higher price in the future. Last year they delayed in supplying stored potatoes in the market for creating an artificial crisis of potato that increased the potato price in 2020.
- Government had no or limited control in the market. Besides, government couldn't focus on the real facts of market. So, lack of control and monitoring in the market gave extra privileges to the greedy cold storage owners and traders to create artificial potato crisis.
- Sometimes rumor on price, demand and supply pinched the price to increase.
- Print and electronic media, and social communication system played crucial role to spread rumor on potato marketing, demand and supply. Producer and traders influenced a lot by this false information. FGD participants told that rumor inclined farmers and traders to do bad practice on potato trading, such as creating artificial crisis in the market by keeping potato in the storage.

- As no legal action was taken for doing malpractices by traders in the past, they are doing the same practices for trading different agricultural products year after year. Lack of legal actions increases the malpractices on market, which creates price hike.
- Participants opined that a group of traders led the total potato marketing. They changed repeatedly the market behaviour based on their own benefits. But authority didn't take any actions against this group. According to the participants, this group of traders also played a key role in increasing market price of potato in 2020.
- Market intervention by TCB was very much limited as only 215.5 MT of potato so far sold in different districts.

Recommendations for Stabilizing Potato Price

- Government may announce maximum and minimum support prices of major crops including potato every year considering the cost of production, overall demand-supply situation in domestic and world markets, domestic and international prices, inter-crop price parity, terms of trade between agriculture and non-agriculture sector etc. after setting up an Agricultural price commission under the Ministry of Agriculture.
- Data on production, demand, supply and price should be collected starting from grass root level using modern technologies/methods so that ambiguity on data may be removed. Many stakeholders during FGD sessions raised question on the validity of production data published by BBS. For instance, in 2019-2020, BBS data shows over 5% year-on-year increase of potato production in Munshigonj district, while during FGD sessions the different stakeholders said that the production declined by 10-20% this year.
- Government may monitor the release of potato from cold storages throughout the year so that stock holders may not create scarcity artificially.
- Legal action can be taken for any type of malpractices made by stakeholders. For that purpose, new act may be formulated or existing one may be modified.
- Government may broadcast the true picture with data to counter any rumor in the market. Stern action is to be taken to the persons/organizations who are spreading rumor.
- Potato export should be enhanced through setting up all infrastructures and meeting all requirements of foreign buyers, especially in the year of excess production.
- As it is not possible to make a significant increase in export of fresh potato soon, the country can immediately expand export of processed potato product, such as potato chips, crackers etc. if private companies start processing and exporting of potato after assessing the need in the foreign countries. Moreover, for this purpose varieties appropriate for processing and export need to be developed. BARI so far developed 44 potato varieties, but most of them are not suitable for processing.
- Large scale market intervention through OMS is required in the case of scarcity and subsequent price Large scale market intervention through OMS is required in the case of scarcity and subsequent price hike.

3.8 Conclusion

The recent unusual price hike of potato not only embarrasses consumers but government also. The study has tried to explore the causes of the price hike. Satisfying all sorts of demand, a considerable amount of potato remains surplus in the market. The main cause of this price hike was the artificial crisis created by some profit seeking traders rather than the low production and higher consumption of potato in the country. Fixation of price, regular market monitoring and taking legal action to the artificial crisis creators may be the way of avoiding such unexpected price hike of potato in the country.

References

Azad et al., 2019. Krishi Projukti Hatboi (Handbook on Agro-Technology), 8th edition, Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh.

BARI (2020) Krishi Projukti Hatboi (Handbook on Agro-Technology). 9th edition, Bangladesh Agricultural Research Institute, Gazipur.

BBS (Bangladesh Bureau of Statistics). 2019. Yearbook of Agricultural Statistics. Statistics and Informatics Division (SID). Ministry of Planning, Government of the People's Republic of Bangladesh.

DAM, 2020. Report of the Department of Agricultural Marketing, Khamarbari, Dhaka, Bangladesh.

FAOSTAT, 2020. New Food Balance Sheet for Bangladesh, 2020. Food and Agriculture Organization of the United Nations. http://www.fao.org/faostat/en/#data/FBS.

Gilbert, C. L. 2010. How to Understand High Food Prices, Journal of Agricultural Economics, 61(2): 398-425. .-..https://doi.org/10.1111/j.1477-9552.2010.00248.x

Gilbert, C.L. and C. W. Morgan, Has food price volatility risen? Department of Economics, University of Trento, Italy, 2010.

Hajong, P, M. Moniruzzaman, M. I. A. Mia, and M. M. Rahman, 2014. Storage System of Potato in Bangladesh, Universal Journal of Agricultural Research 2(1): 11-17, http://www.hrpub.org DOI: 10.13189/u-jar.2014.020102

HIES, 2016. Household Income and Expenditure Survey-2016. Bangladesh Bureau of Statistics, Yearbook of Agricultural Statistics. Statistics and Informatics Division (SID). Ministry of Planning, Government of the People's Republic of Bangladesh.

Hortex Foundation, 2020. Horticulture Export Development Foundation (Hortex Foundation), Ministry of Agriculture, Dhaka-1207, Bangladesh. Brief on Potato Export in Bangladesh. (November 03, 2020)

Hossain M. A. and M. A. M. Miah, 2009. Post-harvest losses and technical efficiency of potato storage systems in Bangladesh. Research report, FAO Bangladesh, Food Planning and Monitoring Unit (FPMU), Ministry of Food and Disaster Management, Dhaka, Bangladesh.

Hossain M. A. and M. A. M. Miah, 2011. Assessment of post-harvest losses of potato in Bangladesh. Asia-Pacific Journal of Rural Development, Vol. XXI (2):79-94

Kabir M. S., et al., 2015. Rice Vision for Bangladesh: 2050 and Beyond, Bangladesh Rice Journal 19 (2): 1-18.

Sabur, S.A., 1986. Production and Price Structure of Potato in Bangladesh, Bangladesh Journal of Agricultural Economics, 9(1): 1-15, DOI: 10.22004/ag.econ.208367

Table 1. Area, Production and Yield of Potato in Bangladesh

Year	Area (Hectare)	Production (MT)	Yield (MT/ Hectare)
1972-73	79958	746725	9.34
1973-74	80057	718535	8.98
1974-75	93863	866465	9.23
1975-76	95931	888760	9.26
1976-77	77376	723720	9.35
1977-78	89909	849410	9.45
1978-79	96675	894955	9.26
1979-80	96481	902633	9.36
1980-81	102127	983130	9.63
1981-82	107667	1077855	10.01
1982-83	110079	1131089	10.28
1983-84	110415	1239162	11.22
1984-85	111264	1159383	10.42
1985-86	108409	1100085	10.15
1986-87	106364	1069295	10.05
1987-88	123393	1275650	10.34
1988-89	136405	1089358	7.99
1989-90	116584	1065680	9.14
1990-91	123846	1236805	9.99
1991-92	127796	1379370	10.79
1992-93	129605	1438015	11.10
1993-94	131248	1438055	10.96
1994-95	131248	1438055	10.96
1995-96	134609	1491555	11.08
1996-97	133973	1507865	11.25
1997-98	136274	1553180	11.40
1998-99	244835	2761940	11.28
1999-00	243020	2923020	12.03
2000-01	248993	3215570	12.91
2001-02	237650	2994120	12.60
2002-03	245323	3385910	13.80
2003-04	270826	3907120	14.43
2004-05	348149	4855377	13.95
2005-06	301044	4160890	13.82
2006-07	344924	5166672	14.98
2007-08	401855	6647768	16.54
2008-09	395597	5268327	13.32
2009-10	434570	7930240	18.25
2010-11	460206	8326390	18.09
2011-12	430264	8205470	19.07
2012-13	444144	8603120	19.37
2013-14	462041	8950024	19.37
2014-15	471023	9254285	19.65
2015-16	475700	9474099	19.92
2016-17	499948	10215957	20.43
2017-18	477613	9744412	20.40
2018-19	468584	9655082	20.60
2019-20	461317	9605624	20.82

Source: Bangladesh Bureau of Statistics

Table 2. Annual Wholesale Prices of Potato in Bangladesh

Year	Price (Tk./100kg)
1999	843
2000	759
2001	520
2002	719
2003	918
2004	829
2005	658
2006	1398
2007	1638
2008	1265
2009	2042
2010	1098
2011	870
2012	1556
2013	1194
2014	1476
2015	1599
2016	1694
2017	1306
2018	1621
2019	1519

Source: Department of Agricultural Marketing

Table 3: Potato Production (Million MT) in Leading Countries

Year	Bangladesh	China	France	Germany	India	Netherland	Poland	Russia	USA	Ukraine
2009	5.27	69.89	7.12	11.68	34.39	7.18	9.70	31.13	19.62	19.67
2010	7.93	76.59	6.62	10.14	36.58	6.84	8.45	21.14	18.35	18.71
2011	8.33	81.64	7.44	11.84	42.34	7.33	9.36	32.68	19.51	24.25
2012	8.21	84.40	6.38	10.67	41.48	6.77	9.09	29.53	21.09	23.25
2013	8.60	85.93	6.96	9.67	45.34	6.58	7.29	30.20	19.72	22.26
2014	8.95	84.21	8.09	11.61	46.40	7.10	7.69	31.50	20.06	23.69
2015	9.25	82.89	7.12	10.37	48.01	6.65	6.31	33.65	20.01	20.84
2016	9.47	84.99	6.95	10.77	43.42	6.53	8.87	22.46	20.43	21.75
2017	10.22	88.54	8.55	11.72	48.61	7.39	9.17	21.71	20.45	22.21
2018	9.74	90.32	7.86	8.92	51.31	6.03	7.31	22.39	20.42	22.50
2019	9.66	91.88	8.56	10.60	50.19	6.96	6.48	22.07	19.18	20.27

Source: FAOSTAT

Table 4: Potato Yield (MT/ha) in Leading Countries

Year	Bangladesh	China	France	Germany	India	Netherland	Poland	Russia	USA	Ukraine
2009	13	14	44	44	19	46	19	14	46	14
2010	18	16	42	40	20	44	21	10	45	13
2011	18	16	47	46	23	46	23	15	45	17
2012	19	17	41	45	22	45	24	13	46	16
2013	19	17	43	40	23	42	21	14	46	16
2014	19	17	48	47	23	46	28	15	47	18
2015	20	17	43	44	23	43	21	16	47	16
2016	20	18	39	44	21	42	29	16	49	17
2017	20	18	44	47	22	46	28	16	48	17
2018	20	19	39	35	24	37	25	17	50	17
2019	21	19	41	39	23	42	21	18	50	15

Source: FAOSTAT

Focus Group Discussion (FGD) & Key Informant Interview (KII)

Focus Group Discussion (FGD) & Key Informant Interview (KII)






Availability and Price Volatility of Onion in Bangladesh: An Inter-Institutional Study in 2020

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Executive Summary

Onion is commonly used as spices in Bangladeshi diet. Bangladesh have to depend on other countries specially India to fulfill its domestic demand. Much of the onion import takes place during August to October, coinciding with the arrival of Rabi crop, which has good import substitution potential. Fluctuations in production in Bangladesh and neighboring countries greatly influence the onion market. As Bangladesh imports the lion share of its onion demand from India so any movement of India's onion market price influences Bangladesh's market instantly. Bangladesh faces a highly volatile onion prices during the last few years. The price spikes are turning seasonal and severe over time, sometimes creating a situation of onion crisis when import origin country India bans its export. Changes in nature of demand for onion and price speculation by small and marginal hoarder are also important reasons for price hike. Considering this, current research was conducted to analyze various dimensions related to production, trade, consumption, prices and price transmission in onion with a view to suggest suitable policy options to control or mitigate the recurring onion price shocks.

The analysis is largely based on the secondary data obtained from various sources and primary information by conducting FGDs by an inter-institutional study team. Insights were also obtained from primary onion markets of top five growing areas of Bangladesh. Price transmission analysis was applied to analyze the linkages and transmission of onion prices to different domestic markets and imports. The market behavior was studied using data on onion arrivals after harvest, seasonality of storage and prices in Dhaka, Kashinathpur market in Pabna, Rosulpur markets in Faridpur and Bonpara market of Natore district.

Onion area, production and productivity witnessed significant growth during the last few years. Onion production increased by about 60% in ten years following 2010-11, which attracted area shift in favour of onion. However, the production of onion faced sharp year to year fluctuations leading to the price shocks. Pabna district is the leading onion producing district and accounted for 42% of onion production. Onion area and yield witnessed significant growth in Pabna, Faridpur and Rajshahi, which resulted in sharp increase in onion production during the above period. A number of factors were responsible for recent onion price hike in Bangladesh which include Indian ban and domestic market manipulation by the unscrupulous trade syndicates. Following the ban imposed by India this syndicate engineered domestic market in such a way so that they can reap the advantage of curtailed supply of onion in the market. Besides consumers rushed for buying and storing onion at the inception of price hike that provided extra privileges to the market functionaries to do malpractice with the market. At the same time lack of market control, lack of alternative sources of onion for quick imports, misleading data and information and limited area coverage of summer onion and murikata onion were some of other crucial reasons for onion price spike in Bangladesh. The study suggests some policy recommendations to overcome onion price spiral such as identification of unscrupulous trade syndicates and put them under trial, finding out several exporting countries for onion imports during crisis, reduction of import dependency through increasing domestic production, regular updating of onion production and marketing data to avoid misleading information, and fixing the year round prices of onion in the market. Besides, an examination of the onion prices and policy in recent years clearly brings out that domestic supply management needs to follow advance and well thought out plan in response to the signals given by market prices and check price spikes.

