









Research Article

# Determinants of Youth Participation in Agriculture: A Case of Polder Farming Practices in Southwest Coastal Areas of Bangladesh

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## Abstract

Revitalizing the agricultural sector through youth participation is essential to better adapt to changing climate and support sustainable development. However, youth participation in agriculture has been declining in developing countries, including Bangladesh. Only a limited number of scientific studies have been conducted to address this concern. This study aimed to examine the factors affecting the perception and participation of youths (18-35 years of age) in agriculture, considering the polder agricultural practices in the coastal zones. A simple random sampling technique was followed in this study. The quantitative data were randomly collected from 270 young men (64%) and women (36%) from Polder 30 located in Khulna district of Bangladesh. The determinants of participation choice were identified using the logit regression model. The empirical findings reveal that factors such as gender, farming experience, agricultural and youth development training, and access to credit positively affected youths' decision to participate in agricultural practices. On the other hand, their age, education level, and plan to migrate to cities inversely influenced their decision. Moreover, the nature of the work, restricted access to land, and fewer work opportunities often contributed to such negative attitudes of youths toward agriculture. It is recommended that the government and policymakers should adopt appropriate measures through inclusion of practical agricultural education in

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curriculum, availability of extension services, and training programs on modern agricultural technology, a significant social recognition of agriculture in society and provide access to new technologies and adequate credit facilities to change the attitude of youths toward agriculture that will contribute to achieving agricultural sustainability and food security in Bangladesh.

## Keywords

Youth Perception, Youth Participation, Coastal Area, Polder Agriculture, Bangladesh

## 1. Introduction

A country's economic development is largely contributed by the youth [1], and agricultural and rural development are no exception. They are regarded as the most energetic, productive, efficient, and innovative segment of a country, which, if properly supported and systematically guided, can promote the sustained growth of a country [2, 3]. Despite the potential of youth to revitalize agriculture, their interest in agricultural employment has been declining at an alarming rate in recent times [4, 5]. Therefore, this calls for studies to determine the factors that affect youths' participation in agriculture.

Being an agriculture-based country and given that agriculture has always been the central policy concern for the economic development of Bangladesh [6, 7], more than 11.66% of the country's GDP comes from this sector [8]. It also provides employment opportunities for approximately 39% of the country's labor force [5]. The youth age group (15-24) represents 19.09% of the total population in Bangladesh, accounting for about 31.53 million people, of which 73% live in rural areas [8]. Although agricultural production, climate change, and youth employment remain central to the poverty reduction and economic growth strategy of the government highlighted in the agenda of the Sustainable Development Goals (SDGs), youths do not find agriculture a promising livelihood option. Environmental disasters, seasonal variability in production, market risk and uncertainties, the attraction toward urban lifestyle, higher education, etc., are a few key factors contributing to the declining participation of youth in agriculture [9, 5]. From 2015 to 2020, agricultural employment in Bangladesh dropped from approximately 43% to 39% while service-sector employment increased from nearly 36% to 40% [5]. A process of change includes a move from overwhelmingly farm work to increased non-farm work observed in Bangladesh [10]. While the aging of the agricultural labor force and its impact on sustaining agricultural production continue to attract extensive attention, little has been known about youth's disinterest in agriculture, especially in the natural disaster-prone areas.

This situation is more critical in the coastal zones of Bangladesh,<sup>1</sup> which are regarded as the most deprived and backward regions of the country. These regions are vulnerable and risky to climate change [11] and the home of socioeconomically challenged populations, whose livelihood reflects the scenarios of poverty, food insecurity, and malnutrition [12,

13]. Although agriculture and aquaculture play a vital role in maintaining the livelihood of almost 25% of the people living in these regions occupying close to 30% of the total land area, field crop productivity is largely hindered by soil and water salinity in the low-lying inundated land, caused by riverine tides [14, 15]. As the hydrology of the coastal zones is unique vis-à-vis that of other areas for agricultural production, the government took initiatives to transform about 1.2 million hectares of agricultural lands to polder farming<sup>2</sup> during the 1960s and 1970s to diversify the cropping patterns for increasing agricultural production [14]. Although polder farming can provide scope for youth employment in which they can use their talents and abilities to adopt climate-resilient agricultural technologies to sustain crop production in coastal areas, they are not willing to undertake farming as a means of livelihood [16]. The rural youth labor force is one of the crucial factors for production, which must be allocated efficiently to maximize agricultural output. However, a limited number of studies have attempted to examine the factors that influence youths' decision to participate in such farming practices in Bangladesh. This is what this study aims to explore.

In the body of the literature, many scholars have looked into rural youths' perceptions and participation in agricultural occupations in Africa [1, 2, 3, 17-20]. Among the studies that focused on agriculture and coastal areas in Bangladesh, [21, 22] found that crop, livestock, and fisheries production were not at an optimum level due to the higher amount of land devoted to shrimp cultivation than farming. Lázár *et al.* [23] developed a framework incorporating farmers' decision-making into the climate and environmental analysis so that it could alleviate environmental risk and promote development. Sultana and Mallick [24] determined the adaptation strategies of poor rural households caused by cyclones in coastal areas. Kundu *et al.* [25] came up with several recommendations for building up coastal agricultural resilience. Additionally, Quddus and Kropp [26] examined the constraints to agricultural production and marketing in the coastal regions of Bangladesh.

