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Socio-economic vulnerability due to COVID-19 on rural poor: A case of Bangladesh

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ABSTRACT

This study aims to unearth the nature of socio-economic status of Bangladesh's vulnerable population in the COVID-19 circumstances. This study uses primary data from 100 respondents selected through convenience and selective sampling from all around Bangladesh. Additionally, descriptive analysis is included, which considers the respondents' immediate poverty and economic variables. The study provides an overview of the status of vulnerable persons affected by COVID-19. This study identifies a significant decline in income of marginal and vulnerable socio-economic groups due to COVID-19 and infers that it will raise poverty, increase expenditure and reduce monthly savings. Finally, this paper recommends that the findings can assist the stakeholders in comprehending the position of Bangladesh's vulnerable people as a result of COVID-19 pandemic situation.

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Introduction

The Coronavirus (COVID-19) appeared for the first time in China's Hubei Province in December 2019. From China, it spread all over the world. The World Health Organization (WHO) designated COVID-19 as a pandemic, and a global health emergency was issued concurrently (WHO, 2020). Around 80% of the world's poorest and most vulnerable people live in remote rural areas of low-income developing African and South Asian countries (World Bank, 2016). The rural sector in Bangladesh suffered various negative consequences due to the containment efforts, including a delayed harvest, difficulties selling farm products, labour and material input interruptions and cost increases, and decreases in remittance receipts and non-farm company sales. Rural households were obliged to reduce their food consumption in exchange for government food assistance and private sector monetary support. Families headed by a woman, a person with less education, a child, or someone engaged in informal labour, were the most vulnerable. The severity of the infection's concentration changed significantly among geographic areas, but not so much in terms of the seriousness of the lockdown measures (Malek *et al.*, 2021). The entire world is suffering from this pandemic; there is no way to escape unless we develop a vaccine, but the virus is expected to slow down in some regions where it has hit saturation point. This virus is wreaking havoc on the global economy,

causing demand and supply chain disruptions, as well as an increase in the unemployment rate (Mahmud *et al.* 2020). Social isolation, institutional and home quarantine, social separation, and community confinement methods were quickly deployed. Stringent measures were taken to contain the spread of the disease, including the cancellation of thousands of locations that hosted social gatherings, such as offices, classrooms, reception centres, clubs, transportation services, and travel restrictions, effectively locking down many countries through swift administrative action and increased awareness among individuals about social distancing. The COVID-19 outbreak is inflicting havoc on the global economy, particularly in Bangladesh. On March 8, 2020, Bangladesh confirmed its first case of COVID-19 (Bodrud-Doza *et al.*, 2020). In the absence of mass vaccination or effective response measures, governments worldwide undertook broad-scale containment measures, such as restricting economic activity to the bare necessities. When combined with residents' social distancing measures to avoid virus contagion and economic shutdown, these actions have resulted in enormous short-term financial losses. Economic activities are gradually restarting with the reluctant of lockdown measures; however, it is unclear whether a full-fledged recovery would be possible (Rahman *et al.*, 2020).

Bangladesh's economy and society have accelerated as a result of COVID-19. The country is in the middle of a crisis unlike any other in recent memory. The Coronavirus pandemic, which began as a public health emergency, has quickly grown into a multifaceted humanitarian crisis affecting every aspect of economic and social sphere of lives and livelihoods. Economic hardships brought on by the virus have wreaked havoc on the economy's dominant informal sector, which employs around 85% of the workforce (Mujeri, 2020). It reveals profound underlying instabilities with far-reaching consequences for Bangladesh. Millions of people have lost their jobs and become the "new poor" within weeks of the COVID-19 epidemic, going hungry and needy.

The additional economic challenges are sluggish revenue, mounting fiscal deficits, excessive liquidity and solvency crises in the financial sector, and a prolonged bear market. Bangladesh will endure a slowdown and recession, but the government must ensure that the health crisis that has morphed into an economic catastrophe does not erupt into a full-blown social crisis, wiping out the decadal progress in poverty reduction. It is too early to assess the true scope of the COVID-19 pandemic's impact, as well as the government's response to these complex economic and social issues (Zahid, 2020). COVID-19's harmful impact caused havoc on the Bangladeshi people's socio-economic lives, creating massive demand- and supply-side shocks. The COVID-19 pandemic has hurt the country's earlier rapid progress, which has occurred globally, regardless of developed or developing countries (Iqbal, 2021). Given the conditions, the goal of this study was to look at the COVID-19 outbreak's socio-economic repercussions in Bangladesh via the lens of public opinion. These research findings could aid Bangladesh's government's policy formulators with pragmatic socio-economic and cultural measures in making educated decisions.

Research Objectives

The researchers here are attempting to achieve the following study objectives:

- To analyse the nature of current socio economic vulnerabilities of rural Bangladesh's vulnerable group; and
- To recommend policy implications to the rural disadvantaged population's socio-economic vulnerabilities.

Literature Review

Bodrud-Doza *et al.* (2020) attempted to undertake a perception-based analysis to better understand people's emotional and socio-economic crises, as well as potential environmental crises, during Bangladesh's COVID-19 pandemic. There was a strong link between public worry about the COVID-19 outbreak and the country's ailing healthcare system. Furthermore, a negative association was found between Bangladesh's feeble

health system and the government's ability to deal with the pandemic, exposing the healthcare system's poor governance. A link between the shutdown and social withdrawal and the fear of losing one's or a family member's life owing to a lack of healthcare treatment suggests that people may be under emotional and financial stress due to their decision to stop doing everyday tasks. The risk of a severe socio-economic and health crises will be exacerbated if there is a positive link between the shutdown's socio-economic impact and impoverished people's suffering, price increases for necessities, impediments to formal education, and the risk of a severe socio-economic and health crises. Furthermore, climate change-related disasters and infectious diseases like dengue fever might occur during or after the COVID-19 event, resulting in severe food insecurity and a healthcare crisis. Despite the restart of industrial activity, Bangladesh's partial lockdown encouraged community transmission and exacerbated the healthcare crisis, economic burden, and GDP loss due to the COVID-19 pandemic. Individuals have experienced emotional and socio-economic insecurity as a result of the loss of lives and livelihoods.

According to Haque *et al.* (2020), when participants are subjected to socio-economic stress via the COVID-19, their satisfaction level is determined using the well-known index life scale to evaluate the judgment component of subjective well-being. To maintain social distance, 44% of respondents preferred internet-based activities directly related to online activity and occupation-related activities over physically involved activities (33%). Additionally, around 46% of cleaners were suspended due to hygienic problems, and 45% of drivers were suspended due to an inability to meet maintenance costs, i.e. economic strain experienced by a broad range of people. According to the life scale rating, 35% of respondents indicated mild discontent with this state, while only 1% showed excellent satisfaction. This shows that the majority of people let their living conditions deteriorate during a pandemic crisis.

According to Islam *et al.* (2020), the key factors contributing to the spread of COVID-19 include a lack of well-equipped hospitals, insufficient testing facilities, a lack of knowledge, incomplete information, attitude toward and practice of rules, poverty, and unstable employment. Strict enforcement and monitoring of people's adherence to standards may aid in the prevention of disease spread. The affordability of healthcare services is critical for the establishment of proper medical treatment. The government faces a difficult task in influencing the public and raising awareness about the virus's contagious nature. To do this, strong steps may be implemented to ensure that social separation and mask-wearing in public areas are adhered to during this pandemic time.

Begum *et al.* (2020) aim to present a comprehensive and illustrative analysis of the observed and possible repercussions in the days ahead. Because of a lack of proper information on the subject at hand and varying levels of deadly tension between countries. The overall number of confirmed cases in Bangladesh is increasing exponentially. Due to falling prices, dairy farmers, vegetable growers, pharmaceutical makers, and poultry farmers are all in serious problems. The pandemic has also substantially impacted educational systems, banking, foreign direct investment, ready-made apparel, and remittances, among other areas. Finally, individual efforts to reduce pandemic effects are impractical; an integrated action involving state authorities and concerned citizens from all sectors is required.

Khondker and Rahman (2020) emphasise the generational deficits' funding, which is private mainly due to insufficient state expenditures on education, health, nutrition, and social protection. Thus, it re-emphasised the critical role of rapid, sustained, and inclusive economic growth in ensuring generational equity and livelihoods in Bangladesh. The investigation demonstrates the fragile effects on the deficit generations' spending - children and the elderly. Private transfers, which account for most children's consumption, are threatened, necessitating an effective state transfer in the form of child benefit, social pension, or family benefit - at least until the economy

Table 1. Study Area and Number of Respondents

Study Area	Criteria of Respondents	Type of research methods and tools used	Number of Respondents
Bijoypur Union (Cumilla)	General Citizens	Questionnaire survey	33
Kadirpur Union (Noakhali)			33
Charsubuddiup Union (Narsingdi)			34
Total			**=100**

returns to normalcy.

Malek *et al.* (2021) study depicted the devastating economy of Bangladesh during the first three months of the substantial shutdown in comparison to the pre-COVID-19 period. The study further suggests that the COVID-19 outbreak hit Bangladesh's rural economy hard, causing a drop in household output and spending. Households in rural areas have seen some crucial changes. Due to a lack of human resources, around 30% of agricultural products could not harvest on time. Due to declining demand or supply chain constraints, while non-farm cottage/business sales fell (predominantly transportation) to an alarming extent. Most of the crop production badly was affected, and the cost of non-labour inputs increased due to the interruption of supply chain of essential inputs like seeds, fertilisers, and insecticides. The state of labour scarcity due to restriction of movement and growing labour costs posed the most significant hurdles to farm productivity in Bangladesh, as they did in other labour-intensive emerging countries. COVID-19-related regulations. on the other hand, created prime barriers to marketing of dairy products due to a lack of merchants and transportation concerns including challenges in smooth function the network of supply chain and value chain. Furthermore, the study identified that roughly 31% of absentee workers forced to leave the work place and left for their home and the consequence was drastic fall of remittance.

Materials and Methods

The study followed the triangulation strategy, i.e. mixed research strategy by integrating both qualitative and quantitative methods. The study uses primary data collected during Bangladesh's COVID-19 lockdown scenario between June and December 2020. Purposive sampling method was followed to collect data from particular socio-economic groups. The researchers gathered data from 100 respondents, selected from three districts, namely Cumilla, Noakhali and Narshingdi. The data were collected from the vulnerable population following the standard rules of Bangladesh Bureau of Statistics. The study mostly employed descriptive analysis. Moreover, qualitative data and personal observations of social behaviour were gathered from selective individuals and groups. The authors also took help of secondary data with the help of Google Search Engine and referred and consulted some research articles on the COVID-19 pandemic.

Present Uncertainties and Vulnerabilities in Bangladesh

COVID-19 is causing chaos in the world economy, and Bangladesh is no exception. As an LDC (Least Developed Country), Bangladesh's economy is negatively impacted by COVID-19 (Mahmud *et al.*, 2020). Significant shocks are emerging from Bangladesh's labour sector as a result of widespread job losses. Because more than 85% of the labour force works in the informal sector, job losses are mostly concealed. They inevitably have the effect of exacerbating poverty in Bangladesh, both now and in the future. Rural poor households who receive remittances have also grown more vulnerable due to the abrupt decline in remittance revenue. The expected increase in poverty has many consequences. Without a doubt, our long-achieved progress in reducing poverty since 1990 is at risk at the moment.

Additionally, many poor people who had previously graduated from extreme poverty

and lived on or near the poverty line before the pandemic may revert to poverty or extreme poverty. Additionally, a significant proportion of these highly impoverished individuals may face long-term deprivation. The deterioration of poverty is likely to persist for some time, hindering Bangladesh's efforts to achieve the sustainable development goals (SDGs) by 2030. (Iqbal, 2021). According to the World Bank, around 55% of Bangladesh's urban population lives in slums (World Bank, 2020). Due to the risk of contact transmission, private hospitals and clinics cannot provide services during the lockdown. As a result, there is less of a scarcity of primary and critical care healthcare institutions. Residents have chastised and shamed healthcare personnel who have been infected while treating patients. Protests have taken place in several localities against installing quarantine facilities, COVID-19 care hospitals, and clinics. Police officers and government officials routinely employed social shaming as a technique. On numerous occasions, family members abandoned the sick, which resulted in their deaths in hospitals. Further, funerals at community graves were denied to the deceased, which are fundamental cultural rights for Muslims. Additionally, the lockdown severely impacted those earning daily wages and low- and middle-income individuals who lost their jobs and sources of income during the lockdown. Worry and fear of death as a result of hunger or illness resulted in several suicides. As one might expect from a contagious epidemic outbreak, both individuals and society suffer. Given the population density, educational attainment, social structure, cultural norms, and healthcare capacity of Bangladesh, it is difficult to isolate a country of 165 million people (Bodrud-Doza *et al.*, 2020).

Domestic violence is more prevalent under these time constraints when families spend more time together (Bradbury-Jones & Islam, 2020). This illness affects women of all social classes, and within the confines of their homes, women face daily crushing and shattering of their self-esteem. It is well-known that Bangladesh's violence against women and children is a severe social, economic and cultural problem (Islam *et al.*, 2020). Furthermore, through the Vulnerable Group Feeding (VGF) and Vulnerable Group Development (VGD) programmes, the government has committed to enhancing the food security of marginalised and low-income people, especially those employed in the informal sector, the elderly, and poor women. The government should prioritise ensuring that all disaster assistance is supplied to the relevant individuals at the appropriate time. At the moment, there is no clear indication of the amount of funding available, the duration of these activities and initiatives, or their transparency and independence from political interference.

Results

The GoB developed several strategies targeted at restricting and stopping COVID-19's spread. A "Bangladesh Preparedness and Response Plan for COVID-19" was established by the Ministry of Health and Family Welfare. The primary goal of this strategy is to mitigate the impacts of the disease. For many people in Bangladesh who live on insecured incomes, the stark decision during the shutdown was either contracting a deadly infection or being hungry due to their inability to access jobs and money. Many preferred the former to avoid starvation; remaining closed was not an option for them. And when they were forced to shut down, many were unable to work, resulting in a loss of revenue. The government support was insufficient and came too late. As a result, many not previously impoverished became impoverished, while those already disadvantaged became poorer. Due to the economic, geographical, and cultural context in which the people of Bangladesh's live, social separation is frequently a significant obstacle. Additionally, lack of awareness of COVID-19, insufficient knowledge of, attitudes toward, and practice of social distancing all contribute to the epidemic's enormous threat to the nation. Simultaneously, concerns like poverty, hunger, and fear of losing employment contribute significantly to non-compliance (Islam *et al.*, 2020). COVID-19 mediated shocks include health shocks,

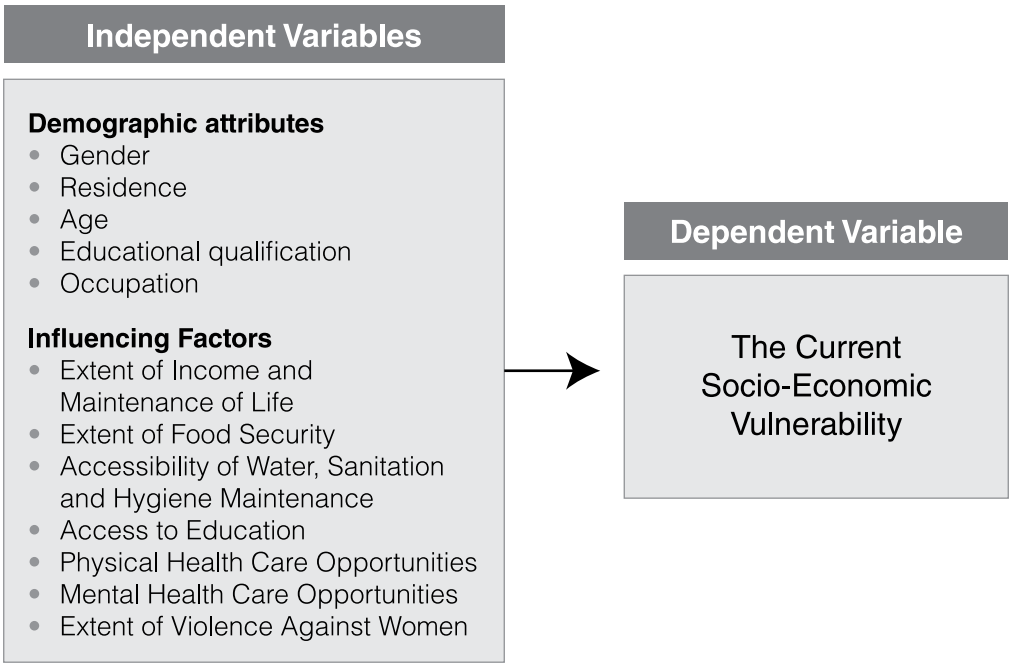

Figure 1. Analytical framework of the study

Source: Developed by the author based on Barkat, 2020; Human Development Research Center, 2020; Islam *et al.*, 2020.

psychological shocks, shocks associated with sudden job loss, income shocks, shocks related to inaccessibility to food, shocks associated with the loss of ability to run a family, shock associated with the loss of micro and small businesses, shocks related to the inability to obtain fair prices for agricultural commodities, shocks related to loneliness in quarantine, and shocks associated with uninvited (Barkat, 2020).

Demographic Profile of the Respondents

Gender: Gender is one of the demographic elements that will be considered in the evaluation of the study. 65% of the general population was male, while 35% of the general population was female.

Age: The age of the respondent is another socio-demographic variable included in the study. The respondent's age was classified into five age categories, including those aged less than 20 years, those aged between 20 and 35 years, those aged between 36 and 49 years, those aged between 50 and 65 years, and those aged 65 years and over. The age group of 36-49 years old received the most significant number of responses in the category, accounting for 32 percent of those who were selected as respondents.

Occupations: The occupation of the respondents is an additional socio-demographic component that was included in the study. The respondents were divided into public employees, farmers, homemakers, private employees, business owners, and job seekers. The majority of the respondents (27%) those who answered the survey questions were small farmers, while the rest 23% of the respondents were homemakers. About 18% of the respondents were unemployed.

Education: The study participants were drawn from the local community. Regarding the educational attainments, about 26 percent of respondents said that they did not have formal and functional education. However, about18 percent respondents attained the primary school.

Table 2. Percentage Distribution of Respondent's Demographic Profile.

No	Profile	Category of the Respondents Citizens
1.	**Gender**	
	Male	65%
	Female	35%
2.	**Age**	
	Under 20	6%
	20-35	30%
	36-49	32%
	50-65	20%
	65+	12%
3.	**Occupation**	
	Public Employee	5%
	Farmer	27%
	Housewife	23%
	Private employee	15%
	Businessman	12%
	Unemployment	18%
4.	**Education**	
	Uneducated	26%
	Primary	18%
	SSC	13%
	HSC	7%
	Honours	21%
	Total	**100%**

Source: Field Survey, 2020.

Impact on Socio-Economic Condition Due to COVID-19

The Extent of Income and Maintenance of Life and Livelihood

The pandemic of COVID-19 has had a significant impact on household income. 37% of the respondents said little in response. Since this poor segment of the population living in low-income settlements is more severely impacted than the rest. Their first effect is a massive reduction in job opportunities, resulting in a significant decrease in income. Other 10 percent of those who responded made only a few words. A large number of paid employees have lost their employment. In the majority of cases, the surviving workers do not receive their salaries in whole and consistently. 24 percent of the respondents said average, since individuals who worked as home-aids were denied entrance to homes due to the risk of contracting the virus, and many of them were not paid. Numerous small enterprises have closed or are unable to attract a sufficient number of consumers. One of the respondents said that "I used to sell tea on the streets, but the cops now prohibit me from doing so. Additionally, individuals are averse to drinking tea on the street due to concern of COVID-19. Moreover, people do not have enough money for regular meals in their houses, l*et alo*ne street tea.

The Extent of Food Security

Food security is defined as the physical and economic availability and accessibility of food. When all home members have year-round access to various safe foods that they require to live a healthy life, the household is considered food secure. COVID-19 pandemic, according to 10% of respondents, is a health crisis threatening food security and nutrition for more poor people in Bangladesh. Since the lockdown, many impoverished individuals in rural areas have suffered from food insecurity, insufficiency, and malnutrition. 12 percent of respondents indicated the distribution of households experiencing food insecurity before and after the COVID-19 lockout and that they are having a difficult time because their business is shuttered. They must cook half a kilogram of rice instead of one kilogram. Another 24% of respondents answered, "All sorts of food are accessible in the market, but we can't afford to buy them because the costs are considerably higher than they were before, and we have less money." The price of food has soared in the market as income has fallen. As a result, the price is significantly greater than before. We've been eating less as a result of this.

Accessibility of Water, Sanitation and Hygiene Maintenance

Good maintenance conditions, such as safe drinking water, improved sanitation facilities, and good hygiene practices, significantly impact people's health. There is no fundamental difference in water use among homes between the baseline and now, following the lockout, according to 38 percent of respondents. Tube-wells are the most frequent water source at both times, followed by piped water into the yard. According

Table 3. Impact on Socio-Economic Condition Due to COVID-19 Pandemic.

Criteria	Excellent	Very Good	Good	Average	Little	Very Little
Extent of Income and Maintenance of Life	4%	10%	15%	24%	37%	10%
The Extent of Food Security	5%	18%	14%	27%	12%	24%
Accessibility of Water, Sanitation and Hygiene Maintenance	5%	10%	20%	38%	17%	5%
Access to Education	5%	10%	24%	5%	16%	40%
Physical Health Care Opportunities	5%	3%	18%	17%	42%	15%
Mental Health Care Opportunities	7%	14%	5%	23%	35%	16%
Extent of Violence Against Women	11%	15%	29%	20%	17%	8%

Source: Field Survey, 2020.

to 20% of the participants, most persons in their neighbourhood have their tube well and mainly collect their drinking water from it. Access to improved latrines has grown in the examined areas, according to 10% of respondents, across all types of households, since the baseline survey.

Access to Education

Child schooling has been severely disrupted, according to 16 percent of respondents, potentially leading to a high number of dropouts, underage labour, and possibly child marriage among girls. As a result of lockdown, it causes COVID-19 to have detrimental consequences. According to 40% of responses, no school-aged child is attending school during these years. During the COVID-19 pandemic, however, all instructional activities are conducted online. As a result, most students struggle to access online classrooms and communicate with lecturers and classmates. Due to the slow internet bandwidth in rural Bangladesh, 16 percent of respondents said students had difficulty accessing online lessons. The slow speed and expensive cost of internet bundles obstruct online learning. According to 5% of respondents, countries lack modern network infrastructure, and rural cell networks and internet systems are inadequate. Due to a lack of high-speed internet and cellphone networks, most learners in distant places cannot complete their virtual classes.

Physical Health Care Opportunities

The COVID-19 outbreak has generated one of the most severe public health catastrophes in Bangladesh's history. According to 42% of respondents, children are suffering more during this COVID-19 pandemic because of abject poverty and economic hardship. They said that they were unable to obtain healthcare services during the COVID-19 lockdown due to a lack of doctors. The majority of hospitals were also shut down. People avoided going to the doctor because they were afraid of corona.

About 15% of respondents indicated that they were unable to provide nutritious food for their children. If they receive any food or nutrition balanced food aid, it will greatly benefit us. 17% of respondents informed that their households were afflicted with various ailments during the COVID-19 lockdown and their afflicted members suffered from infectious diseases like cold and cough, fever, diarrhoea, and dysentery. Generally, residents of lower-income settlements are averse to admitting that they are infected with COVID-19 or have COVID-19 symptoms. As previously said, this could be due to societal stigma or fear of isolation.

Status of Mental Health

Rural poor people confront various psychological diseases, including stress and depression, due to the COVID-19 pandemic and its associated problems, most notably livelihood concerns. Depression is a primary cause of disability, suffering in various ways, and can even result in suicide. Health is not only the absence of disease or weakness; it is a state of total physical, mental, and social well-being. 23% of respondents stated that depression, a psychiatric condition, is frequent among people: physical and psychological strain, anxieties, irritability, and negative emotions. COVID-19 continues to claim lives and inflict significant human misery throughout Bangladesh. This epidemic put the physical and emotional health of people from all walks of life at risk. 35% of respondents stated that the disadvantaged group suffers more from this adversity due to their health and socio-economic vulnerabilities. COVID-19 has introduced a new level of difficulty for service seekers and suppliers.

The Extent of Violence against Women

Women are subjected to a number of domestic violence. Though sexual harassment and murder are reported at a lower rate, quarrels, beatings, the use of slang language, bullying, insistent, lack of tolerance, rude, rough, tough and harsh behavior and mental torture found to be prevalent and have grown during the lockdown, as stated by 29% of the respondents. According to the participants, most male household members stay at home due to the loss of their jobs and work during the lockdown. As a result, sadness and rage are becoming more prevalent, prompting them to commit violent crimes. 20% of respondents reported that their jobs had been lost due to COVID-19, that they were out of money, and that they were experiencing food and economic crises; all of these reasons led to a significant increase in domestic violence.

Discussions

COVID-19 is unquestionably eye-opening for Bangladesh, as it demonstrates how internal and external shocks can impact the country's hard-won progress in reducing poverty over the last decades. In light of the pressing need for time, it is necessary to increase people's resilience and intrinsic capacity to cope with COVID-19 situations (Iqbal, 2021). The COVID-19 lockdown has caused untold misery and sadness in the lives of everybody, especially those living in low-income communities, who have been disproportionately affected. Many people have lost their employment, and firms have closed. Many people's incomes have been lowered to the point where they can no longer afford to buy the bare minimum of food for a healthy lifestyle. They are forced to use their savings and sell household possessions in hardship, and some are forced to take out a loan that will be extremely difficult to repay. Domestic violence has escalated as a result of economic shock, severe depression, and apathy. Health vulnerabilities come in a variety of shapes and sizes. Child schooling has been severely disrupted, perhaps leading to a high number of dropouts, child labour, and possibly child marriage among girls (HDRC, 2020). Like that of many other countries, Bangladesh's government has recommended a variety of policies and initiatives to help reduce the pandemic's impacts. These are admirable endeavours. Additionally, the commercial sector, non-governmental organisations, and other development partners contribute. Government stimulus efforts should be directed primarily at tackling the health risks and social and economic pitfalls that poor populations face. In the case of Bangladesh, a critical advantage is that fiscal and monetary mechanisms for deploying these stimulus are already in place (although inefficiently). Providers of digital finance services such as bKash, Rocket, and Nagad will be the key conduits for low-cost, speedy, and efficient fund transfers that avoid human interaction. Bangladesh has also benefited from the establishment of effective clusters of civil society and non-governmental organisations (NGOs).

They can collaborate with the government to identify beneficiaries, distribute resources to the poor and disadvantaged, and monitor stimulus implementation. Effective and timely money distribution is crucial for combating COVID-19 economic and social dangers. In

Bangladesh, public expenditures frequently lack value for money, as seen by cost overruns and implementation delays. This is the time to buck the trend and get the most bang for your buck from the incoming budget's promised stimulus and other efforts. The following steps may help improve the situation: the establishment of a dedicated cell within the Planning Commission to approve COVID-19 related projects within 10 days to ensure prompt delivery of cash, goods, and services; and the extension of support from the Bangladesh Bank for the quick approval of projects (Khondker, 2020). The percentage of salaried/wage employment or self-employment has drastically fallen across all socio-economic groups. Rural poor people confront various psychological challenges including stress, anxiety, stigma, uncertainty, insecurity and depression, due to the COVID-19 pandemic and its associated problems, most notably livelihood concerns. Depression is a primary cause of mental state and respondents did suffer from multifarious ways, and even resulted extreme cases of suicide. Depression is a common psychological condition. Physical and mental strain, anxieties, irritability, and negative emotions are the most important concerning issues in the COVID-19 pandemic.

Conclusion & Way Forward

The current study identified and analysed a considerable decline in the overall income of the poor and vulnerable socio-economic groups in Bangladesh. Income decreased due to loss of jobs, substantial reduction of wages, and lack of financial incentives and support from both management/owner/governments especially in the most neglected informal sector and small/medium businesses enterprises. According to the study, the COVID-19 pandemic-related job or business loss, household income decline, uncertainty about children's education, food insecurity, domestic violence, and the prospect of forced migration are all significant variables contributing to the rural poor people's development in Bangladesh. Additionally, poor individuals have not been educated about good hand washing techniques to avoid contracting COVID-19.

This study assists other scholars in analysing the impact of Corona on the country's overall socio-economic status and local authorities in determining which types of individuals require assistance during the lockdown, enabling them to provide appropriate government assistance. Apart from pandemic conditions, the authority is capable of identifying widespread socio-economic difficulties. Bangladesh's government has already taken many preventative measures to ward off COVID-19. The prime minister offered a series of financial packages that will help people from all socio-economic classes, which is crucial for those who have lost their principal income source due to the pandemic. The following recommendations are being made in this regard to strengthen social policies:

(i) Local governments should take concrete steps to guarantee that social separation and masks in public places are observed.

(ii) Appropriate preparations, such as improved healthcare facility equipment and worker training, are critical in this regard.

(iii) Implementing the government's economic recovery programmes for the poor and low-income people should be prioritised.

(iv) Governments and non-governmental organisations should work together to put some safety measures for women victims of violence.