1. Introduction

1.1 Background of the study

Agriculture is the single most important sector of the economy in Bangladesh. The economic development is inextricably linked with the performance of this sector. The performance of this sector has an overwhelming impact on major macroeconomic objectives like employment generation, poverty alleviation, human resources development and food security. The overall performance of the economy is, therefore, yet inextricably linked to the performance of the agricultural sector. In order to ensure long-term food security for the people, a profitable, sustainable and environment-friendly agricultural system is critical. Agriculture of Bangladesh is enriched with diversified crops and cropping systems. Besides food crops, spices crops are getting importance day by day. Spices and condiments play quite an important role in the national economies of several spice-producing, importing and exporting countries of the world. Presently 109 kinds of spices are cultivated in the world but in Bangladesh we use only 27 and produce17. On the basis of area, yield, demand and availability, spices are divided into three categories viz. major, minor and exotic. Major spices such as chili, onion, garlic, turmeric and ginger are regularly used in daily diet at large amount (Islam et al. 2011).

Onion is one of the essential food items of the people of Bangladesh. Among the spice crops, onion is a popular food ingredient and an integral part of curry cooking. Although used as a vegetable in most countries of the world, onion is a basic ingredient in South Asian food and is used as a spice in almost all countrie. The major onion producing countries are China, India, Egypt, USA, Iran, Turkey, Russia, Pakistan, Bangladesh, Brazil, Mexico, Netherland, Nigeria, Korea, Spain, Algeria, Ukraine, Myanmar, Japan and Uzbekistan (Appendix Table 1). Although most countries grow more or less onions, India produces around one-quarter of the global onion supply (second only to China), and exports about 10 percent of its total onion output-much of it to Bangladesh, Malaysia, and Singapore (Ahmed and Ahmed, 2013).

Onion stands first among the spice crops in Bangladesh both in area (1.85 lakh ha) and production (19.54 lakh metric ton) (BBS, 2019).Top ten onion producing districts of Bangladesh in 2019-20 were Pabna, Faridpur, Rajbari, Rajshahi, Kushtia, Jhinaidaha, Manikganj, Magura, Meherpur and Khulna. (Table 1) As the production of onion in Bangladesh has gradually increased in recent years, its import dependency also increased. In contrast, the volume of imports has increased almost two and a half times in the last five years due to increasing demand. The Figure 1 of onion import in Bangladesh shows that in 2008-09 total import of onion was 1.35 lakh MT which increased by 12.24 times in 2018-19 to 16.49 lakh MT. From 2008-09 to 2017-18 import expenditure has increased by 1435 percent (Appendix Table 2). In other words, the cost of imports has increased at an increasing rate. As a result of onion imports, the total import expenditure of Bangladesh has definitely increased. This increased cost has been incurred in two directions. First, we had to import more onions in every year. Secondly, the price of onion in the world market has increased over the years.

Table 1.Top ten onion growing districts in Bangladesh

Sl No.	Districts	Production (M. ton)
1.	Pabna	494163
2.	Faridpur	265150
3.	Rajbari	251861
4.	Rajshahi	195452
5.	Kushtia	132536
6.	Jhinaidaha	95781
7.	Manikganj	59189
8.	Magura	59187
9.	Meherpur	49317
10.	Khulna	49317

Source: BBS, 2019

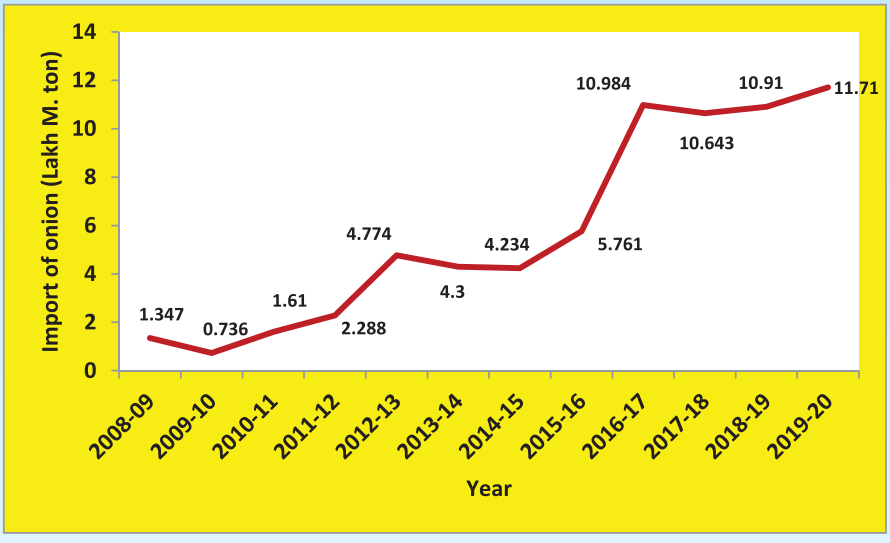

Fig. 1: Import of onion during 2008-09 to 2019-20
Source: Bangladesh Bank, 2020

1.2 Justification of the study

More than one-fifth of total onion production in the world is grown in India. Out of this production, more than 50 per cent is produced in three states of India: Maharashtra, Karnataka and Gujrat (Faridi 2020). Whenever some adverse weather condition occurs in these states, in the form of heavy rain or drought, production of onion is affected. As a result, supply in the market is disrupted and price of onion starts to go up in Indian market. To prevent price spiral, Indian government tries to ensure availability of maximum supply in the local market. In that regard, they either set high minimum export price or put a ban on export of onion. Bangladeshi domestic production can meet demand for 7-8 months and on average 10-12 lakh tonnes of onions are needed to be imported every year. India has been the main source of onion imports for Bangladesh and the country imports more than 350,000 tonnes from India each year. Due to crop damage and delayed harvest by excessive rain and flood in major onion growing areas, India banned onion exports last year (September 29, 2019) and this year (September 14, 2020) that resulted in scarcity in the local market. It caused prices of onion to skyrocket to a historic high of Tk 250 per kg in Bangladesh in 2019. While India imposed a ban on 14 September, 2020 onion prices jumped in Bangladesh by more than 50% to about 80% on 15 September, 2020 although the supplied onion in the market was imported one or two week earlier at that time. The news of onion ban by India influenced the farmers and traders to make stocks for future selling. Afterwards the government of Bangladesh had to fly for onions from other countries such as Pakistan, Turkey, Egypt, Myanmar, etc.

It is recognized that price in the market will move with the movement of demand and supply of a product in the market. Increase in supply of a product decreases the price of that product and vice versa. But in 2020, the price of onion in Bangladesh witnessed a dramatic rise which is a history in the onion market. Bangladesh did not face such a price spike in case of onion except in 2019. Government could not control the market although sufficient onion was imported from different countries. It was found that in the months of November and December some farmers and traders had sufficient onion stock in their hand. They did not dispose their onion though historical price hike occurred in Bangladesh. So, it was thought necessary to investigate the reasons for the recent price hike of onion. In the context of price hike and disequilibrium of market demand and supply situation of onion in 2020, the present study was undertaken to examine the real situation and to recommend some policy guidelines for stability of prices in the onion market.

1.3 Objectives of the study

The present study was undertaken to fulfill the following objectives

- To analyze the long-term trend of production of onion and import situation in Bangladesh;

- To analyze price variation over time;
- To explore the reasons for price spiral in 2020; and
- To recommend policy measures for price stability.

2. Materials and Methods

2.1 Study areas and respondents

Three onion growing areas of Bangladesh such as Faridpur, Pabna and Natore were selected for the study. In addition to a large number of farmers, DAE and DAM personnel were interviewed in the study areas. The present study was mainly based on secondary data obtained from DAM, BARI, BBS, DAE, BADC, TCB, Tariff Commission, Shambazar wholesale market, Dhaka etc. Before commissioning the actual research, a series of meeting was conducted with different personnel of aforesaid institutions/organizations in order to get their opinion on recent price hike. Additionally, some important information was collected from different stakeholders in the supply chain through Focus Group Discussion (FGD) and Key Informant Interviews (KII) using predefined checklists. The stakeholders were farmers, wholesalers, Beparis, consumers and importers.

2.2 Conducting FGD

Focus Group Discussion (FGD) was conducted to analysis price volatility and availability of onion in Bangladesh. It was done by an inter-institutional study team comprising of members from BARI, BARC, BAU and senior agricultural economists. In total nine FGDs were conducted in three onion growing areas of Bangladesh viz. Nagarkanda upazila of Faridpur district, Sathia Upazila of Pabna district and Boraigram Upazila of Natore district. FGDs were conducted with the farmers, traders and consumers of three survey areas. Each of the FGDs comprised of ten farmers and five to ten traders of different levels. Traders included importer, Faria, Bepari, Paiker, Aratdar (commission agent) and seasonal hoarder. A discussion guide was prepared prior to the commencement of the FGDs. The guide comprised the general format of the discussions and the techniques that were used to elicit responses. In addition to a moderator in FGD, there was a note keeper who recorded comments and observations of the FGDs. A voice recorder was also used to record whole discussion in order to recall necessary issues.

2.3 Analytical techniques

Growth rate analysis: The compound growth rates of area, production, yield and price of onion were worked out by fitting exponential function of the following type:

$$Y = ae^{bt} \text{ or } \ln Y = \ln a + bt$$

Where, Y is area/production/yield/ price of onion, 't' is the time and 'a' is the constant. eb-1 be the compound growth rate which is expressed in percentage.

Calculation of DRC: Domestic resource cost (DRC) analysis attempts to provide an estimate of the value of domestic resources used in producing a particular product when all intermediate inputs are valued at world prices and all factor inputs are valued at their true opportunity cost prices. The following formula is used for calculating DRC.

$$DRC = \frac{\sum D_{ij} V_i}{B_i - \sum T_{ik} V_k}$$

Where,

D = Quantity (MT) of domestic resources and non-traded inputs used for producing a product

V_i = Price (Tk/MT) of domestic resources and non-traded inputs

B = Boarder price (Tk/MT) of that particular product

T = Quantity (MT) of tradable inputs for producing that product

V_k = Boarder price (Tk/MT) of tradable inputs for producing that product

If DRC<1, the economy can save foreign exchange by producing the ith crop domestically either for export or for imports substitution. This is because the opportunity cost of domestic resources and non-traded inputs

used in producing i crop is less than the foreign exchange earned or saved. In contrast, if DRC>1, domestic costs was in excess of foreign exchange or savings indicating that i crop should not be produced domestically and should be imported instead.

3. Results and Discussion

3.1 Area, Production and Yield of Onion

Onion is an important spices crop in Bangladesh which ranks first in production among the spices. Since independence Bangladesh witnessed significant increase in the yield of onion from 4.9 M. ton per hectare in the FY 1972-73 to 10.54 M. ton per hectare in FY 2019-20 (Fig. 2) and (Appendix Table 3). But the first phase (FY 1973-72 to FY 2003-04) witnessed a stagnation in production driven largely by area decline. In this period, a stagnant picture of onion cultivation was found. Besides, the yield levels remained stagnant at nearly 6 MT per hectare. After 2003-04, two dimensions of production witnessed exponential growth of onion. In thirteen years following 2003-04, onion productivity increased by about 60 per cent which attracted moderate area shift in favor of onion. As a result, onion production tripled in less than 10 years since 2003-04. Currently the yield of onion is 10.54 M. ton per hectare (Appendix Table 3) which is very low compared to some other onion producing countries such as Ireland (58 tons/ha), Korea Republic (57 tons/ha), USA (55.88 tons/ha), Spain (52 tons/ha), Chile (48.50 tons/ha), Australia (49 tons/ha) and India (13.20 tons/ha).