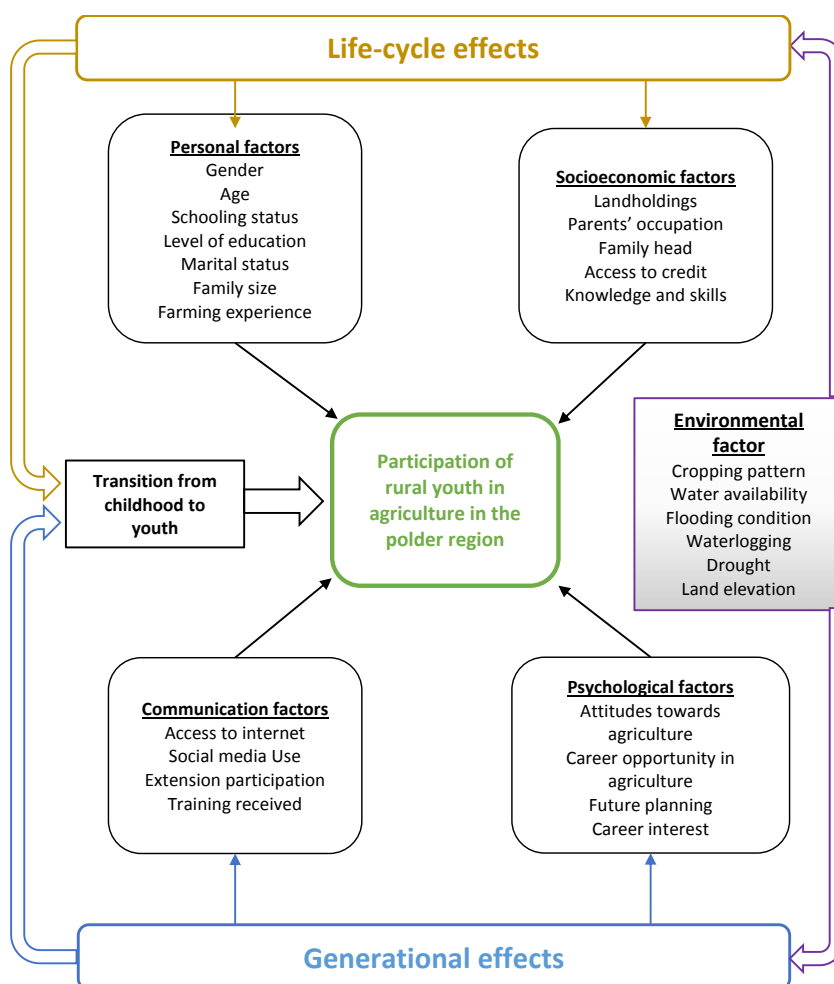
Some studies are similar to the highlighted context of our study [5, 9, 28]. However, [5, 9] looked into youth participation in agriculture without considering the context of coastal regions, which is quite different from that of agricultural practices in other areas of Bangladesh. Although [28] con-

sidered the case of commercial agricultural practices in Bhola District (one of the coastal areas), the study did not specifically consider the youth involved in polder farming practices. Also, the sample size (i.e., 80), as well as the study area, was not as extensive as in our study. Figure 1 shows the word cloud of the keywords (“Polder,” “Agriculture,” and “Bangladesh”) based on 20 articles from the Scopus database, which does not indicate an emphasis on youth or youth engagement.

Moreover, the above literature reviews suggest that the studies conducted in Bangladesh specifically focused on the environmental aspects of coastal farming practices. In contrast, empirical economic analysis on the perceptions and participation of youth in polder farming practices is quite limited. Therefore, our study is a comprehensive study that will fill this knowledge gap.



**Figure 1.** Word cloud of keywords based on 20 scientific articles on polder agriculture in Bangladesh.



**Figure 2.** Conceptual framework and hypothesis postulation. Source: Prepared by the authors based on the information from [32] and field survey.

The major focus of our study, the transition from childhood to farm work, is the conceptual framework in [Figure 2](#), which

revolves around the idea of determinants and perception of the decision to participate in agricultural work in polder areas

between stages of life (i.e., youth). Traditional measures of being involved in the labor market (agricultural or otherwise) involve obtaining education, starting a job, being financially independent, and starting a family [29]. According to [30], the course of youth transition is influenced by generational impacts as well as life-cycle influences. Personal and socioeconomic elements that are inherent to youth as a stage of life are included in life-cycle impacts. These impacts are thus understood in terms of restricted access to resources, such as money, land, and knowledge and skills. However, generational effects—which encompass psychological and communicative factors—are particular to a certain period and do not affect adolescents alone. However, given the life-cycle effects, the strength of these effects may be especially strong for young people. The macro-determinants of youth labor markets, the macroeconomic environment, and labor market trends may all be taken into account when analyzing these impacts. Environmental variables also have an impact on the life cycle and generational consequences, which eventually impact the decision to engage in agriculture. It is crucial to recognize that, despite the above-mentioned linear movement between successive life phases appearing in the decision to engage in agriculture, their paths are frequently very varied and non-linear [31]. Since the study focuses on youths in polder regions, the analysis's goal is to pinpoint the factors that influence youths' opinions of and involvement in agriculture.

## 2. Literature Review and Hypotheses of the Study

Based on the literature review, several factors were selected to determine youth participation in agriculture. The hypothesis on the probable effects of these variables on the binary outcome variable is discussed below.

### 2.1. Personal and Socioeconomic Factors

Gender plays a vital role in developing agriculture. Traditionally, women's contribution is mostly seen in post-harvest operations, food processing, and household chores, whereas males are likely to take part in farming decisions, supplying farm labor, and managing farm resources [17, 33]. Therefore, it is assumed that the estimated coefficient of participation in agriculture would be positive if the gender of the youth were male and *vice versa*. Age of the youth also acts as a proxy of their experience. It reveals the maturity of an individual and his/her self-realization about the importance of an agricultural occupation for economic and national development [34, 35]. According to [9], youths of age 25 and above are more enthusiastic, energetic, and active farm participants who can realize the full potential of their occupation. Therefore, it is expected that as the age of the youth increases, the probability of undertaking farming as the primary occupation will increase and *vice versa*.