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Effect of postharvest treatment with thiovit and rovral on extending shelf-life of snake-gourd and papaya

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ABSTRACT

In this study, the effects of two fungicides (thiovit and rovral) on the shelf-life of snake-gourd (Trichosanthes cucumerina L.) and papaya (Carica papaya L.) were investigated. The fungicides were sprayed in three different concentrations (1%, 2%, and 3%) and the shelf-life, physical changes during storage, weight loss (%), and residual sulfur (%) were observed. From the derived results, it could be said that the application of fungicides indeed improved the shelf-life and overall external quality of snake-gourd and papaya. Vegetables treated with 3% of thiovit and rovral demonstrated better results as compared to the other samples. Snake-gourd treated with 3% of rovral had shelf-life of 11 days followed by the other samples treated with 3% thiovit and rovral which had 10 days of shelf-life. For weight loss percentage, treated samples with 3% of both fungicides had lower weight loss percentage than other samples and control which indicated their low decomposing level. For residual sulfur analysis, residual sulfur percentage increased with increasing concentration of the fungicides, though the obtained values are lower than the maximum permitted value. Snake-gourd and papaya, treated with 3% of thiovit and rovral demonstrated 0.6079±0.0008 %, 0.127667±0.0107%, 0.0861±0.0003%, and 0.0658±0.0014% respectively. This study showed that thiovit and rovral can be potential fungicides to treat vegetables, particularly snake-gourd and papaya for extending the shelf-life.

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Introduction

Post-harvest loss is a multi-disciplinary term that can range from biology, engineering, agricultural economy, food processing, nutrition, food safety and environmental conservation (Kitinoja *et al.*, 2011). According to different studies, almost half of the cultivated fruits and vegetables are wasted before consumption or reaching the market level due to post-harvest losses (Elik *et al.*, 2019). Reduction of these losses can bring the opportunity to be able feed more people in future (Gustavsson *et al.*, 2011). That is why, it is important to reduce the losses during post-harvest storage of fruits and

vegetables (Elik *et al.*, 2019). Post-harvest loss can occur due to diversified reasons, such as, over-ripeness, soft fruits, mechanical damages during transportation, but what causes the main concern is decaying of vegetables during storage because of fungal growth on surface (Ventura *et al.,* 2004). Fungicides are the main approaches used to minimize the fungal growth which led to the reduces post-harvest shelf-life of fruits and vegetables. However, the use of fungicides is thoroughly questioned and doubted, fungicides are still used to increase the storage time for raw agricultural product (Habiba *et al.*, 2021). Thiovit is a popular sulfur containing fungicide which is widely used all over the world (Sanjib *et al.*, 2010). The previous studies about using thiovet as a fungicide during post-harvest treatment is well documented (Nahar *et al.*, 2020). Ipriodine, commonly known as rovral, also had its efficacy proved as a fungicide on vegetables like beet-roots, carrots, cabbages and radishes (Faure and Hooghe, 1979). However, Thiovit and Rovral have hardly been found to use for post-harvest treatment on vegetables like sanke-gourd or papaya. Snake-gourd is cultivated in tropical regions. It contains high nutritional value and the seed reported to have high quality vegetable oil (Adebooye *et al.*, 2001, Abukutsa-onyago, 2003). This super vegetable has a plethora of health benefits such as detoxification of body, boosting the immune system, managing diabetes, aids in digestion, lowers the risk of cancer (Layek *et al.*, In press). Papaya belongs to the Caricaceae family, grown in most subtropical and tropical regions of the world (Bautista-Baños *et al.*, 2013). Post-harvest losses of papaya compiled of reasons such as mechanical damage, chilling injury, over-ripeness and microbial diseases (Alvarez and Nishijima, 1987). From different studies focusing on minimizing the post-harvest loss it was found that, diseases caused by various fungi were the major concern during handling and storage of papaya (Singh, 2010). Though, the use of fungicides on the vegetables and fruits to extend the shelf-life has brought another concern of residual chemical. Fungicides contain sulfur dioxides and sulphites as a preservative in fruits and vegetables to prevent the growth of bacteria, mold, and fungus and to improve the overall post-harvest quality (Virgilio *et al.,* 2011). They may impose detrimental threat to health. It has been reported that consumption of sulfur higher than the permitted value can cause inhibition of specific nerve signals, restriction in lung performance and it is a direct allergen (WHO, 1999). Therefore, the objectives of this study are to assess the shelf-life of fungicide treated selected vegetables, to optimize the use of selected fungicides, and to analyze residual value of fungicides in vegetables used.

Materials and Methods

Fresh and mature snake-gourd and papaya were collected from Bangladesh Agricultural University research field as sample materials. After collection, the samples were pre-cooled by fan to remove the field heat as soon as possible. All chemicals used in this study were reagent grade.

Fungicides thiovit and rovral were prepared in different concentrations (T_0 = Control, T_1 = 1g of thiovit/100 ml water, T_2 = 2g of thiovit/100 ml water, T_3 = 3g of thiovit/100 ml water; R_0 = Control, R_1 = 1g of rovral/100 ml of water, R_2 = 2g of rovral/100 ml of water, R_3 = 3g of rovral/100 ml of water) to treat the vegetables. The different concentrations of fungicides were sprayed over the sample by hand sprayer. Then it was kept in moist condition for 15 minutes. After that, the surface was dried and placed in the storage facility at ambient condition (26 to 32°C, 71 to 84% RH) for further investigation. The control samples of fresh papaya and snake-gourd selected and arranged at random with replication were also stored with the treated samples. Shelf-life was calculated by the number of days kept the samples fresh with optimum eating qualities. The physical parameters studied during the storage period were changes in peel colour, texture and visual microbial growth. Moisture content, weight loss, dry matter content and residual chemical analysis of sulfur were measured at a decided interval during the storage period.

Weight loss was measured as a reduction

in weight of the treated samples (Antora *et al.*, 2018). The weight of the samples treated with different concentration of the fungicide was taken at an interval of two days. The weight loss was expressed in percentage.

$$\% \text{ Weight Loss} = \frac{\text{IW-FW}}{\text{IW}} \times 100$$

Where,

% WL = Percent total weight loss

IW = Initial weight of samples (g)

FW = Final weight of samples (g)

Shelf-life was conducted on the samples by keeping them in a room with ambient storage condition. Shelf-life was calculated by the number of days until which the samples displayed optimum consumption qualities

Treated vegetable samples with different concentration were cut into small pieces. Then it was dried 65°C temperature for 24 hours in a cabinet drier. After drying, the samples were cooled and then grinded by grinder (Grinder model and make). Determination of sulfur was done according to Gunduz & Akman (2014) with slight modifications. 5g powered sample of each treatment was transferred into a dry clean 100 ml kjeldhal flasks. 10 ml of di-acid mixture (HNO_3:$HClO_4$=2:1) were added into the flask. After leaving for a while, the flasks were heated at a temperature slowly raised to 200° C. The contents of the flask were boiled until they become sufficiently clear and colourless. After cooling, the digested sample were transferred into 100 ml volumetric flasks and the volumes were up to the mark with distilled water. 5 ml of sample was taken from 100 ml extract and readings were taken by spectrophotometer at 420 nm of wavelength.

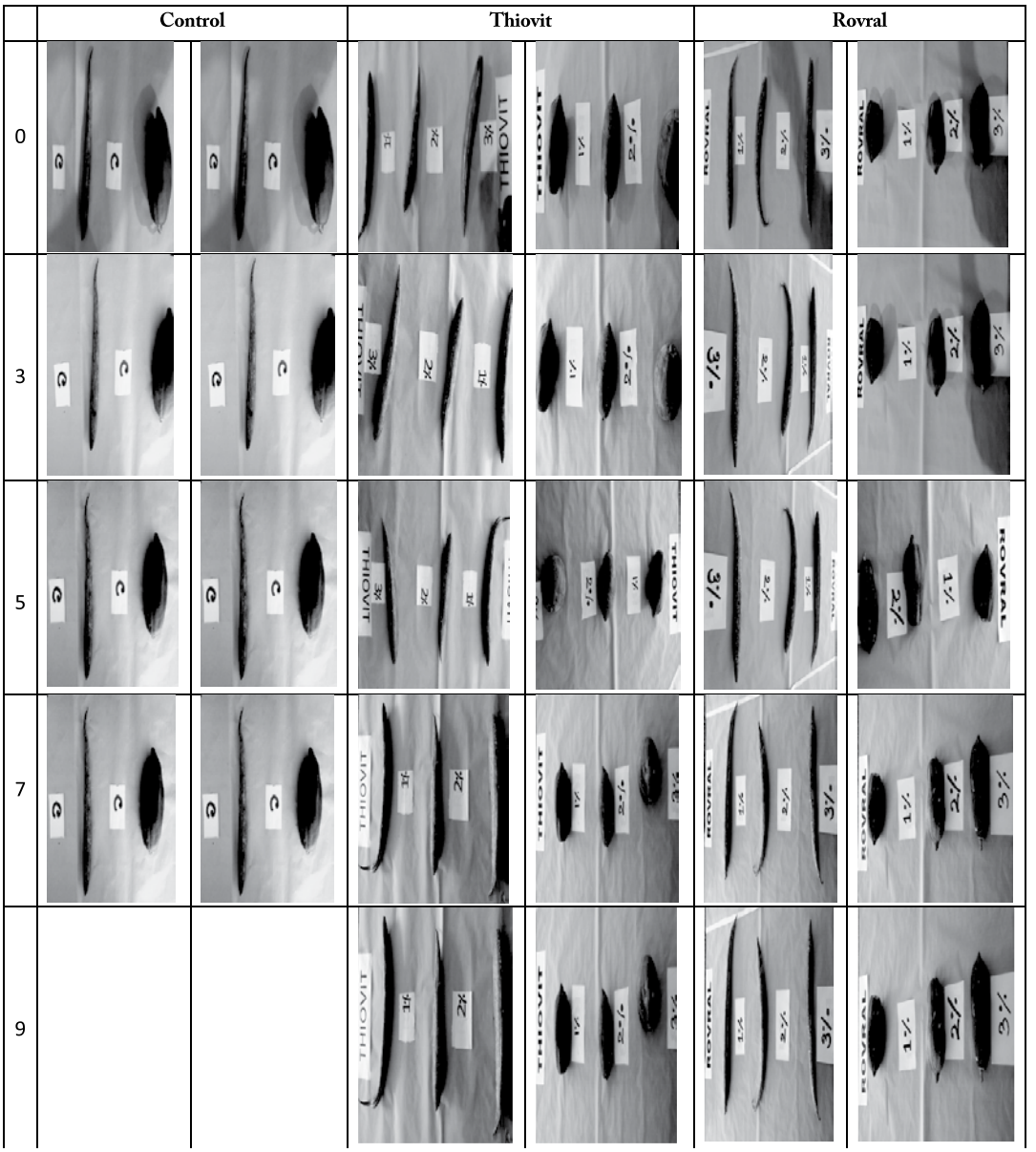
One-way analysis of variance (ANOVA), followed by t test, was used to compare the difference between the means at 5% significance level. Data analysis was conducted by using statistical software IBM SPSS version 23.0 for Windows (SPSS, Inc., Chicago, II., USA).

Results and Discussion

Changes in physical characteristics

The changes in different physical characteristics of papaya and snake-gourd under different concentrations of thiovit and rovral (T_1, T_2, T_3, R_1, R_2, and R_3) had been observed for 10 days and the results are presented in Table 1. The result showed that the rates of overall deterioration of papaya and snake-gourd were different among treatments and control. In the case of papaya, the control samples began to lose its characteristic green colour and started to decompose from 5th day and on 7th day the decomposition was more prominent that studying the physical changes was discontinued for next days. Similar scenario was also observed for the control sample of snake-gourd which also started to wither at both ends and lost the natural colour from 5th day as well. After 5th day, the texture became soft, both ends began to rot and it was unsuitable to observe for further physical changes. For the treated samples, both papaya and snake-gourd treated with T_1, T_2, and T_3 did not show any decomposition or damage other than mild discolouring of their peel until 5th day. After 5th day decomposition and de-greening quickened and visible black spots can be observed on the peel with some hints of microbial growth on 9th day. Among the treated samples of snake-gourds, the sample treated with T_3 remained comparatively fresh than the other two samples. The papaya samples treated with Thiovit almost followed the same trend as snake-gourd. On the 7th day, beginning of decaying can be observed. In the last day of observation, samples treated with T_1, and T_2 could be seen to have lost their natural green colour, developed dark spots all over the skin and the interior became soft due to decomposition. As for the papaya samples treated with R_1 and R_2, they started to show signs of decay from 5th day with mild darkness in peel colour and losing the rigidness in texture. The snake-gourd samples of R_1 and R_2 exhibited the beginning of perishability on the 7th day as their edges became wrinkled, colour became faded and they lose their fresh appearance. On the 9th day, samples treated with R_1 and R_2 of both snake-gourd and papaya could be clearly seen to have lost their acceptability for consumption as they had black spots with

Table 1. Changes in physical characteristics during storage.



discoloured exterior and some visible white spots which could have been some microbial growth. This could happen because of the quickening in the rate of the metabolic process (Sivakumar *et al.*, 2011). The samples of both snake-gourd and papaya treated with T_3 and R_3 displayed the best physical characteristics compared to the other treated samples at the end of the storage period. The probable reason could be the concentration of fungicides, which helped to slow the metabolic process and enzymatic breakdown. Enzymatic breakdown could contribute to the physical deterioration during storage (Barbagallo *et al.*, 2012). It has also been reported that fruits are treated with different concentration of fungicides to reduce the post-harvest loss and fungal growth (Bautista-Baños *et al.*, 2013). A previous study showed that, submerging papaya in a fungicide

Table 2. Weight loss (%) in snake-gourd treated with thiovit and rovral.

Days of storage	Concentration of thiovit				Concentration of rovral			
	Control (0%)	1%	2%	3%	Control (0%)	1%	2%	3%
3rd Day	7.17±0.05^{a}	6.13±0.15^{b}	6.27±0.15^{b}	5.17±0.06^{c}	7.17±0.05^{a}	6.45±0.05^{b}	6.76±0.05^{ab}	5.17±0.06^{c}
5th Day	18.7±0.10^{a}	12.55±0.05^{b}	11.57±0.11^{c}	10.8±0.10^{d}	18.7±0.10^{a}	13.5±0.26^{b}	11.27±0.15^{c}	10.09±0.11^{d}
7th Day	23.17±0.21^{a}	19.82±0.04^{b}	15.83±0.06^{c}	14.47±0.31^{d}	23.17±0.21^{a}	20.83±0.21^{b}	18.53±0.15^{c}	16.23±0.15^{d}
9th Day		32.43±0.12^{a}	25.2±0.00^{b}	23.47±0.35^{c}		34.33±0.21^{a}	25.6±0.1^{b}	22.52±0.44^{c}

solution for 10-15 minutes could reduce the anthracnose decay (Guillén-Sánchez, 2000; De la Cruz et al., 2003). Our results also showed similar scenario as all the treated samples had longer shelf-life than control.

Shelf-Life Study

The shelf-life of papaya treated with both thiovit and rovral were observed by placing them in room temperature and the result is displayed in Figure 1 and Figure 2. It can be observed from the Figure 1 and Figure 2. that thiovit and rovral both had significant effect in prolonging the shelf-life of snake-gourd and papaya. From Figure 1 it is found that, snake-gourd treated with R_3 has the longest shelf-life which was 11 days followed by snake-gourd treated with T_3 which had a shelf-life of 9 days. It can be assumed that T_3 and R_3 were the most suitable to retain the texture and firmness which are considered important attributes for overall acceptability of fruits and vegetables (Ma *et al.*, 2017). All the samples treated with T_1, T_2, R_1, and R_2 had 7 days of shelf-life and the control sustained only for 5 days. So, it can be said that, R_3 was the best treatment for snake-gourd to increase the shelf-life. Figure 2 presents, papaya samples treated with T_3 and R_3 both had a shelf-life as long as 10 days but the control samples only lasted for 7 days. For samples treated with T_1, T_2, R_1, and R_2 each had shelf-life of 9 days which also indicated that thiovit and rovral had same effects on papaya for prolonging the shelf-life.

Total Weight Loss

Total weight loss was observed in all the samples treated with thiovit and rovral as well as the controls for the whole storage period at an interval of one day. Evaporation of water activated by a gradient of water vapor pressure at different locations in fruit and vegetables is the main mechanism contributing to weight loss (Zhou *et al.,* 1997). The results for weight loss were documented from the 3rd day until the 9th day. The effect of thiovit on the weight loss of snake-gourd and papaya is presented on Table 2

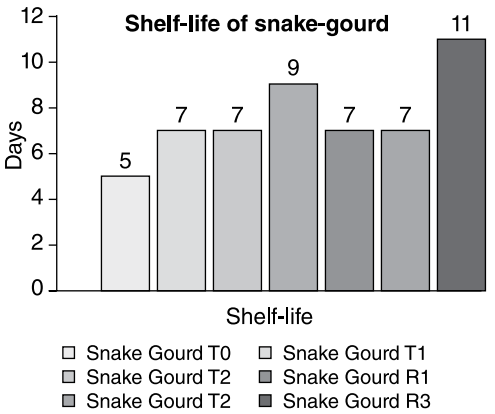


Figure 1. Shelf-life of snake-gourd.

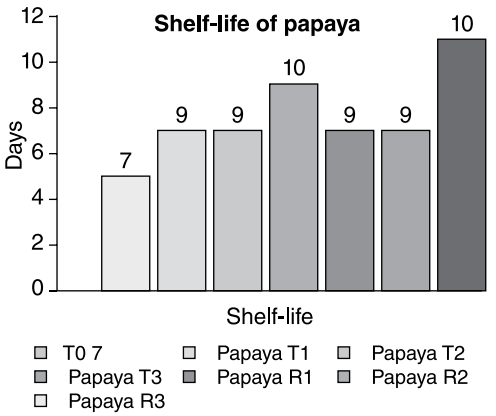


Figure 2. Shelf-life of papaya.

Table 3. Weight loss (%) in papaya treated with thiovit and rovral.

Days of storage	Concentration of thiovit				Concentration of rovral			
	Control (0%)	1%	2%	3%	Control (0%)	1%	2%	3%
3rd Day	4.3±0.10^{a}	3.33±0.15^{bc}	3.43±0.06^{b}	3.09±0.12^{c}	4.3±0.10^{a}	4.22±0.03^{b}	3.47±0.06^{c}	3.16±0.10^{d}
5th Day	11.20±0.09^{a}	9.28±0.11^{b}	9.8±0.10^{c}	8.57±0.12	11.20±0.09^{a}	10.10±0.1^{b}	9.16±0.07^{c}	8.47±0.11^{d}
7th Day	22.3±0.00^{a}	17.35±0.13^{b}	15.56±0.15^{c}	15.46±0.21^{c}	22.3±0.00^{a}	17.3±0.2^{b}	12.5±0.17^{c}	12.6±0.20^{d}
9th Day		29.43±0.15^{a}	22.23±0.21^{b}	21.13±0.17^{c}		26.67±0.15^{a}	24.43±0.35^{b}	21.48±0.03^{c}

and Table 3. From the results, it could be inferred that application of thiovit on both samples played a role in loss of weight of the samples over time. For control sample of snake-gourd and papaya, the weight loss on 3rd day were 7.17±0.05% and 4.3±0.10%, respectively. In the case of treated samples, snake-gourd and papaya treated with T_3 showed weight loss of 5.17±0.06%, and 3.09±0.12% respectively which were lower than other concentrations of same vegetable sample. From the results of the 3rd day, it could be noticed that the weight loss in control samples were higher than that of treated samples. In treated samples, both the snake-gourd and papaya with T_3 treatment, showed overall the best results with minimum weight loss percentage until the 9th day which were 23.47±0.35% and 21.13±0.17%, respectively; both lower than the other treated samples as well as the control. From this result, it could be extrapolated, application of thiovit played a role to retain the weight. The effect of R_1, R_2, and R_3 on the weight loss percentage of snake-gourd and papaya are presented on Table 3. From the Table 3 it can be seen that application of rovral also reduced the weight loss percentage of the treated samples than the control. The results also showed that the samples treated with R_3 had the least weight loss percentage all over the storage period; for example, snake-gourd and papaya treated with R_3 showed 22.52±0.44%, and 21.48±0.03% of weight loss respectively on their 9th day of storage, whereas, snake-gourd and papaya treated with R_1 and R_2 showed higher weight loss percentages. It could be assumed that the application of the fungicides acted as surface coatings which resulted in a significant delay in the decaying of vegetables and minimized weight loss, as compared to the controls, which had remarkable compositional changes with maximum weight loss during storage at room temperature. The fungicide coating acted as a physical barrier for gas exchange between the vegetables and the environment. So, it could be possible that thiovit and rovral acted as a physical barrier between the vegetables and the environment.

Concentrations on the same day with thiovit denoted with same letter had no significant ($p<0.05$) difference. Concentrations on same day with rovral denoted with same letter had no significant ($p<0.05$) difference.

Concentrations on same day with thiovit denoted with same letter had no significant ($p<0.05$) difference. Concentrations on same day with rovral denoted with same letter had no significant difference.

Table 4. Residual sulfur (%) in snake-gourd, treated with thiovit and rovral.

Concentrations	S% in thiovit treated sample	S% in rovral treated sample
0%	0.0364±.00003^{a}	0.0364±0.0003^{a}
1%	0.1145±0.0005^{b}	0.054433±0.0005^{b}
2%	0.515±0.001^{c}	0.0573±0.0006^{c}
3%	0.6079±0.0008^{d}	0.127667±0.0107^{d}

The results of the S% in the same column with same letter had no significant ($p<0.05$) difference

Residual Sulfur

Residual analysis for sulfur (S) was performed to determine percentage of sulfur increased on the treated vegetables compared to the controls. The Codex Alimentarius Commission, (FAO/WHO 2011) permitted the maximum levels of sulphites in dried vegetables are 500 mg/kg. The results of the analysis are displayed in Table 4 and Table 5. From the results it can be seen, that amount of S increased with increasing concentration of thiovit and rovral. Snake-gourds

Table 5. Residual sulfur (%) in papaya, treated with thiovit and rovral.

Concentrations	S% in thiovit treated sample	S% in rovral treated sample
0%	0.0246±0.0005[a]	0.0246±0.0005[a]
1%	0.0416±0.0015[b]	0.035±0.001[b]
2%	0.0566±0.0005[c]	0.047±0.002[c]
3%	0.0861±0.0003[d]	0.0658±0.0014[d]

The results of the S% in the same column with same letter had no significant ($p<0.05$) difference

treated with T_3 and R_3 exhibited 0.608±0.0008 % and 0.128±0.0107 % of S respectively which were higher than the other treated samples as well as control samples. The control snake-gourd and papaya sample showed 0.0364±0.0003% and0.0246±0.000% presence of S respectively Like snake-gourd papaya also showed the highest presence of residual S in T_3 and R_3 which were 0.0861±0.0003 % and 0.0658±0.0014 % respectively. From the obtained results, it could be noted that, snake-gourd already had a higher amount of sulfur than papaya naturally and after treatment, the residual % of S was also higher than that of papaya. It is possible that untreated vegetables contain residual sulfur because of use of sulfur and sulphatebased fertilizers to improve the yield (Gunduz & Akman, 2015). From all the results, it can be deduced that all the treated samples had residual sulfur % lower than the permitted maximum value.

Conclusion

Post-harvest treatment of snake-gourd and papaya with thiovit and rovral can offer extending shelf-life and quality. Fungicides are considered as a source of post-harvest disease management. They are widely used and accepted to a certain degree but not completely applauded. The major reasons for the drawbacks are different health problems accelerated directly or indirectly by various fungicides. In our study, we performed a preliminary approach to observe the suitability of thiovit and rovral. This was just a first step to establish their suitability. Further study needs to be done considering all the factors during storage such as time, different temperature and humidity, study of the decay (%), cultural analysis of microbial growth, etc. It would be interesting to determine the accurate dose of these fungicides to be applied in vegetables and determination of toxicity level. Overall, this study confirmed that, both thiovit and rovral contributed to better shelf-life of the vegetables with reduction in weight loss (%) and had residual sulfur (%) under permitted value which make them suitable for future utilization.

Conflict of Interest

The authors have no conflict of interest.

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Vulnerability of wheat production to high temperature due to global warming: A review

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ABSTRACT

Global warming is exceedingly affecting natural ecosystem worldwide. Cereal crops especially wheat production is devastated by periodical heat waves and increase in temperature during different growth stages of wheat production. High temperature induced loss of wheat yield has become a global phenomenon and posing a threat to world food security. This review focuses on the loss of wheat yield from global perspective as a consequence of global warming. The article also shed some light on the potential escape mechanisms which could be adopted in future wheat research for better performance and to rescue this important staple cereal crop from the wrath of global warming.

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Introduction

Wheat is one of the three most dominant cultivated cereal crops (Giraldo *et al.*, 2019) with a global annual production of 749.46 million tonnes (FAOSTATa). Since its domestication around 10,000 years ago (Dubcovsky & Dvorak, 2007) cultivation of wheat spread over 100 countries (Shewry, 2009), including 200 million hectares of farmland (Ortiz *et al.*, 2008) both in the Northern and Southern Hemispheres including the highlands of tropics and sub-tropics (Feldman, 1995). World wheat production is 95% hexaploid bread wheat (*Triticum aestivum* L.) and 5% durum wheat (*Triticum durum*) (Shewry, 2009; Peng *et al.*, 2011). Wheat plays a crucial role in the global agricultural economy and food security as one of the world's most important staple crops. It is a staple food for over 35% of the global population (Paux *et al.*, 2008), accounts for 20% of human consumption of calories (FAOSTATb) and is an important source of protein, vitamins, carbohydrates and minerals. Demand for wheat as human food is expected to grow by 1.6% per annum, and as animal feed by 2.6% per annum, in developing countries, until 2020. The global average wheat yield will have to increase during the coming 25 years from 2.6 to 3.5 tonnes/ha to meet the demand of the projected increases in population (Ortiz *et al.*, 2008).

Global warming is characterized by shifts in weather patterns with increases in the frequency and magnitude of extreme weather events. Increasing temperature and incidence of drought are posing serious threats to food security (Lobell *et al.*, 2012). The global average temperature of both land and sea increased 0.85 from 1880 to 2012 and is predicted to increase a further by 1.5 to < 2 ˚C by the end of this century (Pachauri *et al.*, 2014).

Like other cereal crops, wheat production is also affected by biotic and abiotic stresses and

heat is one of the major abiotic stresses in wheat production. Temperatures above the optimum for growth at different stages are deleterious, causing injury or irreversible damage, which is generally called 'heat stress' (Wahid *et al.*, 2007). Heat stress is a function of the magnitude and rate of temperature increase, as well as the duration of exposure to the raised temperature (ibid.). In this era of global warming heat stress is posing threat and reducing production of cereal crops (Rezaei *et al.*, 2015), therefore it would be worthy looking at the effect of heat stress on the productivity of wheat.

This review focuses on the extent of damage and production loss caused by high temperature at different growth stages of wheat at a global standpoint. Wheat is very sensitive and vulnerable to heat stress therefore having a weak defence mechanism against high temperature induced yield loss. This article also discusses about different heat stress escape mechanisms adopted by crops other than wheat which could be a potential rescue mechanism for wheat to provide higher yield even after exposure to high temperature.

Global production loss of wheat due to exposure to high temperature

Wheat production has decreased in many countries of both the Northern and Southern Hemispheres. In the last three decades global wheat production has fallen 5.5%, an amount equal to the annual wheat production in France (33 MT). Due to heat there was a 15% decline in wheat production in Russia alone during 1980-2008 (Lobell *et al.*, 2012). Even a brief period of heat stress (>35 °C) affects wheat yield and grain quality (Wardlaw & Wrigley, 1994; Graybosch *et al.*, 1995; Rane & Nagarajan, 2004; Mason *et al.*, 2010). Asseng *et al.* (2011) showed that there are on average 15 days with >34 °C during grain filling at locations across the Australian wheat belt. Their modelling suggested a yield reduction by 5% for each such day, because of a dramatic acceleration of leaf senescence proportionate to the number of such shocks (ibid.). In the Mediterranean region, the USA (Graybosch *et al.*, 1995; Mason *et al.*, 2010), India (Rane & Nagarajan, 2004) and Australia, heat stress at grain filling reduces yield significantly. Annual average yield losses of 10- 15% (AUD 300-400 M) due to heat were estimated for Australia and the USA (Wardlaw & Wrigley, 1994). Analysing heat events across the Australian wheat belt based on 50 years of historical records it was found that winter temperature is increasing during pre-flowering which causes serious damage to yield, therefore warmer winters would shorten the wheat season by up to 6 weeks (Zheng, *et al.*, 2012).

Under moderate temperature stress during grain filling (25–32 °C), wheat grain yield declines by 3-4% for each 1 °C rise in average temperature above 15 °C under both controlled conditions (Wardlaw *et al.*, 1989ab) and field conditions (Wiegand & Cuellar, 1980; Dhadhwal, 1989). This phenomenon affects about 9 million hectares of wheat grown in tropical and subtropical areas which experience temperatures above 17 °C even in the coolest month of the growing season (Ortiz *et al.*, 2008). The Indo-Gangetic Plains contribute 15% of global wheat production but by 2050 about 51% this area is predicted to be reclassified as a heat-stressed as a result of climate change (Ortiz *et al.*, 2008).

Future climates will also be characterized by greater variability in temperature and increased frequencies of hot days (Pittock, 2003). Therefore, a major concern arises for the long-term productivity and sustainability of cropping systems under future climate conditions (Stokes & Howden, 2010; Anwar *et al.*, 2013; Challinor *et al.*, 2014; Rodriguez *et al.*, 2014). Major wheat-producing regions show a trend of increasing growing season temperatures (Gaffen & Ross, 1998; Alexander *et al.*, 2006; Hennessy & Flagship, 2008). Therefore to adapt crop varieties to the future climate, it is necessary to understand how crops respond to elevated temperatures and how tolerance to heat can be improved (Halford, 2009).

Impact of heat on different aspects of wheat

Wheat production decreases due to deleterious effects of heat stress at different developmental stages of wheat are discussed as follows:

Grain filling (grain size)

Grain filling is sensitive to elevated temperature (Ferris *et al.*, 1998). Heat stress accelerates grain filling rate, hasten senescence (Wardlaw & Wrigley, 1994) and physiological maturity after anthesis (Warrington *et al.*, 1977; Shpiler & Blum, 1986) and shortens grain filling duration (Dias & Lidon, 2009).