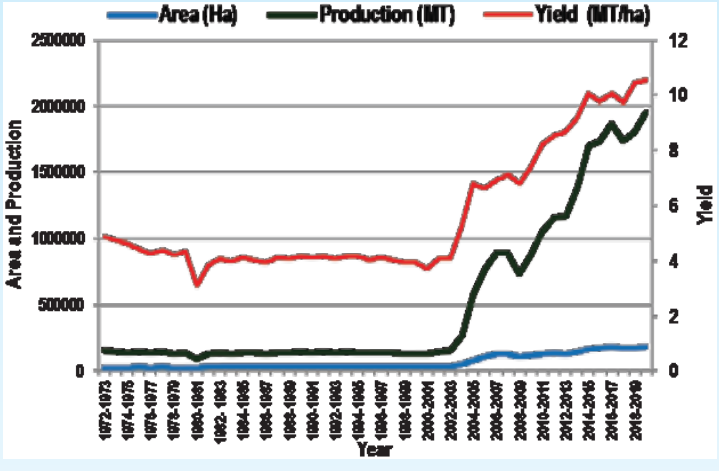

Fig. 2: Area, productio and yieldof onion in Bangladesh (1972/73 to 2019/20)
Source: Different issues of BBS

The recent development of onion cultivation in Bangladesh is mostly due to development of high yielding varieties and improved crop production technology from Bangladesh Agricultural Research Institute (BARI). BARI has developed first onion variety in 1996 which was BARI Piaj-1. Since then it has developed additional four onion varieties of which BARI Piaj-2 and 3 are good for growing in Kharif season (Azad et al., 2019). The yield of BARI developed onion varieties is enumerated in Table 2.

Table 2: Yield of BARI developed onion varieties

Variety	Year of release	Yield (M. ton/ha)
BARI Piaj -1	1996	12-16
BARI Piaj -2	2000	18-22
BARI Piaj -3	2000	17-22
BARI Piaj -4	2008	17-22
BARI Piaj -5	2010	18-20

Source: Azad et al., 2019

The growth of area, production and productivity of onion has shown in three different periods. First after the independence from 1972/73 to 2019/20 where the area, production and yield of onion grew by 4.29%, 6.33% and 2.04%, respectively (Table 3). During the period of 1972/73 to 1997/98 the growth was accounted for 0.43%, 0.05% and -0.39% respectively. However, these growth rates increased significantly to 8.99%, 14.21% and 5.22% in area, production and yield respectively during 1997/98 to 2019/20.

Table 3. Compound Growth Rates (%) of Onion in Bangladesh

Year	Area			Production			Productivity		
	Growth rate	R^2	t-value	Growth rate	R^2	t-value	Growth rate	R^2	t-value
1972/73-2019/20	4.29*	0.75	11.85	6.33*	0.72	10.89	2.04*	0.64	8.98
1972/73-1997/98	0.43*	0.63	6.37	0.05	0.0017	0.21	-0.39	0.13	-1.92
1997/98-2019/20	8.99*	0.85	11.18	14.21*	0.88	12.65	5.22*	0.92	15.11

Source: Different issues of BBS
*Significant at 1% level

The growth of onion producing area and productivity is presented through the (Fig. 3 and 4) respectively (Appendix Table 4 and Table 5). These indicate a high instability of area growth. The negative growth of onion growing area in Bangladesh was observed for alternative years. Onion production in the country even after area decline have experienced productivity growth. After FY 2002-03 growths of onion growing area, production and productivity got a dramatic increase and continued until 2004-05. But after that period again it started to fall and became negative in 2007-08.

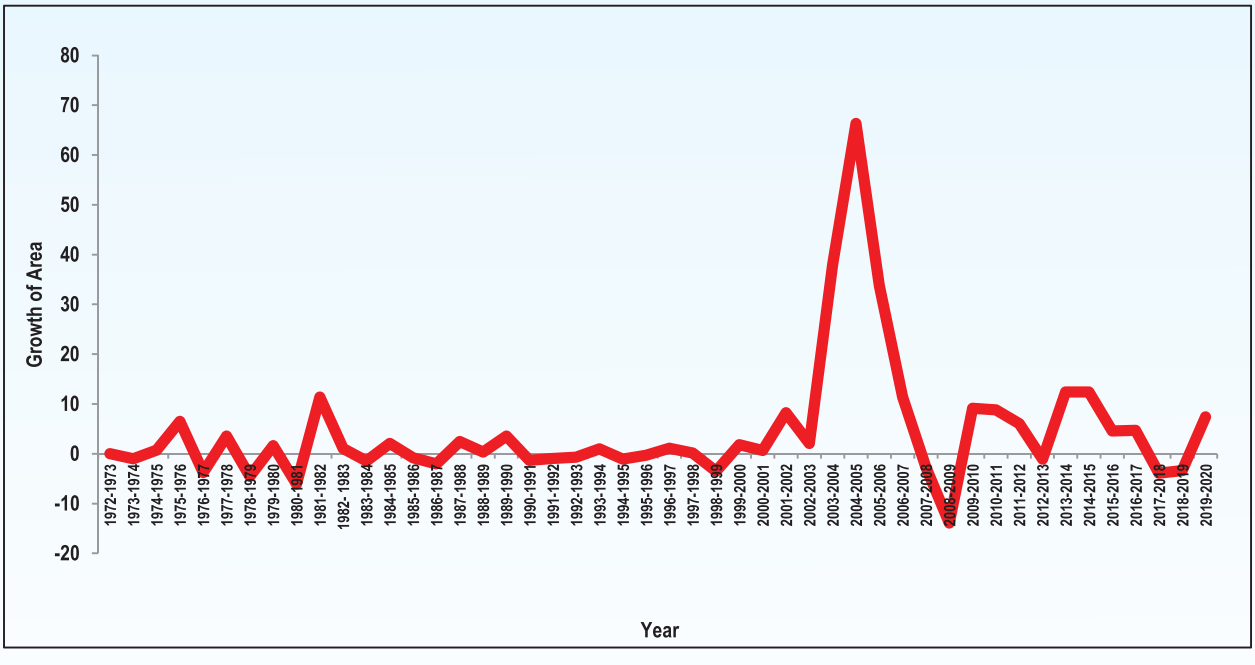

Fig.3: Instability of onion cultivation area in Bangladesh (1972-73 to 2019-20)
Source: Different issues of BBS

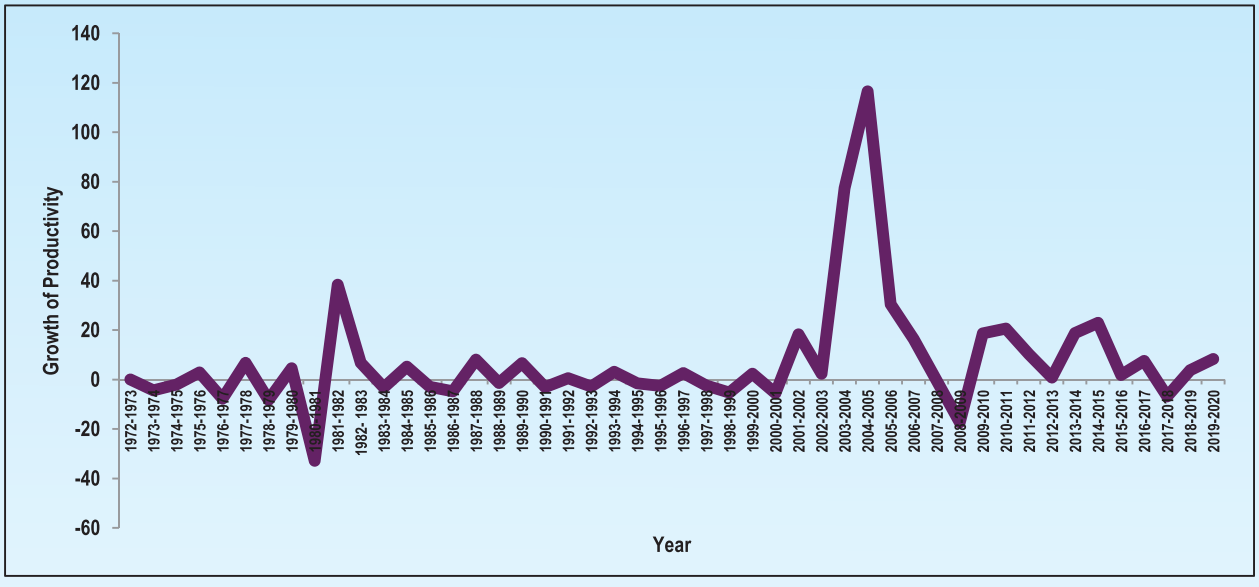

Fig. 4: Instability of onion productivity in Bangladesh (1972-73 to 2019-20)
Source: Different issues of BBS

Inconsistencies in information on onion cultivation and production

The area under onion cultivation and production data originated from two sources. One is the Department of Agricultural Extension (DAE) and the other is the Bangladesh Bureau of Statistics (BBS). There is a wide gap between the area of onion cultivation and the calculation of production obtained from these two sources. For example, in 2017-18, according to the estimates of DAE, 23.30 lakh metric tons of onion was produced in 2.07 lakh hectares of land. Where BBS says in 2017-18, 17.38 lakh metric tons of onion tubers have been produced by planting onions in 1.78 lakh hectares of land. Similar gaps are evident in previous years. DAE estimates are higher than BBS estimates for both cultivated area and production (Fig. 5). Again, there are inconsistencies in the areas under onion cultivation. During the period from 2008-09 to 2017-18, the DAE source estimated 13-46% higher area of onion cultivated land than the BBS statistics. More differences were also found in production. DAE estimated 13.92% higher production during the period over BBS statistics. Researchers do not have enough data to say whose figures are inconsistent or inaccurate. The DAE and the BBS may come to a single conclusion in the negotiations to address this inconsistency.

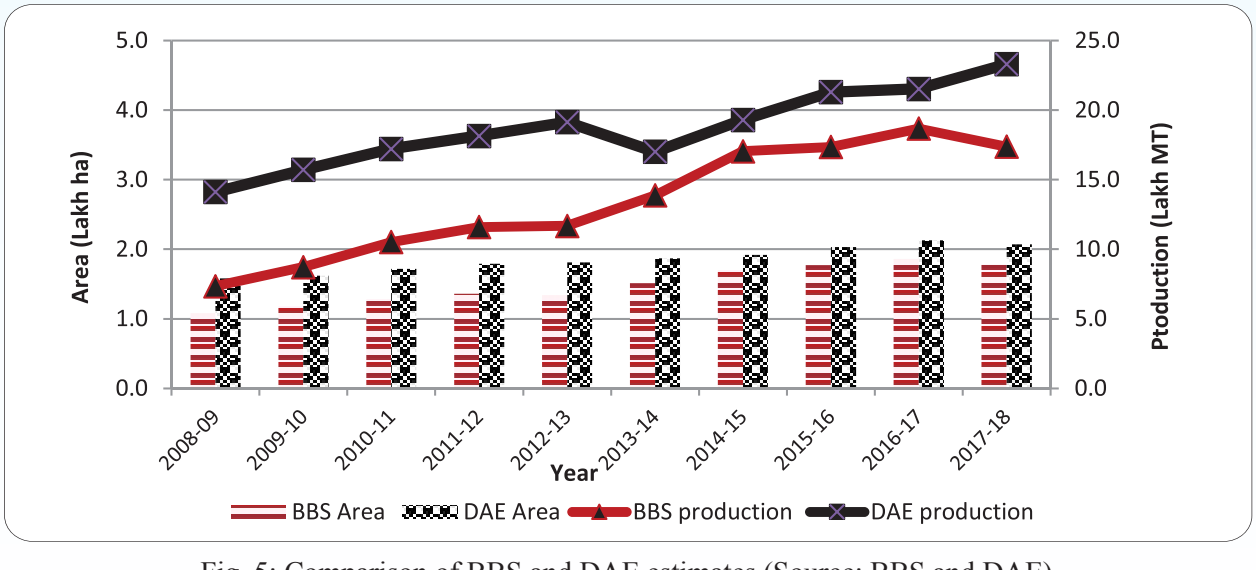

Fig. 5: Comparison of BBS and DAE estimates (Source: BBS and DAE)

3.2 Price variation of onion

Prices of onion in the market are regulated by the existing market demand and supply integration. Demand for onion depends on a lot of factors such as population, habit, custom, income, taste and availability of that product. Besides, supply of onion depends on production, marketing facilities, availability in the market and imports. The trend of annual nominal farm gate, wholesale and retail prices of onion from FY 2005/06 to FY 2018/19 has been shown in Figure 6 (Appendix Table 6). Each of the three prices shows about the same fluctuations throughout the period.

Fig. 6: Annual average price variation of onion (2005/06 to 2018/19)

If one year witnessed upward trend then the subsequent year witnessed downward trend of prices. This trend continued until FY 2015/16. Within the period a dramatic rise in prices was found in FY 2012/13 accompanied by sudden fall in the subsequent prices (Fig. 6). Among those 14 years prices increased sharply in 2006/07, 2008/09, 2010/11, 2012/13, 2014/15. After 2015/16 an upward trend was found in each of the three categories of prices in Bangladesh and this continued in 2019 and 2020. The prices of onion reached to a historic high of Tk 250 per kg in Bangladesh in 2019. The farm gate and wholesale price increased by 16% per annum while the retail price increased by 15% per annum.