The level of education is expected to be either positively or negatively associated with youths' choice to participate in an agricultural occupation. It is assumed to be negatively related since educated youths usually tend to find their career in the service sector with assured salaries, which is mostly available in cities [9]. On the contrary, [34] noted that farms serve as laboratories where educated youth can apply their extended theoretical knowledge to practical life. Moreover, educational institutions can motivate them to participate in farming so that they can pay off their educational expenses. In Bangladesh, 46% of the total unemployed youth are university graduates. Their higher educational status can aid them in finding technical solutions to agricultural production and distribution-related problems [5, 28]. Because of both possibilities, this variable is expected to have a mixed influence on youths' choice of participation in agriculture.

Family size is supposed to either increase or decrease youths' probability of participation in agriculture. A large family size can have a negative influence on youths' participation in agriculture because households with more residents may face barriers in meeting food security and other social needs more than those having a small family. Therefore, rural youths who belong to large families may look for a profession that is more profitable than agriculture [34]. In addition, a large family size implies less landholding per household, which is not sufficient to carry out an agricultural occupation to fulfill the food security requirements of the household [9]. Such a situation is also supposed to discourage youth from undertaking agriculture as an occupation. On the contrary, small family size can have a positive influence on youth's participation in agriculture. Because of both likelihoods, the expected sign of this variable is either positive or negative in this study.

The marital status of the youths may have a mixed influence on their intention to participate in agricultural occupations. A recent study by [2] found that married youth are less likely to engage in agricultural entrepreneurship. On the other hand, [34] identified this variable as a significant determinant of participation by youth. According to the authors, rural youth prefer fewer mobile jobs because of their sense of family responsibility and choose farming over other jobs as it provides the chance to stay with the family. With such conceptions, marital status is expected to either positively or negatively affect youths' probability of participation in agriculture.

Farm size is an important determinant of agricultural participation. It facilitates the adoption of new technologies for increasing farm production. Generally, youth do not own the land. They rely on their parent's land. Therefore, if the parents of youth possess some land area, this facilitates youth participation in agriculture more than their counterparts [9]. As the cultivable land per household is quite limited in Bangladesh, youth face more difficulty in managing the land for cultivation [5]. A large farm size can assure them a means of livelihood in case they fail to obtain monthly salaried jobs. If



the farm size is smaller, youth may not be interested in investing their energy in agricultural production due to the lower profit margin from small farm output [17]. Small land size may also act as a constraint to obtaining a bank loan, which may prohibit youth from starting agricultural entrepreneurship [36]. Because of these possibilities, farm size is expected to be positively associated with youth participation in an agricultural occupation.

Access to land is probably the most critical building block of participation in agriculture for youth. In many developing countries, land ownership is transferred through inheritance, which mostly occurs once the parents die or are too old to carry out agricultural activities. In such circumstances, youth often have to work on their family land with limited access and little or no remuneration. This circumstance often discourages youth from participating in an agricultural occupation [17, 36]. According to [36], access to credit is another important factor for youth to start farming, which largely depends on their access to land, as it serves as the security and collateral against their credit. Therefore, our study hypothesizes that the probability of agricultural participation by youth would be highly correlated for those having access to land as compared to others. The availability and accessibility of credit are crucial for rural youth to start farming activities. These require the necessary capital to meet the cost of production as well as investment in the adoption of new technology [36]. Although agricultural credit has been increasingly extended to poor farmers in Bangladesh, the system is not so friendly for youth. Youth are often denied access to formal credit as in most cases they are unable to provide collateral and security for their credit [9, 28]. Keeping these views in mind, it is assumed that the probability of agricultural participation will be higher for those youth who will have access to credit.

Experienced youth are thought to be more efficient in managing farm activities because of their better practical knowledge and skills. This can be regarded as a decision tool that can ensure secure investment, sales, and cash outlay from agriculture [17]. Therefore, farming experience is hypothesized to be positively correlated with youths' choice of participation in agriculture. Youths obtain basic motivation and inspiration to participate in agriculture from their parents. Parents' involvement is often regarded as a source of social capital for youth, which can guide them on how to manage the farm resources and operate the farm successfully [17, 34]. Therefore, youths' participation in agriculture is also assumed to be positively associated with the parents' involvement in agriculture.

## 2.2. Communication and Psychological Factors

*Agricultural and youth development training and support:* Agricultural knowledge, information, and training are crucial for youth to overcome the obstacles they face when engaging themselves in agricultural occupations. Although youth may obtain farming knowledge from their parents, such informal

education is not sufficient for them to undertake agriculture as a profession. Therefore, coordinated and effective training and support are required [36]. Such a conception indicates that, if youth obtain adequate agricultural training on improved technologies and better farm management practices, their attitudes toward agriculture as a low-status job will change and they will be encouraged to participate in agricultural occupations [9, 28]. Therefore, this variable is expected to have a positive influence on youths' choice of participation in agriculture.

*Availability of Internet and communication media:* In today's digital era, the availability of the Internet and communication are crucial for the smooth operation of any activity. Youths prefer to use electronic information and communication platforms to engage in interactive communications so that their farming exposure can be extended. According to [36], about a third of the world's population uses the Internet, of which more than 45% belong to the urban young generation. The two most widely used payment and trading services such as mobile banking and internet trading act as important digital tools for selling their products beyond the farm gate. Social media such as Facebook, Twitter, Instagram, etc., are some of the effective information-sharing platforms that are easy to use and reach many people [28]. Despite such benefits of internet and communication systems, many rural areas still lack such facilities in most of the developing countries, which may demotivate rural youth from staying in villages and recognizing agriculture as a potential source of livelihood [36]. Having such conceptions, the likelihood of participation in agriculture is thought to be higher for those having greater access to the internet and communication systems.