Grain set (number of grains per spikelet)

Heat stress due to moderately high temperatures (>20 ˚C) between spike initiation and anthesis can substantially reduce grain number per spike (Fischer, 1976; Warrington *et al.*, 1977). Grain number per spike decreased by 4% for every 1 ˚C (from 15–22 ˚C) increase in the 30 days before anthesis (Fischer, 1985). Wheat plants exposed to 30 ˚C for 3 consecutive days or for 3 days to day/night temperatures of 30/20 ˚C when pollen mother cells were dividing, markedly reduced grain set and therefore grain yield (Saini & Aspinall, 1982). Wheat grain set is affected by high temperature in various ways and at different stages. Some of the effects of heat stress are discussed below:

Floret sterility due to floret organ failure

Heat, at or around meiosis, has been reported to lead to failed fertilization (sterility), due to failure of individual floret organs. Complete sterility was observed when wheat plants were grown at high temperature (35 ˚C) during ear emergence and onward (Owen 1971; Saini & Aspinall 1982). Saini and colleagues showed that heat stress can affect both male and female organs in wheat (Saini & Aspinall, 1982; Saini *et al.*, 1983). Adverse effects of heat stress on pollen tube growth has also been reported (Saini *et al.*, 1983).

Approximately 60% reduction in pollen viability was observed in cotton after a 5 hour incubation at 39˚C (Burke, 2007), and reduced pollen viability under heat stress has been linked to altered carbohydrate metabolism and starch deficiency in other cereals like sorghum (Jain *et al.*, 2007; Prasad & Djanaguiraman, 2011). Rice plants showed complete spikelet sterility after heat treatment at 39 ˚C/30 ˚C for 2-4 days at the microspore stage (Endo *et al.*, 2009).

Although less researched, female reproductive organs are also affected heat stress. Heat stress at meiosis has been reported to result in abnormal ovary development and accelerated stigma and ovule development, which may contribute to reduced pollen tube growth and seed set (Barnabás *et al.*, 2008).

Early grain abortion

Heat stress within the first three days after pollination can lead to early abortion of grain growth (Saini & Aspinall, 1982; Saini *et al.*, 1983; Wardlaw *et al.*, 1989a; Tashiro & Wardlaw, 1990b). Free nuclei in the developing endosperm multiply in the three days after pollination and heat treatment at this stage may result in abnormal nuclear division, which might explain the appearance of abortive or shrunken grains in heat-treated plants (Tashiro & Wardlaw, 1990b).

Photosynthesis, stay green and senescence

The wheat photosynthetic apparatus is affected by heat both functionally and structurally (Baker, 1991; Sharkey, 2005). Electron transport activity and fluorescence of chloroplasts decreases due to an increase in peroxidation of thylakoid lipids in heat treated leaves (Mishra & Singhal, 1992). Thylakoid membranes and photosystem II (PS II) are very sensitive to high temperatures and their destruction under high temperatures can limit photosynthesis (Ristic *et al.*, 2007). Degradation of chlorophyll a and b, separation of light harvesting complex II from PS II (Schreiber & Berry, 1977), dissociation of oxygen evolving complex (OEC) from PS II, reduction of photosynthetic pigments, reduction in RuBisCO activity, and other changes in photosynthesis machinery due to heat stress, reduce photosynthesis rate (Wahid *et al.*, 2007).

Photosynthesis is related to the stay-green trait. Stay-green is the ability of plants to delay

senescence and maintain green leaf area during the reproductive stage. Senescence reduces chlorophyll which in turn affects photosynthesis and photo-assimilate supply. Heat stress accelerates loss of chlorophyll, hence stay-green can also represent the reduction of this stress induced effect.

Stem reserves and current photosynthesis contribute to grain growth. Under optimum conditions, stem reserves contribute less to grain growth compared to the current photosynthesis, while under heat stress conditions when current photosynthesis is impaired it tends to contribute proportionately more to grain growth, depending on the genotype (Blum, 1998; Yang *et al.*, 2002). These studies suggest that maintaining photosynthate supply to the developing grain, either through maintaining access to high levels of stem reserves or sugars from current photosynthesis, may play a role in tolerance of grain filling under heat-stress conditions.

Heat stress hastens the senescence-related metabolic changes in wheat (Paulsen, 1994; Al-Khatib & Paulsen, 1999) by inhibiting chlorophyll biosynthesis (Tewari & Tripathy, 1998) and accelerating the breakdown of thylakoid components (Harding *et al.*, 1990). Early senescence in response to external environmental factors (e.g. heat, drought, and disease) affects photosynthetic competence and assimilate supply and consequently can negatively impact grain growth and yield (Distelfeld *et al.*, 2014). Positive associations have been reported between stay-green and grain yield in wheat (Reynolds *et al.*, 1994; Reynolds *et al.*, 1998; Lopes & Reynolds, 2012; Kumari *et al.*, 2013).

Stay-green sorghum genotypes under drought stress at grain filling stage exhibit increased xylem pressure potential, delayed loss of photosynthetic competence, modification of canopy development, leaf anatomy, root growth, water uptake, and enhanced nitrogen uptake (Tuinstra *et al.*, 1998; Vadez *et al.*, 2013; Borrell *et al.*, 2014a; Borrell *et al.*, 2014b). Delayed senescence is positively correlated with high water use efficiency during grain filling (Gorny & Garczynski, 2002) and a root architecture that allows water to be extracted from deep in the soil profile post-anthesis under field conditions (Kirby, 1988; Christopher *et al.*, 2008).

Silva *et al.* (2001) reported control of stay-green by a single locus, showing high heritability and partial dominance in crosses of four contrasting genotypes of bread wheat. Joshi *et al.* (2007) found stay-green to be controlled by around 4 additive genes. Vijayalakshmi *et al.* (2010) observed polygenic inheritance of stay-green in recombinant inbred line (RIL) populations under field and controlled environment under high temperature conditions. A stay green durum wheat mutant showed increased leaf area and grain filling rate (Spano *et al.*, 2003). High expression of Rubisco activase, soluble starch synthase and glycine decarboxylase were seen for a longer time in a stay-green durum wheat mutant in comparison with the non-stay-green parent line, which further suggest a positive effect of stay-green in prolonging photosynthesis and grain filling (Rampino *et al.*, 2006).

Positive correlations were found between stay green and heat tolerance for grain weight under late season heat and drought conditions (Naruoka *et al.*, 2012; Distelfeld *et al.*, 2014). However, stay-green may have negative impact on yield under regular conditions (Kichey *et al.*, 2007; Derkx *et al.*, 2012; Naruoka *et al.*, 2012; Kipp *et al.*, 2014) because it might hamper remobilization of assimilate reserves to grains, resulting in more of the storage carbohydrates remaining in the straw (Yang *et al.*, 2002). An alternative explanation for adverse effects of stay-green is prolonged consumption of glucose for continued nitrogen assimilation and protein synthesis by green leaves, which can deprive the grains of assimilate for grain filling (starch synthesis) (De Vries *et al.*, 1974; Hirel *et al.*, 2007; Kipp *et al.*, 2014).

Whereas drought stress at anthesis affects mainly grain size, stress at the young microspore stage of pollen development is characterized by abortion of pollen development and reduction in grain number. We identified genetic variability for drought tolerance at the reproductive stage. Drought-tolerant wheat germplasm is able to maintain carbohydrate accumulation in the

reproductive organs throughout the stress treatment. Whereas drought stress at anthesis affects mainly grain size, stress at the young microspore stage of pollen development is characterized by abortion of pollen development and reduction in grain number. We identified genetic variability for drought tolerance at the reproductive stage. Drought-tolerant wheat germplasm is able to maintain carbohydrate accumulation in the reproductive organs throughout the stress treatment.

Dough quality

Wheat proteins gliadins and glutenins are associated with dough extensibility and elasticity respectively. Glutenins link via disulphide bonds to form high molecular weight polymers which confer the elasticity to dough (Shewry *et al.*, 2000; Ali *et al.*, 2010). A shorter grain filling period as a result of heat stress lead to reduced disulphide bound formation due to shortening of the disulphide bond formation process (Blumenthal *et al.*, 1994). Extensibility and elasticity are important factors in bread baking performance because of their contribution to the dough strength and ability of dough to rise and maintain its shape as it is baked. Heat stress (>35 ˚C) for 3 days during grain-filling can reduce dough strength (highest resistance to dough mixing) by 50% (Blumenthal *et al.*, 1995), leading to a loss of quality for bread making (Blumenthal *et al.*, 1991; Blumenthal *et al.*, 1995; Corbellini *et al.*, 1998). Exposure to 32 ˚C for 1-4 days during the grain-filling period can damage wheat quality by altering starch and protein composition (Wardlaw & Wrigley, 1994). Stone and Nicolas (1994) studied grain yield and quality in response to short periods of high temperature in five wheat cultivars and the gliadin: glutenin ratio was found to be altered in the range -9 to +18% depending on variety. Proteomic analysis of grains from heat treated plants showed that under heat stress expression of several gliadins were increased but not glutenins.

General mechanisms of heat tolerance and damage

The capability of crop plants to survive and produce economically viable grain yield under heat stress is the heat tolerance (Wahid *et al.*, 2007). Some general mechanisms of heat tolerance and damage are discussed below:

Cell function

Plants react to changes in ambient temperature through changes in metabolism, membrane fluidity, protein conformation and assembly of the cytoskeleton (Ruelland & Zachowski, 2010). Transcriptome analysis of heat tolerant and susceptible wheat genotypes following heat treatment suggested that genes for heat shock proteins, transcription factors, calcium signalling and metabolism pathways are involved in responses of plant cells to heat (Qin *et al.*, 2008). Heat has been documented to negatively affect cellular function in several ways. High temperature alters membrane fluidity (Alfonso *et al.*, 2001; Sangwan *et al.*, 2002) and enzyme function through denaturation (Vierling, 1991; Kampinga *et al.*, 1995). Heat stress induced membrane and protein damage can result in elevated concentrations of reactive oxygen species (ROS) that in turn create oxidative stress which can be harmful to plant tissues (Sairam *et al.*, 2000; Mittler, 2002; Almeselmani *et al.*, 2009). Hence detoxification of ROS by enzymatic and non-enzymatic antioxidant systems (Noctor & Foyer, 1998) are important for protecting plants against heat stress. The activities of antioxidants (e.g. superoxide dismutase and catalase) increase when heat stress (34/22 ˚C) is applied during the reproductive phase (Zhao *et al.*, 2007). Heat stress can also induce programmed cell death (Swidzinski *et al.*, 2002; Vacca *et al.*, 2004) and activate expression of heat shock proteins (HSPs) as a protective mechanism (Blumenthal *et al.*, 1994).

Hormone signalling

Plant growth and development is regulated by hormones (Santner & Estelle, 2009). Ethylene is a hormone known to regulate growth and development and to trigger senescence and maturation in wheat (Pratt & Goeschl, 1969; Beltrano*et al.*, 1994; Khan, 2006; Schaller, 2012). Increased ethylene production in response to heat is associated with short grain filling period,

decreased 1000 kernel weight and accelerated maturity (Beltrano *et al.*, 1999).

Enhanced ethylene accumulation upon heat exposure has been suggested to act as a timing signal to arrest development, trigger senescence and shorten grain filling duration, since endogenous application of an ethylene receptor inhibitor reduced heat stress induced kernel abortion kernel weight reductions in an otherwise susceptible wheat genotype (Hays *et al.*, 2007). Enhanced production of ethylene in the wheat spike has also been found during or after recovery from water stress (Morgan *et al.*, 1990; Narayana *et al.*, 1991; Beltrano *et al.* 1997; Beltrano *et al.*, 1999). Ethylene is also known to reduce root and embryo growth (Wilkinson & Davies, 2010). In soybean, heat stress increased ethylene production rate which triggered premature leaf senescence (Djanaguiraman & Prasad, 2010).

Application of gibberellic acid to seeds of a heat tolerant barley led to loss of tolerance due to loss of membrane stability and physiological damage to the photosynthetic apparatus (Vettakkorumakankav *et al.*, 1999). Exogenous application of cytokinin at the ear emergence stage increased the number of grain endosperm cells, and increased grain weight and grain filling duration under normal temperatures (Alizadeh *et al.*, 2010). On the other hand, reduction in cytokinin (50-80%) due to high temperature (7 days at 35/25 ˚C) was accompanied by reduced mature grain mass, in wheat (Banowetz *et al.*, 1999). This suggests that cytokinins might have a role in the heat stress response.

Root-shoot signalling involving abscisic acid (ABA) under water deficit conditions (Wilkinson & Davies, 2002). Drought stress at the reproductive stage causes pollen sterility and grain loss in wheat due to ABA accumulation in spikes in drought-sensitive varieties (Ji *et al.*, 2011).

Stem water soluble carbohydrate

Positive associations have been observed between stem water soluble carbohydrate content and floret fertility and grain number in wheat under high temperature conditions. High Water Soluble Carbohydrate (WSC) lines were found to have more grains per spike associated with more (~10 more) fertile florets per spike at anthesis and a higher glucose content and biomass spike at booting. At booting, high WSC lines showed higher rates of ^{13}C fixation and higher levels of expression of genes involved in photosynthesis, sucrose transport and lower expression of genes involved in sucrose degradation, compared with Low WSC lines (Dreccer *et al.*, 2014). The ability to set grain under heat might therefore be related to carbon availability, suggesting an area for further in depth study.

Water relations

Increased evapotranspiration under high temperatures can increase plant water stress if the soil moisture and hydraulic conductivity of the soil or plant cannot keep up with the evaporative demand and leads to a critically low water potential of leaves and grains (Wahid *et al.*, 2007). Elevated temperature tends to increase hydraulic conductivity of membranes and plant tissues due to increased aquaporin activity, membrane fluidity and permeability (Martínez-Ballesta *et al.*, 2009). Increasing hydraulic conductivity may also be beneficial if water supply is not limiting as it would allow stomata to stay open for longer. Transpiration also serves to cool the plant tissues, thereby alleviating heat stress.

Drought and waterlogging represent opposite ends of the spectrum of water supply. At least for waterlogging, the effect of combining with heat stress has not been widely investigated. Excess rain or irrigation may cause waterlogging and under this condition roots cannot respire due to a shortage of oxygen (hypoxia). Waterlogging can reduce root and vegetative biomass (Huang *et al.*, 1994a; Malik *et al.*, 2001; Lee *et al.*, 2007), photosynthesis (Huang, Johnson, NeSmith, & Bridges, 1994b) and induce leaf chlorosis (Huang *et al.*, 1994b; Lee *et al.*, 2007). In cotton 10% (Bange *et al.*, 2004) to 40% (Hodgson, 1982) yield loss could be attributed by waterlogging (Collaku & Harrison, 2002). Oxygen already has a lower diffusion rate in water than in air (Christianson *et al.*, 2010) and oxygen solubility in water decreases further with increasing temperature.

Low oxygen levels cause rapid changes in gene transcription, protein synthesis/degradation, and cellular metabolism (Bailey-Serres & Voesenek, 2008). Waterlogging causes the accumulation of ethylene in the soil which can ultimately impede root growth and function thereby adversely affecting shoot growth (Smith & Russell, 1969; Arshad & Frankenberger Jr, 1990). It also caused a substantial reduction in grain yield and grain protein content and reduced processing quality of the wheat grain (Fan *et al.*, 2004). Zheng *et al.* (2009) reported that waterlogging decreased protein and starch content in the grains of the two wheat cultivars, Yangmai 12 and Huaimai 17.

Conclusion

Burgeoning global population and global warming are putting ever greater pressure on wheat farmers to increase yields. With the global population projected to exceed 9 billion by 2050 (Roberts, 2011) researchers, breeders and growers are facing the challenge of increasing world food production by about 79 percent to meet future demands (Tweeten & Thompson, 2008).

High temperature for short period at reproductive stage adversely affects floret fertility and grain filling in wheat therefore, reducing productivity of the most cultivated cereal crop of the world. Wheat is a major cereal crop with a very complex genome configuration. It is not a easy task to bring about desired and targeted genetic modifications in wheat. Understanding heat tolerance mechanism in wheat is crucial for further development and to enhance global wheat production. This review reveals that heat stress seems to be unavoidable in future wheat cultivation therefore, scientific researches focusing on development of heat tolerant varieties, identification of heat tolerance genes, cultural practices and physiological mechanisms could rescue this valuable crop from heat susceptibility and to endure global food security.

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Contribution of rural women to their household food utilization

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ABSTRACT

The objectives of this study were to determine the contribution of RDRS women beneficiaries to their household food utilization and to explore its relationship with their selected characteristics. The study was conducted at Sadar upazila of Panchagarh district. Ninety-four RDRS women beneficiaries were selected randomly as a sample from 935 women beneficiaries. A pre-tested interview schedule was used to collect data from the respondents from 24 September to 22 October 2019. The contribution of women beneficiaries to household food utilization was considered as the focus issue of the study and measured by a 4-point rating scale along with five dimensions containing twenty-six activities. The observed overall contribution of women beneficiaries score ranged from 16 to 74 with a mean of 38.21 and standard deviation of 13.43. The RDRS women beneficiaries played medium to high contributions to household food utilization. Among different dimensions of food utilization, the most important contribution was food preparation, followed by food hygiene and intra-household food distribution. Correlation analysis indicated that educational qualification, earning members, credit received and extension media contact were positively correlated with the contribution to their household food utilization and negatively correlated with household annual income and dependency ratio. It may be recommended that, RDRS should provide sufficient non-formal education like training, extension campaigns, discussions with their woment beneficiaries regarding household food utilization. In this connection special emphasis need to be given on "food processing and preservation" as well as "water and sanitation" dimensions of food utilization for improving beneficiaries' knowledge on household food utilization.

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Introduction

Food security is the physical and economic access to sufficient food to meet the dietary requirements for productive and healthy life (FAO, 2007). Peoples' food security occurs when all have physical and economic availability and access to sufficient, safe and nutritious food at all times that meet their dietary needs and food preferences for active and healthy life (IFPRI, 2021). Four main dimensions of food security

can be identified as physical availability of food, economic and physical access to food, food utilization, and stability of the other three dimensions over time (FAO, 2008). In contrast to the other three pillars food utilization is often used interchangeably with nutrition, yet while utilization focuses on nutrition; it also includes food storage, processing, health, and sanitation as they relate to nutrition (Aromolran *et al.,* 2017). Thus, food utilization refers to the way that households' used to meet specific dietary and nutritional needs, as well as individuals' ability to absorb the nutrients. It is exhaustively linked with the betterment of the livelihood of the farm people (Hanif *et al.*, 2018). It includes a variety of issues, such as food storage/processing, intra-household food distribution, preparation practices, infant and young child feeding practices, hygiene practices, and access to safe water and sanitation.

Rural women play an essential role in the four pillars of food security. Women are generally responsible for food selection and preparation and the care and feeding of the family. They are the key to food security for their household food utilization (ADB, 2013). Their role in food utilization for food security is perhaps the most critical and outweighs the importance of their role in food production and how they spend the income they earn. They are typically responsible for food preparation and thus are crucial to the dietary diversity of their households. Therefore, they play a decisive role in food security, dietary diversity, and children's health (Nasrin, 2015). They have to play both productive and reproductive roles in other words both maintaining the household and securing foodstuff for the household members.

Rangpur Dinajpur Rural Service (RDRS) is one of the leading non-governmental organization (NGO) in the northwest of the Bangladesh working with the disadvantageous people in order to build their empowerment capacity, create resilience to adverse situation and improve access to opportunities to realize decent lives free from poverty and distress (Islam, 2010). The organization is a break through with a view to bringing rural women to improve their efficiency in household activities and to make them conscious about household health and nutrition. As rural women are the main organizer of household-related activities, they are often faced with a variety of obstacles which render them unable to fulfil their role as gatekeepers by dedicating their own time, income and decision-making to maintain food and nutritional security of their households and communities. These obstracles might vary with the socio-economic scenario of the rural women. To determine the food security status we need to consider women contribution to their household food utilization along with their socio-economic characteristics. It was expected that contribution of the women towards food utilization would be influenced by the selected characteristics of the respondents. Thus, we considered some selected characteristics of the women beneficiaries to measure their relationship with household food utilization.

Objectives of the Study

The present study was undertaken with the following specific objectives:

a. to determine the contribution of RDRS women beneficiaries to their household food utilization; and
b. to explore the relationship between the contribution of women beneficiaries to their household food utilization and their selected characteristics.

Materials and Methods

Research design: An ex-post-facto explanatory cross-sectional research design (Hasan *et al.*, 2018) was used for this study as the study is quasi-experimental in nature and it tried to predict the relationship of the selected characteristics of the female beneficiaries with their contribution to food utilization at a particular time. The face-to-face interview method was used for data collection. A pre-tested interview schedule was used during the interview for data collection. The interview schedule contained both open and closed form questions. Data were collected from 24 September to 22 October 2019.

Study area: The study was conducted in the

Panchagarh district. This is the northernmost district of Bangladesh and is considered as one of the most high prevalance food-insecure districts of the north-west zone (Coirolo *et al.*, 2013). The researchers are familiar with the socio-cultural environment of the district.

The Sadar Upazila of Panchagarh district was selected randomly among the five Upazilas of the district. Thus, the Sadar Upazila of Panchagarh was the locale of the study.

Sampling Design: RDRS was selected purposively for data collection as it is one of the top-ranked NGOs working in Sadar Upazila of Panchagarh district. The women beneficiaries who are the members of RDRS of the Panchagarh Sadar Upazila for at least last two years constitute the population of the study and the total number was 935. Due to constrains of time and resources, 10 percent of the population that is 94 women beneficiaries were randomly selected as a sample by using a simple random sampling method for data collection. The random sampling method is selected as it eliminates bias by giving all individuals an equal chance to be chosen in the sampling frame (Hasan *et al.*, 2018). A reserve list of 10 women beneficiaries was also prepared for using as a sample in case of unavailability of original sampled women during the interview.

Variables of the study: Twelve characteristics of the RDRS women beneficiaries viz., age, educational qualification, household size, household farm size, household annual income, earning members, dependency ratio, training experience, credit received, extension media contact, access to facilities and family shock faced were selected based on review of literature and previous similar studies. The measurement of these variableas are given below. Age of the respondents were measured in terms of the actual years passed from her birth to the day of interview (Sultana, 2017). The educational qualification was measured on the basis of grade passed by a respondent from a formal institution or equivalent qualification possessed (Sarmin & Hasan, 2019). Household size is the total number of family member (Hasan *et al.*, 2019), whereas household farm size referred to the toal area of land on which the respondent's family carried out farming operation (Mondol, 2019). Household annual income was considered as the total income obtained from different sources by all the members of the household of the respondent (Hasan *et al.*, 2019). The earning member indicates the total number of family member(s) of the household involved in earning (Sultana, 2017). The dependency ratio of a respondent's household was measured by ratio of total dependent members (number of children aged under 15 years and number of the older aged above 65 years) to total working members (number of members aged 15 to 65) of the household, multiplied by 100 (Sultana, 2017). Training received was considered as the participation of the respondents in different training activities in her life expressed in days (Hasan *et al.*, 2019). Credit received was measured in terms of the amount of money received by the respondent from different monetary organizations (Sultana, 2017; Mondol, 2019). For measuring the extension media contact a four-point rating scale was used along with selected 14 extension media contact with the extent of responses of 'regularly', 'often' 'rarely, and 'not at all' with score values of 3, 2, 1 and 0, respectively. Thus, the total extension media contact score of a respondent could vary from 0 to 42, where 0 indicating no extension media contact and 42 indicating highest level of extension media contact (Kisku, 2017). Access to different facilities was measured by nine facilites accessible by the respondent. Each facility has a binary responses such as 'yes' or 'no' with a scoring of 1 and 0, respectively (Sultana, 2017; Mondol, 2019). Family shock faced by the respndents was measured by statements related to six shocks faced by the respondents like domestic or physical violence, dowry demand, death of child before five years etc.. Each of the statement has binary responses such as 'yes' or 'no' with a scoring of 1 and 0, respectively (Sultana, 2017; Mondol, 2019). The focus issue of the study was the contribution of women beneficiaries to their household food utilization.

Measurement of the focus issue: Food

utilization is an important pillar among the four pillars of food security which addresses not only how much food the people eat but also what and how they eat and is comprehensively linked with poverty (Islam *et al.*, 2007). In this study, we considered four dimensions of food utilization as suggested by Nasrin (2015) viz. food preparation, food processing and preservation, water and sanitation and intra-household food distribution. In addition, we also considered food hygiene as a dimension of food utilization as it helps to protect the health of consumers from foodborne illness and food poisoning (Ehuwa *et al.*, 2021). Twenty-six activities of five dimensions to household food utilization namely, food preparation (four activities), food processing and preservation (six activities), food hygiene (five activities), water and sanitation (five activities) and intra-household food distribution (six activities) were considered for measurement of 'contribution in household food utilization'. These activities were measured by a 4-point rating scale following the methodology of Nasrin (2015). The score was assigned as '0' for not at all, '1' for low, '2' for medium and '3' for high contribution to the activities related to household food utilization. Thus, a total score of a respondent might vary from 0 to 78 on this scale, where '0' indicated not at all and '78' indicated the highest contribution to the activities related to household food utilization.

Ranking of the dimensions of contribution to household food utilization

To rank the selected five dimensions, contribution index (CI) along with rank order was computed by using the following formula:

Mean contribution index of a specific dimension (MCI) = Mean of (Sum of a total score of all the activities of the specific dimension/Number of total activities of the specific dimension)

The MCI score could range from 0 to 3, where 0 indicates no contribution at all to that specific dimension and 3 indicates the highest extent of contribution to that specific dimension.

Data analysis: The collected data were coded, compiled, tabulated and analyzed. The local units were converted into standard units. The qualitative data were transferred into quantitative data by appropriate scoring techniques. Data were analyzed following the objectives of the study by using Statistical Package for Social Sciences (SPSS) computer program (version 23). Various statistical measures such as range, mean, number, percentage, standard deviation and rank order were used to describe the selected characteristics of the respondents of the study area. ,o find out the relationship between the selected characteristics of the farmers and their household food utilization, Karl Pearson's Product Moment Correlation Coefficient (r) was computed.

Result and Discussions

Contribution of RDRS women beneficiaries to their household food utilization

The observed overall contribution of women beneficiaries to their household food utilization score ranged from 16 to 74 with the possible range of 0 to 78 Table 1. The mean score of the contribution of women beneficiaries to their household food utilization is 38.21 with a standard deviation of 13.43. Based on mean and standard deviation of the contribution to household food utilization score (mean±standard deviation), the women beneficiaries were classified into three categories are presented in Table 1.

The findings implied that the majority of the respondents were clustered around the moderate

Table 1. Distribution of women beneficiaries according to their contribution to household food utilization score (N=94).

Categories	Frequency	Percentage	Mean	Std. deviation
Low (≤26)	8	8.5		
Moderate (27-52)	74	78.7	38.21	13.43
High (above 52)	12	12.8		
Total=	**94**	**100.0**		

contribution to high contribution to their food utilization category. This is in support of the findings of Kobir (2007), Rahman (2010) and Nasrin (2015). Household food utilization is an important pillar for the assurance of household food security. As it was found that women beneficiaries had moderate to high food utilization, their knowledge and skill on the same can be further strengthened for ensuring food security and assuring adequate food utilization in their households. In addition, women had low contribution to their household food utilization need to focus intensively for ensuring household food security. This can be done by different non-formal education like training, group discussion etc.

The rank order of the dimensions of contribution to household food utilization

The contribution of RDRS women beneficiaries towards household food utilization has been examined by computing rank order through the mean contribution index of the women are shown in Table 2.

The findings of Table 2. show that the mean Contribution Indices (CI) of the selected five dimensions of contribution to household food utilization ranged from 1.09 to 1.67 against a possible range of 0 to 3. Dimension wise rank order of the contribution to the household food utilization indicates that food preparation dimension ranked top followed by food hygiene and intra-household food distribution. The degree of variation is comparatively low for these dimensions also. But the women beneficiaries had less contribution to water and sanitation and least contribution to food processing and preservation. Their degree of variation is also comparatively high for these two dimensions indicating the distribution is disperse highly around the mean. Lack of proper sanitation awareness might be the root cause for such findings. In addition, households having solvency in income might employ helping hands who are basically responsible for food processing and preservation other than the respondents themselves. In addition, these housholds might be highly dependent on processed foods available in market. But these two dimensions are very much important for the management of household health and nutrition. Thus, women beneficiary's knowledge and skill on these two dimensions are needed to be improved for increasing their contribution . This might improve their insight and might contribute more to their household food utilization.

Characteristics profile of the women beneficiaries

There were various characteristics of the women beneficiaries that might influence their contribution to their household food utilization. In the present study, twelve characteristics of the RDRS women beneficiaries were selected, which included their age, educational qualification, household size, household farm size, household annual income, earning member, dependency ratio, training experience, credit received, extension media contact, access to facilities and family shock faced. The salient features of the characteristics of the respondents are presented in Table 3.

Findings of Table 3 indicated that an overwhelming majority of the respondents were middle to young. Exposure to formal education is very

Table 2. Rank order of the dimensions of the contribution of women beneficiaries to their household food utilization.

Dimensions	Contribution index		
	Mean	CV	Rank
1. Food preparation	1.67	34.78	1st
2. Food processing and preservation	1.09	56.87	5th
3. Food Hygiene	1.64	33.30	2nd
4. Water and sanitation	1.36	44.33	4th
5. Intra-household food distribution	1.51	36.43	3rd

CV = Coefficient of variation

Table 3. Distribution of the women beneficiaries based on their selected characteristics scores (N=94).