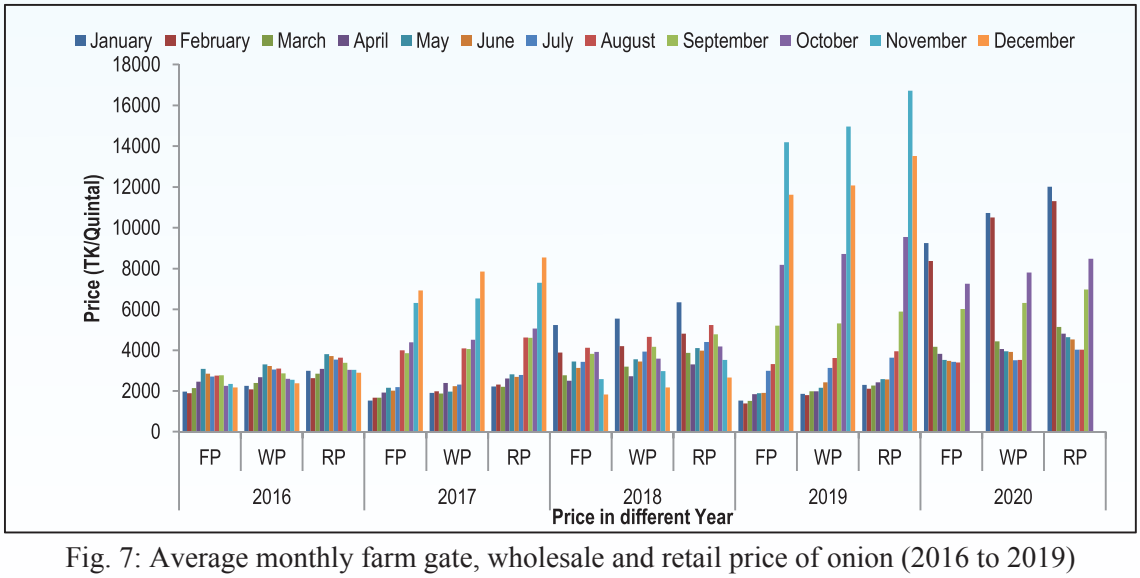

Fig. 7: Average monthly farm gate, wholesale and retail price of onion (2016 to 2019)

Average monthly farm gate, wholesale and retail price of onion (2016 to 2019) is presented in Figure 7 (Appendix Table 7). Limited fluctuations of prices were found in the whole year of 2016. In 2017 prices were volatile in the last four months of the year when stock of onion reduced at the farm level. This picture was similar in 2019. But unfortunately the price reached to the historic high position.

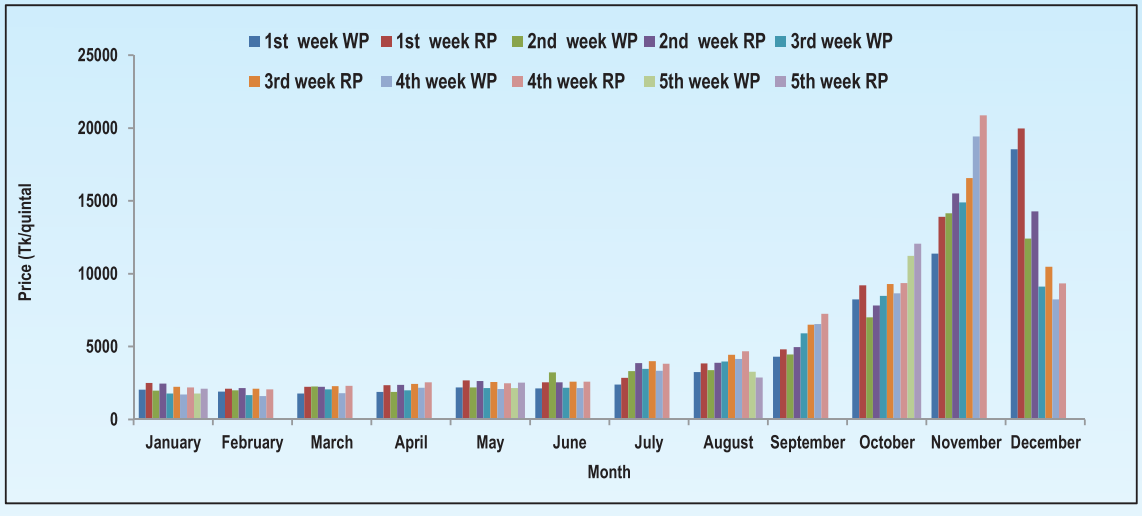

Fig. 8: Average weekly wholesale and retail price of onion in 2019

Figure 8 (Appendix Table 8) shows the volatility of weekly wholesale and retail price of onion in 2019. Here, prices were very unstable in the last four months of the year. Wholesale price of onion in the first week of January was Tk. 2033 per quintal of onion while it reached to Tk. 18537 per quintal in the first week of December. The highest wholesale price of onion was found in the fourth week of November in 2019 which accounted for Tk. 19430 per quintal of onion. The retail price started from Tk. 2513 per quintal of onion in 2019 while it reached to Tk. 9329 in the fourth week of December 2019. The retail price reached the peak in the fourth week of November which was Tk. 20859 per quintal of onion in 2019.

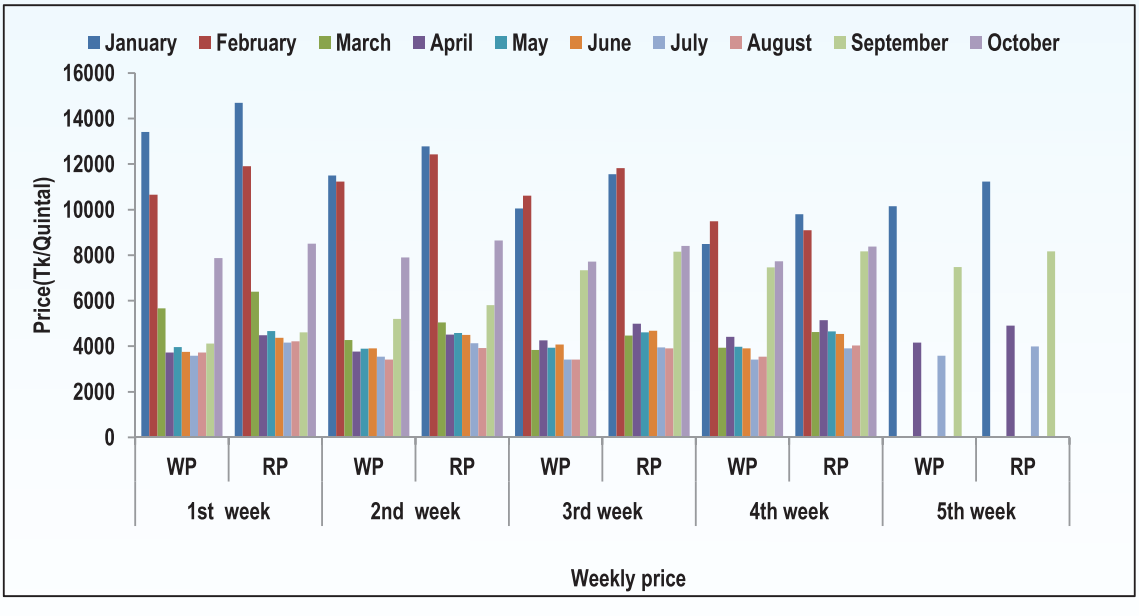

Fig. 9: Average weekly wholesale and retail price of onion in 2020

Average weekly wholesale and retail price of onion in 2020 is depicted in Figure 9 (Appendix Table 9). Prices in the last four months of 2019 showed an increasing trend, and the first three months of 2020 witnessed a higher wholesale and retail prices. From April 2020 to September 2020 the prices were relatively stable. But it became high again in October 2020. Prices of onion became stable in the month of April to August and it started to volatile from September to March of the following year.

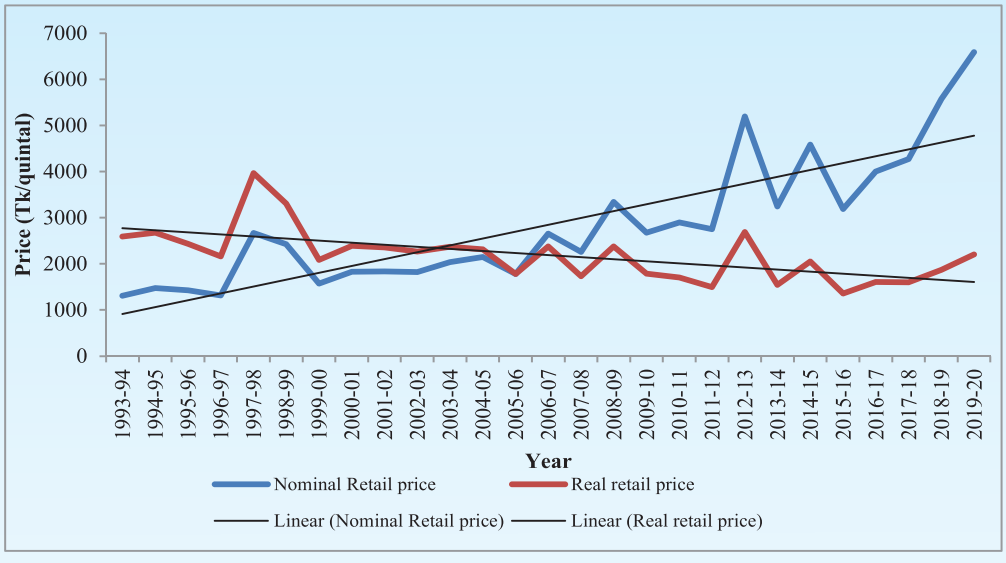

Fig. 10: Annual nominal and real prices of onion with trend lines (Retail level)

The annual nominal and real retail prices of onion during 1993/94 to 2019/20 as shown in Figure 10. It exhibits upward trend for nominal retail price and downward trend for real retail price. It implies that nominal onion prices are influenced by rise of inflation. The nominal price of onion at retail level during this period increased significantly by 5.12%. Real price (retail level) of this period declined by 2.01% (AppendixTable 11). Price increment was found in the year 1994/95, 1997/98, 2006/07, 2008/09, 2012/13 and 2014/15. After 2015/16 no decreasing trend was found for both nominal and real prices.

Price transmission to Bangladesh from Indian markets: Error Correction Term (ECM) based evidence

The coefficient of error correction term denotes the speed of adjustment; the higher the speed of adjustment, the higher is the chance of correction of any disequilibrium caused due to change in any phenomenon.

$$lnDomesticprice_t = -0.06ECT_{t-1} + 0.12\sum \Delta lnIndian\ FOBprice_{4-1} + 0.13\sum \Delta lnDomesticprice_{4-1} \quad \text{.....(1)}$$

It is observed that when Bangladeshi onion price is considered to be dependent on the international (mostly Indian) markets, the speed of adjustment is very high (6%) in general in Bangladesh. The imported quantity might be released due to which faster error correction mechanism takes place. The supply shock by Indian onion export ban directly affects the current as well as future prices in a period of 12 months. It was observed that when a price shock was given to Bangladesh market, an immediate and a high response was noticed in almost all periods.

Figure 11 shows the movement of domestic and world price of onion. From 2010 to 2016 domestic onion prices went in similar pattern with world prices. But the domestic price was far higher than the world prices in 2016 and 2020. This occurrence happens when domestic price of onion is deployed by the domestic stakeholders.

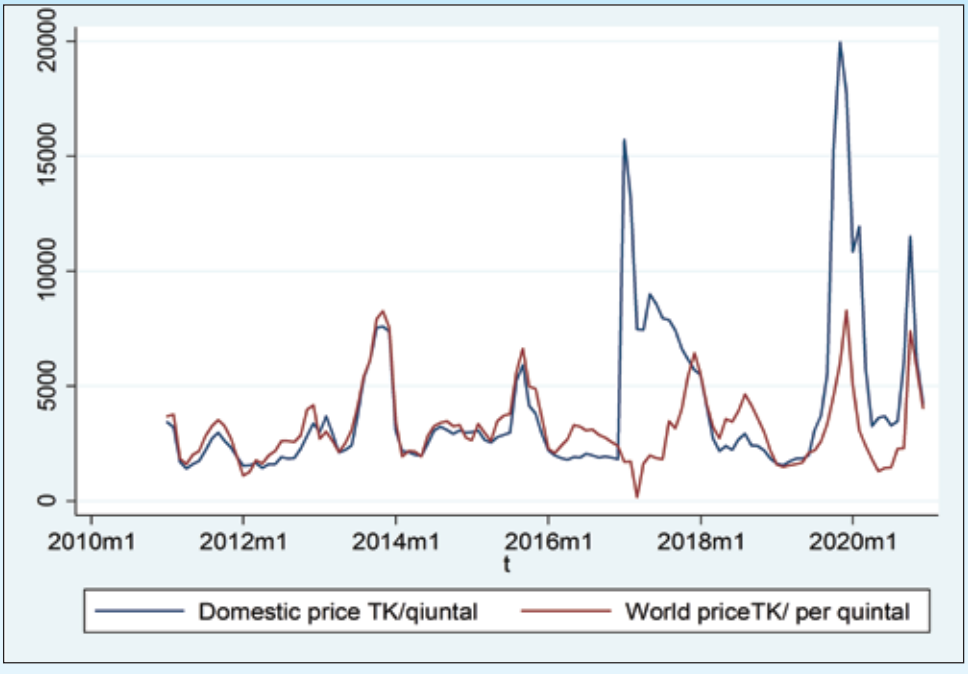

Fig. 11: Movement of Domestic and world price of onion

Source wise FOB price and import parity price of onion at retail level

Source wise FOB price and import parity price of onion at retail level in Bangladesh have been shown in the Figure 12. It is evident from the figure that, if Bangladesh imports onion from India then price of onion will be Tk 43.58 per kg of onion at retail level. The price of onion will be Tk. 52.23 per kg if Bangladesh imports from Turkey. At the same time, the per Kg of onion price will be Tk. 24.18, Tk.38.51 and Tk.40.43 if Bangladesh imports from China, Pakistan and Egypt respectively (Figure 12). Thus, Bangladesh can reduce import dependency on India rather it can import from Turkey, China, Pakistan and Egypt in crisis period.