## 3. Materials and Methods

### 3.1. Data

This study was conducted in two unions called Batiaghata and Gangarampur of Batiaghata upazila of Khulna District, located in Polder 30, a coastal zone of southern Bangladesh (Figure 3). According to [37], Polder 30 contains about 9490 households with 45000 people, of which youth comprise 38% of the total population and agriculture is the primary occupation for about 83% of the total population in this zone. Therefore, this area was preferred for capturing a true picture of youths' perception and participation regarding agricultural occupation in the coastal zones of Bangladesh.

In this study, our targeted population is the youth. In Bangladesh, the National Youth Policy 2017, 'Youth' is defined as 18-35 years, while the Bangladesh Bureau of Statistics defines youth as people aged 15-29 [38]. However, the United Nations defined youth as those segments of the population aged from 15 to 24 years [16]. As the National Youth Policy is specifically for the youths, we have considered the population aged 18-35 years as youths in this study.

The data for this study were collected through an interview

survey conducted using a structured questionnaire. Other than the total size of the population, we did not know any information about the study area. Therefore, a purposive simple random sampling technique was applied for selecting the youth respondents. Considering a 6% margin of error, we estimated the target total sample size as  $n = N/(1 + N \cdot e^2) = 273$ ; where  $N$  is the population size, and  $e$  is the margin of

error. However, we have selected a sample of 270 youths, of which 64% were male and 36% were female.

A well-established quantitative approach was employed to analyze the collected data. After analyzing the data, we conducted four FGDs with the key informants to validate the results.

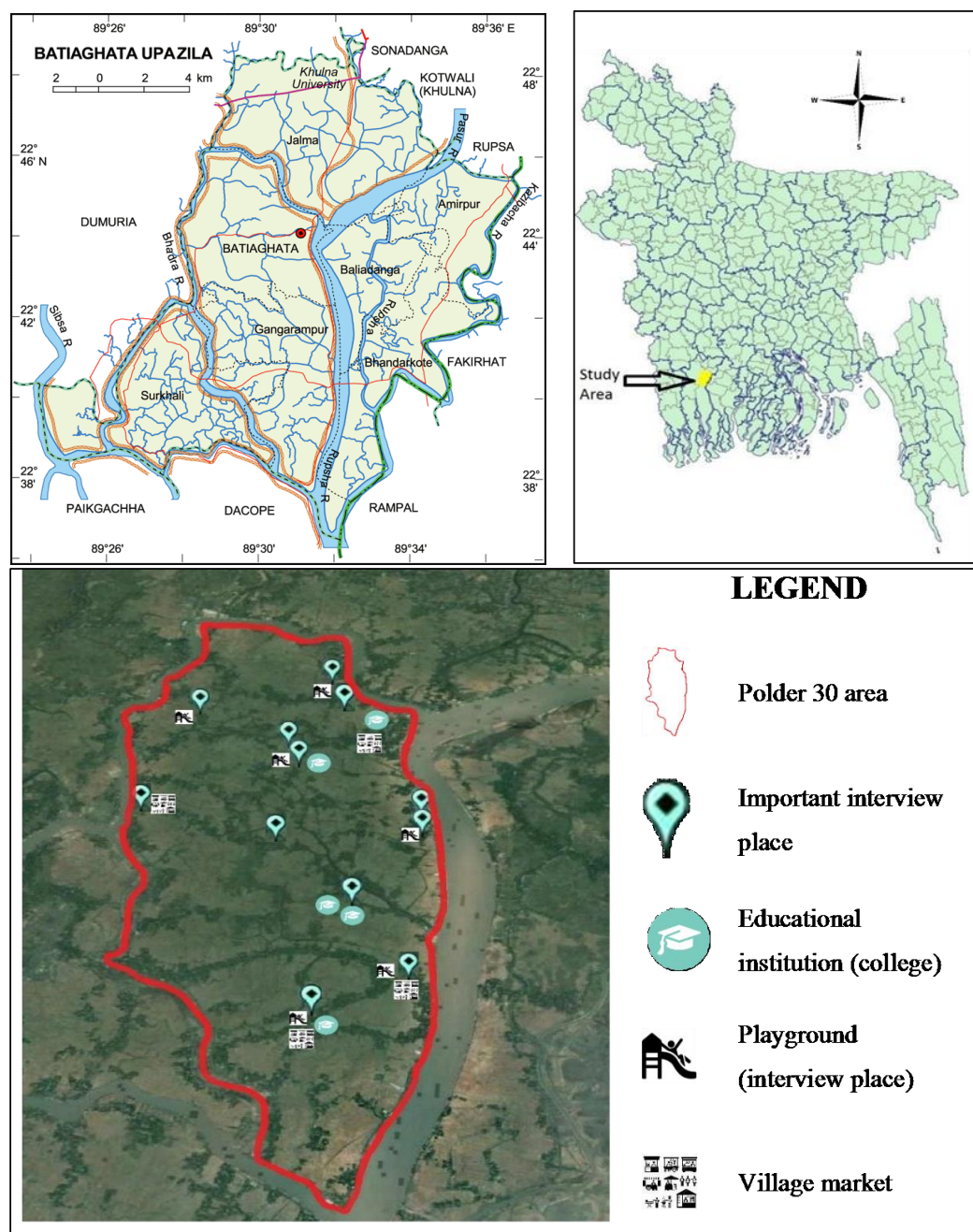


Figure 3. Study area.