Characteristics	Scoring method	Range		Categories	Respondents		Mean	SD
		Possible score	Observed		Freq.	%		
Age	No. of year	Unknown	22-60	Young (18-35)	30	31.9	40.26	9.28
				Middle (36-55)	59	62.8		
				Old (> 55)	5	5.3		
Educational qualification	Year of schooling	Unknown	0.5-16	Can sign name only (0.5)	51	54.3	4.17	4.60
				Primary (1-5)	10	10.6		
				Secondary (6-10)	25	26.6		
				Higher secondary (11-12)	4	4.3		
				Above higher secondary (>12)	4	4.3		
Household size	No. of members	Unknown	3-9	Small (1-4)	45	47.9	4.79	1.30
				Medium (5-6)	39	41.5		
				Large (>6)	10	10.6		
Household farm size	Hectare	Unknown	0.17-2.77	Marginal (<0.21)	21	22.3	0.45	0.39
				Small (0.21-1.0)	68	72.3		
				Medium (1.01-3.0)	5	5.3		
Household annual income	('000' Tk.)	Unknown	91-530	Low (≤ 100.00)	6	6.4	172.35	68.29
				Medium (100.01-200.00)	69	73.4		
				High (200.01-300.00)	15	16.0		
				Very high (>300.00)	4	4.3		
Earning member	No. of members	Unknown	1-7	Low (1-2)	19	20.2	3.69	1.32
				Moderate (3-4)	51	54.3		
				High (>4)	24	25.5		
Dependency ratio	Score	0-100	0-83.33	No dependency (0)	32	34.0	21.73	21.15
				Low dependency (1-33.00)	35	37.2		
				Moderate dependency (33.01 to 66.00)	20	21.3		
				High dependency (above 66.00)	7	7.4		
Training experience	Day	Unknown	1-6	Daylong (1)	58	61.7	1.69	1.8
				Two-days (2)	27	28.7		
				Above two-days (>2)	9	9.6		
Credit received	('000' Tk.)	Unknown	0-270	No (0)	22	23.4	40.16	57.25
				Low (1 to 90.00)	59	62.8		
				Medium (90.01-180.00)	7	7.4		
				High (>180.00)	6	6.4		
Extension media contact	Score	0-42	7-34	Low (1 to 14)	23	24.5	19.05	6.23
				Medium (15-28)	60	63.8		
				High (>28)	11	11.7		
Access to facilities	Score	0-9	2-8	Low (≤ 3)	16	17.0	4.67	1.25
				Medium (4-6)	70	74.5		
				High (>6)	8	8.5		
Family shock faced	Score	0-6	1-6	Low (≤ 2)	63	67.0	2.31	1.26
				Medium (3-4)	23	24.5		
				High (>4)	8	8.5		

important for shaping up the behaviour of an individual. It was found that respondents having higher education (above secondary level) are very few in number and most of the respondents are dropped out from education after ther secondary level. However, more than half of the respondents have no formal institutional education in the study area. It was found that 89.4 percent of the respondents had small to medium sized household. It is assumed that the respondents having small and medium household are likely to provide more contribution to their household food utilization especially considering the dimension intra-household food distribution. Following the classification of DAE (2016) it was found that the majority of the respondents had small to marginal sized farm and there were no landless and large farm sized women beneficiaries. RDRS mainly work with the disadvantageous group of people, thus the large farm sized respondents were absent, whereas the landless respondents were absent as most of them maintain their livelihood by selling their labor to other households and they were highly dependent on those households for food utilization.

Results presented in Table 3 show that majority of the respondents had medium to high income, whereas about four-fifth of the respondents had moderate to high earning members in their household. Earning member expresses how many household members are earning and higher-earning member of the household indicates that more earning of the household. The results indicates that 49 households having 4+ family members and out of these 24 have 4+ earning members. This indicates that, housholds having more family members are less engaged in earning. The dependency ratio expresses how many non-earning aged family members are dependent on an earning aged member and higher dependency ratio of the household indicates that more non-earning aged household members is dependent on less earning aged member of the household. It was found that about one-third of the respondents had no dependency that is all the members of their family were earning aged members. Results also indicates that, high dependency is not profuse in the studay area.

The training experience of the women beneficiaries is directly related to their organizational affiliation as well as skill development. The range of duration of training experience was very narrow but the respondents were mainly clustered in "daylong training" and "two-day training" categories. As training improves psychomotor as well as cognitive contents of an individual, women contribution to food utilization can further be improved by trining programs. It was found that majority of the respondents clustered around no to low credit received categories. The socio-cultural barrier as well as male dominancy in the family might influence this kind of findings. A overwhelming majority of the respondents (88.3 percent) had low to medium extension media contact in the study area which was an indication of inadequate extension services to their community.

Access to facilities might indicate the inherent strength of a respondent to contribute more to their household food utilization. The findings show that most of the respondents had low to medium access to facilities which was an indication of their medium contribution to their household food utilization. Family shock is the dummy psychological stress variable of the respondents which might inversely affect to the contribution to household food utilization. It was also found that overwhelming majority (91.5 percent) of the respondents had low to medium family shock faced in the study area. These issues might be considered for improvement of the women's contribution towards household food utilization.

Relationship between the selected characteristics of RDRS women beneficiaries and their contribution in household food utilization

Karl Pearson's Product Moment Correlation co-efficient (r) was used to determine the relationships between the selected characteristics and the focus issue. A summary of the correlation analysis is presented in Table 4.

Out of twelve selected characteristics of the women beneficiaries four namely, educational qualification, earning members, credit received

Table 4. Relationships between the selected characteristics of the women beneficiaries and their contribution to household food utilization.

Focus issue	Selected characteristics	Computed values of 'r' with 92 df.	Tabulated value of 'r'	
			0.05 level	0.01 level
Contribution to household food utilization	Age	0.092	±0.203	±0.265
	Educational qualification	0.498**		
	Household size	0.018		
	Household farm size	0.140		
	Household annual income	-0.235*		
	Earning members	0.314**		
	Dependency ratio	-0.334**		
	Training experience	0.140		
	Credit received	0.254*		
	Extension media contact	0.342**		
	Access to facilities	-0.094		
	Family shock faced	0.064		

*Correlation is significant at the 0.05 level and ** Correlation is significant at the 0.01 level

and extension media contact showed positive significant relationship with their contribution to household food utilization. In contrast, household annual income and dependency ratio of the women beneficiaries showed negative significant relationship with their contribution to household food utilization. Rests of the characteristics such as age, household size, household farm size, training experience, access to facilities and family shock faced by the women beneficiaries had no significant relationship with their contribution to household food utilization. Educatonal qualification of an individual might expand the horizon of outlook and insight of a respondent (Sarmin and Hasan, 2019). This might help them to contribute more to their household food utilization. Having more earning members in a household might open up the communication opportunities with the outside world and the respondents of such houshholds might get more information in this indirect pathway which might improve their knowledge on food utilizaton. Similarly, to receive credit the respondents might require functional interpersonal communication with the credit providing institutions. This might improve their cognitive ability which might help their analytical potential for improving their contribution to household food utilization. More contribution to household food utilization as extension media contact is a kind of non-formal education which improves the congnitive ability of the respondents (Kisku, 2017) which ultimately helps respondents to contribute more to their household food utilization. However, respondents having high household annual income had less contribution to household food utilization. This might be due to the fact that, high income households had more helping hands in their households who deal the food related issues. In addition, these housholds might be highly dependent on processed foods which are easily available in market. Dependency ratio also has negative relationship with contribution to household food utilization which might be due to the fact that households having high dependency ratio are more concerned about the availability and access of food rather than utilization.

Conclusions

The majority of the RDRS women beneficiaries had a medium extent of contribution to their household food utilization indicating there is plenty of opportunities to improve their contribution to household food utilization. In addition, the positive correlation between the extension media contact and the focus issue indicates that

different non-formal educational activities like training, extension campaigns, discussions are needed to be emphasized to improve women beneficiaries' contribution to food utilization, more specifically on "food processing and preservation" and "water and sanitation" dimensions. In this connection, the non-formal educational activities should focus on the need of rural women for increasing their awareness, management skill and operational abilities to contribute more to their household food utilization. Moreover, the educational qualification is positively related with contribution to household food utilization indicating government should bring more rural women under educational facilities by strengthening the whole system. Access to credit facilities are needed to be boosted-up with easy terms and conditions for the rural women. Proper initiatives should be taken to create diversified income-generating activities so that rural women would engage themselves in such activities to increase their income and play an important contribution to their household food utilization in one hand. On the other hand, they should also be motivated for their proper roles in food utilization and thereby improving the food security situation of their households. In addition, awareness programs should be taken in the study area for increasing women's access to control over resources as well as their contribution in household decision-making process.

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Nature of social capital of civil society organizations in Bangladesh: Towards social cohesion or not

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ABSTRACT

Social capital is a normative concept which works as a vein of social cohesion in a society. The tradition of civil society organizations (CSOs) in Bangladesh is very old and distinctive, and working in various arenas of rural village. Although the CSOs have remarkable records of success but commonly affected social issues such as drug addiction, social conflict, decreasing trust, non cooperative attitude, political and social unrest, etc. are increasing day by day. In this perspective, the study is attempted to explore the nature of social capital of CSOs in Bangladesh. The effects of CSOs on the social cohesion in case of collective actions are addressed here using mixed method approach. Cognitive and structural components of social capital are satisfactory but involvement of CSOs in common issues and collective actions is not pleasing. New shaping of rural power structure, the involvement in commercial venture, political divergence, vertical relation within the CSOs etc. are the factors preventing the social cohesion in spite of high level social capital formation at organization level.

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Introduction

Social capital is a qualitative notion which has multidimensional ramification on the individual's ethos to national solidarity. As a valuable asset, it makes good citizen through transferring social values and skills among each other that gives civic order for congenial environment of the society. The core question of the 21st century is which society is better to live in. Putnam (2000, p. 396) claims that "societies with high stock of social capital are better places in which to live". Civil society organizations (CSOs) in the society are common sphere of different background of individuals, which lubricate trust, voluntary co-operation, norms of reciprocity and networks of civic engagement. The practice of these virtues among the individuals increases the stock of social capital in the society. In a societal system, the stock of social capital indicates the strength of social cohesion. The sociologist Emile Durkheim (1858-1917) was exponent to elaborate the concept of social cohesion. He considered social cohesion as an ordering feature of a society and defined it as the interdependence between the members of the society, shared loyalties and solidarity. These features are relevant to belonging, inclusion, participation, recognition and legitimacy (Jenson, 1998). Social

scientists have emphasized that the social capital of a society is an essential foundation of social cohesion (Maxwell, 1996; McCracken, 1998). It changes the attitude, and creates a larger engagement sphere of the citizen; which inspire them to involve with the societal works. Such types of works encourage them to do for others. In this situation, an individual searches his/her benefit from the welfare of whole society. Such types of collective attitude and welfare depend on the frequency of CSOs in the society and level of engagement. The present article makes an attempt to examine whether these features are present in the CSOs of Bangladesh or not and its effects on social cohesion.

Context of the Study

The tradition of CSOs in Bangladesh is very old, and has self-distinctive characteristics. The genesis of CSOs can be traced back to British colonial period and beyond (Lewis, 2011). It was inspected by modern philosophy of Europe during the colonial period (1757-1947, 1947-1971). The objectives and formation pattern of these CSOs were different. Some of them participated in mass movement against the unjust and the undue role of colonial master in different parts of this region. Organizers treated the CSOs as protector of civil rights and the place of common space. After the partition of the Indian subcontinent in 1947, a number of CSOs had grown up by left leaning activists for the demand of separate cultural identity e.g. Tamuddin Majlish. Promoters of these organizations also thought that the relationship between state and CSOs is antagonistic. But many organizations became absorbed into the state apparatus, gradually narrowing into a more tightly organized political movement under the Awami League (AL), as Bangabandhu Sheikh Mujibur Rahman used the party organizations to "establish state control over society" (Jalal, 1995, p. 90).

In post liberation period, many scholars assumed that the CSOs are the opponent of military government. In contrast, others thought that the CSOs are the development agent and watchdog to ensure good governance and business operation. There are two views regarding the nature of CSOs – one perceives a hostile relationship between state and CSOs in the sense of dominance, and another finds a partner relationship in the aspect of development which is known as neo-liberal view. According to new liberals, the CSOs can play a positive role to articulate a set of socially responsible demands and public action which can help to balance the tendency of state and market institutions to overwhelm the interests of citizens. Two different interrelated civil society traditions can, therefore, be identified loosely corresponding with pre and post liberation forms of new and old civil society (Lewis, 2005).

Those who were involved in the international aid effort during massive post-conflict reconstruction in 1971 and devastating famine in 1974, they were the promoters of new liberal views. During this period, they formed new groups and organizations and gained experience from the grass root level. In fact, these organizations filled up the post liberation vacuum of CSOs in the country. At this moment liberals, internationally, gained one kind of triumph against the Gramscian followers in Eastern Europe. As a whole, new liberals become prominent in our country with the help of international aid and advocacy. Later, middle class elites of society also formed a number of community based organizations with the help of donors. Most of them were vernacular, freedom fighters and left leaning students, and they engaged themselves in welfare works of the society. The government also tried to promote these new CSOs through local government tiers. Of course, this is a new paradigm of CSOs in Bangladesh, which has given vast avenues of civic engagement in the aspect of capitalist view. The changing idea of CSOs in Bangladesh is undoubtedly a paradigm shift.

The growth of new CSOs in Bangladesh is treated as associational revolution. There were two reasons behind this pervasive growth of CSOs. One was internal background of the country, and another was international perspective. During this period, many complexes issues such as poverty, health, education and

women empowerment were facing Bangladesh. Internationally the ideas of CSOs had been shifted to as a development partner. International development organizations like the World Bank, Asian Development Bank (ADB), International Monetary Fund (IMF), different donor agencies, etc. gave the prescription to Third World countries to involve the CSOs as development partners. After the Liberation War, few volunteer groups started working in the rural areas for rehabilitation and construction. Welfare and charity were the strategies of works. Later, these volunteer groups organized through the massive field experiences. During this period, they used the community development approach to achieve the targets instead of charity. In the 1980s, they changed their strategies and used many means such as group formation, training for capacity building, credit, non-formal education, health care, etc. After the collapse of the socialist block in the world, a considerable number of CSOs grew again with the help of donor agencies and organizations. After the 1990s the new growing CSOs became the development partner of government with the support of donor agencies. Now many CSOs (mostly known as NGOs) of Bangladesh are the giant development partners of the government, particularly in rural areas. Group formation process is a common strategy of NGOs to achieve the defined objectives. The group is the core unit of activities. The center is consisted of few groups along with organizational structure, but the structure is horizontal. Many liberals think that NGOs are one kind of civil society organization, although they are the development partner of government, especially in developing countries. The word NGOs had been used loosely to distinguish between the civil organizations and intergovernmental process. They are now called civil society organizations in order to express its affinity to civil society (Krut, 1997). Civil society is usually taken to mean a realm or space in which there exists a set of organizational actors which are not a part of the household, state or market. "These organizations form a wide-ranging group which includes associations, people's movements, citizens' group, consumer associations, small producer associations, women's organizations, indigenous peoples' organizations – and of course NGOs" (Lewis & Kanji, 2009, p. 121).

It is observed from the context that range of CSOs are very wide and diversified. These are working in the different aspects of the society but common affected social issues such as drug addiction, social conflict, decreasing trust, non cooperative attitude, political and social unrest, etc. are increasing day by day. The question arises, what is the functional nature and setbacks of new CSOs? What kinds of social capital are they producing and its effect on the society? In this perspective, the study has defined to explore the nature of social capital of new CSOs in Bangladesh and its effect on the social cohesion or not in the aspect of collective action.

This article is presented in few sections where context of the study has included the problem of statement and objectives. Third section deals with methodology. Fourth sections has incorporated the mapping of concept of the study while fifth section brings the data and main findings. This section has included some subsections such as trend of trust, trend of network, trend of cooperation, involvement in common issues, collective efforts and social capital towards social cohesion or not. The final section presents the implications and conclusion.

Adopted Methods

The study employed the mixed method approach to extract data. The data were collected from both primary and secondary sources. The sources of primary data were the members of CSOs and the representatives of *Union Parishad* from the selected villages. The study employed the questionnaire survey due to placing of respondents, resource constraints and easy administration. A schedule questionnaire format was formulated on the basis of the research issues. In the set of question, Likert and Guttman scales have been adopted. The study area – district, *Upazila* and *Union Parishad had been* selected purposively. Selected unions of the study are Raynagor of Shibganj *Upazila*, Bogra district, and Malanchi

of *Sadar Upazila,* Pabna district. The Raynagor is formed with 26 villages, and Malanchi consists of 32 villages. Formal and informal members of CSOs were the study population of these two unions. The existing CSOs of two Unions have been categorized into five - volunteer based organizations, youth development organizations, women development organizations, cooperative societies and village centre of NGOs. Each member of CSOs was the 'unit' of the study. The aggregation of all units was 1105 which were the figure of study population. Sample size was determined through the following formula (Douglas *et al.*, 2008, p. 316).

$$n = \frac{Z^2\sigma^2}{\in^2}$$

Here, n= sample size,
Z = value (1.96 for 95% confidence level)
σ^2 = population standard deviation (0.5)
$\in^2$ = margin of Error 5%

According to the formula, sample size of the study was 286. Among 286 the respondents, 179 were male members, and rests 107 were the female. Female respondents were the members of 4 women development organizations and 29 village centers of NGOs. The 65 female respondents have been taken from Raynagor Union, and rest 42 from Malanchi Union. Five focus group discussions (FGDs) were carried out to extract qualitative data from the participants. In-depth and informal interviews were conducted during the fieldwork. Data coding and SPSS program data have been followed as per rule. As a qualitative study, it has predominantly, followed the descriptive analysis along with data interpretation.

Mapping of the Concept

Social Capital

Social capital is a concept of early twentieth century, but its appeal has been recognized by the researchers since 1990s. Hanifan (1916, p. 130) who was state supervisor of rural schools in West Virginia of the United States of America (USA) coined the term social capital. After connotation of Hanifan, the idea of social capital was latent for long days. The concept of social capital is popularized by Putnam in 1993, before those sociologists Pierre Bourdieu (1986) and James S. Coleman (1988) have elaborated the concept of social capital in the discipline of sociology. Bourdieu (1986, p. 249) has coined it as - "The aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition – or other words, to membership in a group which provides each of its members with the backing of the collectivity-owned capital, a credential which entities them to credit, in the various sense of the word". Coleman (1990, p. 98) explains social capital in terms of social action. For an analytical explanation he, firstly, has introduced sociological and economic intellectual streams. He identifies the flaws of these two theories. He, then, defines social capital by its function of nature. "It is not a single entity, but a variety of different entities. ... like other forms of capital, social capital is productive, making possible the achievement of certain ends that in its absence would not be possible. Like physical capital and human capital, social capital is not completely fungible, but may be specific to certain activities. A given form of social capital that is valuable in facilitating certain actions may be useless or even harmful for others."

Robert D. Putnam is a political scientist who has written two path breaking books on social capital and democracy: (i) Making Democracy Work: Civic Tradition in Modern Italy and (ii) Bowling Alone: The Collapse and Revival of American Community. Putnam (1993, p. 167) defines that, "Social capital refers to features of social organization, such as trust, norms, and networks that can improve the efficiency of society by facilitating coordinated actions". Putnam (2000, p. 19) explains how social capital effects on individual and group productivity like physical and human capital. "Whereas physical capital refers to physical objects and human capital refers to the properties of individuals, social capital refers to connections among individuals—social networks and the norms of reciprocity and trustworthiness that arises from them. In that sense social capital is closely related to what some have called 'civic virtue".

Table 1. Range of network after having the membership of organization.

Name of organizations Chapter One	Nature of Network			Total Chapter Two
	Expanding	Decreasing	Static	
Volunteer based organizations	54 (94.7%)	_	3 (5.3%)	57
Youth development organizations	36 (87.8%)	2 (4.9%)	3 (7.3%)	41
Women development organizations	22 (91.7%)	_	2 (8.3%)	24
Cooperative societies	71 (87.7%)	1 (1.2%)	9 (11.1%)	81
Village center of NGOs	74 (89.2%)	1 (1.2%)	8 (9.6%)	83
Total	**257 (89.9%)**	**4 (1.4%)**	**25 (8.7%)**	**286**

Two dimensions of social capital are visible in all democratic societies, one is structural and another is cognitive (Norman Uphoff, 2000, p.221). Woolcock (1998) and Putnam (2000) have classified the patterns of social capital on the basis of nature - bonding, bridging and linking. Bonding social capital refers to the intra-community ties that members can depend on the situations of need. Such ties can be sources of valuable services, ranging from house minding to job referrals and emergency cash (Wallis *et al.*, 2004). Bridging social capital denotes ties among the members of different groups, organizations and associations to achieve greater purposes. Bonding ties work as sole agent of such type of bridging in the community. Bridging refers to the inter-community ties which cross social divides, such as ethnicity, gender and socioeconomic status. Linking social capital denotes ties between or among the people in dissimilar position. Therefore, social capital is, simultaneously, public as well as a private resource, which is different from physical and human capital for its instinctive nature. It encompasses the broad range areas such as the mutual sense of trust, network, reciprocity, cooperation, relationship, friendship, interactions, solidarity, inclusion, participation, information and communication, groups and association which are considered as components in this study.

Social Cohesion

The sociologist Emile Durkheim (1858-1917) was the first man who has elaborated the concept of social cohesion in terms of social development. He considered social cohesion as an ordering feature of a society and defined it as the interdependence between the members of the society, shared loyalties and solidarity (Jenson, 1998). It denotes the connections and relationships between societal units such as individuals, groups, associations as well as territorial units (McCracken, 1998). Woolley (1998, p.2-5) has distinguished three ways to define the concept of social cohesion (i) as absence of social exclusion (ii) as interactions and connections based on social capital (iii) as shared values and communities of interpretation based on group identity. Berger-Schmitt (2000) has drawn two ways to understand social cohesion

Table 2. Formation of social capital in terms of network.

Formation of Social Capital Chapter Three	Range of Network			
	Almost Always	Occasionally	Almost Never	Total
Bonding Social Capital in terms of information dissemination within the members of own organization.	38 (13.3%)	232 (81.1%)	16 (5.6%)	286
Bridging Social Capital in terms of information dissemination with community members.	11 (3.8%)	247 (86.4%)	28 (9.8%)	286
Bridging Social Capital in terms of collective works with other organizations.	8 (2.8%)	73 (25.5%)	205 (71.7%)	286

(i) the reduction of disparities, inequalities and social exclusion and (ii) the strengthening of social relations, interactions and ties. Therefore, the dimension of social cohesion includes the components of social capital such as norms of reciprocity, exchange of values, collective actions, network, mutual of cooperation, feeling unity and solidarity, etc. Therefore, the components of social capital are considered as inner features of social cohesion in this study.

Data and Main Findings

The concept of social capital is related to a bundle of attributes that refer to trust, norms of reciprocity, networks, collective actions and their ramification on the society. The cognitive (i.e. trust, civic norms, values etc.) and structural (i.e. network, rules, procedure etc.) components of social capital are taken into account. There is no unanimous scale to measure social capital. Each of these issues of social capital is very complex, and measuring the degree to which each is present in a community means using several yardsticks. As a result, there is no single yardstick to measure of social capital that can be reliably used (Cummins, 2006). The present study has used Likert and Guttman scale to measure nature of social capital.

Trend of Network

The network is a means to get the resources and to accelerate the mobilization of a democratic society. The structure of CSOs and frequency of engagement determine the depth of networks. Some of these networks are primarily 'horizontal', bringing together stakeholders of equivalent status and power. Others are primarily 'vertical', linking unequal stakeholders in asymmetric relations of hierarchy and dependence. The rural social texture of Bangladesh is primarily based on the patron-client relationship. It is characterized by dominance and dependence instead of mutuality. Only the CSOs of the society facilitate common spheres and avenues to achieve the common ends.

The Table 1 shows that the network of 257 respondents (89.9%) has increased after having the membership of CSOs. On the other hand, the network of 4 (1.4%) respondents has decreased and 25 (8.7%) respondents' network remains static after the joining of CSOs. The network of 94.7 percent respondents from volunteer based organizations has increased after the inclusion of CSOs, which is highest among the categorized CSOs of the study. The network of 87.7 percent respondents of youth development organizations have increased while the network of 4.9 percent respondents of these organizations has decreased. Most of the respondents of these CSOs are students, and majority of them are unemployed, which may be the cause of decreasing and static (7.3%) network exists among them. Around 11.1 percent respondents of cooperative societies report that the network does not expand after having the membership. However, the figure of the Table illustrates that the CSOs are vibrant to form social capital.

The Table 2 shows the nature of bonding and bridging social capital on the basis of network which have been defined by Putnam (2000) and Woolcock and Narayan (2000). The present study has measured these on the basis of information dissemination among the members of CSOs as well as community members. Bonding social capital expresses strong tie among the members which exists among 94.4 percent respondents. Among them, 81.1 percent 'occasionally' and 13.3 percent 'almost always' inform the discussed issues to those who were absent in the meeting. Indeed, such figures indicate that a strong bonding exists among the members. The bridging social capital expresses the tie with the community members regarding the information and reciprocity. The Table also reveals that bridging social capital lies more than 90 percent among the respondents. Among them, 86.4 percent 'occasionally' and 3.8 percent 'almost always' inform the community members about commonly discussed subjects.

The Table 3 shows the scenario of bridging social capital in terms of collective actions at the organization level. The 28 (49.1%) respondents of volunteer based organizations 'occasionally' participated in collective actions with the other organizations. This is the highest participation among the categorized organizations. About 12.5

Table 3. Bridging social capital in terms of collective action at the organization Level.

Name of the organizations	Nature of Collective Action			Total Chapter Four
	Almost always	Occasionally	Almost never	
Volunteer based organizations	_	28 (49.1%)	29 (50.9%)	57
Youth development organizations	3 (7.3%)	14 (34.1%)	24 (58.5%)	41
Women development organizations		3 (12.5%)	21 (87.5%)	24
Cooperative Societies	5 (6.2%)	22 (27.2%)	54 (66.7%)	81
Village center of NGOs	_	6 (7.2%)	77 (92.8%)	83
Total	**8 (2.8%)**	**73 (25.5%)**	**205 (71.7%)**	**286**

percent respondents from women development organizations and 7.2 percent from village center of NGOs participated in collective actions with other CSOs. The data on 'almost always' (2.8%) does not indicate the good enough of collective actions for common wellbeing.

Trend of Trust

Trust has multidimensional ramification in the society, which builds from the interaction and engagement process at the community and organizational level. Organizational trust depends on the nature (vertical and horizontal) of the organization. Trust in CSOs forms easily for its horizontal nature. Such types of trust make confidence and trustworthiness among the members of CSOs through continuous engagement. The standard account of trust, what Fukuyama (1995) calls 'knowledge based trust', presumes that trust depends on information and experience. The study has searched the trend of trust in CSOs in two areas; one is in exchange of money and material. Another is the changing level of trust after having the membership of the organization.

The Table 4 shows the existing trust level among the members regarding transaction of money and material. About 92 percent respondents have general trust on transaction of money and material. Only 1.7 percent respondents have trust 'very much' on others. It is noteworthy that there is none of the respondents who agreed to 'no trust' unit of scale. The data indicate that general trust among the members of CSOs regarding the money and material is good enough.

The Table 5 reveals that trust level of 61.9 percent respondents has increased after the inclusion of CSOs; this is significant indicator to achieve the common goal and activities. It is apparent that a vibrant engagement exists in the organization. On the contrary, the trust level of 34.3 percent respondents does not change after having the membership of CSOs. This figure indicates that the lack of sufficient engagement and knowledge are lying among the members. The trust level of 3.8 percent respondents has been decreased after having the membership. Anisur , a respondent of volunteer organization, opined that "before my involvement with this organization I was a member of two organizations, the leaders of these organizations looted the fund. Besides, they collected money from different sources, but general members did not get equal benefit". However, trust among the members of CSOs exists at satisfactory level in case of reciprocity.

Table 4. Trend of trust in terms of financial and material deal.

Issue Chapter Five	Unit of Scale					Total Chapter Six
	Very much	General	Undecided	Less trust	No trust	
Have trust on members of organization in dealing with money, material, etc.?	5 (1.7%)	263 (92%)	3 (1.0%)	15 (5.2%)	_	286

Table 5. Change of trust after the inclusion of CSOs.

Issue Chapter Seven	Unit of Scale			Total Chapter Eight
	Increasing	Decreasing	Static	
Trust level after the inclusion of CSOs	177 (61.9%)	11 (3.8%)	98 (34.3%)	286

Trend of Cooperation

There is a tradition of CSOs to act collectively during critical position of an individual or community in Bangladesh. Even the CSOs play pioneer role in critical periods of the country. Members of the CSOs motivate others to be involved in voluntary functions. Generally mutual cooperation occurs among the members, secondly, it occurs at the community level, and thirdly, bridging cooperation occurs in the society. The study explores the nature of cooperation of CSOs at the three stages.

The Table 6 shows three separate issues to understand the mutual cooperation of the members of CSOs in the critical time. First one is about bonding cooperation among the members, which reveals that 62.2 percent respondents 'occasionally' cooperate the members of his/her organization during jobless/workless days. Only 19.6 percent respondents do not help their fellows. However, about 80 percent respondents of the study co-operate their fellows in critical period. The figure indicates that considerable cooperation prevails among the members, which makes their life easy.

Second issue on the Table is about cooperation toward neighbors during critical time. The study reveals that 56.6 percent respondents 'occasionally' co-operate their neighbors at the critical period such as: job seeking period, jobless days, financial hardship, etc. About 24.8 percent respondents do not co-operate the villagers as a member of CSOs. It is a significant finding that about 75 percent members of CSOs provide cooperation to their neighbors in different scales, which means that one kind of social bonding is prevailing in the society.