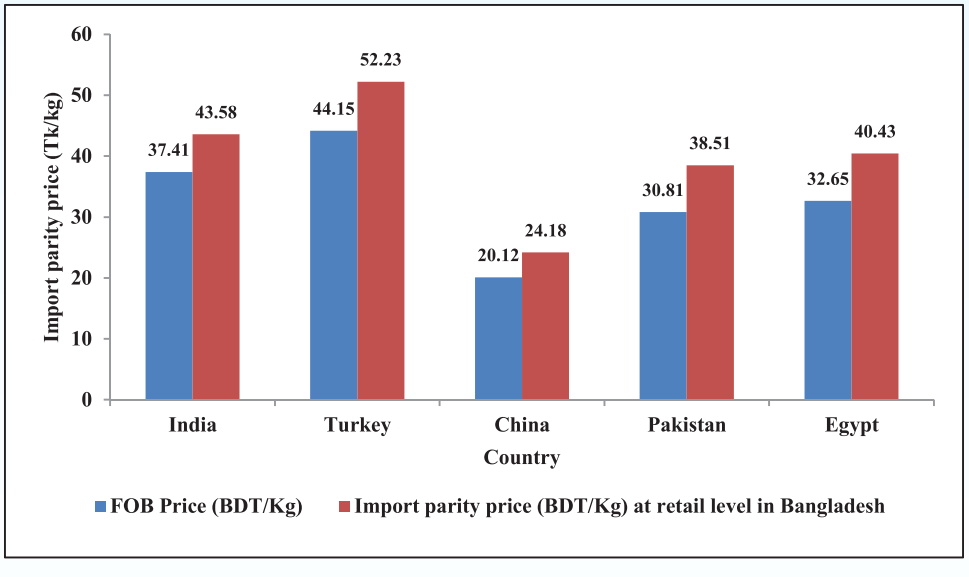

Fig. 12: FOB price and import parity price of onion at retail level

Price Transmission across Domestic Markets

As revealed that the shocks generate from the primary onion markets and spread throughout the markets in the country, the variance decomposition technique was applied for examining the price changes in other markets caused due to changes in Pabna district's prices. As Kashinathpur bazar of Pabna district is a major

distributing market, the time series onion wholesale price data were standardized by dividing with the Dhaka Shambazar wholesale price of onion. After standardization, the series became stationary at the level. It can be observed that Kashinathpur is the major influencing market for all the selected markets. As markets are co-integrated, the price signals are transmitted speedily to other markets as well. In the case of Kashinathpur market, Kashinathpur prices are influenced by the changes in its own price. This seems to be very logical as Kashinathpur is the biggest primary market of onion and does not receive produce from any other markets. Thus, only the changes on supply front in the surrounding producing clusters will bring the change in Kashinathpur has been a major change agent in causing variation in other domestic markets too, mainly in Faridpur, Natore and Rajshahi markets. Kashinathpur is located at the distance of 200-400 km from these markets, so the physical movement of onion can easily take place between Kashinathpur and these markets. The long run impact of Kashinathpur in Pabna has been quite significant. Faridpur is the only market which seems to be least affected by its own price changes. Faridpur dominates in terms of supply of second highest quantity of onions.

3.3 Demand and supply situation of onion

Annual supply of onion

In 2018-19 and 2019-20, the domestic production of onion was 18.03 and 19.53 lakh metric tons, respectively. However, onions are considered as perishable goods and about 25% of the total production is considered as post-harvest waste. As a result, the quantity of usable onions stood at 13.52 and 14.54 lakh metric tons in the 2018-19 and 2019-20, respectively (Table 4). A portion of the imported onions of these years also suffered a loss at the distribution stage which can be considered as 5%. Of the 10.91 and 11.71 lakh metric tonnes of onions imported in 2018-19 and 2019-20, the usable quantity remained as 10.36 and 11.12 lakh metric tonnes. As a result, the net amount of onion for human consumption was 23.88 and 25.77 lakh metric tons, respectively (Table 4). The low level of import was the main reason for the short fall of total quantity in 2019-20.

Table 4. Annual supply of onion in Bangladesh in 2018-19 and 2019-20

Serial No.	Details	Amount of supply (lakh metric tons)	
		2018-19	2019-20
1	Gross domestic production	18.03	19.53
2	Post-harvest loss of onion (25%)	4.51	4.88
3	Usable Net Production (1 - 2)	13.52	14.65
4	Total imports	10.91	11.71
5	Loss at distribution stage of imported onions (as 5%)	0.55	0.59
6	Net Availability of Imported Onions (4 - 5)	10.36	11.12
7	Net availability for human consumption (3 + 6)	23.88	25.77

* It takes 6.25 kg tuber for per kg seed production. Requires seedlings of 4 kg of seedlings per hectare. Therefore 6.25 * 4 = 25 kg of onion tuber is required to produce the amount of seedlings required for planting one hectare of land.

Annual demand for onion

The Household Income and Expenditure Survey 2016 report shows that the per capita daily onion consumption in 2010 was 22 grams which increased to 31.04 grams in 2016 (BBS 2019a). In other words, the demand for onion has increased at the rate of 1.51 grams per capita annually. As such, the per capita daily demand

for onion in 2018-19 and 2019-20 stood at 34.06 grams. But considering the amount of domestic production and import of onions and in the context of improving the quality of life of the people, the per capita daily consumption of onions for 2018-19 and 2019-20 seemed to be more. The total annual demand for onion multiplied by the population were 22.23 and 22.92 lakh metric tons, respectively in 2018-19 and 2019-20. Moreover, onions were used for seed production and for the production of murikata onions. In Bangladesh, a total of 1.73 lakh hectares required 0.043 lakh metric tons onion tuber in 2018-19 and 1.85 lakh hectares required 0.046 lakh metric tons onion tuber in 2019-20 (Table 5) for the seed purpose. On the other hand, 0.312 lakh hectare crop land under murikata onions required 0.68 lakh metric tons for both the period (1.50 tons per hectare) of onion tuber. Apart from this, another use of onion is in processing industry and pharmaceutical industry especially in making Unani and Ayurvedic medicine. According to various sources, about 1.0 lakh tonnes of onions are also used in this case. In all, the annual net demand for onion stood at 22.23 and 22.92 lakh metric tons, respectively in 2018-19 and 2019-20 (Table 5).

Table 5. Annual demand for onion in Bangladesh in 2018-19 and 209-20

Serial No.	Statement	Amount of demand (Lakh Metric Tons)	
		2018-19	2019-20
1.	Annual demand for human food (daily per capita consumption is 34.06 grams).	20.51	21.19
2.	Demand for seed production (Per hectare 25 kg tuber requi red in 1.73 &1.85 lakh hectare land).*	0.043	0.046
3.	Demand for *murikata* onion production (quantity of onion tuber in 0.312 lakh hectare land as 1.50 tonne per hectare).	0.68	0.68
4.	Used in processing industry and pharmaceutical industry especially in making *Unani* and *Ayurvedic* medicines	1.00	1.00
5.	Net demand for onions	22.23	22.92

* It takes 6.25 kg tuber for per kg seed production. Requires seedlings of 4 kg of seedlings per hectare. Therefore 6.25 * 4 = 25 kg of onion tuber is required to produce the amount of seedlings required for planting one hectare of land.

The annual demand for onion here is 22.23 and 22.92 lakh metric tons as against the supply of 23.88 and 25.77 lakh metric tons, respectively in 2018-19 and 2019-20. This means that the supply was higher than demand implying that Bangladesh at that time had sufficient onion stock to face the demand. The supply of onion in the market is always kept a bit high as it is perishable.

Consumption of onion

Consumption of onion has increased over time. In 1995, the per capita daily onion consumption was 11.60 grams; it has almost tripled in 21 years to 31.04 grams per capita in 2016. In the period from 2010 to 2016 alone, the per capita annual consumption of onion increased by 1.51 grams (Table 6). With the gradual increase in per capita onion consumption over the last 21 years (1995-2016), it can be said with certainty that per capita onion consumption has increased by more than 1.51 grams per annum since 2016. It is very normal for the per capita consumption of onions to increase as a result of increasing per capita income and living standards. Along with the increase in per capita demand, the demand for about one million Rohingya refugees who arrived in Bangladesh in 2016 is also noteworthy here.

Table 6. Consumption of onions at different times

Year	Consumption per capita daily (grams)	Increase in annual per capita consumption (grams)
1995	11.60	-
2000	15.41	0.762
2005	18.37	0.592
2010	22.00	0.726
2016	31.04	1.507

Source: BBS (2017)

Estimated demand for onion in Bangladesh for 2021

The demand for onions in Bangladesh in 2018-19 was 22.23 lakh metric tons from which the net availability for the people was 23.88 lakh metric tons (Table 4) excluding post-harvest losses and losses at the distribution stage of imported onions. But with the increase in the quality of life of the people, the demand for onion is increasing every year. In this situation, the demand estimate prepared for 2021 shows that the net demand for onion will be 25.79 lakh metric tons. In order to meet the demand for this quantity of onion, 34.39 lakh metric tons (Table 7) of onion has to be produced. Because 25% post-harvest loss is experienced out of the onion produced. Here the per capita annual consumption as food has been considered to increase at the rate of two grams. Moreover, other uses of onions are expected to increase by 10% in three years.

Table 7. Estimated demand for onion in Bangladesh for 2021

Serial No.	Details	Estimated **amount (Lakh MT)**
1	Annual demand for human food (per capita daily consumption increases from 34.06 gm to 40.06 gm in three years)	24.13
2	Demand for seed production (Considering 10% increase compared to 2016)	0.047
3	Demand for *murikata* onion produc tion (Considering 10% increase compared to 2016)	0.512
4	Processing industry and use in *Ayurvedic* and *Unani* pharmaceutical industry (considering 10% growth as compared to 2016)	1.10
5	Net demand for onion (1 + 2 + 3 + 4)	25.79
6	Gross demand for onion (25% post-harvest loss adds to net demand)	34.39

3.4 Profitability of onion cultivation

Input use pattern for onion cultivation

The Table 8 enumerates different inputs necessary for onion cultivation which includes human labor, seed, manure, chemical fertilizers, insecticides, pesticides, weedicides, vitamin, hormone and irrigation. For one hectare of onion production average 208 human labour was used of which 105 were supplied from family. On average, farmers used 9.1 kg seed to cultivate one hectare onion. Farmers applied different organic and hemical fertilizers in onion field. On average, they applied 5.8 ton of decomposed cowdung, 203 kg of Urea, 298 kg of DAP, 225 kg of MoP, 18 kg of ZnSO4, 253 kg of ACI organic manure, 14 kg of Mg, and 14 kg of Zn. In order to clear weed they applied 0.95 kg of weedicide in the onion field. Farmers had to incur a large amount of money for insecticide, fungicide, vitamin and hormone application which amounted to about Tk. 8584. Onion field was irrigated 3-4 times in a season. The per hectare average charge of irrigation in a season was Tk. 11132.