### 3.2. Analytical Approach

The quantitative data analysis was further divided into de-

scriptive and functional parts. Descriptive statistics such as frequency distribution, tables, and percentages were used to analyze the data on the selected socioeconomic characteristics of the respondents and the perceptions of youth regarding

agricultural activities in Polder 30. For the empirical estimation of the determinants of youth participation choice in polder farming, a logit regression model was applied and run in STATA (version 14). Logistic regression is a statistical analysis method used to predict the relationship between the response variable (dependent variable) which has two or more categories with one or more explanatory variables (independent variable) on a category or interval scale [39]. The description of the relationship between response variables that have qualitative or categorical properties with explanatory variables that have two or more categories cannot be solved by ordinary linear regression models using the Ordinary Least Square (OLS) method [40]. If the linear regression method is forced to analyze data whose response variables have the characteristics as mentioned above, there will be a violation of the Gauss-Markov assumption [41]. Haridanti et al. [42] state that the logistic regression analysis is a regression analysis used to describe the relationship between the response variable (outcome or dependent) and a set of predictor variables (explanatory or independent), where the response variable is binary or dichotomous. The response variable is dichotomous qualitative data with a value of 1 (one) to indicate the occurrence of an event and a value of 0 (zero) to indicate the non-occurrence of an event. The basic structural equation of the logit regression model<sup>3</sup> has been adopted from [43], which is as follows:

$$\text{logit} [(p)] = \log \left[ \frac{p(x)}{1-p(x)} \right] = \beta_0 + \beta_i X_i$$

Where,  $p$  = the probability that a response is either 1 or 0;  $\beta_0$  = the constant;  $\beta_i$  = the coefficient of the  $i^{\text{th}}$  predictor variables;  $X_i = i^{\text{th}}$  explanatory variables;  $(p(x))/(1 - p(x))$  = odds ratio of those who perceived agriculture as a promising employment opportunity to those who did not think it was promising.

We used the "Kernel Density test" and the "Skewness and Kurtosis test" to determine whether the distribution was normal. We discovered that the residuals' distributions were normal in both situations. To determine if the homoscedasticity assumption is met, the Breusch-Pagan/Cook-Weisberg test was utilized. Heteroscedasticity was an issue, as evidenced by the 5% significant level rejection of the constant variance null hypothesis. Robust standard errors, thus, effectively addressed the model's heteroskedasticity issue. There is no multicollinearity issue with the dataset, as indicated by the mean variance inflation factor (VIF) of 1.67, which is less than 10.

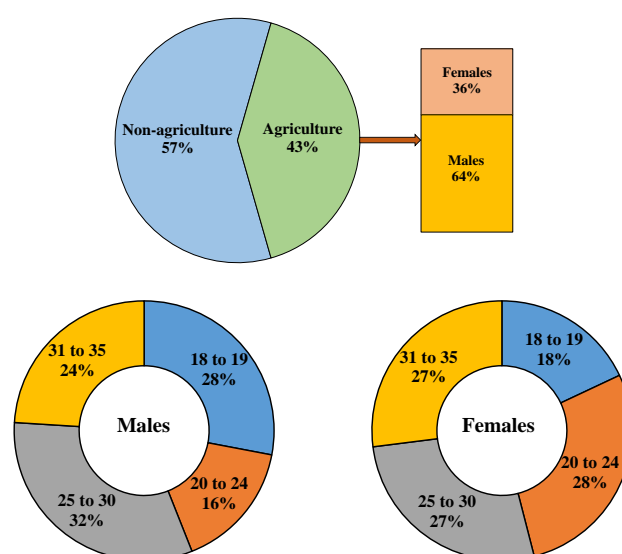
A Hosmer-Lemeshow chi-square value of 26.25 and a Pearson's chi-square value of 428.86, obtained from the goodness of fit test, are both determined to be highly significant ( $p < 0.01$ ) but less than the values at the 95% confidence interval (i.e.,  $0.01 < 0.05$ ). As a result, our study's null hypothesis, which states that there was no statistically significant difference between the observed and projected values of the categorical variables employed in the model estimate, cannot be accepted. Thus, the model can be regarded as the best fit for this analysis.

The calculated model's sensitivity and strength are evaluated using the likelihood ratio (LR) test. It specifically aims to determine if the difference between the log-likelihoods of the two models—that is, the original model and the one with extra variables—is statistically significant by estimating and comparing the log-likelihoods of the two models. The present model is the most appropriate model for this study as the test statistic under this test is calculated at 0.04 and is determined to be statistically insignificant. With the estimated projected probabilities, the estimated model accurately predicted the likeliness of the dependent variable by 87.78% (Table 2).

## 4. Results

### 4.1. Descriptive Statistics

Table 1 represents the results of descriptive statistics analyses along with their probable effect on the outcomes of the variables used in model estimation. The survey result shows that about 43% of the sampled youth participated in Polder agriculture. Most of the youth were males (64%) and unmarried (73%), with a mean age of approximately 23 years and almost 11 years of schooling, which represents the higher secondary level of education (Figure 4).



**Figure 4.** Age and gender-wise distribution of youth participation in agriculture in the study area. Prepared by the authors based on the information from the field survey.

On average, the sampled youth or their families owned 1.08 hectares of landholdings, while about 40% had adequate land access. The sampled youths had a bit more than 3 years of farming experience. Despite 76% of the youths' parents being involved in agricultural occupations. Only 32% of the youth received either agricultural or youth development training to apply in their farming practices. About 41% of the youth were

motivated to migrate to towns and cities to find a decent standard of living. Only half of the youth were using the internet and communication services. Around 13% of them indicated that loans were readily available, regardless of their

decision to participate in and make investments in agriculture. Therefore, such a narrow connection is expected to have an ambiguous influence on their decision to participate in farming.