The Table also reveals that the cooperation trend of respondents in the village periphery is satisfactory. About 80 percent respondents co-operate the villagers during their critical moment. Among them, 60.5 percent 'occasionally', 13.3 percent 'rarely' and 6.3 percent 'frequently' assist the others during their critical period. Therefore, the CSOs are vibrant in the aspect of cooperation.

Involvement in Common Issues

Society is a whole set of life where every member of the society is interdependent. There are many common evil issues which affect the members of the society as a whole. The CSOs of the society play a vital role to prevent these evil activities. The CSOs often organize ground of social movement against the evil activities, and also create consciousness among the members of the society. Drug addiction, damaging public goods and violence in the period of election were taken into consideration as common affected issues in the study.

The Table 7 shows that about 67 percent

Table 6. Trend of co-operation in critical period.

Issue Chapter Nine	Unit of scale					Total Chapter Ten
	Almost Always	Frequently	Occasionally	Rarely	Almost Never	
Cooperation during unemployed days among the members of own organization	_	17 (5.9%)	178 (62.2%)	35 (12.2%)	56 (19.6%)	286
Cooperation during workless days among neighbors	_	11 (3.8%)	162 (56.6%)	42 (14.7%)	71 (24.8%)	286
Cooperation within village periphery	1 (0.3%)	18 (6.3%)	173 (60.5%)	38 (13.3%)	56 (19.6%)	286

Table 7. Involvement in common aspect.

Issues Chapter Eleven	Unit of Scale					Total Chapter Twelve
	Almost Always	Frequently	Occasionally	Rarely	Almost Never	
Preventing drug addiction or creating awareness about it	2 (0.7%)	87 (30.4%)	87 (30.4%)	18 (6.3%)	92 (32.2%)	286
Protecting public goods	_	_	15 (5.2%)	32 (11.2%)	239 (83.6%)	286
Stopping violence in period of election.	_	_	12 (4.2%)	24 (8.4%)	250 (87.4%)	286

respondents engaged themselves to prevent drug addiction at the different scale of unit. Among them, 30.4 percent 'frequently', 30.4 percent 'occasionally' and 6.3 percent 'rarely' engaged themselves in preventing drug addiction. Naem, participant of FGD 2 expressed his views:

"The young's of our village were not familiar with drug addiction. Now it becomes one of the major social problems in our society. Although they are very few but they are damaging our tradition and peace. From our organization we tried to motivate them. Even we complained to the Chairman about their activities. Ultimately, we need a mass movement for preventing drug addiction."

The Table also demonstrates the nature of involvement in protecting public goods; such as: school, college, roads, culverts, health centre, etc., which are commonly required for all in the society. The study reveals that 83.6 percent respondents did not engage themselves in preventing the public goods. Only 5.2 percent respondents 'occasionally' and 11.2 percent 'rarely' participated in protecting of public goods. The data illustrate that the CSOs are not more active to protect the public goods. Ali Bakker, a participant of FGD, reported that, "we are not conscious about the public goods. We all say that this is the work of government, not us. We do not realize that these are our asset. These issues should be included in the school syllabus".

The Table 7 also shows that 87.4 percent respondents did not involve themselves to stop violence during election. Only 4.2 percent respondents 'frequently' and 8.4 percent 'rarely' engaged themselves to stop the election violence. Indra Jit, a respondent of FGD, opined that "we know that pre and post election violence is damaging our social tie and cohesion. But, we avoid this consciously because of political atrocity. Candidates of the election employ the young group of the villages, who are also the members of different clubs and organizations which are controlled by that candidates". The data of the Table illustrate that involvement in preventing drug addiction is wider compared to other commonly affected issues. People do not have much consciousness about their responsibilities regarding the protection of public goods. Besides, they avoid being involved in protesting election violence due to the political atrocity.

Collective Efforts

The economic and political performances of the societies, from village to international

Table 8. Willingness to sacrifice own resources and participating in collective action.

Issue	Unit of Scale					Total Chapter Thirteen
	Almost Always	Frequently	Occasionally	Rarely	Almost Never	
Willingness to participate in collective action and to sacrifice own resources for common wellbeing	16 (5.6%)	179 (62.6%)	66 (23.1%)	6 (2.1%)	19 (6.6%)	286
Willingness to stay with collective effort despite not getting benefit from it directly	85 (29.7%)	97 (33.9%)	81 (28.3%)	7 (2.4%)	16 (5.6%)	286

communities, depend critically on how the members of a community and the CSOs solve the collective dilemmas. The dilemma of collective actions is the important obstacle for the development of politics and economics (Putnam, 1993; Coleman, 1990; Fukuyama, 1995). It is observed in Bangladesh, practice of collaboration is reducing day by day from village to city. Trustworthiness, networks and institutions are interrelated vehicles to solve the problem of collective actions. Trustworthiness is embedded in a person's intrinsic norm through which one reciprocates other's trust even when material self-interest does not compel one to do so. It is a characteristic of preferences (Ahn & Ostrom, 2008). The CSOs play role as a mediator to solve the dilemma of collective actions. At first, this study raised question to understand respondents' attitude and willingness to sacrifice own resources and participating in collective actions for common wellbeing. About 97 percent respondents opine that collective effort is essential for the welfare of the villagers. This is a significant attitude for collective action where CSOs can work easily for enhancing social cohesion and development of the society.

The Table 8 shows that about 93 percent respondents agree to participate in collective effort if they have to sacrifice their own resources and asset for the welfare of the people. Among them, 62.6 percent 'frequently', 23.1 percent 'occasionally' and 5.6 percent 'almost always' are ready to stay with the collective effort of CSOs, and agree to sacrifice some land or resources for wellbeing of the society. The data indicate that this attitude of the respondents is viable to act collective efforts.

The Table 8 also reveals that about 94 percent respondents agree to stay with collective effort even if they do not get benefit from it directly. Among them, 29.7 percent 'almost always', 33.9 percent 'frequently', 28.3 percent 'occasionally' and 2.4 percent 'rarely' concur to help others. Indeed, the figure illustrates that the respondents of the study have high sacrifice mentality for the betterment of others and participating in collective efforts. But in practice the collective actions of the CSOs do not observe in the study area at the satisfactory level.

The Table 9 shows that 71.3 percent respondents did not participate in the development of social institutions (such as: playground, school, college, hat-bazaar, etc.) from their organizations. It is noted that their participation in collective actions for the development of social institutions are low (28.7%) compared to their sacrificing attitude (about 93%). Other two common issues - protecting water bodies/ensuring safe water, and tree plantation/protecting trees. About 93.2 percent respondents did not work collectively from their CSOs on ensuring/protecting water bodies safe water issues. While about 72 percent respondents participated in tree plantation and protection activities from their organizations. Among them, 49 percent 'occasionally' and 10.5 percent 'frequently' engaged themselves. Involvement in tree nursing and plantation are wider than the activities of protecting water bodies. However, it appears through the field visit that members of CSOs are eager to engage

Table 9. Collective efforts of CSOs for common wellbeing.

Issue	Unit of Scale					Total
	Almost always	Frequently	Occasionally	Rarely	Almost never	
Collective works for protecting common resources	2 (.7%)	3 (1.0%)	54 (18.9%)	23 (8.0%)	204 (71.3%)	286
Collective works for ensuring safe water/water bodies for the community	_	6 (2.1)	9 (3.1%)	7 (2.4%)	264 (92.3%)	286
Collective works for protecting and developing environments	_	30 (10.5%)	140 (49.0%)	37 (12.9%)	79 (27.6%)	286

collective actions, but they could not translate it into actions due to the absence of competent leadership among the CSOs and lack of bridging social capital at organization level (bridging with other organizations).

Social Capital: Towards Social Cohesion or not

The social capital of a society is an essential foundation of its social cohesion (Maxwell, 1996; McCracken, 1998). The formation of social capital at the organizational level leads belongings, cooperation, sense of commonness and solidarity which aggregate the social cohesion. The study finds that trust level of 60 percent respondents has increased after the inclusion of CSOs regarding financial transaction, 92 percent respondents have trust on the members of their own organization. Bonding and bridging social capital in terms of reciprocity is more than 80 percent. Seventy percent respondents reported that cooperation prevails among the members, neighbors and at village periphery. The data illustrate that social cohesion exists in the society.

The Table 10 presents the perception of respondents about the role of CSOs in enhancing the social cohesion. About 82.5 percent respondents think that the CSOs have contribution in enhancing social cohesion among the villagers. Only 11.9 percent respondents did not agree to the opinion that have positive role in this regard. They have given different answers and place arguments in favor of the disagreement through open ended questions. The answers of their disagreement are: (i) political affiliation among the members of the CSOs creates tense in the society (ii) the CSOs pay more attention to the commercial venture instead of welfare activities (iii) creating dispute among the members regarding the distribution of money and position (iv) NGOs are mainly remained busy with credit activities instead of participating in social activities.

The Table 10 also shows the perception of each other CSOs regarding the performance in social cohesion. About 84.3 percent respondents think that perception of the CSOs about one another is good. Around 12.6 percent respondents think that the relation among the CSOs is not good, and identified the causes in favor of their disagreement as: (i) lack of co-operative attitude among the members of different CSOs (ii) lack of vision for social welfare in the constitution of CSOs. Bipul Pramanik, a participant of FGD expressed the situation as follows:

"In the past, the CSOs played vital role in taking decision for the society. Generally the CSOs arranged general meeting in the village to make common decisions especially, in case of establishing social institutions and arranging welfare functions. All of us used to take a unanimous decision instantly. Now-a-days the CSOs have no such tradition because of political bifurcation and excessive credit functions. Decision of political leaders is all in all, the consent of villagers is not the matter of concern to them. It is true that the CSOs are playing vital role in constructing personal bonding among the members of the community."

Reid & Salemen (2002) has studied on the cognitive dimension of social capital and given an example of low and high cohesive village in Mali, which depicts how much social cohesion is essential for the acceleration of development projects. "Tingoni Bamanan (low cohesive village), a local nongovernmental organization

Table 10. Role of CSOs in enhancing social cohesion.

Social Cohesion	Unit of Scale					Total
	Strongly agree	Agree	Undecided	Disagree	Strongly disagree	
Are the CSOs playing effective roles in enhancing social cohesion?	2 (0.7%)	236 (82.5%)	14 (4.9%)	34 (11.9%)	_	286
Is the perception of each other CSOs good regarding the performance in social cohesion?	_	241 (84.3%)	8 (2.8%)	36 (12.6%)	1 (.3%)	286

offered to provide the village with a pump water. The village elders could not agree on whether the pump should be placed in the older part of the village or in the new, more populated sector, which had recently settled near a national road. Lack of agreement resulted in the cancellation of the project by the NGO. In contrast, two neighboring villages (high cohesive) received the pumps with the agreement of all".

The study reveals that social capital formation at organization level is satisfactory, but the involvement of CSOs in common affected issues as well as collective actions for wellbeing of the villagers is not satisfactory. Nature of rural politics and power structure are very much related to the collective actions of the CSOs. If national and local politics do not provide democratic environment, the CSOs cannot work smoothly in a society for common wellbeing, and even co-operate the government functions. It is observed that rural power structure in Bangladesh has taken into new shape. Now the patron (large landholders and businessmen) establish links to national political parties and present themselves as an activist or leader of a large political party at the rural area. They play vital role to distribute the resources of local government. In fact, they give privileges of their followers, and often use them against the members of anti political party. This open political divergence in the society is destroying the social unity and mutual interdependence. As a result, the CSOs could not resolve social conflicts which arise from livelihood practice. Thus, narrow power politics are rifting existing social unity and preventing the further social cohesion in spite of high level of social capital formation in the organizational level.

Implications and Conclusion

Ideally, there is an antagonistic relationship between CSOs and state at the evolving from traditional to modern state. The CSOs are the powerful platform to protest against the malpractices and autocratic nature of the state. The autocrat and military rulers try to suppress the CSOs as an anti-power phenomenon. This idea of CSOs has been changed since 1980s at the aspect of development agenda. Since then the government treats the CSOs as a development partner to solve the complex crisis of the society. Various CSOs including NGOs have grown with the blessing of donors. The new growing CSOs along with old ones started working on a good numbers of arenas such as education, health, social peace, development, sanitation, micro credit, women empowerment etc. Now they are working yet with the strategy of social engagement and group formation where trust, network, cooperation, collective efforts etc. are worked as a vein of blood.

Trust, reciprocity and network among the members of the organization as well as at organizations level are encouraging. Trust on other members in transaction of money and material is more than 90 percent. Increasing trust after the inclusion of CSOs is about 62 percent. Bridging and bonding (81.1% and 86.4% respectively) social capital are also at satisfactory level, but bridging social capital in respect of collective action is bleak. Low civic engagement, commercial venture and political bifurcation of CSOs are the core causes for deterring the CSOs from participating in the collective actions etc. In this perspective, government agencies (Cooperative Societies, Women Affairs Office and Social Welfare Office and NGO Bureau) can play a vigorous role to prevent political bifurcation within their legal jurisdiction. Policy and guidelines are needed to increase the frequency of collective actions and oust the detrimental factors. Mass media can also play effective roles in this regard through publicity.

Social capital among the members of village centre of NGOs is low compared to other organizations. Two causes are mainly responsible for narrow nest of social capital in NGOs such as: (i) quick group formation for credit activities and (ii) vertical relation between the agent of NGOs and members of village centre. Village centre of NGOs have often lost its group formation mechanism because of quick result. Only targeting credit functions have cut the generating social bonding values. In this perspective, donor agencies and government, especially NGO Bureau of Bangladesh can make

monitoring program for deliberating contribution in social and political aspects.

The study reveals that CSOs are vibrant to form social capital at the individual and organizational level, but this formation does not lead to collective actions and involvement in commonly affected issues of the society. Willingness to sacrifice one's own resources or asset for collective actions leading to the betterment of the community is high (93%). Even though they do not get immediate benefit from collective actions, they (94%) are ready to stay with the collective activities. The data indicate that people possess high sacrifice mentality toward collective efforts. But the CSOs could not translate their willingness due to existence of *partyarchy*, lack of leadership, existence of vertical relation and political split in organizations. The study also reveals that many CSOs have grown in the villages with patronization of political leaders with the concealed of political banners. Most of them are volunteer based organizations. Political leaders use these CSOs for their personal interest during local and national election and also to establish dominance in the village society. Such types of activities are decaying the social cohesion. Commitment of the national political leaders can minimize this situation, and can create the avenues for contribution of CSOs.

Political split of CSOs, commercial venture, vertical relation and *partyarchy* are the main detrimental factors for the deliberative contribution of CSOs in social cohesion. It is true, institutional change is essential, but it is also necessary to change the attitude of individual especially the political leaders. Besides, the people have the scatter knowledge and perception about the CSOs and its functions. These negative contributing factors have exacerbated the inner weakness of CSOs for producing the social capital. Therefore, it is necessary to take steps for creating awareness of people and political leaders along with national policy which works as vigilant of CSOs.

Limitations and Future Research

Due to the study focused on the objectives, it could not explore all relevant aspects detail. Access to internet is the significant aspect of social cohesion which has positive and negative aspects. It has changed the nature of individual interactions and even organizational activities including CSOs. This is the vast domain of social capital formation. This study could not cover this area owing to time and resources constraints. This area may be the important room of future research. The rural power structure and social cohesion are very interrelated aspects where political and social elites play important role on collective actions and solidarity of the society. This study did not explore the nature of changing power structure of the village and formation of social capital. This is potential arena of future study. This study did not explore the separate role of male and female in the formation of social capital and social cohesion. But there is significant difference between male and female in the society. Apparently, females are more active in social capital formation. But it is still unexplored - What are the exact scenarios between male and female in the village area? This study could not cover detail. This may be the important avenue of further research.

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Financial autonomy of Union Parishad: A study of model Union Parishad

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ABSTRACT

Financial autonomy empowers local government institutions to serve their citizens better and distribute the wealth properly. This study examines the model Union Parishad's financial autonomy in terms of revenue and expenditure framework and the factors influencing it. The study used mixed methods, including primary and secondary data sources with qualitative and quantitative research tools. Three model Union Parishads (UPs), which were purposely chosen for this research, provided the primary data. Like other UPs in Bangladesh, the financial autonomy of model UPs is contingent upon the availability and source of funding. Entirely dependent on the central government budget and lacking permanent skilled personnel like tax collectors, UPs struggle to collect revenue. Lack of expertise in financial management, absence of strong coordination among local MPs, Upazila Parishad Chairman, UNO, and UP Chairman, are the main influencing factors in expenditure autonomy. The government would consider the model UPs as a practice model in all aspects, including financial autonomy. To meet local needs, laws and regulations should be amended to expand the scope of financial autonomy and ensure adequate flow of resources from the center to the local according to local demands.

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Background

In Bangladesh, Union Parisad (UP) is the oldest and smallest local government institution. Local government structure and functions have developed with the country's socio-economic and political changes. To protect democratic values and provide economic and social fairness, the Bangladesh Constitution (Articles 9, 11, 59, and 60) established the local government as an integral part of state administration (Khan, 2008). Chowkidar, property, and other taxes were allowed under the Basic Democracy Order 1959. A new UP structure and funding sources developed after independence.

Usually, UPs generate revenue from three sources: 1) Tax revenues and other self-generated revenue, 2) General-purpose grants, 3) Specific grants. Also, UPs received an annual government subsidy for rural works projects. Alternatively, it spends on a priority basis are the payment of salaries and allowances to the officers and employees of the council, development expenditure, obligatory expenses on funds, etc. The surplus money must be spent in the sector as instructed by the government. The UPs may

invest any part of their funds in the prescribed manner. The government's prior approval may constitute and maintain a separate fund for any particular purpose, which shall be governed and regulated in the manner prescribed by the government. Each UP will have the power to acquire, occupy, and dispose of property and enter into agreements; in case of acquiring or disposing of immovable property, the council must get the government's prior approval (UP Act-2009, articles 51-56).

Financial autonomy refers to the ability to manage its funds independently (EUA, 2021). It is not relying on anyone's money to fulfill the purpose of an organization or an individual. "The financial autonomy of local government is the freedom to impose local taxation, generate revenue within its assigned sources, allocate its financial and material resources, determine and authorize its annual budget without external interference" (Okafor, 2010). Thus, UPs can earn and spend their funds. Even if the government does not approve the finances, the government has to be informed.

Statement of the Problem

The structure and activities of local government have developed in line with the country's socio-economic and political changes. The UPs of Bangladesh carry out two types of responsibilities. These are compulsory and optional. The mandatory list of functions ranges from construction and maintenance of roads to removal, collection, and disposal of solid waste, water supply, sanitation, and drainage to control traffic (UP Act-2009).

On the other hand, the optional functions include checking adulteration of food products, controlling the market, maintaining educational institutions, etc. (UP Act-2009). UP receives money from taxes, interest rates, and many other sources to maintain all these things. The UP receives the power of revenue collection and obligation of providing urban public services through the ordinance 1977. Bangladesh's UP heavily depends on the contribution of the central government (Ullah, 2010). According to UP Act-2009, Every UP has a Union Fund of taxes, rates, fees, and other levies. However, a legitimately elected authority exists in rural areas, providing practical opportunities for public involvement and local community empowerment. Bangladesh is not exceptional.

Nevertheless, resource mobilization in rural Bangladesh remains challenging due to a lack of real commitment from both the national and local governments. Furthermore, due to a lack of administrative and budgetary authority and institutional capacities, it is struggling to provide expected public services to the general public at the grassroots level (Mahfuz, 2015). The UP could play a catalytic role in local level development if it could overcome the existing organizational and financial limitations by accelerating the decentralization process, i.e., financial autonomy of UP (Khan, 2008).

Consequently, this research aims to investigate the reality of financial autonomy and the factors that affect (income and expenditure context) on the model UP's financial resource management capacity.

Objectives of the study

1. To investigate the income and expenditure decision autonomy of the model Union Parishad.
2. To explore factor influences the financial autonomy (income and expenditure context) of selected Union Parishad.

Review of literature

UP is a local government entity that may control various local institutions such as schools, hospitals, and other publicly funded institutions. It can also mobilize support for multiple initiatives such as numerous campaigns against dowry, child labor, human trafficking, and mobilization of local resources, etc. However, as the people's representative body, UPs can assure national government accountability. "The more aware, vigilant, and active the community becomes as a result of their involvement in local government units, the greater the pressure on these institutions to become more open and responsible" (Hye, 1998). Hussian (2007) found

that significant reforms and reorganizations have been implemented in Bangladesh's local government institutions over the last century. However, qualitative improvement in governance at these levels is still a long way off. To serve the people and create a feeling of self-confidence and awareness about producing or building new resources and their appropriate uses for the people's well-being, we use the term "resources" (Akhter, 2006). According to Seltzer (2014), resource mobilization includes all activities to acquire new resources for your organization. It also entails maximizing current resources.

Towhidul (2020) shows that UPs are financially, functionally, and administratively self-sufficient, but due to a lack of financial decision-making capacity and fiscal autonomy, the UP has become a weaker and less effective local government body. The central government gave local government's limited powers, functions, and jurisdiction, allowing them to control tightly. However, central power is always present. Financial flexibility is essential for broad-based municipal development. People feel that to ensure local progress, and UP should be financially supported. As an independent organization found that UP earns from several sectors and uses this money for various reasons (Khan, 2000), livestock, health, education, small- and cottage-industry, irrigation, communication, etc.

Additionally, it uses its fund for family planning, assuring the growth and proper usage of local resources. Moreover, the fund is used to repair public assets such as roads, bridges, culverts, sewerage, telephone, and electricity. Additionally, it conducts all types of censuses. Furthermore, it uses its funds to register births, deaths, beggars, and the poor. The sectors listed above account for the majority of UP's expenditure.

Aminuzzaman (2001) shows the current local government structure's fragility. They are not self-governing. Central authority primarily controls them via circulars, directives, and funding allocations. They lack resources, making them unable to do necessary and voluntary duties. Historically, UPs have struggled with resources. They are, however, constitutionally entitled to raise local money through taxes, leasing local headgear and bazaars, and water bodies.

Nevertheless, UPs cannot use all of these resources. These are disseminated throughout management levels and used for various purposes. Meaning the legislative framework/ordinance does not allow for or facilitate devolution. Specific rules are outdated and contradict both the spirit of decentralization/devolution and the LG ordinance; Legal frameworks do not effectively provide for UP capacity building, restricting the possibility of initiating change.

Talukdar (2020) highlights how 'budgetary instrumentalism' and 'high conditionality' on intergovernmental transfers might threaten the spirit of community stakeholder consultation and local governance that is, responding to community concerns and fostering community-driven development. Moreover, the study demonstrates that the primary impediment to the local government union council's effective functioning in Bangladesh is more closely related to the elected council's crisis of ownership and competence than to external influences affecting their autonomy in the budgeting and decision-making processes. The research finds that local governments should be allowed taxing autonomy rather than relying on a highly conditional, incremental annual grant to service their different stakeholders. Second, by increasing citizen awareness and requiring public disclosure of all revenue allocations and expenditure requirements, governance shields may be constructed to prevent money leakage and improve service transparency. Thirdly, it appears as though procedural improvements, adequate professional human resource assistance, and capacity-building interventions are critical preconditions for resolving the institutional accountability challenge. However, the accountability system will fail to work successfully in this context unless elected leaders, notably council chairmen, display a propensity for institutional commitment and ownership. Despite their same spirit, the 'community perception of accountability' concepts and methodologies are diverse. Local citizens, for example, are more concerned with roads and constructions, the

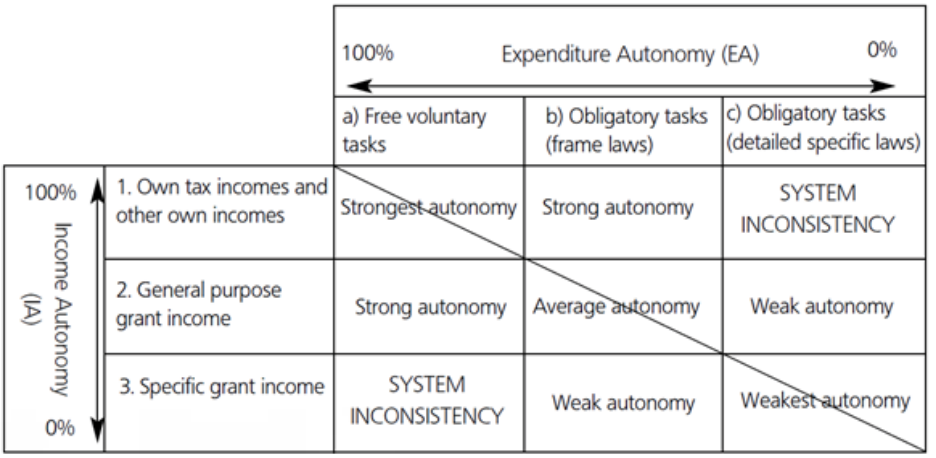

Figure 1. Matrix of financial autonomy which combines the income and the expenditure aspect of local government adopted by Oulasvirta and Turala, 2005.

apparent equitable distribution of relief and social safety-net programs, the social connections, and public access to elected officials than with the councils' formal profits and expense-related accountability. Furthermore, community members are more concerned with immediate outputs, visibility, and quantity than with service quality and the long-term development of society.

The elements that affect resource mobilization are revenue collection, expense management, and autonomy. This study tries to illustrate a complete picture of the financial decision autonomy of three model UPs of Bangladesh.

Conceptual framework

Theoretically, financial autonomy includes both income and expenditure autonomy. Income and expenditure autonomy are more realistic ideas than overall financial autonomy. Income and expenditure autonomy may be related. For example, government funds to local governments are allowed for grant-eligible projects. The various components of financial autonomy affect the ability to decompose the theoretical notion into a practical definition for evaluation and measurement.

The qualitative method measures income autonomy by ranking local governments' income sources from strongest to weakest autonomy based on their decision-making power over diverse income sources. UPs assigned specific spending items on a field of autonomy ranging from voluntary tasks (expenditures) to commissioned studies detailed by the central government. Expenditures may be sufficient to compare local governments' financial autonomy. The Organisation for Economic Co-operation and Development (OECD) (2001) analytical approach was used to classify revenue sources.

The study adopted the financial autonomy matrix of Oulasvirta and Turala (2005). Figure 1 depicts the revenue and expenditure autonomy of local governments in Finland and Poland. Income and expenditure autonomy can be combined. The figure's top left-to-bottom right diagonal line represents uniformity in the local government funding structure.

Methodology of the study

The study is based on mixed methods. It is a new era of conceptualization and interdisciplinary in the social and behavioral sciences (Tashakkori & Creswell, 2007). A mixed-method study is done on both primary and secondary sources of data and information and involved both qualitative and quantitative research approaches. Discussions with relevant people and papers yield relevant data and information. So a checklist was made. The research objective shaped the questionnaire.

The questions were open-ended and closed. Some sections asked for participants' opinions, assessments, and suggestions. Closed-ended

Table 1. Study area.

Division	District	Upazila	Model Union
Rajshahi	Bogura	Sherpur	Garidaha
Khulna	Jashore	Sadar	Deara
Dhaka	Dhaka	Savar	Tetuljhora

questions were used to save time; open-ended questions extracted deeper information, insight, personal experiences, and observations. In Bangladesh, there are 4573 UPs; 64 of them have been designated as model UP. Primary data were acquired from the following three model unions, which were purposefully chosen for this study:

Qualitative data is collected through interviewing four target groups;

- Elected representatives like UP chairmen/ members
- Former UP chairmen and members
- UP secretaries
- K.I.I. (From Upazila chairmen, DD (LG) and LG experts)

To get a more profound knowledge of the realities of financial resource mobilization and the use of UP, several chosen examples from finished or continuing development projects have been examined. In this context, 51 respondents were purposively selected from the study areas, 17 from each union.

Result and discussions

This study aims to look at the model UPs income and expenditure decision autonomy. UP Member, UP Chairman, UP Secretary, Ex-Chairman, and Member of the Union Parliament are among those who have taken part in in-depth interviews for this study. The results are divided into two large segments based on the survey questionnaire. The first section discusses the respondents' demographic information. The second section discusses the financial independence of model UPs.

Demographic profile of the respondents

The general characteristics of the respondents were selected for the present study included age, level of education, training exposure, working experiences and political identity, knowledge on financial management, etc., for UP resource mobilizations have been presented in Table 3.

Table 2. Numbers of the respondents surveyed.

SL No.	Categories	Total Number
1	UP Member	3*12=36
2	UP Chairman	3*1=3
3	UP Secretary	3*1=3
4	Ex-Chairman and Member of UP	3*3=9
	Total	**51**

The average age of the respondent was 47 years, observed range 28-72 years with standard deviation 14.28 and average education level 11.59, observed range 5-18 years with standard deviation 3.66. The average working experiences were 6.96 years, observed range 2-15 years with a standard deviation of 1.73, and average knowledge experiences were 11.67, observed range 3-20 with a standard deviation of 4.47. The observed range of training exposure was 0-14 days with an average of 4.85 and a standard deviation of 3.64.

The interviewees were categorized into three age groups: young (under 35), middle-aged (36–50), and elderly (>50). Most of the responders are in their forties. Respondents were split into five categories based on educational background. The one-third proportions (33.33%) of the respondents had higher secondary education, 25.49% had bachelor degrees or equivalent, 25.53% had secondary education, and 15.69 had masters or equivalent degrees. Knowledge expands people's horizons and increases their capacity to analyze situations. A well-educated person is more open to new ideas. Regarding political identity, majority of the respondents (56.86%) belong to Bangladesh Awami League, 25.49% Bangladesh Nationalist Party (BNP), and 17.25% others. Most of the respondents (45.10%) of the study area have low working experiences (up to 5 years), 35.29% medium, and only 19.61% have high working experiences as people representatives. The majority of respondents (60.78%) showed poor knowledge, followed by 25.49% intermediate knowledge and 13.73% insufficient knowledge. Knowledge

Table 3. Description of respondents characteristics of the study (N=51).