Table 8. Level of input use per ha of onion cultivation

Input	Unit	Faridpur	Pabna	Natore	All area
Human labour	Manday	205	203	217	208
Family labour	Manday	109	98	107	105
Hired labour	Manday	96	105	110	104
Seed	kg	9.5	8.7	9.0	9.1
Cowdung	kg	5236	6234	6048	5839
Urea	kg	202	189	219	203
DAP	kg	310	290	293	298
MoP	kg	223	235	217	225
ZnSo4	kg	19	18	18	18
AC I organic manure	kg	260	255	245	253
Weedicide	kg	0.95	0.95	0.95	0.95
Mg	kg	14	14	14	14
Zn	kg	14	14	14	14
Insecticide, fungicide, vitamin and hormone	Tk	8083	9450	8218	8584
Irrigation	Tk	11400	10987	11009	11132

Source: FGD, 2020

Cost of onion cultivation

Onion cultivation includes both variable and fixed costs. The present study considered both the costs in order to calculate per hectare onion cultivation cost (Table 9). About 75.8% of the total cost was for variable cost inputs and the rest 24.2% was due to fixed cost inputs. Fixed costs include cost of family labour and land use cost. Variable costs include cost of land preparation, cost of seed, cost of organic and chemical fertilizers, cost of weedicide, cost of insecticide, pesticide, fungicide, vitamin and hormone, cost of irrigation and interest on operating capital. The lion share of fixed costs was occupied by family labour (15.4%) whereas it was for cost of seed (28.9%) among the variable cost items. The cost of producing per Kg of onion was Tk. 14.95 in the survey area.

Table 9. Per hectare cost of onion cultivation

Particular	Faridpur	Pabna	Natore	All area	% cost
A. Variable cost (VC)	**155548**	**152511**	**155183**	**154414**	**75.8**
Land preparation	14250	13278	13879	13802	6.8
Hired labour	28800	31500	33000	31100	15.3
Seed	61750	56550	58500	58933	28.9
Cowdung	2618	3117	3024	2920	1.4
Urea	3232	3024	3504	3253	1.6
DAP	8680	8120	8204	8335	4.1
MoP	3345	3525	3255	3375	1.7
ZnSo4	3610	3420	3420	3483	1.7
ACI organic manure	3120	3060	2940	3040	1.5
Weedicide	1900	1720	1470	1697	0.8
Mg	2100	2100	2100	2100	1.0
Zn	2660	2660	2660	2660	1.3
Insecticide, fungicide, vitamin and hormone	8083	9450	8218	8584	4.2
Irriga tion	11400	10987	11009	11132	5.5
Int. on OC	3245	3684	3874	3601	1.8
B. Fixed cost	**50590**	**49200**	**47800**	**49197**	**24.2**
Family labour	32700	29400	32100	31400	15.4
Land use cost	17890	19800	15700	17797	8.7
C. Total cost	**206138**	**201711**	**202983**	**203611**	**100.0**
Cost o f production (Tk/kg)	15.27	14.78	14.79	14.95	

Source: FGD, 2020

Financial profitability of onion cultivation

Table 10 enumerates per hectare financial profitability of onion cultivation. The average per hectare yield of onion was found 13623 kg in the survey areas where highest yield was found in Natore district followed by Pabna and Faridpur districts. Based on total cost the average benefit cost ratio was found to be 1.58 (Table 10).

Table 10. Financial profitability of onion cultivation per hectare

Particulars	Faridpur	Pabna	Natore	All area
Yield (kg/ha)	13500	13650	13720	13623
Selling price (Tk/kg)	23.00	23.00	25.00	24
Gross return (Tk/ha)	310500	313950	343000	322483
Gross margin (Tk/ha)	154952	161439	187817	168069
Net return (Tk/ha)	104362	112239	140017	118873
Benefit Cost Ratio				
Over variable cost	2.00	2.06	2.21	2.09
Over total cost	1.51	1.56	1.69	1.58

Source: FGD, 2020

Economic profitability of onion cultivation

Economic profitability of onion cultivation is presented through Domestic Resource Cost (DRC) in Table 11. DRC designates comparative advantage of producing a product in the country for export or not. When the value of DRC is greater than one, it indicates that the economy loses foreign exchange through domestic production. Besides, the value of DRC less than one indicates that production is efficient and will make positive contribution to domestic value addition. The average value of DRC of onion cultivation (Table 11) for the financial year 2019-2020 is 0.35 implying that onion cultivation in Bangladesh has comparative advantage and after fulfilling the domestic demand it has the option to export.

Table 11. Domestic Resource Cost (DRC) for onion

Particulars	Faridpur	Pabna	Natore	All area
A. Traded input (Tk/MT)	1900	1815	1846	1854
Urea	481	445	513	479
DAP	934	864	869	889
MoP	486	506	465	486
B. Non-traded inputs and domestic resources (Tk/MT)	8706	8808	9215	8909
Human labour	2266	2395	2634	2431
Land preparation	750	710	780	747
Seed	3250	3024	3287	3187
Cowdung	138	167	170	158
ACI organinc manure	164	164	165	164
ZnSO4	190	183	192	188
Weedicide	100	92	83	92
Mg	111	112	118	114
Zn	140	142	149	144
Insecticide, fungicide, vitamin and hormone	425	505	462	464
Irrigation	600	588	618	602
Int. on operating capital	171	197	218	195
Land use	942	1059	882	961
C. Output price (Tk/MT)	27519	27519	27519	27519
D. Value added (Tradable) (Tk/MT) (C-A)	25619	25704	25673	25665
E. DRC (B/D)	0.34	0.34	0.36	0.35

Source: FGD, 2020

3.5 Onion marketing and trade

The domestic onion market is largely depending on Pabna, Faridpur, Natore, Rajshahi and Kustia districts of the state. As reported by stakeholder in FGD seed based and bulb-based production system of onions are marketed in Bangladesh. Where about 10-15 per cent of production took place from bulb-based. The seed-based production covers 85 percent during Rabi season. The summer season onion has not yet significantly appeared in the country. The Table 12 showed weekly disposal of domestic origin in Bangladesh. The disposed volume was observed two times in a week in Nagarkanda Upazila whereas it was occurred daily in Sathia Upazila of Pabna district. Supply of onion from hoarder decreased in the beginning of October and average disposal pattern per month was 98 M. ton at that time in Rasulpur bazar of Nagarkanda Upazila. Gradually the level of disposed amount reduced to 14 M. ton in the month of March. Yearly disposed volume from Rasulpur is 5544 M. ton. The supply of onion in Rasulpur mainly comes from 22-23 villages of Faridpur district. Besides, onion in Kashinathpur bazar came from 10 unions of Sathia Upazila. Kashinathpur bazar is the largest market for local onion supply in Bangladesh. Besides, Rasulpur market is one of the top most market of domestic onion supply in Bangladesh as mentioned by the participants. Fifty percent of the onion in Rasulpur market went to Dhaka (Shambazar and Kaoranbazar), 25% to Barishal and the rest to Gazipur, Mymensingh, Sherpur, Khulna, Sylhet and Chattogram districts.

Table 12. Weekly disposed volume of selected top ten onion growing upazila

Name of Upazila and district	Name of secondary market	Weekly disposed volume (M. ton)		
		Just after harvest (Mid April to July)	Instability period (August to December)	Lean season
Sathia, Pabna	Kashinathpur bazar	500-700	400	50-150
Sujanagar, Pabna	Sujanagar bazar	600-800	500	80-200
Bera, Pabna	Bera bazar	100-200	100-150	50
Nagarkanda, Faridpur	Rasulpur bazar	20	20	3.4
Boalmari, Faridpur	Boalmari bazar	80	70	4
Boraigram, Natore	Bonpara bazar	100	80	5
Puthia, Rajshahi	Puthia bazar	150-220	150-200	6
Durgapur, Rajshahi	Durgapur bazar	80-100	50	3
KustiaSadar, Kustia	Kustiasadar bazar	100-140	60	4

Source: FGD, 2020

The Table 13 shows monthly disposal pattern of onion from secondary markets of Faridpur, Pabna and Natore districst to terminal markets of Dhaka and Gazipur. The lion share of onion of terminal markets came from secondary markets of Faridpur and Pabna districts of Bangladesh.

Table 13. Disposal patterns of onion from secondary to terminal market

Month	Faridpur (%)		Pabna (%)		Natore (%)	
	Dhaka	Other than Dhaka	Dhaka	Other than Dhaka	Dhaka	Other than Dhaka
January	50	50	59	41	25	75
February	56	44	53	47	34	66
March	50	50	68	32	25	75
April	52	48	69	31	45	55
May	53	47	72	28	35	65
June	50	50	74	26	38	62
July	49	51	69	31	43	57
August	54	46	73	27	40	60
September	50	50	75	25	38	62
October	50	50	65	35	29	71
November	48	52	71	29	18	82
December	56	44	68	32	12	88

The lowest percentage of onion of terminal markets came from the secondary markets of Natore district of Bangladesh. Beside this average per farm onion harvest, stock and disposal pattern from farm level of selected surveyed onion farmers of Faridpur, Pabna and Natore districts is shown by the Table 14. The Table shows that January to April is the harvest time and May to November is the time to stock onion for future sell. Disposal of onion is done throughout the year. The highest amount of harvest was occurred in the month of April. Generally, farmers disposed onion mostly in the month of April and after that they disposed based on their family financial requirement, price of onion, demand and supply of onion in the market.

Table 14. Average per farm onion harvest, stock and disposal from farm level

Month	Quantity (mound)								
	Faridpur			Pabna			Natore		
	Harvest	Stock	Disposal	Harvest	Stock	Disposal	Harvest	Stock	Disposal
January	3*	0	3	3*	0	3	1.5*	0	1.5
February	4*	0	4	3*	0	4	3*	0	3
March	3*	0	3	2*	0	3	3*	0	3
April	240	0	30	200	0	100	30	0	15
May	0	210	30	0	100	50	0	15	4
June	0	180	30	0	50	8	0	11	1.5
July	0	150	15	0	42	12	0	8.5	2
August	0	135	15	0	30	10	0	6.5	1.5
September	0	120	15	0	20	5	0	5	2
October	0	105	52	0	15	4	0	3	2
November	0	53	53	0	11	7	0	1	2
December	2*	0	2	4*	0	4	2*	0	2

* Murikata onion
Source: FGD, 2020

COVID 19 pandemic started in March in Bangladesh. Government and other private and autonomous organizations extended their helping hand in order to reduce the damages due to COVID 19. For this everyone wanted to provide daily needs of people. Wealthy citizens gave rice, pulses, potatoes, vegetables and cash for the poor and disadvantaged people. Government strengthened the services through open market sales of essential commodities by the Trading Corporation of Bangladesh (TCB). Generally TCB sold sugar, lentil and soybean oil. Due to COVID 19 pandemic it also sold onion on reduced price to the poor and disadvantaged people in 12 centers of Bangladesh.

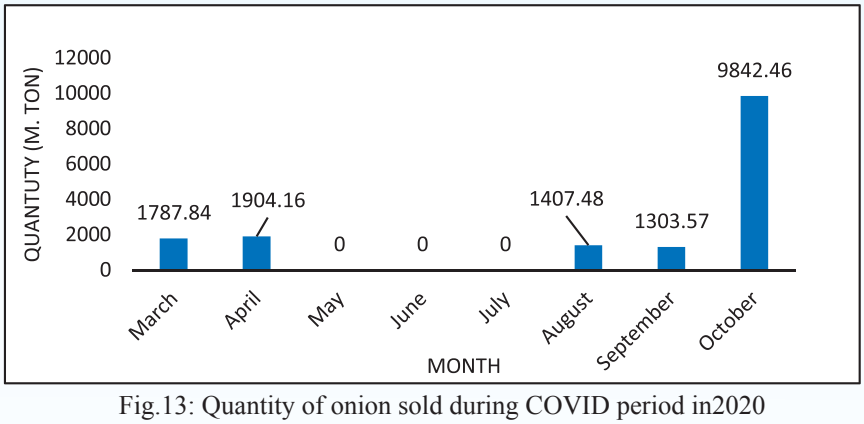

Fig.13: Quantity of onion sold during COVID period in2020
Source: TCB

TCB started open market sale (OMS) of onion at subsidized rate of Tk 30 a kg across the country through 275 trucks. The figure 13 provides the quantity of onion sold through TCB during March 2020 to October 2020. During May to June they didn't sell any onion due to lack of onion in the market and its high prices. From August they again started to sell onion and in October the quantity of selling reached its peak which accounted for 9842.46 M. tons.

3.6 Analysis of driving forces of onion prices and reasons for price surge

Indian ban and domestic market mechanism

When prices of onion started to rise in September 2019 and crossed Tk 100 per kg in retail kitchen markets, Indian government's decision to ban the onion export was blamed. The export ban was enacted at the end of September to check the soaring prices of the essential kitchen item in the domestic market of India. As 90 per cent of imported onion is sourced from India, it was a big blow to Bangladesh. This was one of the main reasons for onion price hike in Bangladesh in 2019 which provoked all other market functionaries to do malpractices for their own profit.

The reason for price spike of onion in 2020 was almost the same. The ban on import of Indian onion on September 14, 2020 fueled price surge in Bangladesh. The prices increased upto about Tk. 100 per kg immediately after the export ban. The government tried to stabilize onion prices by open market sales and imposing a fixed market price, but those were less effective in the real life.

The main reason for price hike is the supply shortage. This is due to low production, short fall in supply and import dependency.