**Table 1.** Description of the variables used in the model estimation and their summary statistics.

Variable name and description	Mean/proportion	Standard deviation	Probable effect
Dependent variable			
Participation in farming (dummy: yes = 1, no = 0)	0.43	0.49	To be estimated
Independent variables			
Gender of the respondents (dummy: male = 1, female = 0)	0.64	0.48	+/-
Age of the respondents (years)	22.67	0.34	+
Educational level (years of schooling)	10.53	0.18	+/-
Family size (no.)	4.41	0.07	+/-
Marital status (dummy: married = 1, unmarried = 0)	0.73	0.49	+/-
Farm size (decimal) <sup>4</sup>	267.00	15.34	+/-
Access to land (dummy: yes = 1, no = 0)	0.40	0.49	+
Farming experience (years)	3.44	0.30	+
Parents' involvement in agriculture (dummy: yes = 1, no = 0)	0.76	0.43	+
Agricultural training (dummy: yes = 1, no = 0)	0.32	0.47	+
Family income (thousand taka/year)	98.24	27.58	-
Family expenditure (thousand taka/year)	87.49	21.22	+
Plan to migrate (dummy: yes = 1, no = 0)	0.41	0.03	-
Access to internet (dummy: yes = 1, no = 0)	0.50	0.50	+
Access to credit (dummy: yes = 1, no = 0)	0.13	0.02	+

The descriptive statistics of the variables used in model estimation are presented in Table 1 along with their probable effect on the outcome variable. The survey result shows that about 43% of the sampled youth participated in polder agriculture. Most of the youth were males (64%) and unmarried (73%), with a mean age of approximately 23 years and having almost 11 years of schooling, which represents the higher secondary level of education. Given the estimated age of the sampled youth, they had a bit more than 3 years of farming experience. Despite 76% of the youths' parents being involved in an agricultural occupation, only 32% of the youth received either agricultural or youth development training to apply in their farming practices. The average family income is more than the family expenditure of the sampled participants. About 41% of the youth were motivated to migrate to towns and cities to find a decent standard of living. Only half of the youth were using the internet and communication services. About 13% of them reported the availability of and accessi-

bility to credit facilities irrespective of their choice to engage and invest in polder farming. Therefore, such a narrow connection is expected to have an ambiguous influence on their decision to participate in polder farming in the study areas.

## 4.2. Empirical Findings

Table 2 presents the estimated logit model outcomes, which show that eight of the 15 predictor variables substantially influenced the decision of youths to participate in agriculture. Youth choice to be involved in agriculture was positively impacted by factors including gender, farming experience, agricultural and youth development training, family expenditure, and access to credit; on the other hand, factors like age, education, and migration plan had an adverse effect.

When it comes to youth engagement, males are more likely than females to pursue agriculture, as indicated by the positive gender coefficient sign ( $p < 0.1$ ). This could be the case due to



the labor-intensive nature of farming, which suits men more than women in the current sociocultural environment.

The negative coefficient sign of age ( $p < 0.1$ ) indicates that youths' willingness to participate in agriculture declines with age, which goes against the hypothesis expressed in section 3. Such an outcome is conceivable in an environment where young people are more likely to focus their energies on other sources of revenue generation than agriculture, which can guarantee larger returns. On the other hand, when young people get older, they might choose to work in a setting that guarantees greater comfort and needs less effort.

It has been revealed that youth participation in agriculture is adversely correlated with educational attainment. This is because educated young people would prefer to work in a respectable career that pays well than engage in risky and challenging agriculture.

Increasing work experience is likely to boost youths' participation in agricultural practices, according to the highly significant coefficient of farming experience ( $p < 0.01$ ), which supports the prediction regarding the variable's influence on youths' decision-making.

The very significant outcome of agricultural and youth development training ( $p < 0.01$ ) suggests that young people who receive such training are likely to choose to become farmers, which is consistent with the findings of research by [9, 28]. This is because prolonged exposure to these training facilities raises young people's farming knowledge. They can use newer information and technology more effectively, which finally results in increased agricultural profits. As a result, they might no longer view farming as a low-status occupation, which would encourage them to engage in agriculture.

Family expenditure is positively correlated with youth engagement in agriculture. This is because the family expenditure creates pressure to generate income on the family members. Therefore, like other family members, the youths of the family want to engage in farming activities to contribute in the family income.

Youths' plans for migration exhibited a strong negative reliance ( $p < 0.01$ ) on their choice of involvement in agriculture, as was previously anticipated in Section 3. According to [16], the youngsters' expectations of living a contemporary life and getting a monthly compensated job—which they view as a higher-standard career than agriculture—could be the apparent explanation for this finding.

Lastly, the calculated coefficient of access to credit is shown to be very significant ( $p < 0.01$ ), with a positive sign, indicating that the youths who had access to financial services were inclined to engage in agriculture. Furthermore, this finding suggests that young people may complete timely and required agricultural investment tasks with extended loan

facilities, which may have had a favorable impact on their decision to participate in agriculture. This finding contrasts with [9], who did not find this variable to be a significant predictor of youths' involvement choice and is in line with [28], who likewise reported a positive correlation between credit support and youths' engagement in agriculture.

All other factors were shown by the model to be negligible drivers of youths' choice to participate in agriculture, except the relevant ones. Family size, marital status, farm size, access to land, parents' involvement in agriculture, and availability of Internet and communication media are some of these variables. Consequently, policies should pay less attention to these factors to encourage young people to choose agriculture as their main source of income. Therefore, if proper steps are taken to change the levels of these factors, variables that have a favorable influence may improve their willingness in the future. As a result, it is strongly advised that no variable be given less weight as long as it has a favorable effect on the result.