Characteristics	Category	Respondent %	Measuring system	Observed Range	Average	Standard Deviation
Age	Young age (up to 35)	23.53				
	Middle age (36-50)	56.86	Years	28-72	47.00	14.28
	Older age (above 50)	19.61				
Education	Primary level (1-5)	1.96				
Secondary level (6-10)		23.53				
	Higher Secondary level (above 10-12)	33.33	Years of Schooling	5-18	11.59	3.66
	Bachelor Degree (13-16)	25.49				
	Above	15.69				
Political Identity	Awami League	56.86				
	BNP	25.49	-	-	-	2.42
	Other	17.65				
Working experience as UP representative	Low (up to 5 years)	45.10				
	Medium (6-10 years)	35.29	Years	2-15	6.96	1.73
	High (Above 10 years)	19.61				
Knowledge on Financial Management	Poor (up to 7)	60.78				
	Moderate (7-14)	25.49	Score	3-20	11.67	4.97
	Adequate (Above 14)	13.73				
Training Exposure	No experiences	49.02				
	Low (Below 3 days)	23.53	Score	0-14	4.85	3.64
	Medium (3- 10 days)	15.69				
	High (Above 10 days)	11.76				

is a vision of an explanation in every scenario. Understanding, or clear awareness of reality or truth, aids a person in anticipating future consequences. It makes people rational and informed of the field. To perform as a local leader successfully, the people representatives should have adequate knowledge of different aspects of it. Hence, the concerned authority may emphasize increasing the knowledge level of the elected representatives in other elements of UP management and financial management.

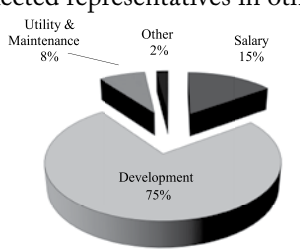

Figure 2. Major Fields of expenditure as stated in the budget 2020-21.

The elected people representative's training exposure ratings varied from 0 to 14 days with a mean and standard deviation of 4.85 and 3.65. Table 3. shows that almost half of the survey respondents (49.02%) had no training experience, 23.53 percent had low training exposure, and 1 (5.69%) had medium training exposure. Only 11.76 percent of the respondents had high training exposure. Individuals gain information and skills that they may use in their own lives in skill development and UP operation. Exposure to training is critical to increasing knowledge and skills in everyday life. So a trained representative would want to refresh and integrate their knowledge and expertise into their UP operations.

Table 4. The income structure of the selected model UP for the year 2020-21.

Income sources	Garidaha (%)	Tetuljhora (%)	Deara (%)
Tax incomes and other own sources	10	10	9
General-purpose grants (Development fund)	75	74	77
Specific grants	15	16	14
Total	**100.00**	**100.00**	**100.00**

Source: Prepared by the authors based on official statistics of those UP

Financial autonomy of selected model Ups

The survey data has been presented chronologically with findings and necessary analysis, considering the study's research purpose.

Main sources of fund of model UP

Local governments must raise funds from many sources to fulfill their obligations. Local government autonomy is linked to its financial power and income base. According to the budget 2020-21 of selected three UP sources of funds are shown in Table 4.

Main fields of expenditure of UP

The expenditure refers to the activities incurred by the local governments to satisfy the collective social wants of the people and operate the organization. Local autonomy cannot be meaningful unless local authorities possess adequate sources of financing. According to the budget 2020-21 of UP major fields of average expenditure of selected three are shown in Figure 1.

From Figure 2 it was found that the main head for expenditure about 75% was the development purpose of those UPs followed by salary 15% and 8% in utility and maintenances. Like other UPs models, UPs also expend their resources on development purposes. The fund can be defined as the total amount of income that accrues to the UP from various sources within a specified period. There are two types of funds for UP: Internally Generated Fund and revenue allocation from the central government. The primary sources of revenue collection of the UPs are from their resources and citizen. Fundraising own sources of UPs and utilization freedom are presented in Table 5.

Table 5 reveals that 78.43 percent fundraise UP from various sources and only 21.57 percent from citizens. Independent utilizations of funds encourage the local government's autonomy. As a fourth-tier government, all local government is supposed to be independent. This question was mainly asked the people representative. When the respondents were asked can Utilize funds independently, 64.71% of respondents answered that UP could not utilize funds independently, and in this connection, they cannot solve their local problems and needs immediately. Surprisingly 19.61% of respondents do not have any comments, and only 15.69% answered that UP could utilize funds independently. When the respondents were asked to collect funds from their source, they replied that funds should not be generated from their sources, especially tax and other chares like hashul, registration charges, etc., from citizens because of losing their popularity and people feels

Table 5. Own fund sources and expenditure autonomy UP in the study area.

Own fund Sources and Utilization	Category/ Sources	Percent
Fund raise from own sources	UP own resources (Hat bazar lease, 1% from land registration etc.)	78.43
	Citizen (tax, fee, toll, revenue etc.)	21.57
Can you utilize funds independently	Yes	15.69
	No	64.71
	No comments	19.61

the charges as punishment/burden.

Income source and expenditure decision autonomy of selected model UPs

Local government autonomy includes decision-making power over tasks and expenditures and the financial means to carry out tasks. The ability to finance expenditures is closely linked to the variety of available income sources and the extent of local control over those income sources and their use. That is why the concept of financial autonomy is used here, which includes both expenditure and revenue decisions. Although measuring expenditure autonomy is more difficult quantitatively, explaining the related concept of expenditure autonomy is still necessary. The costs are divided into three categories based on the tasks performed (Oulasvirta and Turala, 2005):

a. The local government council decides on voluntary local tasks.
b. Framework laws define obligatory tasks more loosely. In this case, the citizen cannot demand a specific service mode, regardless of local government budg*et all*ocations.
c. The legislation defines obligatory duties in detail. The most notable case of this category is legislation that established a statutory right for the customer to receive a particular service from the local government. Regardless of its budgetary allocations, the local government must supply them.

Financial autonomy of model UPs dependent on the fund availability and its source. When income comes from Tax and other own incomes UPs have strongest autonomy for free voluntary tasks followed by strong autonomy for obligatory tasks (frame laws). Side by side when income generate from general-purpose grant UPs have average autonomy for free voluntary tasks followed by strong autonomy for obligatory tasks (frame laws) and weak autonomy for obligatory tasks (detailed specific laws). Alternatively when UPs dealt with specific grant income, it's has no autonomy for free voluntary task and weak autonomy for obligatory tasks (frame laws) followed by weakest autonomy for Obligatory tasks (detailed specific laws).

As shown in the table above, these three task categories form a decreasing spending autonomy continuum, referring to the degree of local expenditure generation and control. In this way, tax income, other funds, and general-purpose grants may be utilized to support activities of various scope, allowing for differing degrees of financial autonomy for UPs in different areas. Restricted grants may provide some flexibility depending on how much control the job has over its expenditures.

The significant UP setbacks autonomy

Each development activity has to face various obstacles. The development process of UP also has to face the same legal, political, administrative, economic, social etc. are presented in Figure 3. The financial autonomy of UP will be ensured only when the mentioned constraints could be eradicated. When the respondents were asked their opinion about the obstacles to ensure financial independence of UP, 31% of respondents opined that legal bindings are the main obstacle to ensure financial autonomy of UP as UP bodies cannot take any decision about its operation and development functions. One-fourth of the respondents believed that political will is the main obstacle to ensure financial autonomy of UP, and the respondents believe that as UP bodies are the lower tier of the government, the member of parliament and the Upazila Parishad always try to dominate the UP, and they do not want to leave the control of UP.

About 22% of respondents opined that the administrative system is the main obstacle to ensure financial autonomy of UP as Upazila Nirbahi Officer (UNO) as well as Deputy Commissioner of the concerned Upazilla district try to control the operation of UP, and 17% of respondents opined that an economical binding is the main obstacle to ensure financial autonomy of UP. Only 6% of respondents opined that the social system is the main obstacle to ensure the financial independence of UP.

Political intervention in UP activities has developed into a practice that obstructs the UP's smooth operation. Members of Parliament

Table 6. Showing the combine income and the expenditure aspect for financial autonomy.

Income sources	Extend of Expenditure Decision Autonomy (Scale 0-4) % respondents opinion														
	a) Free voluntary tasks					b) Obligatory tasks (frame laws)					c) Obligatory tasks (detailed specific laws)				
	Weakest	Weak	Average	Strong	Strongest	Weakest	Weak	Average	Strong	Strongest	Weakest	Weak	Average	Strong	Strongest
Tax own incomes and other own incomes	0.00	0.00	3.92	11.76	84.31	5.88	7.84	13.73	64.71	7.84	-	-	-	-	-
General-purpose grant income	5.88	7.84	62.75	13.73	9.80	7.84	15.69	9.80	62.75	3.92	25.49	62.74	11.77	0	0
Specific grant income	-	-	-	-	-	41.18	49.02	9.80	0.00	0.00	80.39	17.65	1.96	0.00	0.00

(MPs), Upazila Parishad (UzP), and the UP should work cooperatively and cooperatively rather than through domination and suppression. The jurisdictions of the MPs, central government, and local government institutions respective must be explicitly defined to protect the UP from political interference. MPs, the national government, and the UzP should abstain from interfering in UP's internal affairs. There must be a clear division of authority between members of parliament and local government organizations.

Factor Influences the Financial Autonomy (Income and expenditure context) of Selected UPs

The UP must be granted substantial autonomy, and financial independence is necessary for the UP's long-term growth. It must have its decision-making authority, the ability to use funds independently, its own rules of procedure, its budget, and the ability to initiate and carry out local development initiatives autonomously. Financial insolvency is the biggest impediment to the UP performing adequately. The majority of its local revenue streams are insufficient to operate the UP. It is currently entirely reliant on grants from the federal government and development partners. The central government's increasing incursion into the proper domain of local government resources and insufficient allocation and timely dispersal of resources in favor of the local government has made it heavily reliant on the central government. External involvement and inadequate financial management have weakened and diminished the UP's effectiveness as a local government organization. The UP frequently carries out programs and decisions dictated by the central government, which may conflict with local demands. If UPs are provided with enough funding and human resources, they will more accurately assess their needs and challenges and establish development plans accordingly. To promote national development at the grassroots level, monies must be disbursed directly to the UP following local needs rather than the current project-based allocation. Their budget will dictate their local conditions. A board must be established to oversee and assess the operation of UP.

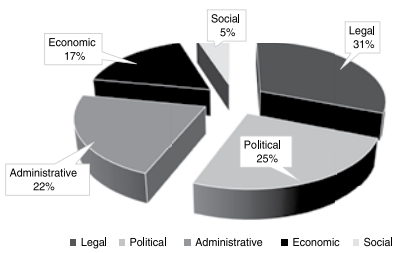

Figure 3. Respondent's opinion on "major setbacks of UP autonomy.

The respondents mentioned (9+7) =16 different influential factors upon which the financial autonomy, i.e., income and expenditure of a UP, depend, are presented in Table 7. Among those, pressure from local MP and political leaders and over-dependence on central administration is the major influential factors followed by lack of experience in financial management and lack of coordination among local MP, Upazilla Chairman, UNO, and UP chairman in expenditure autonomy decision. On the contrary, the non-availability of the permanent revenue collector, lack of local wealth, and tax-avoiding behavior of citizens are the major influencing factors for a UP's income autonomy.

Like other UPs models, UPs do not have enough income and expenditure decision autonomy. Most UP employees lack skills and understanding in financial management, which is necessary nowadays. They lack permanent revenue collectors, limiting UP revenue-generating. Human resources must be effectively trained, and the organization must be restructured to boost productivity and acquire talented and computer-literate workers. The administration and local leaders tend to control the UP. Political pressure, government non-cooperation, administrative obstacles, and red flags all affect the UP's financial autonomy. The UP's decision-making process must be free of administrative impediments. Locally influential persons frequently thwart UP's intentions. The UP lacks the legal and administrative ability to stop such actions. Socially significant people must participate in UP's decision-making. The highest taxpayer in each union, the leaders of its schools and colleges, and other first and second-class government employees may form a committee. Effective performance requires UP operation synchronization. Inadequate UP coordination hinders decision-making, project planning, and budget management. Coordination among parties must be developed, with an emphasis on anti-corruption measures and their implementation. The Central government must also approve legislation granting the UP autonomy.

Conclusion and way forward

Local government autonomy includes decision-making power over tasks and expenditures and funding for activities assumed or imposed by them. The ability to fund spending is directly linked to the range of available income sources and the degree of local control over those income sources, including the distribution of income to various expenditures. That's why this study coined the term financial autonomy, which encompasses

Table 7. Rank order of influencing indicator for financial autonomy of selected UPs (Income and Expenditure).

Sl.no	Influencing factors	Frequency	Percentage	Rank order	Comments
	Income influencing factor of UP				
1.	Non-availability of the permanent revenue collector	42	82.35	1	
2.	Tax avoiding behaviour of the citizen	34	66.67	3	
3.	Lack of experience in financial management	25	49.02	4	
4.	Fear of declining popularity of UP chairman/ members	21	41.18	5	
5.	Following the previous tax schedule for collecting tax	14	27.45	9	*Multiple responses
6.	The financial inability of citizen	17	33.33	6	
7.	Lack of data management	19	37.25	7	
8.	Lack of local wealth	41	80.39	2	
9.	Poor government supervision	13	25.49	8	
	Expenditure influencing factor of UP				
1.	Pressure from local MP and political leader	44	86.27	1	
2.	Lack of coordination	31	60.78	5	
3.	Lack of experience in financial management	37	72.55	4	
4.	Over-dependence on central administration for General-purpose grant income	42	82.35	2	*Multiple responses
5.	Political corruption	39	76.47	3	
6.	Weaknesses in the internal systems and processes	25	49.02	6	
7.	The reluctance of community engagement	20	39.22	7	

both expenditure and revenue decisions. This study presents a better picture of local government autonomy by assessing both revenue and expenditure autonomy of model union perished.

The financial autonomy of model UPs is contingent upon the availability and source of funding. When revenue is derived from taxes and other sources of self-sufficiency, UPs have the greatest autonomy for voluntary work, maximum autonomy for required tasks (frame laws). While the fund is generating via general-purpose grants, UPs have an average degree of autonomy for voluntary work, a high degree of autonomy for obligatory tasks (frame legislation), and a low degree of autonomy for obligatory duties (detailed specific laws). On the other hand, when UPs deal with specific grant funds, they lack autonomy for voluntary duties and have only a limited autonomy for mandatory tasks (frame laws), with the weakest autonomy for mandatory tasks coming last (detailed specific laws). Generally, UPs avoided internal sources of revenue, such as taxes and other charges and additional fees imposed on inhabitants, because of the losing favor and are viewed as a punishment/burden by a local. That is why UPs can't enjoy financial autonomy at all. In reality, not only for model UPs representing in this regard, but similar scenarios can be found in other UPs of Bangladesh.

Findings of the study shown that the most significant impediment to model UP achieving financial autonomy is legal obligations, which prevent UP bodies from decision making choices about the organization's operations and development activities followed by lack of political willpower and an ineffective administrative system. Additionally, the UP's responsibilities are supervised by the Upazila Nirbahi Officer (UNO) and the Deputy Commissioner (DC). Political interference in the UP's actions is now a statutory requirement. MPs and UzP would not interfere with Union Parishad's internal matters. To overcome these obstacles, a clear division between central and local government authorities is required. The government would recognize Model UPs as a practical model in all respects, including financial autonomy. To meet local needs, laws and regulations should be amended to expand the scope of financial autonomy at the local level. The UPs and the government must work together to improve their financial status. Otherwise, the aspirations of rural people for social and economic progress will be unfulfilled.

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Productivity and profitability of Sonali chicken: A case study at the poultry unit of the Rural Development Academy, Bogura

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ABSTRACT

An experiment was conducted to assess the productivity and profitability of commercial Sonali chicken up to three targeted market ages 56 days, 63 days, and 70 days of age. In this study, 432 day-old chicks were distributed into three experimental age groups, with 144 chicks in each group. Each group had four sub-groups having 36 chicks in each. The experimental birds were fed a commercial Sonali starter diet on an adlibitum basis. There was similar care and management to all groups of birds. After rearing the birds up to the target periods, they were found to attain 650, 745, and 775 gm of body weight at 56, 63, and 70 days, respectively. In these different age groups, the feed conversion ratio (FCR) was better in 63 days; in contrast, the highest mortality rate (6.3%) was found in the 70 days. On the other hand, the lowest mortality rate was noted in the 56 days age group. However, profits are found on the live bird sell (Tk/kg live bird) were 22.64, 26.12, and 15.66 Tk in 56, 63, and 70 days the age of groups, respectively. Studies found that the profitability decreases with the increase of rearing time due to the rate of higher mortality and additional labor cost as well as management cost involved in rearing the chicken for a longer period. Therefore, the results obtained from this research that the market age of commercial Sonali chicken rearing could be up to 63 days to obtain maximum profit.

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Introduction

Bangladesh is one of the most densely populated country in the world, and its economy is dependent on agriculture. Within agriculture, poultry plays a diversified role in the economic development of Bangladesh to uplift the livelihood like in most developing countries. Poultry represents the highest priority area for primary investment in the livestock sector, followed by goat or sheep and cattle in the rural environment to overcome malnutrition and poverty. Poultry meat and eggs are incredibly important animal protein sources for human beings, particularly for growing children, pregnant mothers, and nursing people. On the other hand, about 89% of the rural labor forces are dependent on agriculture (BBS, 2009). Thus, the huge pressure of population and unemployment rate on scarce land has undoubtedly created an extremely narrow land: man ratio. Therefore, the poultry sector in Bangladesh is dynamic and has potential

for employment creation and a rapid poverty reduction through income generation.

Commercial poultry farming has gained popularity, and employment opportunities are created in the poultry sector for rural farmers, retailers, traders, service providers, entrepreneurs, etc. In Bangladesh, there are different commercial poultry farming systems available, i.e., Sonali, broiler, layer, Cockrel, and indigenous chicken farming. Increased population, income diversification, changed food demand patterns, the dietary shift towards high-value foods, and rapid migration to urban areas are causing increased demand for foods of animal origin, where poultry meat and eggs are considered acceptable protein sources by most people.

Sonali chicken is a cross-bred bird admirably adapted to the Bangladesh climate system and has a similar phenotypic appearance to that of local chickens. It was introduced in 1996–2000 in northern parts of Bangladesh, representing about 35 percent of the country's total commercial broiler and layer production (FAO, 2015). Cross-bred progenies are superior to purebred in growth rate, meat quality, body weight gain, and feed conversion ratio (Masic and Khalifah, 1965). Commercially, Sonali birds have been reared in response to the market demand for colored birds. It also requires less care and attention than other standard breeds; therefore, it is easier for rearing in rural conditions.

In Bangladesh, Sonali chicken has already been proved worth in production performances in a semi-scavenging system under the village condition (Amber *et al.* 1999). Considering environmental factors, e.g., rainfall, housing, and economic traits such as survivability, the rapid growth of male chicks, as well as a female's higher egg production rate, this cross-bred was recommended to the rear by small-holder poultry farmers in Bangladesh (Amber, 2000). But the actual information regarding the Sonali chicken farming system is not always available in farmers' communities.

Moreover, all consumers have the highest acceptance of small size Sonali chicken because of their tenderness. Also, the clients are ready to pay more for Sonali chickens which provide a clear competitive advantage over broiler and other chickens. However, the increasing rearing time of Sonali cross-bred chicken decreases the profitability due to higher mortality and excess labor and management cost involved such a long period. Thus, the present study was designed to explore the growth rate, feed intake, feed conversion efficiency, mortality, cost return, and profitability of Sonali cross-bred chicken at different target ages of marketing. This research has also given attention to feeding, disease management, vaccination, and bio-security issues to increase productivity and profitability at the different target marketing ages. This study aimed to assess the production performance and cost-effectiveness of Sonali chicken at different target ages.

Materials and Methods

Experimental birds and management

The experimental day-old chicks (DOC) of commercial Sonali chicken were procured from the local dealer of the Bogura district. In this study, 432 day-old chicks were distributed into three experimental age groups, with 144 chicks in each group. Each group had four sub-groups having 36 chicks in each following a completely randomized design. The chicks were offered 5% glucose and electrolyte solution water at the time of receiving to overwhelmed transportation stress. For the first three days, crumble-type Sonali starter feed having crude protein (CP) 23.1%, crude fibre (CF) 5.9%, ether extract (EE) 4.4%, and Ash 6.1% were used (Nourish Poultry and Hatchery Limited, Dhaka, 2021). The feed has been supplied on a clean newspaper up to one week of age. After one week, the newspaper was replaced by round feeders, and the feed was changed to Sonali grower feed with nutrient contents CP 24.8%, CF 5.5%, EE 4.3%, and Ash 5.9%. All birds were fed and water on an adlibitum basis. Feed and water were offered three times per day during the first week and then twice daily up to the end of the experimental period.

Brooding and lighting

During the research period, required quantities of 100-watt bulbs were hung in each experimental pen to brood day-old chicks. There also room temperature was 29-34°C at the first week. After the first week, the ambient temperature increased excessively, and it was 30-39°C up to the 4th week. During the first and second week, 24 hours lighting was confirmed, and it was decreased at the rate of one hour in each subsequent week up to target weights and days.

Vaccination and deworming

All birds were vaccinated against Ranikhet and Gumboro diseases. Baby Chick Ranikhet Disease Vaccine (BCRDV) was administrated one drop in any eye at the 5th and 21st days of age. Gumboro vaccine was given on the 12th and 16th day of age. Ranikhet Disease Vaccine (RDV) was given at two months of age before the deworming was ensured at 45 days.

Biosecurity measures

Adequate hygienic measures and the appropriate sanitation program were carried out during the experimental period. The experimental area was kept open only to researchers and workers related to the experiment, and their feet were dipped in a water bath containing disinfectant. The hygienic management of feeding, watering, vaccination programs, and litter management were taken during the experimental period. Disinfectant, fot example, Virkon®S; Antec International, USA was sprayed regularly on the road and surroundings of the experimental shed to prevent diseases outbreak, and kerosene was spread carefully to control ant. After selling all the chicken, feeders and drinkers were moved outside the poultry house, cleaned, and sanitized. The litter was removed from the house for use in the biogas plant. After that, the floor was washed and brushed to remove the excess litter and prepared for the next batch. The disinfectant was sprayed in the poultry house, on the floor, walls, roof, and atmosphere to kill germs that might infect future flocks. Fumigation has been done in the closed poultry house to ensure complete sanitation.

Growth performance and record-keeping

Weekly body weight and feed intake were recorded regularly. Bodyweight gain, feed consumption, and feed conversion ratio (FCR) were calculated.

Statistical analyses

The growth rate, feed consumption, expenses, and returns were statistically analyzed by using the "SPSS V-16" statistical program in a completely randomized design involving three targeted age groups, each of 4 replications by computing analysis of variance (ANOVA).

Results and Discussion

The execution of commercial Sonali chicken up to target ages is shown below:

Survivability

There was no significant difference ($p>0.05$) found in survivability among different groups of birds. The mortality was 6.3%, which was close to the earlier report of Azharul *et al.* (2005), who found 7.8% mortality in the same type of birds during a period of 56 days.

Bodyweight

In this trial, the chicken attained 650, 745, and 775 gm at 56, 63, and 70 days of age, respectively, whereas Chowdhury (2003) conducted an experiment with cross-bred chickens (Sonali) and reported 750, 1000, and 1250 gm live body weight at 98, 126 and 147 days of age respectively. Islam *et al.* (2006) found 928 gm live weight at 84 days, and Azharul *et al.* (2005) found 1001 gm live weight at 56 days old, respectively.

Feed consumption and FCR

The feed consumption and FCR of Sonali chicken were 1745, 2077, 2403 gm and 2.68, 2.79 3.10 respectively, which are not in agreement with the results of Chowdhury (2003), whose findings were 4360, 6810, and 7830 gm; and 5.81, 6.80, 6.26 for weight groups of 750, 1000 and 1250 gm respectively. This may have been since Chowdhury (2003) fed homemade feed and allowed the birds for scavenging, whereas birds of this trial consumed industrial high proteinous Sonali feeds. However, the FCR values were

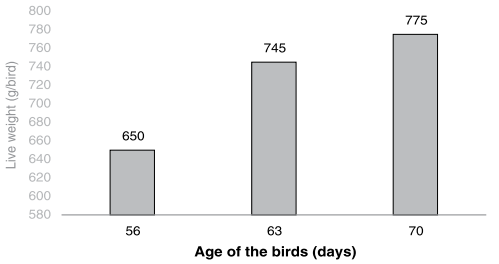

Figure 1. The live weight gain of Sonali chicken at different ages

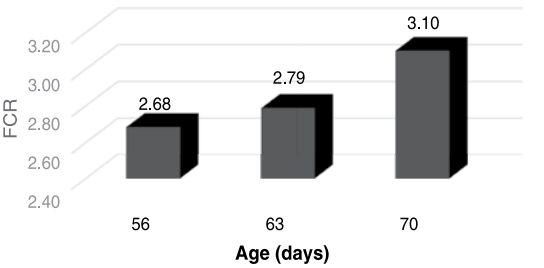

Figure 2. Feed Conversion Ratio (FCR) in different age

close to the report of Rahman *et. al.,* (2004), who found 2.9 and 3.1 at 56 and 84 days of age, respectively.

Economics of production

Figure 3 shows the economics of producing commercial Sonali chicken grown to different target ages. The cost items included the cost of chick, feed, litter, medicine, vaccine, labor, light, electricity, and miscellaneous items. Expenses involved for dead birds were included in total cost, and net profits were calculated on the live weight of bird basis. The differences in the total cost and net profits were significantly different in the age groups ($P<0.01$). Feed constituted the major cost as it was expected. It was found that total cost (Tk/kg live bird) was always highest in 70 days market age and the lowest was in 56 days. The market price of Sonali chicken was Tk 190 per kg live weight. Figure 3 also shows that 63 days of age group attained the highest profit followed by 56 days and the lowest at 70 days.

The cost per bird was Tk 108.78, Tk 122.09, Tk 135.11, and gross income per bird was Tk. 123.50, Tk 141.55, Tk 147.25 at 56 63, and 70 days, respectively. The higher net return per bird, Tk 19.46, was found at 63 days of age, followed by Tk 14.72 at 56 days of age, and the lowest net return per bird, Tk 12.14, was found at 70 days of age.

Profits (Tk/kg live bird) were Tk. 22.64, 26.12, and 15.66 at 56, 63,and 70 days, respectively. The experiment showed that profitability decreases with the increase of rearing time due to higher mortality, additional labor, and management costs involved in rearing Sonali chicken for a longer period.

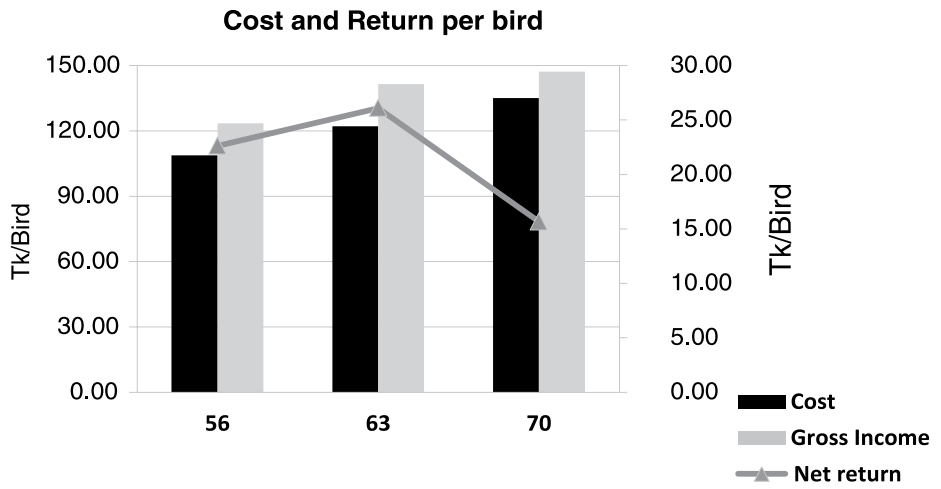

Figure 3. The cost and return of Sonali chicken reared until different marketing ages.

Conclusion

The study results concluded that Sonali chicks could be reared up to 63 days of age to reach profitable weights to obtain maximum profit. Future research works to generate more information on these genotypes of birds may be useful for small farmers. Since the current study was conducted in farm conditions, a study of this nature under field conditions would be helpful. The year-round profitability of commercial Sonali chicken is yet to be determined independently, so that small farmer can be suggested to select the right age to rear up to the right target weight throughout the year.

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Water supply and sanitation system in coastal Bangladesh: Analysis of existing scenario and issues

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ABSTRACT

Bangladesh played a vital role to achieve Millennium Development Goals (MDGs), but there is still big lacking in proper water supply and sanitation, particularly in the coastal areas of the country. The sewerage systems in rural areas are traditional and based on nature. There are several challenges of proper management in this sector. As a result, natural environment is continuously contaminated by the so called improved sanitation. From this perspective, this research work tries to analyze and explore the present scenario of water supply and sanitation system in Sathkhira District. It is possible to identify the present situation of sanitation system from this study and it will also help us to make better sanitation policies and strategies in future. This research work is mainly dependent on secondary information but some important data was collected from conducting Focus Group Discussion (FGD) and observation. There are several factors like number of hygienic latrine facilities, sources of water and distance of water source from sanitation site where rural areas are comparatively lacking behind. So, present water supply and sanitation system has a long-term impact to human health, environment and economy in rural areas. Government and non-government organizations should consider the importance of sustainable water supply and sanitation to implement their interventions in coastal Bangladesh.