Inflation expectation

In the reference year, when prices of onion started to increase at a faster rate, consumers rushed for making hectic purchases. They were driven by 'inflation expectation' that price would increase further in near future. As more consumers rushed to the market, it pushed the demand further and also contributed to price hike. Retailers and wholesalers started to stockpile and reduced selling of onion.

Misleading data

The current crisis has exposed the lack of adequate data on the country's demand, supply and production of onion. BBS showed that annual production of onion in FY18 stood at 1.73 million tonnes while Department of Agriculture Extension (DAE) put the figure at 2.33 million tonnes. Thus, there is a difference of 0.60 million tonnes in onion output data of two state agencies.

By adjusting post-harvest loss of onion the country needs to import at least 0.65 million tonnes a year. NBR showed that in FY18 some 0.90 million tonnes of onion was imported which increased to 1.10 million in FY19. Thus, there was enough surplus of onion. Taking the BBS output data into consideration and adjusting it with 25 per cent damage, it is apparent that at least 0.95 million tonnes of onion needs to be imported annually. The lesson from the onion crisis is: Without having a clear demand, production and consumption data market may turn volatile by any small disruption in the supply.

Syndication

'Onion syndication' or market collusion by the traders is considered as the main reason for abnormal rise in onion prices. Different sections of people strongly believe that importers and traders have increased the prices to make a hefty profit by taking the advantage of low supply of onion. Both print and electronic media, coupled with social media, squarely blamed the market syndicate for pushing up the price of onion.

Lack of market control

Government had limited control on the prices of onion. Besides, government couldn’t intervene effectively to stabilize the market. So, lack of control and stabilizing mechanism in the market gave extra advantages to the hoarders and traders to create artificial onion crisis.

COVID 19 pandemic

Due to COVID 19 pandemic a lot of workers returned from overseas. They turned to onion business and most of their investment was in hoarding of onion. But they didn’t dispose their onion in time which helped partly to raise the price of onion this year.

Too much dependency on India

Too much dependency on India for onion import is a major cause of recent price hike. Bangladesh failed to communicate with other onion exporting countries to supply onion in time. This gave traders additional incentives to hoard for future price spike and ultimately they got the hectic profit out of it.

Lack of legal action against illegal hoarding

Lack of appropriate legal actions increased the malpractices in the market, which created artificial demand supply disequilibrium and thus caused price hike. Besides, participants of FGD opined that a group of big traders and importers led the total disruption in onion marketing. The authority didn't take any effective action against this group.

Rumor

Print and electronic media, and social communication system played crucial role to spread rumor on onion marketing, demand and supply. Farmers and traders were influenced a lot by fake information. FGD participants told that rumor influenced farmers and traders to do bad practice on onion trading, such as creating artificial crisis in the market by hoarding it in the storage.

Lack of demonstration of summer onion and improved crop production technology

BARI developed two summer varieties of onion (BARI Piaj 2, 3). But the demonstration of these varieties was very limited. Even farmers knew very little about these varieties. Cultivation in only one season cannot fulfill the local demand rather it puts extra pressures on farmers to produce more. For this they applied more fertilizer to the onion field. It reduced the shelf life of onion which increased the post-harvest losses. So farmers and traders had to bear significant post-harvest losses which influenced them to raise price for short run. BARI has recently developed a new variety of onion (BARI Piaj-5) which deserves quick attention of extension workers for wide demonstration in the field.

3.7 Policy recommendations for stabilizing onion market

1 This is not the first time Bangladesh has suffered from an onion crisis. In 2013, a shortage caused prices to rise rapidly. Reasons were determined to be overdependence on imports from India. The story has not ended yet. The reason for crisis in 2019 and in 2020 was identified as the same as India imposed a ban on import. So it is necessary to reduce dependency on India for onion and search for reliable other onion producing countries to import until Bangladesh become self-sufficient in onion production.

2 Disincentives to local onion production caused by the subsequent price reduction from imports will make reluctance to grow more. Therefore, there should be a provision of incentives for the loosing farmers in the production systems.

3 Consumer's panic can be addressed by identifying and eradicating sources of misinformation. Traders who attempt to inflate the market through rumors must be identified and properly handled.

4 It is crucial that authorities, importers, and traders be responsive to global price trends. Quick actions be taken to stabilize prices in the local market and remedial measures be undertaken for short, medium and long term basis.

5 The concern authority needs to take initiative to identify the existence of so-called syndicates and their extent.

6 A preventive approach, as opposed to a reactionary approach, should be followed to keep the market stable.

7 Onion should not be imported in January, February, March, April and May as these are the peak months for harvesting at home. If Bangladesh continues to import onion at that time then it will lower the market prices. Sometimes due to import at harvesting time farmers did not get prices that covered their cost of production. At the same time lower market prices in the harvesting time will influence the farmers to stock for future selling which will make artificial crisis resulting in future price hike.

8 Fixing the onion prices throughout the year based on cost of production and marketing so that farmers and traders can recover their cost of production with a reasonable profit. According to the FGD, farmer participants opined that if price of onion remains stable at Tk. 30-35 per kg then they will be happy as it will cover their cost of production and will also provide reasonable profit margin. This in turn will help make stable production in each year.

9 Establishment of an Agricultural Price Commission is necessary for formulation of an effective price policy in the country.

10 In order to make onion production stable and make it to increase year after year, it is necessary to ensure the supply of required onion farming inputs in time. Necessary items such as seed, fertilizer and insecticides must be supplied in time. Otherwise onion production will be hampered which will ultimately hit the stability of onion price.

11 It is necessary to increase farm level storing capacity of onion. Farmers and traders of top onion producing areas opined that government can provide support to build community level warehouses so that farmers can stock onion for a definite period. The study suggests capacity building for 5 lakh M. Tones/year of onion storage by the public sector.

12 It is necessary to ensure strong market monitoring from the government so that the stakeholders do not get any chance to make malpractices with the market.

13 Fixing the magnitude of onion disposal from the farmers and traders stock throughout the year in order to make onion available in the market round the year. This is very crucial for a stable market price. Besides it is necessary to fix the minimum price to buy onion in the harvesting time.

14 Data on onion production, demand, supply and price should be collected from the field level which will focus on the real situation of the market. Otherwise false information will spread rumor on future supply and price of onion.

15 Print and electronic media, social communication media and other online communication platforms should be brought under rules and regulations so that they can not spread any rumor on onion production, demand, supply and price.

16 If Murikata onion comes just one month earlier than it will be helped for the smooth onion supply, market price and market stability. Researchers need to work on it.

17 Demonstration of summer onion should be increased as this will be best alternative to reduce pressure on Rabi onion and import dependency of Bangladesh.

18 The road map prepared by the MoA to achieve self-sufficiency in onion production is endorsed.

3.8 Conclusion

People of Bangladesh witnessed an abnormal and rapid surge of onion prices in 2019 and 2020. Government tried to stabilize the market through importing onion from different countries. But this price hike involved some other factors for which authority couldn't control the onion market. The present study has explored those factors responsible for price hike of onion. It appeared that a section of unscrupulous trade syndicates controlled the onion market and took the advantage of curtailed supply to make a hefty profit. Besides, Indian export ban, sudden rush of consumers in the market to buy onion, lack of market control by the government and too much dependency on Indian onion imports contributed largely to raise onion price in Bangladesh. Reduction of dependency on India for large scale import, increased domestic production, fixing onion prices throughout the year and control of the market from the invisible syndicates are recommended to avoid such unexpected price spike of onion in Bangladesh.

References

- Ahmed, A. U. and Ahmed, K. (2013). Sudden onion price surge in Bangladesh: a situation analysis for policy. Bangladesh Policy Research and Strategy Support Program (PRSSP), International Food Policy Research Institute (IFPRI).
- Azad, M. K., Ohab, M. A., Saha, M. G., Nesa, G., Rahman, M. L., Rahman, M. H. H. and Al-Amin, M. (2019). Edited KRISHI PROJUKTI HATBOI (Handbook on Agro-Technology), 8th edition, Bangladesh Agricultural Research Institute, Gazipur-1701, Bangladesh.
- Bangladesh Bank. (2020). Import of onion during 1979-80 to 2017-18
- BBS (2019), Yearbook of Agricultural Statistics-2018 (30th Series), Bangladesh Bureau of Statistics, Statistics and Informatics Division, Ministry of Planning, Government of the People's Republic of Bangladesh, Dhaka.
- Faridi, R. (2020). Steep rise in onion price: It is preventable. The Financial Express. Published October 04, 2020. Available at: https://thefinancialexpress.com.bd/views/opi ions/steep-rise-in-onion-price-it-is-prevent-able-1601826748
- FAOSTAT (2013). Food and Agricultural Organization of the United Nations. Access date: 27/12/2020
- Islam, M. S., Rahman, K. M., &Hasan, M. K. (2011). Profitability and Resource Use Efficiency of Producing Major Spices in Bangladesh. Bangladesh Journal of Agricultural Economics, 34, 1-2.
- Mitra, J., Shrivastava, S. L. and Rao, P. S. (2012). Onion dehydration: a review. J Food SciTechnol, 49(3):267–277. DOI 10.1007/s13197-011-0369-1
- NHRDF (2009) Area and production data. National Horticultural Research and Development Foundation.ww-w.nhrdf.com. Access date 27 Nov 2009.

Table 1: World's top onion producing countries in 2019.

Country	Production (Tons)	Acreage (Hectare)	Yield (Kg / Hectare)
China	23,907,509	1,086,711	21,999.90
India	19,415,425	1,199,850	16,181.50
Egypt	3,115,482	84,878	36,705.40
USA	3,025,700	53,650	56,397
Iran	2,345,768	61,809	37,951.90
Turkey	2,120,581	65,607	32,322.60
Russian Federation	2,023,271	88,563	22,845.60
Pakistan	1,739,054	135,912	12,795.50
Bangladesh	1,735,334	177,492	9,777
Brazil	1,657,441	57,464	28,843.10
Mexico	1,635,049	51,504	31,745.80

Source: https://www.atlasbig.com/en-us/countries-onion-production

Table 2: Amount of import and expenditure made for imports of onions in Bangladesh

Year	The amount of import (Lakh MT)	Import cost (Crore Tk.)	Increase from 2008-09 (%)	
			Amount of import	Import cost
2008-09	1.347	222.31	-	-
2009-10	0.736	151.52	(-) 45	(-) 32
2010-11	1.610	445.15	20	100
2011-12	2.288	822.70	70	270
2012-13	4.774	1784.80	254	703
2013-14	4.300	733.28	219	230
2014-15	4.234	1066.71	214	380
2015-16	5.761	1535.22	328	591
2016-17	10.984	2462.48	715	1008
2017-18	10.643	3412.27	690	1435
2018-19	10.91	-	1124	-
(2019 to June 2020)	11.71	-	769	-

Source: Compiled from different issues of BBS

Table 3: Area, production and yield of onion in Bangladesh (1972/73 to 2019/20)

Year	Area (Ha)	Production (MT)	Yield (MT/ha)	Year	Area (Ha)	Production (]MT)	Yield (MT/ha)
1972-1973	31238.87	153180	4.903507	**1996-1997**	34421.05	141835	4.120589
1973-1974	30929.15	146564	4.738701	**1997-1998**	34467.61	138430	4.016234
1974-1975	31157.89	143476	4.604804	**1998-1999**	33259.11	131090	3.941477
1975-1976	33185.43	147606	4.447917	**1999-2000**	33858.3	134245	3.964907
1976-1977	31925.1	136162	4.265045	**2000-2001**	34085.02	126770	3.719229
1977-1978	33049.39	145398	4.399415	**2001-2002**	36894.74	150015	4.066027
1978-1979	31548.58	133386	4.227955	**2002-2003**	37653.85	153455	4.075414
1979-1980	32064.78	139414	4.347886	**2003-2004**	51967.61	272230	5.238455
1980-1981	30111.34	93586	3.107999	**2004-2005**	86429.15	589410	6.819574
1981-1982	33542.51	129528	3.861607	**2005-2006**	115649.8	768655	6.646402
1982-1983	33886.64	138220	4.078894	**2006-2007**	128779.4	894255	6.944087
1983-1984	33388.66	133732	4.005312	**2007-2008**	125226.3	889260	7.101223
1984-1985	34072.87	140695	4.129238	**2008-2009**	107795.5	735140	6.819762
1985-1986	33791.5	136615	4.042881	**2009-2010**	117611.7	872081	7.414914
1986-1987	33109.31	130125	3.930163	**2010-2011**	127958.7	1051347	8.216299
1987-1988	33933.2	140545	4.141814	**2011-2012**	135721.9	1159259	8.541432
1988-1989	34051.01	138589	4.070041	**2012-2013**	134281.4	1167839	8.696954
1989-1990	35251.01	147845	4.194064	**2013-2014**	150955.9	1386964	9.187877
1990-1991	34777.33	143305	4.120644	**2014-2015**	169685	1704402	10.0445
1991-1992	34445.34	144040	4.181697	**2015-2016**	177492.3	1735334	9.776953
1992-1993	34206.48	139880	4.089284	**2016-2017**	185817.4	1866502	10.04482
1993-1994	34538.46	144170	4.174187	**2017-2018**	178585	1737714	9.730458
1994-1995	34159.92	141895	4.153845	**2018-2019**	172533.2	1802868	10.4494
1995-1996	34046.56	138190	4.058854	**2019-2020**	185347.8	1953800	10.54127