The predictor variables' marginal effects at their mean values are also included in Table 2. These numbers represent the actual amount or pace at which probability changes as a result of a change in an event. The marginal effect is evaluated regarding both the sign and the magnitude that alter the likelihood of a specific event, whereas the logit model just considers the sign of the coefficients when interpreting the findings. They use different methods for interpreting continuous and binary data, though. For continuous variables, the marginal effect shows the rate at which the dependent variable changes instantaneously in response to a unit change in a certain independent variable [44, 45]. For instance, when it comes to age, it can be understood that for every year that youths get older, their chance of engaging in agriculture drops by 62% in the Polder areas of Bangladesh.

On the other hand, the marginal effect treats all other variables as constant and interprets the change in the dependent variable's probability as a result of a discrete change in a specific independent variable between values 0 and 1 [44, 45]. For instance, agricultural training may be understood as follows: the likelihood that youth would choose to work in agriculture will improve by 24 units if they obtain it (i.e., they move from category 0 to 1). This is because the youth who previously had no agricultural or youth development training will benefit from it. You may interpret all other continuous and discrete variables in the same way. It is observed that the variables that determine youths' choice to participate in agriculture are identified by the marginal impact, which has the same sign but different coefficient values, when compared to the typical predicted coefficients, only their magnitude differs.

**Table 2.** Results of logistic regression model.

Variables used in model estimation	Coefficient	Robust standard error	Marginal effect at mean	Delta method standard error
Gender of the respondents (dummy: male = 1, female = 0)	0.77*	0.45	0.18*	0.10
Age of the respondents (years)	-2.56*	1.48	-0.61*	0.35
Educational level (years of schooling)	-0.68**	0.29	-0.31**	0.13
Family size (number)	-0.05	0.75	-0.01	0.20
Marital status (dummy: married = 1, unmarried = 0)	-0.78	0.65	-0.21	0.19
Farm size (hectare)	0.02	0.10	-0.01	0.03
Access to land (dummy: yes = 1, no = 0)	0.52	0.36	0.13	0.09
Farming experience (years)	4.29***	0.76	1.04***	0.19
Parents' involvement in agriculture (dummy: yes = 1, no = 0)	0.52	0.48	0.12	0.11
Agricultural and youth development training (dummy: yes = 1, no = 0)	0.98***	0.40	0.24***	0.09
Family income (taka per year)	-0.69	0.52	-0.19	0.13
Family expenditure (taka per year)	0.44*	0.25	0.15*	0.08
Plan to migrate (dummy: yes = 1, no = 0)	-1.67***	0.42	0.37***	0.08
Availability of internet and communication media (dummy: yes = 1, no = 0)	0.49	0.48	0.12	0.11
Access to credit	1.74***	0.50	-0.40***	0.09
Constant	5.69	5.01		
No. of observations	270			
LR chi-square (13)	67.14***			
Pseudo R-square	0.71			
Goodness-of-fit test				
Pearson chi-square (256)	429.42***			
Hosmer-Lemeshow chi-square (8)	25.95***			
Likelihood-ratio test	0.04 (Prob > chi2 = 0.8480)			
Predicted probabilities	86.78%			

Note: \*\*\*Significant at 1%, \*\*Significant at 5%, \*Significant at 10%.

## 5. Discussions

The findings of the study reveal that young males are more likely to participate in agriculture than the female. Young females have limited decision-making skills, are viewed as socially fragile, and may face harassment if they labor outside. This finding is consistent with [46, 33], which found that men are superior to women in terms of decision-making and re-

source mobilization and women are less likely to participate in agriculture. Furthermore, most agricultural tools and equipment are designed for men's use, and agriculture is a labor-intensive area, making it challenging for women to be competent in on-farm tasks [47, 48].

The age of the youths is negatively correlated with their engagement in agriculture. Such an outcome is conceivable in an environment where young people are more likely to focus their energies on other sources of revenue generation than

agriculture, which can guarantee larger returns. On the other hand, when young people get older, they might choose to work in a setting that guarantees greater comfort and needs less effort. Akrong & Kotu [35] got the similar result in the case of Benin. However, it differs from the findings of the research by [33, 34], which found that age had a small but beneficial impact on youth engagement in agriculture.

The educated youths are less likely to participate in agriculture. This is because educated young people would prefer to work in a respectable career that pays well than engage in risky and challenging agriculture. Eissler and Brennan [49] also drew a similar conclusion in the case of Africa. Agwu et al. [50] discovered that youths with higher levels of schooling were less likely to work in agriculture. Begum et al. [51] argued that young people in rural areas had lower aspirations for their education and professions. However, [52] argued that youth's ambition in agriculture was impacted by schooling. Henning et al. [53] also arrived at an identical conclusion.

A young person with farming experience would be able to plan, invest, and run a farm with rationality. The results are consistent with [54, 55, 33], which is different from [3], who found no significant correlation between youth engagement in agriculture and farming experience.

The youths who received agricultural and youth development training are more likely to engage in agriculture. [56, 57] also found that trained youths are willing to invest in agriculture and agri-enterprises. Som et al. [58] suggested that subject-specific training helps to retain youths in agriculture.

Youths who belong to a family with high expenses are more likely to participate in agriculture. This is because rural youths want to contribute to the family income to meet expenditures. Agriculture is the common occupation in rural Bangladesh; hence family expenditure forces youths into agriculture. Wittman et al. [59] also drew similar conclusion.

Youths who plan to migrate are less likely to engage in agriculture. Chamberlin et al. [60] found that migration hurt agricultural development, whereas rural in-migration have a positive effect on agriculture. Dokubo et al. [61, 62] concluded that the scope of migration and migration decisions for better income-generating activities have a strong influence of not involving youths in agriculture.