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Introduction

UN Human Rights Council has affirmed that the right to water and sanitation derived from the right to an adequate standard of living and inextricably (United Nations General Assembly, 2010). It is also related to the right of highest attainable standard of physical and mental health, as well as to the right of life and human dignity. Water supply and sanitation services are also critically related to sustainable development. It has a big impact from environmental protection and food security to increased tourism and investment, from women empowerment and the education of girls to reductions in productivity losses due to morbidity and malnutrition (UNDP, 2006).

The combination of safe drinking water and hygienic sanitation facilities is a precondition for human health and for success in the fight against poverty, hunger, child mortality, and gender inequality. It is also central to the human rights and personal dignity for all (ibid.). By considering MDG Goal 7(c) includes a target 'to

halve by 2015 the proportion of people without sustainable access to safe drinking water and basic sanitation'. It is also an important issue to meet Sustainable Development Goals (SDGs). But over 780 million people are still without access to improved sources of drinking water and 2.5 billion lack improved sanitation (WHO-UNICEF, 2012).

Water supply is the provision of water by public utilities, commercial organizations, community endeavors or by individuals, usually via a system of pumps and pipes. The 2010 update presents the drinking water target as one of the few success stories of the Millennium Development Goals (MDGs) programme. Aggregate global coverage has advanced from 77% to 87% between 1990 and 2008, very close to the 2015 target of 88%. In Bangladesh proportion of population using an improved water source is about 86%. But there is a contradictory statistic in sanitation. It indicates that the population using improved sanitation is about 62.7% by using Sample Vital Registration System (SVRS) data, where multiple indicators Cluster Survey 2009 show that the proportion is only 54% (MDG progress report 2011).

Bangladesh government agreed that to uphold success of sanitation achievements considering sustainability issues (LGED, 2014). In contrast, general people have little concern about the proper hygine and sanitation practices. It is observed that main countries across the world try to adopt a waste-to-value approach. In Bangladesh, particularly coastal areas, there are ample opportunities to implement such approach to protect our environment and increase economic growth as well. Human faeces and urine as well as grey water represent potential resources like fertilizer, biogas or alternative water source for irrigation. Coastal areas of Bangladesh have crisis of fresh water, specially after cyclone Aila in 2009. So, this region can be a model to reform sanitation system and apply environment friendly sewerage system.

Scope and Justification of the Research

Water supply and sanitation in Bangladesh is characterized by a number of achievements and challenges. Water scarcity is a common problem in coastal areas of Bangladesh. Because salinity is increasing day by day due to climate change. As well as arsenic contamination is a barrier for meet the demand of fresh water. In my study area Satkhira district there are no sewerage systems in rural areas. In this research the present situation of sanitation system in Satkhira is described briefly. It also evaluates the approaches applied in sanitation to rural areas in coastal lands and tried to find out the problems of these approaches. According to the National Sanitation Strategy (2005), sanitation is referred as the basic human rights. There is also a close relationship among water supply and sanitation with population growth. The nature of the sanitation related problem differs depending on the context of rural or urban, routine or civil emergency and the level of engineering of water supply, excreta disposal and wastewater disposal (Carter *et al.*, 1999). This system is not only inhibiting or stops economic development but also directly damage the health of the nation's people (Akter *et al.*, 2012).

SDGs were adopted by the United Nations in 2015 to work toward a sustainable and poverty-free world by 2030. SDG Goal 6, in particular, seeks to ensure that people have access to clean water and adequate sanitation services worldwide. However, progress in water supply and sanitation is not same in both urban and rural areas. Globally, 79 per cent of the urban population uses an improved sanitation facility compared to 47 percent of the rural population (WHO-UNICEF Joint Monitoring Program, 2012). So, to fulfil the SDG no-6 goal we will have to address the rural sanitation system properly.

In rural and coastal areas several researches including Final Climate Management Plan (2009), National Sanitation Strategy (2005), Pro Poor Strategy for Water and Sanitation Sector (2005) Sector Development Programme (SDP,2011-25), The urban food security atlas of Bangladesh (2008), Joint Monitoring Programme on water supply and sanitation (2013), National

Table 1. Geography of the study site.

Condition	Geography
Absolute Location	22° 36′north Latitude to 22° 50′ north latitude and 89°06′ east longitude to 89° 20′ east longitude
Relative location	
South Western part Bangladesh, near the Bay of Bengal	
Physiography	Coastal Plain land
Land use	Settlement, water bodies Agricultural land, vegetation cover, roads, shops institution etc.

Figure 1. Sathkhira District Map

Cost Sharing Strategy for Water Supply and Sanitation in Bangladesh (2010) National Water Management Plan (2009) have been conducted by different organizations. Some researchers also mention different approaches and importance of sustainable sanitation too. But there are few research work mentioning the sanitation and sewerage system in rural areas. From these perspectives this research work tried to find out the scenario of sanitation and water supply system in coastal Bangladesh with comparing other region of Bangladesh. It may help researchers and policy makers to find out the gaps in sanitation sector in coastal rural areas and think differently and applying new approach like reuse of waste and water by regarding its importance.

Objectives

The main aim of this research work is to analyze the scenario of existing water supply and sanitation situation in coastal Bangladesh and identify the problems of sanitation system in coastal rural areas comparing with overall situation of Bangladesh for future development or progress.

Material and Methods

The Study Site

Satkhira is located in the south-western part of the country and it is just upward to the Bay of Bengal. So coastal saline water has a great influence of the region.

Methodology

The study primarily used secondary data. Secondary data are published by different government departments, either in hard copy or in digital form, and sometimes these data are unpublished but selectively and restrictively available through private enterprises. Effort was given to collect available information from government, semi government and other relevant organizations.

Observation of the study area is particularly valuable as this method introduces relatively little bias. The researcher visited a representative portion of the water supplies and latrines and attended a focus group session. The observations aimed at identifying the appropriateness of the interventions (water protection, sewerage system, latrine state, link with water supply in the surroundings, hygiene promotion techniques).

Focus Group Discussions

The groups had approximately 10 participants. An attempt was made to have a representative group with individuals of different backgrounds and different ages. The facilitators used a list of predefined questions to guide the discussion without providing any technical input themselves and tried to ensure that all participants shared their views and nobody dominated the discussion.

Results and Discussion

Type of Latrine

Sanitation situation is worse than water supply in the study area. The commonly available sanitation facilities include pit latrines, bucket latrines and water seal latrines in Satkhira. According to the

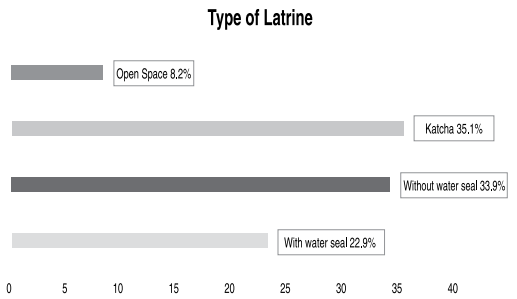

Figure 2. Type of Latrine

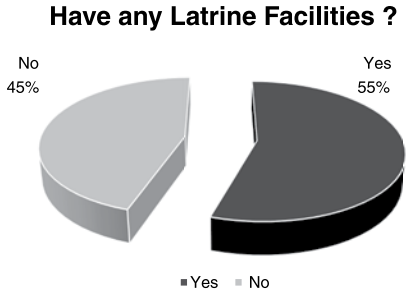

Figure 3. Households Latrine facilities

population census 2011 about 35% people use katcha toilet in study area where 8% people has no toilet facilities. On the other hand, about 34% people are using toilet without water seal. So, overall 77 % toilet of study area are not environment friendly and unhygienic, only 22.9% people are using hygienic toilet with water seal (Figure 2).

Poverty is the main reason for this worse situation. Because like others basic needs sanitation is also required in every day. It needs to construct, repair and release wastes regularly. It is not easy for poor people to keep up these cost. They may get toilet pet from govt. and NGO's but they are not able to beer maintenance cost.

Households Latrine facilities

In case of analyzing existing latrine facilities we get for common 55% and single 45% sanitation facilities in the study area (Figure 3). So it is observed that the type of common latrine is gathering for coastal region's i.e. unhygienic condition. Health and hygienic facilities of this area is in the worst condition. Therefore, different diseases frequently occur in that area. Besides safe distance between water point and latrine is not maintained in most cases that are very harmful for human health.

Improved sanitation Facilities

There are few number of proper hygienic latrines such as water sealed latrine in almost everywhere of the country (Figure 4). In Bangladesh there are only 23 % latrine with water seal, rest 77% are unhygienic latrine without water seal Table 2. Considering the water use facility at or near the latrines and overall hygienic condition of the latrines, the situation is very disappointing. The situation pit latrines and it block has given by different government and non-government organizations. There are no separate sanitation locks for male and female users. So, the hygienic sanitation facilities of Satkhira are not sufficient. About 73% people of this region are using latrine without water seal Table 2. If we compare this situation with the rural areas of rest of the country (Bangladesh), we saw that it is a normal phenomenon in whole Bangladesh. Peoples give less importance in this matter.

Sources of water

In Satkhira, the access to tube well water for drinking was 80.1%. However, majority of these tube wells were not tested for arsenic contamination, leaving the users of those tube wells prone to various arsenic-related ailments, signifying knowledge gap regarding ingestion of arsenic contaminated and the contraction of arsenic-related diseases. On the other hand, it was reported that 81.5% of the tube wells were functional. The households also got sufficient levels of water in both dry and rainy season. Women members in the household also played a vital role in cleaning tube well's platform on regular basis in most cases.

It was observed by author and discussed in focus group discussion (FGD) that arsenic pollution in tube well, salinity in surface water and water purification systems are not enough. More over cyclone Ayla and Sidr contaminated most of the drinking water sources by salinity (UNB,2021)

Table 2. Comparative analysis of Sanitation facilities.

Region	With water seal (%)	Without water seal (%)
Total Bangladesh	23	77
Khulna division on context of coastal region	30	70
Study Area(District Base)	27	73

Latrine Connection and Distance with Water Points

If we compare with other region of the Bangladesh, then we can observe that the water supply in latrines are not available in study areas. Lack of fresh water in coastal area is the reason behind that. So it is quite difficult here to maintain hygienic sanitation. Where about 60% households of Bangladesh has water source inside dwelling in Satkhira this number is only 34.7% Table 3. This status is also very less comparing other rural areas of Bangladesh and overall situation of Khulna. In Satkhira about 21.2% water sources are out 200 meter. Where more than 90% areas of Bangladesh have water facilities within 200 meters' distance. Shakira's condition is also mentionable comparing the average condition of Khulna division Table 3.

Water Supply and Sanitation System (WSS) on environmental context

From the observation of study site, a clear relation between sanitation system and environment pollution in rural areas of Satkhira was identified. In rural areas, waste is discharged into a septic pit. The septic pit is not lined so waste can easily

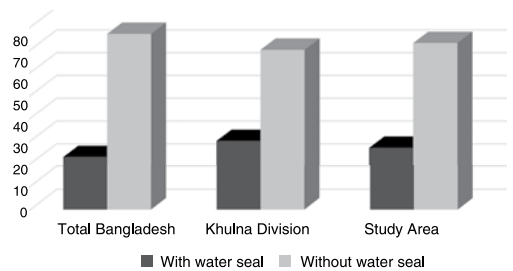

Figure 4. Status of Improved Sanitation Facilities

Source: Population census, BBS, 2011.

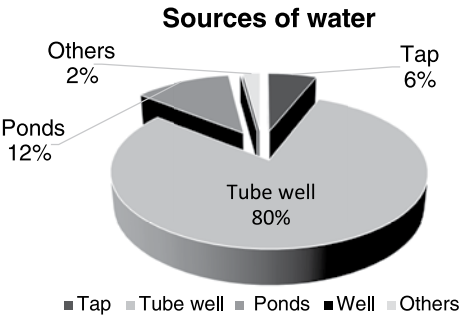

Figure 5. Sources of water.

leach into the groundwater. During floods, which are common in rural areas in Bangladesh. The pit has also a tendency to overflow due to excessive rainfall and flood. It was found that the latrines foul smelled and had fecal matter in them. This was not surprising situation that low availability of water inside or near the latrine. During the rainy season, due to overflow of the septic pit causes the illnesses. This also resulted in soil and water contamination in the surrounding area. Now the impact of sanitary waste on environment and man is given below in a flow chart:

Stage 1: Due to the lack of sewerage, people's sometime open latrine ring or lick it to remove waste. The reason behind that, peoples are not interested to cost money to buy new one .and they also unconscious about the bad effect of waste on environment.

Stage 2: On rainy season and the occasion of natural disasters like floods the tanks are also over flooded. So, human faeces come out.

Stage 3: Those wastages are transported and contaminated air, soil, water and sub-surface water. It effects on environment.

Stage 4: When environment effected it affects human being and other animals directly. Peoples affected by different health hazard from taking those contaminated air or water.

Water Supply and Sanitation System (WSS) on economic context

With population growth the demand of sanitation is also increasing. Without cost recovery it is quit impossible to continue this process for a developing country like Bangladesh. At

Table 3. Latrine Connection and Distance with Water Points.

Distance	Inside dwelling %	Within 200 metres %	More than 200 meters %
Bangladesh	60.7	31.6	7.7
Rural areas in Bangladesh	57.6	33.8	8.7
Khulna division	59.5	30.2	10.4
Study area(District Base)	34.7	44.1	21.2

present the Annual Development Plan (ADP) envisages a total expenditure for the WSS sector for 2003-2004 of BDT 4.6 billion of which some BDT 1.6 billion (33 % of the total amount) is expected to be funded by different development partners such as WB, JICA, ADB, DFID and National Cost Sharing Strategy for Water Supply and Sanitation in Bangladesh, 2012. So, the government is mostly dependent on development partner in this sector. On the other hand, reconstruct, repair and maintaining waste management costs are increasing day by day with the increasment of population. But budget on sanitation sector is not increased with demand.

In 2012-13 fiscal year allocation of budget in sanitation sector was reduced about 1000 crore taka (Figure 7). In 2013, Human Development Research Centre (HDRC) has shown a statistic about the comparative analysis of the national budget for water and sanitation sector in Bangladesh. It explained the diversity of urban and rural areas budget clearly. In 2011-12 about 90% expenditure of Water Supply, Sanitation (WSS) and health was urban based (Figure 8). As well as budget in sanitation sector is not increasing with its demand. It has a negative impact on the development in rural sanitation system.

Conclusions and Recommendations

The study is conducted according to selected objectives and tried to extract the expected results Water supply is not enough in study area and lack of water sources are found. In Satkhira, about 18% people are suffering from the access of pure drinking water (Figure 5). Lack of hygienic sanitation is also mentionable here. About 35% people use katcha toilet in study area where 8% people has no toilet facilities (Figure 2). But there are only 27% people use toilet with seal. So, hygienic sanitation is inadequate in Satkhira district. Most of the people conscious about bad effect of unhygienic sanitation system but they are not active to change this system. If we compare the water supply and sanitation system of rural areas in coastal Bangladesh with overall situations in Bangladesh we can identify the lacking of the areas. For example: 60.7% of Sanitation is facelifted by water sources inside household but in Sathikhira the number is only 34.7% (Table 3).

We observed that water sources from sanitation is far away in many case. More than 20% water sources are located out of 200 meters' circle. So, it also impacts on poor hygiene in rural areas. There is no swerve system in rural areas, and it helps to contaminate the environment. Moreover, expenditure in rural sanitation sector is very low

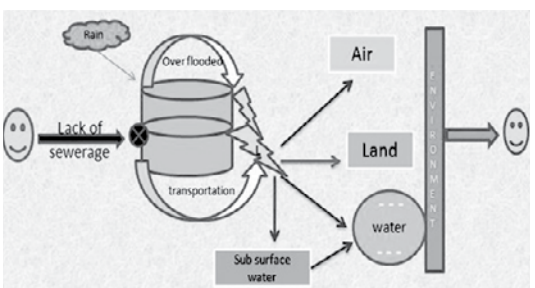

Figure 6. Impact of waste on environment and man

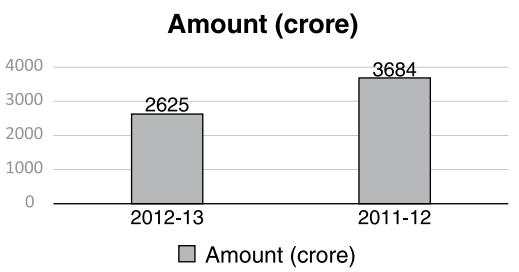

Figure 7. Budget on sanitation sector.

(Figure 8). Overall scenario and status of the water supply and sanitation system in study area is give a view of unplanned, less developed, unhygienic and environment polluting sanitation system in rural areas of coastal Bangladesh.

Combined effort is necessary from the policy makers level with the coordination of grassroots level to solve the problems and make a better future. Some reforms can be done for the betterment of the water and sanitation sector. The following recommendations can apply the overcome the situations.

- Rising awareness about sustainable sanitation is necessary to overcome the situation.
- Need proper fund and management in rural sanitation.
- Government should take proper plan, policy and program by collaborate with different sections.
- It is necessary to strength and involved local government directly in sanitation program.

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Conflict of interest

The authors declare no competing financial or personal interests that may appear and influence the work reported in this paper.

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Shop traders of medicinal products in Natore district of Bangladesh

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ABSTRACT

The objectives of the study are identifying activities, problems, backward and forward linkages, analyzing profitability and determining value addition to medicinal products by shop traders. The present study can contribute to the process of expanding the markets through providing updated knowledge and information. This study was carried out at Laxmipur Kholabaria Union of Natore Sadar Upazila in Natore district of Bangladesh based on primary data from shop traders of medicinal products. The investigated union is the largest commercially growing and dominant cluster of 109 medicinal plants (MPs) in the country. Out of a total 109 MPs, 9 MPs like Amrul (Oxalis comiculata), Basok (Adhatodavasica), Hostipolash (Butea superba), Kalomegh (Andrographispaniculata), Misridana (Scopariadulcis), Oshwagandha (Withaniasomnifera), Shotomul (Asparagus racemosus), Shimulmul (Bombaxceiba) and Tulsi (Ocimum sanctum) were selected for this study as they are produced in large quantities. To achieve the results of the study, descriptive statistics, diagram design of backward and forward linkages and cost, return and benefit-cost ratio analysis were used. The traders always conduct both wholesale and retail business of medicinal products. The flactuation of price makes the business risky and it has happened due to irregular supply and demand for the products in the locality. The calculated net return and BCR were estimated at Tk 361936 and 1.38; respectively that indicate the shop trading enterprise as a profitable business in the study area.Value addition to the products was done mainly through direct selling and also processing and selling and the highest value addition was for crushing selling of Shotomul and the lowest for dust form selling of Oshwagandha. Due to huge weight loss and high cost for processing, high value was added to the converted dry or dust products during selling. Some major problems and constraints, opprtunities and challenges for operation of the enterprise were also identified under the present study. So, for the promotion and sustaining of the medicinal product enterprises and incresing contribution of the enterprise to rural economy as well as national economy, government and non-government organizations should take and implement some necessary activities related to medicinal plants and products such as research programs, training programs for farmers, shop traders including other entrepreneurs and stakeholders such as traders' association, overall support mannual and policy, etc. through proper utilizating the opportunities along with overcoming and minimizing the problems and challenges.

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Introduction

Many medicinal, cosmetic, drug company and food processing industry demanded medicinal and aromatic plants as a raw material for making various products including cosmetics, food and feed supplement and other herbal products. Companies also encourage nearby farmers to grow medicinal and aromatic plants with marketing agreement (Rathore and Mathur, 2018). At present, about 70% of the world population relies on traditional medicine (TM) for their primary healthcare needs, according to WHO estimation (BFTI, 2016). Over four billion of world's population uses the herbal medicine (BFTI, 2016). Even in the developed countries, complementary or alternative medicine (CAM) is gaining more popularity and is being developed. In our country, 75% of our population also uses herbal medicine for primary healthcare. About 7500 species of plants out of 17,000 in the world are known for their therapeutic uses. WHO has compiled a list of 21,000 medicinal plants which are used in different parts of the world. Bangladesh has near about 550 medicinal plants, of which 300 medicinal plants are now in common use in the preparation of traditional medicines in Bangladesh. Most of the medicinal plants of Bangladesh are used in the preparation of mainly Unani, Ayurvedic and Hamdard herbal medicines (BFTI, 2016). Besides, particular small and medium enterprises regarding medicinal and aromatic plants and products are medicinal seed production, processing and marketing; medicinal plant powder processing industry; useable medicinal plant part marketing and export; herbal tea, juice, chocolate and cosmetics manufacturing and selling; etc. (Rathore and Mathur, 2018).

Both India and China earn a handsome amount of foreign exchange by exporting medicinal plants and their semi-processed products to other countries, including Bangladesh. All the continents of Africa, Asia, Latin America, Australia and Europe including specially some countries such as Bangladesh, Canada, Malaysia, China, Brazil, United Kingdom, Thailand, South Korea, France, Spain, Japan, India, Pakistan etc. are large users of herbal medicines today. Being a valuable item of trade, Bangladesh can earn a substantial amount of foreign exchange by exporting this natural wealth to other countries. However, considering the huge export market globally, we are still in a rudimentary stage. Moreover, the industry insiders say that Bangladesh has good prospect of making its niche in the global market for medicinal plants. Bangladesh also looks forward to developing the herbal medicine sector. Major export destinations are Vietnam, Hong Kong, Uganda, Kenya, Somalia, Cambodia, Fiji, Georgia, United Arab Emirates, Myanmar, Thailand, Oman, Romania, Malaysia, United Kingdom, Austria, India, Singapore and Yemen. Moreover, we are exploring many other countries in Asia Pacific, Africa, Europe and Latin America for exporting herbal products (BFTI, 2016). Bangladesh is enjoying duty-free market access to Vietnam, Uganda, Kenya, Somalia, Fiji, Georgia and other countries for herbal products. There are plenty of opportunities to expand the country's export share of herbal products in these markets (BFTI, 2016).

It is estimated by WHO that market value of medicinal products in 2020 is US$ 3 trillion and forecasted that by 2050 it will be US$ 5 trillion as the global market of herbal medicine is growing at a fast pace (Buiya, 2014). Total export value of medicinal plants from Bangladesh amounted to US$ 0.39 million in FY 2014-15, while the value was US$ 0.59 million in FY 2013-14 (BFTI, 2016). The Government of Bangladesh has taken a range of steps in order to create a conductive business-friendly environment and to promote export of the medicinal plants and herbal products. Export policy, 2015 – 2018, encourages stakeholders to produce and export herbal products and medicinal plants. "Business Promotion Council of Medicinal Plant & Herbal Product Sector" formed under the Ministry of Commerce is working as a public- private partnership concern for the boost up of export and business promotion. The Government has declared herbs and herbal medicine as one of the five priority sectors to diversify and enrich the country's export volume. The government

has also exempted Value Added Tax (VAT) on Herbal products (BFTI, 2016).

It was observed under study that in the context of national economic importance, the present agriculture in Bangladesh is gradually modernizingin aspects of commercial priority and diversity which are ultimately being transferred into agribusiness. But, the people in country engaged in conventional agriculture and agribusiness, have little knowledge on agribusiness activities i.e. commercial production, processing, packaging, storage, transportation, distribution, marketing and ICT related to agro-products as well as agro-inputs and service provision. In these circumstances, developing of agribusiness and agribusiness enterprises could improve incomes, employment, food security and poverty reduction by adding more value to agro-products including medicinal products through using less land and intensive utilizing existing land, inputs, instrument and machineries, technologies, capital; and also promoting agro-etrepreneurs/actors' agribusiness knowledge, experience, information and performance. Therefore, under this consideration the present study could contribute for increasing agribusiness knowledge in agriculture sector through providing update knowledge and information.

Although some research studies have been completed earlier on the medicinal plant and product enterprises, detail and specific study on medicinal product enterprise of wholesale-cum-retail business in the union is most essential. This study may be considered as a new addition utilizing latest data on present situation of the - business which will provide specific findings for the aspect in terms of activities, value addition, status of backward and forward linkage, profitability, problems and suggestions and overall agribusiness environment in rural level as well as nationallevel. The findings of this study will be helpful to researchers; planning, policy and decision makers and organizers for promotion of medicinal product business in home and abroad. The specific objectives of the study are: to identify and explain business activities of wholesaler-cum-retailers of medicinal products; find out backward and forward linkages of wholesale-cum-retail enterprise of the products; to analyse profitability of the enterprise in terms of cost-return estimatimation; and to determine value addition to the products in the wholesaler-cum-retailers' level.

Materials and Methods

This study was done at Laxmipur Kholabaria Union of Natore Sadar Upazila in Natore district in Bangladesh based on primary data collected through face-to-face interview from wholesaler-cum-retailers of medicinal products. The Laxmipur Kholabaria union is the biggest commercially growing and dominant cluster of medicinal plants (MPs) of 109 types in the country. Out of total 109 MPs, a considerable number of the MPs are dealt in business by shop traders. But 9 MPs like Amrul (*Oxalis comiculata),* Basok (*Adhatodavasica)*, Hostipolash (*Butea superba)*, Kalomegh (*Andrographispaniculata)*, Misridana (*Scopariadulcis)*, Oshwagandha (*Withaniasomnifera)*, Shotomul (*Asparagus racemosus)*, Shimulmul (*Bombaxceiba*) and Tulsi (*Ocimum sanctum)* were selected for investigation of the study as their transaction occurs in huge quantities in the business mainly in consideration of locally available supply, minimum volume and essential period for storage in the shops. On the other hand, 10 shop traders of medicinal products out of 22 were in the union were selected as the respondents applying purposive sampling technique after preparing a perfect list of the shoptraders through supports of local Upazila agriculture office (UAO) personnel and the traders. Besides, we also organized and implemented a Focus Group Discussion (FGD) using a checklist with participation of shop traders, UAO representative and the researchers for gaining basic, prileminery and field information and enperience about the study and development of a questionnaire for a successful field survey on the primary data collection. Based on the FGD information and experience, the questionnaire for interviewing the shop traders of medicinal products was drafted, pre-testing, revised and finalized before starting the survey of data collection. The collected data were processed and management

in proper systematic way as per the set objectives of the study. Ultimately, the processed data were analyzed by applying descriptive information, tabular statistics, diagram design of backward and forward linkages and cost, return and benefit-cost ratio analysis. Therefore, several analytical tools and formulas used in the study are mentioned below.

(i) Interest on Operating Capital (IOC): To calculate the interest per year of operating capital invested for operating the shop trading enterprise, the following formula was used.

$$IOC = \frac{AI\ it}{2}$$

Where,

IOC = Interest on operating capital
AI = Average Investment (capital)
i = interest rate, t = time period

(ii) Gross Return (GR): Gross return of the enterprise was measured by multiplying total sold quantity by average selling price as follows.

$$GRi = \sum_{i=1} Qi\ Pi$$

Where,

Qi = Quantity of the i-th product
Pi = Average price of the i-th product
i = 1, 2, 3, ----------, n.

(iii) Total Cost (TC): All costs of the enterprise were counted together for calculating total cost. Total cost was estimated by adding total fixed cost and total variable cost as follows.

$$TC = TFC + TVC$$

Where,
TFC = Total fixed cost
TVC = Total variable cost

(iv) Net Return/Profit (NR): Net return/profit of the enterprise was measured by deducting total cost (total fixed and variable cost) from the gross return. Following equation was applied in this direction.

$$NR = GR - TC = GR - (TVC + TFC)$$
$$= GR - TVC - TFC$$

(v) Benefit-Cost Ratio (BCR): BCR of the enterprise was estimated from the gross return by dividing the total cost. Net return per unit Taka gained from per unit Taka invested was determined by using BCR analysis as follows.

BCR = GR/G

Thumb rule/acceptance rule of BCR are:

BCR > 1, enterprise is profitable and will be accepted.
BCR < 1, enterprise is non-profitable and will be rejected.
BCR = 1, enterprise is neither profitable nor unprofitable and will be indifferent; may be accepted or rejected.

(vi) SWOT Analysis: SWOT analysis was used for determining opportunities and challenges (threats) for the enterprise. In this case, opportunities and challenges are external and uncontrolled factors. On the other hand, opportunities are considered as favorable factors, while challenges are unfavorable factors.

Results and Discussion

In the study area, shop trading enterprise of medicinal products has been locally promoted and some local persons areinvolved with this. The traders generally operate wholesale and retail business of medicinal products, medicinal seeds and other products together in rented or own shops situated in local markets. All of them engage their family members or relatives as sales supporters for smooth operation of their business. So, activities, linkages, cost and return, and value addition for the trading enterprise are discussed under some sub-headings in the following.

Activities and Problems of Traders

Several activities regarding to medicinal product business were done by wholesaler-cum-retailers traders locally. These activities including purchase, procurement, sorting, processing, packaging, storage and selling of the products are metioned detail below.

Purchase and selling of products: shop traders always locally purchase green, dry and dust products of medicinal plants from local producers, local processors and local hoarders.

Table1. Purchase and Selling Price of MP Products for Shop Traders (Average/Year).

Medicinal products	Product category	Purchase price (Tk/Kg)			Selling Price (Tk/Kg)		
		Min	Max	Ave	Min	Max	Ave
Amrul root	Green	15	30	22	22	65	41
	Dry	55	110	88	150	210	181
	Dust	120	200	160	170	320	241
Basok leaf (with stem)	Dry	80	90	84	120	155	133
Hostipolash root	Green	50	130	94	60	250	172
	Dry	200	350	288	260	500	378
	Dust	600	800	700	550	1100	908
Kalomegh (full plant)	Dry	60	125	81	100	200	128
Misridana corn *(dana)*	Green	28	45	33	32	55	47
	Dry	80	270	148	100	350	224
	Dust	145	375	257	220	500	339
Oshwagandha root	Dry	120	300	203	200	290	251
	Dust	400	500	450	375	850	498
Shotomul root	Green	30	65	35	42	100	70
	Dry	300	425	363	400	500	450
	Dust	-	-	-	800	1100	840
Shimulmul root	Green	20	51	33	38	65	51
	Dry	72	175	114	90	275	167
	Dust	-	-	-	140	360	226
Tulsi plant (excluding root)	Dry	39	67	57	80	120	96

Source: Field Survey (2017)

Almost all products are purchased in shops, but sometimes they are collected through visiting the local sellers' residence. It was known that dry products are generally purchased from the hoarders in off seasons by the traders. It is found in the Table 1 that purchase price of all types and forms of the products vary in a range. The lowest price per kg for both green and dust was found for Amrul (Tk 22 and Tk 160, respectively); while it was differentform of Kalomegh (Tk 81). The highest price for both green and dust products was associated with Hostipolash (Tk 288 and Tk 700, respectively) and it becomes Tk 363 for dry of Shotomul. The largest purchase price variation for green product was found in Hostipolash; while it was Misridana both for dry and dust products. So, unstable price makes the medicinal products business risky and it was happened due to unstable supply and demand for the products in the locality.