Source: Different issues of BBS

Table 4: Growth of onion growing area in Bangladesh

Year	Growth of area (ha)	Year	Growth of area (ha)	Year	Growth of area (ha)
1972-1973	0	**1988-1989**	0.347193223	**2004-2005**	66.3134933
1973-1974	-0.991446345	**1989-1990**	3.524124319	**2005-2006**	33.80878771
1974-1975	0.739577197	**1990-1991**	-1.343746411	**2006-2007**	11.35285572
1975-1976	6.507276507	**1991-1992**	-0.95459837	**2007-2008**	-2.759010956
1976-1977	-3.797823541	**1992-1993**	-0.693464974	**2008-2009**	-13.91941392
1977-1978	3.521653668	**1993-1994**	0.970529057	**2009-2010**	9.106307863
1978-1979	-4.541111329	**1994-1995**	-1.096002813	**2010-2011**	8.797560077
1979-1980	1.636188643	**1995-1996**	-0.331851852	**2011-2012**	6.066924425
1980-1981	-6.092171717	**1996-1997**	1.099946489	**2012-2013**	-1.061351359
1981-1982	11.39495798	**1997-1998**	0.135262291	**2013-2014**	12.41757745
1982- 1983	1.025950513	**1998-1999**	-3.506196042	**2014-2015**	12.4070364
1983-1984	-1.46953405	**1999-2000**	1.801582471	**2015-2016**	4.601046951
1984-1985	2.049230023	**2000-2001**	0.669616166	**2016-2017**	4.690401135
1985-1986	-0.825807985	**2001-2002**	8.243259294	**2017-2018**	-3.89220187
1986-1987	-2.01881028	**2002-2003**	2.057500274	**2018-2019**	-3.388762313
1987-1988	2.488383468	**2003-2004**	38.01408526	**2019-2020**	7.427309653

Source: Different issues of BBS

Table 5: Production growth of onion in Bangladesh

Year	Production growth (M. ton/ha)	Year	Production growth (M. ton/ha)	Year	Production growth (M. ton/ha)
1972-1973	-	**1988-1989**	0.35	**2004-2005**	66.31
1973-1974	-0.99	**1989-1990**	3.52	**2005-2006**	33.81
1974-1975	0.74	**1990-1991**	-1.34	**2006-2007**	11.35
1975-1976	6.51	**1991-1992**	-0.95	**2007-2008**	-2.76
1976-1977	-3.80	**1992-1993**	-0.69	**2008-2009**	-13.92
1977-1978	3.52	**1993-1994**	0.97	**2009-2010**	9.11
1978-1979	-4.54	**1994-1995**	-1.10	**2010-2011**	8.80
1979-1980	1.64	**1995-1996**	-0.33	**2011-2012**	6.07
1980-1981	-6.09	**1996-1997**	1.10	**2012-2013**	-1.06
1981-1982	11.39	**1997-1998**	0.14	**2013-2014**	12.42
1982- 1983	1.03	**1998-1999**	-3.51	**2014-2015**	12.41
1983-1984	-1.47	**1999-2000**	1.80	**2015-2016**	4.60
1984-1985	2.05	**2000-2001**	0.67	**2016-2017**	4.69
1985-1986	-0.83	**2001-2002**	8.24	**2017-2018**	-3.89
1986-1987	-2.02	**2002-2003**	2.06	**2018-2019**	
1987-1988	2.49	**2003-2004**	38.01	**2019-2020**	

Source: Different issues of BBS

Table 6: Productivity growth of onion in Bangladesh

Year	Productivity growth (M. ton/ha)	Year	Productivity growth (M. ton/ha)	Year	Productivity growth (M. ton/ha)
1972-1973	0.00	**1988-1989**	-1.39	**2004-2005**	116.51
1973-1974	-4.32	**1989-1990**	6.68	**2005-2006**	30.41
1974-1975	-2.11	**1990-1991**	-3.07	**2006-2007**	16.34
1975-1976	2.88	**1991-1992**	0.51	**2007-2008**	-0.56
1976-1977	-7.75	**1992-1993**	-2.89	**2008-2009**	-17.33
1977-1978	6.78	**1993-1994**	3.07	**2009-2010**	18.63
1978-1979	-8.26	**1994-1995**	-1.58	**2010-2011**	20.56
1979-1980	4.52	**1995-1996**	-2.61	**2011-2012**	10.26
1980-1981	-32.87	**1996-1997**	2.64	**2012-2013**	0.74
1981-1982	38.41	**1997-1998**	-2.40	**2013-2014**	18.76
1982- 1983	6.71	**1998-1999**	-5.30	**2014-2015**	22.89

Year	Productivity growth (M. ton/ha)	Year	Productivity growth (M. ton/ha)	Year	Productivity growth (M. ton/ha)
1983-1984	-3.25	**1999-2000**	2.41	**2015-2016**	1.81
1984-1985	5.21	**2000-2001**	-5.57	**2016-2017**	7.56
1985-1986	-2.90	**2001-2002**	18.34	**2017-2018**	-6.90
1986-1987	-4.75	**2002-2003**	2.29	**2018-2019**	3.75
1987-1988	8.01	**2003-2004**	77.40	**2019-2020**	8.37

Source: Different issues of BBS (Productivity growth is expressed in terms of yield per hectare).

Table 7: Yearly average farm gate, wholesale and retail price of onion

Year	Price Categories					
	Farm gate price (Tk/qt)	% increase from 2005/06	Wholesale price (Tk/qt)	% increase from 2005/06	Retail price (Tk/qt)	% increase from 2005/06
2005-2006	1403	-	1555	-	1782	-
2006-2007	2330	66	2415	55	2658	49
2007-2008	1956	-16	2010	-17	2258	-15
2008-2009	2822	44	3055	52	3342	48
2009-2010	2091	-26	2370	-22	2675	-20
2010-2011	2226	6	2696	14	2900	8
2011-2012	2168	-3	2382	-12	2754	-5
2012-2013	4353	101	4610	94	5194	89
2013-2014	2390	-45	2821	-39	3243	-38
2014-2015	2753	15	4008	42	4586	41
2015-2016	2571	-7	2718	-32	3193	-30
2016-2017	3383	32	3531	30	3999	25
2017-2018	3532	4	3677	4	4273	7
2018-2019	4567	29	4943	34	5575	30

Source: DAM

Table 8: Monthly average farm gate, wholesale and retail price of onion (2016 to 2020) in Tk/quintal

Month	2016			2017			2018			2019			2020		
	FP	WP	RP	FP	WP	RP	FP	WP	RP	FP	WP	RP	FP	WP	RP
January	1968	2254	2986	1532	1906	2225	5226	5550	6353	1525	1855	2306	9245	10722	12012
February	1888	2076	2621	1673	1982	2316	3891	4200	4806	1392	1791	2111	8368	10498	11312
March	2140	2391	2846	1672	1876	2211	2766	3200	3864	1513	1977	2264	4169	4430	5138
April	2451	2674	3077	1926	2394	2613	2504	2724	3304	1836	1986	2429	3828	4063	4807
May	3085	3300	3805	2154	1969	2818	3447	3548	4102	1896	2161	2578	3530	3941	4629
June	2855	3225	3715	2015	2230	2690	3128	3437	3980	1912	2426	2573	3472	3910	4519
July	2714	3052	3543	2196	2316	2787	3435	3926	4395	2992	3134	3634	3425	3506	4027
August	2752	3102	3635	3992	4093	4621	4122	4646	5234	3311	3613	3948	3392	3520	4019
September	2764	2858	3374	3846	4051	4600	3828	4161	4781	5200	5305	5884	6023	6323	6980
October	2251	2590	3031	4391	4506	5065	3920	3586	4178	8175	8721	9547	7254	7805	8483
November	2349	2546	3035	6320	6531	7299	2588	2978	3520	14197	14964	16712	-	-	-
December	2176	2377	2894	6920	7848	8550	1832	2168	2661	11626	12074	13512	-	-	-

Source: DAM

Table 9:Average weekly wholesale and retail price of onion (Tk/quintal) in 2019

Month	1st week		2nd week		3rd week		4th week		5th week	
	WP	RP	WP	RP	WP	RP	WP	RP	WP	RP
January	2033	2513	1979	2460	1770	2239	1711	2202	1783	2115
February	1904	2107	1998	2154	1661	2119	1600	2065	-	-
March	1772	2232	2265	2240	2069	2286	1800	2298	-	-
April	1886	2355	1892	2374	1994	2441	2171	2547	-	-
May	2204	2676	2208	2647	2152	2561	2089	2488	2154	2519
June	2140	2552	3232	2546	2180	2598	2152	2595	-	-
July	2388	2850	3317	3865	3482	3995	3348	3824	-	-
August	3257	3839	3393	3894	3971	4438	4163	4688	3282	2879
September	4300	4809	4470	4973	5900	6511	6550	7241	-	-
October	8242	9210	7015	7816	8474	9286	8647	9364	11227	12057
November	11388	13900	14146	15515	14891	16574	19430	20859	-	-
December	18537	19971	12405	14275	9121	10471	8232	9329	-	-

Source: DAM

Table 10: Nominal and real price of onion in Bangladesh(Tk/quintal)at retail level

Year	Nominal price	Real price	Year	Nominal price	Real price	Year	Nominal price	Real price
1993-94	1310	2591	**2002-03**	1822	2265	**2011-12**	2754	1500
1994-95	1474	2678	**2003-04**	2039	2371	**2012-13**	5194	2688
1995-96	1430	2436	**2004-05**	2150	2317	**2013-14**	3243	1546
1996-97	1314	2159	**2005-06**	1782	1782	**2014-15**	4586	2049
1997-98	2668	3969	**2006-07**	2658	2381	**2015-16**	3193	1360
1998-99	2429	3306	**2007-08**	2258	1733	**2016-17**	3999	1607
1999-00	1574	2086	**2008-09**	3342	2377	**2017-18**	4273	1603
2000-01	1827	2389	**2009-10**	2675	1790	**2018-19**	5575	1873
2001-02	1834	2359	**2010-11**	2900	1701	**2019-20**	6592.6	2204

Source: DAM

Table 11: Growth rate of nominal and real price

Particulars	Nominal price	Real price
Growth rate	*5.12	*-2.016
R square	0.81	0.422
t-value	10.16	-4.28

* significant at 1% level

Table 12: Growth rate of nominal and real price

Particulars	Nominal price	Real price
Growth rate	*5.12	*-2.016
R square	0.81	0.422
t-value	10.16	-4.28

* significant at 1% level

Table13. Destination wise FOB price and import parity p rice at retail level (October 2020)

Country	FOB Price (BDT/Kg)	Import parity price at retail level(BDT/Kg)
Bangladesh	55.64	--
India	37.41	43.58
Turkey	44.15	52.23
China	20.12	24.18
Pakistan	30.81	38.51
Egypt	32.65	40.43

Focus Group Discussion (FGD) & Key Informant Interview (KII)






National Workshop held at BARC

National Workshop held at BARC

Acronyms

AERS	Agricultural Economics and Rural Sociology
BADC	Bangladesh Agricultural Development Corporation
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BAU	Bangladesh Agricultural University
BBS	Bangladesh Bureau of Statistics
BCSA	Bangladesh Cold Storage Association
BER	Bangladesh Economic Review
BINA	Bangladesh Institute of Nuclear Agriculture
BLRI	Bangladesh Livestock Research Institute
BRKB	Bangladesh Rice Knowledge Bank
BRRI	Bangladesh Rice Research Institute
CPI	Consumer Price Index
DAE	Department of Agricultural Extension
DAM	Depart ment of Agricultural Marketing
DAP	Diammonium Phosphate
DD	Deputy Director
DRC	Domestic Resource Cost
EEF	Equity and Entrepreneurship Fund
FAO	Food and Agriculture Organization of United Nation
FAOSTAT	Food and Agriculture Organization Statistics
FGD	Focus Group Discussion
FOB	Free on Board
FPMU	Food Planning and Monitoring Unit
GDP	Gross Domestic Product
GSI	Grand Seasonal Index
ha	Hectare
HIES	Household Income and Expenditure Survey
KGF	Krishi Gobeshona Foundation
KII	Key Informant Interview
MoA	Ministry of Agriculture
MoP	Muriate of Potash
MSP	Minimum Support Price
MT	Metric Ton
OMS	Open Market Sale
RP	Retail price
TCB	Trading Corporation of Bangladesh
Tk	Taka
TSP	Triple Super Phosphate
WP	Wholesale Price
WRS	World Rice Statistics

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