Promoting access to agricultural finance would be effective for retaining and involving youths in agriculture. Njeru [63, 64] showed that access to finances attracted youths in agriculture and agricultural value chain development. Rutten & Fanou [65, 28, 66] also found that access to credit significantly influences youths to participate in agriculture.

## 6. Conclusions and Policy Recommendations

The involvement of rural youths in agriculture is critical to the sustainability of agriculture and the future of food security. Nonetheless, the discussion points above show that young

generations are less likely to be involved in farming since they encounter many obstacles while attempting to make a living in the agricultural industry. Thus, efforts must be made to identify tactical solutions that will motivate young people to engage in agriculture. The agricultural industry is fast modernizing, and with it comes farm mechanization and technological innovation. As a result, youth engagement is crucial, as they possess the ability to pick up on these changes quickly and capitalize on them. Agriculture is becoming a commercial industry with enormous potential; it is no longer a means of sustenance. Youth disengagement from agriculture is, however, due as much to cultural disregard for agriculture as a career as to ambitions of profit maximization from other occupations. Therefore, in order to give young people access to practical knowledge about agricultural practices that are most suited to a given region and geographical condition, it is necessary to change their attitudes toward agriculture through engaging agricultural education, extension services, training, workshops, and the introduction of new technologies.

Gender discrimination should also be eradicated to increase the acceptance of agriculture as a career among young people, both male and female. They should also be given access to sufficient credit with flexible terms and conditions to encourage them to start agricultural entrepreneurship in rural areas, which may further assist them in changing their minds about moving to the city, boosting their self-esteem, and feeling that they can make a living there. In addition, a strong societal acceptance of agriculture as a respectable career path can encourage young people to return to farming. Policy-makers have directed their attention toward Asian mega-deltas in recent years, to create adaptable, profitable, and comprehensive deltas that uphold socio-ecological intelligence, adapt to climatic and other stressors, and support human well-being by eliminating structural barriers to scaling transformative advancements and growing at the local, state, and federal levels.

The target group for sustaining the adoption of new technology to sustainable production and agricultural practices in Bangladesh will be rural youth since they are a factor of production. Our study's results should assist policymakers, development practitioners, youth leaders and associations, and producers' groups in coming up with a practical solution that would inspire young people in Bangladesh to view agriculture as a respectable, lucrative, and viable career path.

### *Scope of future research*

Despite earnest efforts to enrich the study, certain vital issues remained unexplored due to constraints in time and resources, presenting opportunities for future research endeavors. Firstly, future studies could encompass a broader geographical scope by considering districts across Bangladesh, facilitating a more comprehensive understanding of agricultural dynamics. Furthermore, another study could be conducted focusing on the challenges encountered by young farmers, along with other pertinent factors affecting youth participation in agribusiness, which merit attention for a more

holistic comprehension of the agricultural landscape. Additionally, a more exhaustive study incorporating all polders within the coastal zone could provide comprehensive insights into agricultural practices across these areas, thereby enhancing our understanding of agricultural activities in coastal regions. Exploring the role of technology and innovation in attracting youth to agriculture would be interesting. How the climate change and adaptation strategy would influence youth participation in agriculture is also a demand to assess. The effectiveness of government and different NGO programs in attracting youths to agriculture is also should be assessed.

## Abbreviations

IRRI	International Rice Research Institute
SDG	Sustainable Development Goal
GDP	Gross Domestic Product
FGD	Focus Group Discussion
STATA	South Texas Art Therapy Association
OLS	Ordinary Least Square
NGO	Non-Governmental Organization

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## Author Contributions

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## Declarations

## Ethical Approval

The researcher has followed the guidelines of the Declaration of IRRI and no human and animal participants have been involved in any clinical trials.

## Informed Consent

An informed oral consent has taken each of the respondents involved in this research.

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## Data Availability Statement

The datasets of this study are available from the first and corresponding author upon reasonable request.

## Conflicts of Interest

The authors declare no conflicts of interest.

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## Research Field

**Mohammad Ali:** Agricultural Economics, Agricultural Marketing, Impact Assessment, Product profile development, Field level experiment

**Sadika Haque:** Agricultural economics, Farm management, Gender analysis, Impact assessment, Farming system

**Manoranjan Kumar Mondal:** Water governance, Resource management, Agricultural engineering, Impact assessment, Crop management

**Fuad Hassan:** Agricultural economics, Agricultural statistics, Crop modeling, Impact assessment, Econometric analysis

**Tania Parvin:** Agricultural economics, Crop economy, impact assessment, farming system, climate change

**Humnath Bhandari:** Agricultural Economics, Agricultural Marketing, Impact assessment, Climate change, Water management

**Krishna Jagadish:** Plant breeding, Crop science, Environmental stress resilience breeding, Impact assessment, Crop physiology

**Ranjitha Puskur:** Gender analysis, Impact assessment, Polder agriculture, Women empowerment, Technology adoption

**Sudhir Yadav:** Crop management, Climate change, Water resource management, Impact assessment, Farming system

**Mohammad Chhiddikur Rahman:** Agricultural Economics, Agricultural Marketing, Impact Assessment, Climate change, Value chain analysis

1 Bangladesh has 19 coastal districts: Jessore, Narail, Gopalganj, Shariatpur, Chandpur, Satkhira, Khulna, Bagerhat, Pirozpur, Jhalakati, Barguna, Barisal, Patuakhali, Bhola, Lakshmipur, Noakhali, Feni, Chittagong, and Cox's Bazar [27].

2 The practice of building large embankments (known as dikes) within the perimeter of islands to form an artificial hydrology [14].

3 The logit regression model is not a unique analytical method. Therefore, the detailed process of deriving the final equation of this model is not specified here. For a comprehensive understanding of its econometric specification, please see [43].

4One decimal is equivalent to 0.00405 hectare.