Shop traders sell products from their shops aspermanent sales points in local markets. Products are sold to several local and outside buyers. These buyers are: local and outside *hawkers/farias,* local and outside *hakims/ kobirazs,* outside wholesaler-cum-retailers, medicinal companies and agro-processing companies. Local and outside buyers visit study

area regularly to purchase medicinal products. Some mentionable regional, national and foreign pharmaceutical and herbal medicinal companies that used to purchase the products are Navana Pharmaceuticals, Square Pharmaceuticals, Acmi Pharmaceuticals, Hamdard Labouratory Limited, Taiwan Agro-processing Company (situated at Valuka of Mymensingh district in Bangladesh), etc. Products are delivered to the companies on non-written verbal agreements. It was informed that medicinal companies collect products one or two times in a month. One thing is worth mentioning that all the buyers purchase their products on their own responsibilities.

In all types of sale, product prices are fixed by open bargaining during or before selling without any artificial pressure imposed from any source. Almost all the sales are made in cash, but for regular purchasing companies and local buyers, partially or fully credit sales are done in some cases. It is realized from Table 1 that product price varies among products and within categories of same products. The lowest price per kg (Tk 41) was found for green form of Amrul, while it was the highest (Tk 908) for dust form of Hostipolash. So, price is positively related with processing; that is, price increases as processing increases.

Sales promotion activities: shop traders are not involvement in processing of MP products. They always purchase processed green, dry and dust products. But sometimes they process some portion of the purchased products into dry and dust forms to increase sales and promotion of purchased products and to add value to low quality rejected and unsold products. It was observed that after the purchase, products with non-uniform size and shape, spot and injury are separated through sorting. Then the sorted products are converted into dry or dust products. The residual low-quality products are also tried to convert into both dry or dust products as far as possible. Green products are converted into dry products through sun drying keeping on open katcha yard or pacca platform. Sometimes polythene is used to spread the product on the yard or platform. Dry products are converted into dust product through crushing by hired crushing machine.Crushing cost of Amrul, Misridana and Shimulmul ranges from Tk 5 – 7; while it is Tk 10 – 12 for Hostipolash, Oshwagandha and Shotomul. On the other hand, per kg labour service charge of crushing ranges from Tk 1 – 2 for all the products. It also indicates in Table 2 that shop traders deal with medicinal products in 1, or 2 or 3 forms i.e. green, dry and dust. All these products are practiced for Amrul, Hostipolash, Misridana, Shotomul and

Table 2. Used Parts, Purchased/Sold Forms and Wholesale Packet Size of MP Products for Shop Trading Business.

Medicinal plants	Used medicinal parts/products	Purchased/sold forms of products	Packet size of wholesale (Kg)		
			Green product	Dry product	Dust product
Amrul	Root	Green, dry, dust	05 - 40	-	1
Basok	Leaf with stem	Dry	-	50 - 200	-
Hostipolash	Root	Green, dry, dust	1 - 5	-	1
Kalomegh	Full plant	Dry	-	1 – 5	-
Misridana	Corn (dana)	Green, dry, dust	50 - 80	-	1
Oshwagandha	Root	Dry, dust	-	50 - 60	1
Shotomul	Root	Green, dry, dust	20 - 30	-	1
Shimulmul	Root	Green, dry, dust	70 - 80	50 - 60	1
Tulsi	Full plant (without root)	Dry	-	20 - 40	-

Source: Field Survey (2017)

Shimulmul; while two or single form is practiced for others. It is revealed in the table that green, dry and dust are the common forms and dry is the prominent of all forms of medicinal products practiced by wholesaler-cum-retailers in the study area.

Shop traders usually store both dry and dust products for a period of 7 to 30 days in residence houses or local market shops. For storing dry products, they utilize plastic and polythene bags and mats, bamboo baskets, plastic tray boxes and pots and plastic drums. They are involved in both wholesale and retail sale of the products. For wholesale, the products are supplied in plastic and polythene bags. But for retail sale, no packet is generally supplied for green and dry products, only small size thin polythene bags are supplied for dust products. Minimum 100 gm of dust and dry products, and 1 kg of green product are sold as retail sale; while different size of packets areused ordinarily for whole saling the products. It is found in Table 2 that packet size differs as per product categories and types of MPs under investigation. In all 3 forms of products, pack size ranged from 1 to 200 kg. It is shown that the smallest packet size of 1 kg is always used for dust form of all the medicinal products. On the other hand, the largest packet size of 200 kg is used for dry product of Basok only and 1-5 kg bundle size is used for also full dry plant of Kalomegh only.

No standardization and gradingare maintained by shop traders in any stage of storage, packaging, transportation and selling of products. All types of product are ordinarily classified according to processed form- green, dry and dust. Shop traders generally collect products in shops. As a result, they use hired motor operating van to carry products only for processing activities. All the actors in the supply chain of MPs have no knowledge on market information and sales promotion activities; although shop traders perform some business linkage activities from their own shops to increase sale of their products. As the shop traders operate the business permanently at their shops in local markets, communication with customers is not needed. All types of customers communicate from their own interests through physical visit. Moreover, selling information is exchanged between sellers and buyers over cell phone. Besides, shop traders communicate with buyers through refreshment in their shops and tea-shops at local markets.

Problems, Opportunities and Challenges: Some major problems and constraints, opportunities and challenges (threats) for operating the shop trading enterprise of medicinal products were indentified under present study. The problems are: dense fogs and heavy rains hamper drying of medicinal products; traders' lack of knowledge about marketing activities of the products; derioration of the product quality due to testing dry moisture with organs, observations and assumptions; huge labour cost occurring for manual cutting and washing of the green products; uncertain demand and supply; irregular buyers; non-available supports and suggestions from government and non-government organizations for operating the business, etc. The opportunities are potential and favorable domestic and foreign markets and business environment of the products; natural good quality of the products; scope of value addition to products through backward and forward activities in home and abroad; huge advantages for investment, employment and income generation and foreign exchange earning; etc. The challenges are unscientific processing and marketing activities in the traders' level; increasing business operation cost gradually; absence of required bank credit support for the business; dishonesty of traders for maintaining the product quality; political and social unrest; natural calamities i.e. heavy rain, dense fog, over flood; etc.

Several activities performed by wholesaler-cum-retailers were mentioned in present study and these were purchase, procurement, sorting, processing, packaging, storage and selling of medicinal products. Hashe *et al.* (2016) in Ethiopia also identified related activities of the present research work in their studies. But the present study identified and discussed detail more activities compared to the previous study that indicate important features of

wholesale-cum-retail enterprise of medicinal products in agribusiness sector. The buyers of the wholesale-cum-retail business dealt in present study were ourside wholesaler-cum-retailers, local and outside *hawkers/farias,* local and outside*hakims/kobirazs,* medicinal companies, agro-product processing companies. Dixie *et al.* (2003), Merry *et al.* (2013), Mohiuddin (2014), BFTI (2016) also mentioned almost some of these local and outside buyers in their studies. Kop *et al.* (2006) in India and Hashe *et al.* (2016) in Ethiopia identified almost same buyers but in different natures as formal and informal traders, cooperatives, intermediary companies, etc. So, the findings of the present study relating to buyers are more or less similar to previous studies done in home and abroad. High price variation was revealed for present study in each of the medicinal products. This variation was created due to unstable supply and demand, seasonal vatiation, etc. Such price variation was also determined in the studies of Sharmin (2004) and Shahidullah and Haque (2010). So, price variation results of the present study are supported by the findings of the reviewed studies done previously.

Backward and Forward Linkage of Shop Trading Enterprise

Based on the investigated area, backward and forward linkages of shop trading enterprisewas identifed under this study and in this aspect; all the actors and stakeholders involved in backward and forward parts of the product supply were generally considered. In the linkages, shop traders was justified as central actors and apart from the actors local producers, local processors and local hoarders of medicinal products were determined as backward linkage actors while the forward linkage actors were local Hawkers/Farias and local Hakims/Kobirazs. Besides, several outside buyer stakeholders such as Hawkers/Farias, Hakims/Kobirazs, wholesaler-cum-retailers, agro-processing companies and medicinal companies were also involvedin the forward linkage of the supply chain. All the entrepreneurs/actors and stakeholders are shown in Figure 1 of the supply chain of shop trading enterprise.

In some previous studies regarding supply chain, backward and forward linkage, supply flow chart and marketing channel with actors and stakeholders of medicinal plants and products were performed both in country and outside countries. Present study was also performed on a strong backward and forward linkage for wholesale-cum-retail enterprise of medicinal products with several actors and stakeholders (MP producers, local processors, local hoarders, local Hawkers/Farias, local Hakims/Kobirazs and outside buyers) in the study area. Dixie *et al.* (2003) determined stakeholders in supply chain of medicinal plants and products which were farmers/collectors, shopers, wholesalers, Bepari, processors, primary processors (Hakims/Kobirazs). Merry *et al.* (2013), BFTI (2016), Kop *et al.* (2006), Hishe *et. al.* (2016) also found such 7, 7, 5 and 8 actors/entrepreneurs and stakeholders in their studies, respectively. Rathore and Aditi, (2018) found out marketing channels of medicinal plants/products consist of cultivator/collector (at village level), local trader (covering small trader), middlemen trader (covering large zones), wholesaler and regional traders (based at regional market), retailers and industries / companies and consumers. Rashid *et al.* (2014) mapped a flow chart showing medicinal product marketing in Natore and identified 7 stakeholders comprising farmers, Kobiraj, pharmaceutical industries, local Beparies, Hawkers, whole sale traders and end users. Threfore, the actors and stakeholders mentioned in the backward and forward linkages of supply chain in the present study are directly supported by all the reviewed studies. Details about the actors and stakeholders are dicussed below.

Local Shop Traders: Local shop traders of medicinal products are active as value adding actors. They deal with the products of all forms - green, dry and dust and almost all the activities related to purchasing and selling of the products is performed in the shops situated in the local markets. The shop traders always collect the products from several local sources

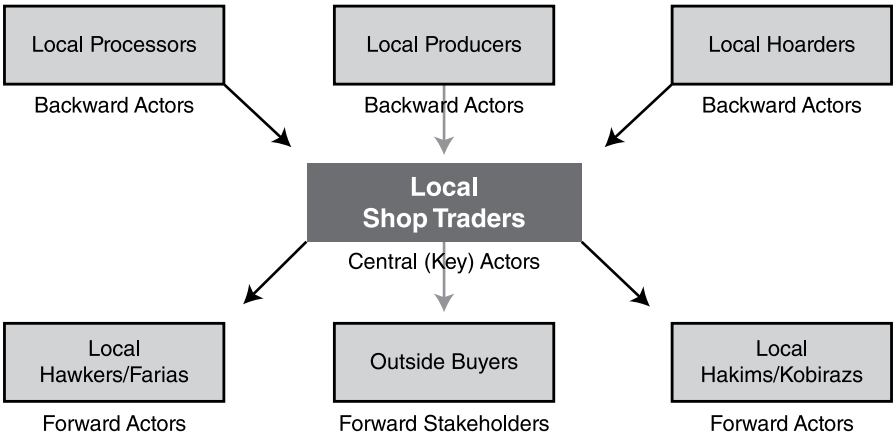

Figure 1: Backward and Forward Linkage of Shop Trading Enterprise of Medicinal Products

ofproducers, processors and hoarders and locally sold also to several buyers are local and outside Hawkers/Farias, local and outside Hakims/Kobirazs, outside wholesaler-cum-retailers, outside agro-product processing and medicinal companies.

Local Producers: The producers are mainly involved with cultivation of MPs and marketing of MP products locally. The producers sell their growing products to several local buyers i.e. shop traders, processors, hoarders, Hawkers/Farias, Hakims/Kobirazs and Ghritokumari suppliers.

Local Processors: Local processors of medicinal products are also backward value adding actors through processing of the products and professionally involve in 3 types of product processing- primary, secondary and tertiary in their residence houses. They purchase only green and dry products only from the local producers and then sell the purchased products in 3 types of forms - green, dry and dust to local shop traders, local hoarders, local Hawkers/Farias, local Hakims/Kobirazs, outside traders and regional and national agro-processing and medicinal companies.

Local Hoarders: Local hoarders are another backward value adding actors of wholesale storage business of dry medicinal products. The products are usually stored in separate storage or separate rooms of the hoarders' residence houses. Sources of the products for the storage business are local producers and local processors while the buyers are local shop traders, outside wholesale traders, and regional and national agro-processing and medicinal companies.

Local Hawkers/Farias: Local Hawkers/Farias of medicinal products are forward value adding actors in the supply chain and operate their business in selected outside areas (business spots) staying ordinarily for the period of 2 to 5 days in a week or 15 to 25 days in a month. They collect products locally and usually one time in a week or month before the time of travelling to business place and always sell the products in the form of purchase without any processing. Purchase sources of the products are local shop traders, local producers, local processors and home supplied (own) and the buyers in business areas are local users/patients, local Hawkers/Farias, local Hakims/Kobirazs and local retail traders.

Local Hakims/Kobirazs: Local Hakims/Kobirazs of medicinal products are also forward value adding actors in the supply chain and involvedin herbal treatment as general village practitioners at their residence and in local hat-bazars in surrounding areas. They supply medicinal products to patients as medicine and the patients pay lump-sum money to them for treatment services and medicines. Sources of medicinal products in the Hakims'/Kobirazs' level are local shop traders, local MP producers

Table 3. Costs of Shop trading Business of Medicinal Products (Annual Average/Trader).

A.Purchase cost of medicinal products

Medicinal Products	Product category	Quantity (Kg)	Price (Tk/ Kg)	Purchase cost (Tk/product)	Total cost (Tk)	% in total cost
Amrul root	Green	644	22	14168	30472 (3.78)	-
	Dry	178	88	15664		
	Dust	4	160	640		
Basok leaf (with stem)	Dry	23	84	1932	1932 (0.24)	-
Hostipolash root	Green	69	94	6486	73758 (9.15)	-
	Dry	219	288	63072		
	Dust	6	700	4200		
Kalomegh - full plant	Dry	95	81	7695	7695 (0.96)	
Misridana corn (dana)	Green	1708	33	56364	69037 (8.56)	-
	Dry	70	148	10360		
	Dust	9	257	2313		
Oshwagandha root	Dry	577	203	117131	119381(14.81)	-
	Dust	5	450	2250		
Shotomul root	Green	3360	35	117600	120867 (15.00)	-
	Dry	9	363	3267		
Shimulmul root	Green	8410	33	277530	328602 (47.11)	-
	Dry	896	114	51072		
Tulsi plant (excluding root)	Dry	56	57	3192	3192 (0.40)	-
Sub-total of purchase cost					**8,06,008 (100)**	**85.38**

B. Procurement and processing cost of medicinal products

Medicinal products	Cost category	Cost/item (Tk)	Total cost (Tk)	
Amrul root	Procurement and primary processing (cleaning) Secondary processing (drying for dry form) Tertiary processing (crushing for dust form)	80 560 105	745 (6.11)	-
Hostipolash root	Secondary processing (drying for dry form) Tertiary processing (crushing for dust form)	50 264	314 (2.58)	
Misridana corn (dana)	Secondary processing (drying for dry form) Tertiary processing (crushing for dust form)	603 588	1191 (9.77)	-
Shimulmul root	Procurement and primary processing Secondary processing (drying for dry form) Tertiary processing (crushing for dust form)	6000 1810 2128	9938(81.54)	-
Sub-total of procurement & processing cost			**1,21,88(100)**	**1.29**

C. Operation costs of business

Costing head	Cost item (Tk)	Cost /item (Tk/yr)	Total cost (Tk)	Total cost as per share	
Shop operating cost	Shop rent Electricity bill Market service charge Other cost	14160 1680 2070 8390	26300	13150 (10.45 (50% share)	-
Sales supporters'cost	Service charge	120000	120000	60000 (47.68) (50% share)	-
Operating capital opportunity cost	Sales supporters service charge Poduct purchase and procurement & processing cost	7200 49092	7200 49092	3600 (50 % share) 49092	- -
	Total			52692 (41.87)	-
Sub-total of operation cost				**1,25,842 (100)**	**13.33**
Total cost of Business (A + B + C)				**9,44,038**	**100**

Source: Field Survey (2017) (Figures in the parentheses are percentages)

and local processors.

Outside Buyers: Several types of outside buyers are major selling sources of business of medicinal products.These outside buyers are mainly Hawkers/Kobirazs, wholesaler-cum-retailers, agro-processing companies and medicinal companies. All the buyers always purchase the products from the shop traders' shops on their own interest and responsibility.

Profitability of Shop Trading Enterprise of Medicinal Products

For the purpose of profitability analysis, different types of costs and return associated with the shop trading enterprise were identified. Total cost was the summation of all individual cost items, whereas gross return was the total sale value of the products. On the other hand, net return of the enterprise was determined from the difference between gross return and total cost whereas gross return was divided by total cost for estimating benefit-cost ration (BCR). All the costs and the returns were calculated from average value encountered by the shop trading entrepreneurs/actors for the period of one year. Only the year of 2016 was considered for calculating both gross return and total cost. All return and cost information of the enterprise was collected from the investigated areas in the period of January to May 2017. Therefore, profitability of shop trading enterprise is discussed below.

Costs of shop trading Enterprise: Total cost included the total of purchase cost, procurement and processing cost and business operation cost incurred by shop trading enterprise. In this case, total purchase cost was determined from the aggregation of purchase values of all the products while collection cost to the shops and primary, secondary (drying) and tertiary (crushing) processing costs of productswere mainly included in procurement and processing cost and

Table 4. Return in Shop Trading Business of Medicinal Products (Average/year).

		Gross Return				
Medicinal products	**Product category**	**Selling quantity (Kg)**	**Selling price (Tk/Kg)**	**Sale value (Tk)**	**Gross return (Tk)**	**% in total return**
Amrul root	Green	452	41	18532	64550	4.54
	Dry	189	181	34209		
	Dust	49	241	11809		
Basok leaf (with stem)	Dry	23	133	3059	3059	0.23
Hostipolash root	Green	65	172	11180	113124	8.66
	Dry	164	378	61992		
	Dust	44	908	39952		
Kalomegh - full plant	Dry	90	128	11520	11520	0.88
Misridana corn *(dana)*	Green	1597	47	75059	105691	8.09
	Dry	52	224	11648		
	Dust	56	339	18984		
Oshwagandha root	Dry	413	251	103663	178861	13.70
	Dust	151	498	75198		
Shotomul root	Green	3360	70	235200	240540	18.40
	Dry	10	450	4500		
	Dust	1	840	840		
Shimulmul root	Green	7725	51	393975	583253	44.70
	Dry	722	167	120574		
	Dust	304	226	68704		
Tulsi plant (excluding root)	Dry	56	96	5376	5376	0.41
Total return					**13,05,974**	**100**

operation cost of business was estimated from total costs of shop operation, sales supporters' service charge and operating capital costs.

Moreover, shop operation cost was included shop rent, electricity bill, market service charge and other cost (entertainment, cell phone, local movement, etc.) and interest on sales supporters' service charge, product purchase cost and procurement and processing cost involved in opportunity cost of operating capital. All the costs involved in the total cost are shown in Table 3.

Table 3 indicates that quantity, price and value of purchase differ among types and forms of medicinal products. The lowest quantity of green product was found in Hostipolash, while it was dry for Basok and dust for Amrul being 69, 23 and 4 kg, respectively. The largest quantity was 8410 and 896 kg for both green and dry products of Shimulmul, respectively and 9 kg for dust of Misridana. In total purchase cost of all the products (Tk. 806008), the smallest share (0.24 percent) was occupied by Basok, and the highest by Shimulmul (47.11 percent). The second highest was (15.00 percent) was done by Shotomul.

Again, it was informed that Basok leaf, Kalomegh plant, Oshwagondha root and Tulsi plant part are always purchased by the wholesaler-cum-retailers from MP producers in dry form and sold in the same form whereas Amrul root, Hostipolash root, Misridana corn *(dana),*- Shotomul root and Shimulmul root are mainly in green form. After purchasing, some portions of the green root of MPs are comverted into dry and dust forms in wholesaler-cum-retailers' level but Shotomul is not processed in dry form due to huge weight loss. It is depicted in Table 3 that procurement and processing cost are not associated with all the products. All the procurement, primary, secondary and tertiary processing costs were occurred for only 2 medicinal products (Amrul and Shimulmul), secondary and tertiary costs for 2 products (Hostipolash and Misridana) and the other had no such cost. In the total estimated cost of procurement and processing (Tk. 12188), the highest cost of 81.54 percent was shared by the products of Shimulmul and the lowest was by Hostipolash (2.58 percent).

On the other hand, almost all the wholesaler-cum-retailers deal with investigated medicinal products along with other medicinal products and seeds of MPs and other category products together. As a result, based on information, observation and experience, average business share of the selected medicinal products under study for shop trading enterprise was determined at 50%. Average service charge of sales supporters was determined based on observation and information at Tk 10000 per month. Interest on the operating capital was calculated at the rate of 12% for half of a year (2016). It is revealed in the Table 3 that total business operating cost was estimated at Tk 125842 of which sales supporter's service charge was the highest (47.68 percent) and the lowest cost was shop operating cost (10.45 percent). Finally, Table 3. indicates that total cost in year of the study appeared to be Tk 944038, contributed the highest of Tk 85.38 percent by purchase cost followed by business operation cost (13.33 percent) and procurement and processing cost (1.29 percent).

Return of Shop Trading Enterprise: Gross return of shop trading enterprise was estimated by adding total sale values of all the products. It is depicted in Table 4 that due to variation in quantity and price, gross return varies among the products and categories of same product. In all the products under investigation in a year, the highest quantity of 7725, 722 and 304 kg were found for green, dry and dust forms of Shimulmul, respectively. The lowest quantity of 65 kg green product was associated with Hostipolash; and 10 kg dry and 1 kg dust products of Shotomul. In gross return of Tk 1305974, the largest return (44.70 percent) came from the products of Shimulmul, while the smallest 0.23 percent from Basok. The second highest return was realized from the products of Shotomul (18.40 percent). So, gross return from Shimulmul products was the highest among the medicinal products under investigation in the study area.On the other hand, net return of wholesale-cum-retail enterprise for a year of the study was determined at Tk 361936 Table 4. It is the profit for 50 percent business share of shop

trading enterprise for the medicinal products investigated under study. The estimated BCR is 1.38 Table 4. indicating that by investing Tk 1 in the business, gross return is earned at Tk 1.38, producing a net return of Tk 0.38. As a result, both net return and BCR indicate that shop trading enterprise of medicinal products is a profitable business in the study area.

This study discussed a detail cost and return analysis and detemined shop trading enterprise was profitable. But, in previous time a few study was done on cost and return of shop traders

Table 5. Added Value to Medicinal Products for Shop Trading Business.

Medicinal products	Methods of value addition	Product category	Selling price (Tk/Kg)	Purchase price (Tk/Kg)	Added value (Tk/Kg)	% of value addition
Amrul root	Selling	Green	41	22	19	86
		Dry	181	88	93	106
		Dust	241	160	81	51
	Drying & selling	Green	181	22	159	723
	Crushing & selling	Green	241	22	219	995
		Dry	241	181	60	33
Basok leaf (with stem)	Selling	Dry	133	84	49	58
Hostipolash root	Selling	Green	172	94	78	83
		Dry	378	288	90	31
		Dust	908	700	208	30
	Drying & selling	Green	378	94	284	302
	Crushing & selling	Green	908	94	814	866
		Dry	908	288	620	215
Kalomegh (full plant)	Selling	Dry	128	81	47	58
Misridanacorn (dana)	Selling	Green	47	33	14	42
		Dry	224	148	76	51
		Dust	339	257	82	32
	Drying & selling	Green	224	33	191	579
	Crushing & selling	Green	339	33	306	927
		Dry	339	148	191	129
Oshwagandha root	Selling	Dry	251	203	48	24
		Dust	498	450	48	11
	Crushing & selling	Dry	498	203	295	145
Shotomul root	Selling	Green	70	35	35	100
		Dry	450	363	87	24
	Drying & selling	Green	450	35	415	1186
	Crushing & selling	Green	840	35	805	2300
		Dry	840	450	390	87
Shimulmul root	Selling	Green	51	33	18	55
		Dry	167	114	53	47
	Drying & selling	Green	167	33	134	406
	Crushing &selling	Green	226	33	193	585
		Dry	226	114	112	98
Tulsiplant(without root)	Selling	Dry	96	57	39	68

Source: Field Survey (2017)

business of medicinal products. The finding of return of the present study is partially supported by the study of Sharmin (2004) in where Ghritokumari, Shimulmul and Misridana were determined profitable. Although similarity of cost items was found between the present study and study of Sharmin (2004), the later one did not analyzed them elaborately.

Gross return	Total cost	Net return	BCR
1305974	944038	3,61,936	1.38

Source: Field Survey (2017)

Value Addition to Products for Shop Trading Business

Value addition to medicinal products for shop trading business was donemainly through selling of products. Added value to products was estimated from the difference between sale price and purchase price of the products. On the other hand, percentage of added value was determined on per kg purchase price of the products. Several methods are followed by shop traders for adding value to medicinal products which are direct selling of purchased products; drying of purchased products and then selling; and crushing of purchased products and then selling. Shop traders sell a portion of products in same purchased form and thus value is added to the products, although the addition is minimum level.

On the other hand, the rest of purchased products are sold after secondary and tertiary processing in dry and dust form and thus a reasonable value is also added to products. Moreover, shop traders add value to the products mainly through selling locally and also make 'possession utility' of the products.

It is found in Table 5 that value addition varies from product to product and form to form. In the case of selling only, value addition is high in green and dry forms than that of dust form. But while considering methods of value addition, the added value is the highest for crushing and selling followed by drying and selling and selling only. The highest value addition of 2300 percent was found in crushing selling of Shotomul; while the lowest was done with selling in dust form of Oshwagandha which is 11 percent only. So, it clears that all the methods are able to add value to the purchased products but crushing adds the highest value followed by drying and only selling, respectively. It was found that due to huge weight loss and highly processing cost of the green products for converting into dry or dust products, highly value was added to the converted products during selling.

Many research works were completed in country and foreign countries on medicinal plants and products production, selling and distribution, but a few of the previous studies dealt in value addition to medicinal products in traders' level. In this case, value addition to MP products was investigated in shop traders' level in the present study. On the other hand, in a similar study, value addition to medicinal products was studied by Shahidullah and Haque (2010) for two traders that are middlemen (Paiker and Bepari) and wholesalers. It was found that although rate of value addition were near consistent but per kg value addition differs from product to product. This might be due to variation in price, period, place and trader levels for dealing with the products.

Conclusion and Recommendations

Shop traders and enterprise of medicinal products is an important part of commercial production, processing and marketing of medinal plants and products in Laxmipur-Kholabaria union of Natore district in Bangladesh. At first, the wholesaler-cum-retailers contribute to the local MP producers for their income earning and MP production sustaining through purchasing the producers' growing MP products and then contribute to the disdribution of the products throughout the country through selling the products to different local and outside buyers. But, all the business activities of the traders are locally conducted from the shops situated in the local markets and all the buyers collect the products from the shops based on their own interest and responsibility. The shop traders have no implications in linkage of regional, national and global markets inaspect of their business. Moreover, many medicinal, cosmetic,

Drug Company and food processing industry demanded medicinal products as a raw material for making various products including cosmetics, food and feed supplement and other herbal products. Besides, most of the medicinal plants of Bangladesh are used in the preparation of mainly Unani, Ayurvedic and Handard herbal medicines. Both India and China earn a handsome amount of foreign exchange by exporting medicinal plants and their semi-processed products to other countries, including Bangladesh. All the continents of Africa, Asia, Latin America, Australia and Europe are the large users of herbal medicines today. Being a valuable item of trade, Bangladesh can earn a handsome amount of foreign exchange by exporting this natural wealth to other countries. However, considering the huge export market globally, we are still in a rudimentary stage, but there areavailable scopes to expand the markets of medicinal products in both country and outside countries. In this situation, for the wholesaling-cum-retailing enterprise some major problems, opportunities and challenges were identified under present study. Therefore, the policy suggestions and recommendations for promotion and sustaining the enterprise are: to establish research centre/station under agricultural related research institute in commercial medicinal plants and products production, processing and business regions with research programs regarding theproduction, processing and business activities; to organize and provide training by concern government and non-government organizations to potential and progrssive entrepreneurs, actors, and stakeholders of medicinal plants and products on scientific activities of production, processing, storage, packaging, transportation, etc.; to form effective co-ordination service team with personnel of government and non-government concern organizations under the Department of Agricultural Extension (DAE) and provide appropriate services related to moisture testing of dry products, product quality maintenance, market linkage development, traders' association organation, available bank credit delivery and other extension service provision, etc.; and to formulate and implement effective mannual and policy for supporting and promoting the medicinal plant secor. Finally, concerned government and non-government institutions should come forward for effective implemention of the suggestions and recommendations with provision of necessary supports to the medicinal plants and product entrepreneurs, actors and stakeholders.

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