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## RESEARCHARTICLE

# IMPORTANCE OF VEGETABLE FARMING IN THE REGION OF SMALLHOLDING AGRICULTURE: A STUDY IN MALDA DISTRICT OF WEST BENGAL

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**ABSTRACT**

The present study tries to assess the importance of vegetable farming in improving the economic and nutritional status of the farmers' family. For this, a primary survey has been conducted in Malda district of West Bengal in 2018. A total of 360 farmers (180 vegetable growers and 180 non-vegetable growers) were randomly selected from three different regions of the district and interviewed. Simple statistical techniques were used to analyze the data. Independent sample T-test has revealed the fact that the farmers who engaged in vegetable farming have a relatively higher daily intake of vegetables and better health status compared to that non-vegetable farmers group. The benefit-cost ratio (BCR) of selected vegetables and cereals crops proved the fact that vegetable farming gives higher economic return and employment opportunities. However, the post-harvest loss due to the poor storage facility and market infrastructure and price instability due to unregulated market policy at the ground level often ruins vegetable farmer. Hence, the study concludes that vegetable farming should be promoted as it has the potential to give both economic as well as nutritional security to the farmers but prior to that special attention should be paid to minimise the post-harvest losses.



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## INTRODUCTION

At present about 800 million people are suffering from hunger and one in eight people lives in extreme poverty worldwide. The major concentration of these hunger and poverty ridden people is found in the developing countries of sub-Saharan Africa and Asia. Out of the total (1.45 billion) multidimensional poor, 48 percent lives in South-Asian countries and 36 percent in Sub-Saharan Africa (Alkire and Robles 2017). Among the South-Asian countries, Afghanistan is the poorest MPI country followed by Pakistan and India. But in terms of absolute numbers India accounts both highest and staggering number of multidimensional poor people in the world. India alone homed to more than 528 million poor which is higher than all the poor people living in the countries of Sub-Saharan Africa combined. There are about 400 million hunger and malnourished people who are mostly live in the rural areas and they are dependent upon agriculture for their sustenance. Now the question arises why the world's poor and hungry people concentrated in these regions. This is simply because of their poor economic base.

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It is found that the countries with high poverty and hunger have agrarian economy andIndia is no exception to this.Here majority (about 2/3) of the people are dependent on agriculture for their livelihood. Their agriculture is predominantly traditional and subsistent in nature which is responsible for their all sorts of economic and social miseries. In these regions farmers uses their small patch of land intensively to produce food for their family consumption, while little remaining is sold for money. The uneconomic nature of their agricultural practices made them poorer and poorer day by day. The low farm-mechanization and the traditionalism of the farmer are the responsible factors that have shackled the pace of agricultural growth. But why, even in this era of science and technology, the agriculture sector in these countries lacks proper mechanization. The researcher have found that apart from the orthodoxy and economic inability of the farmers, the small and fragmented farm-holding is the most serious hurdle before agriculture modernization. Certainly, the consolidation of landholdings is suggested by many researchers as an antidote to the problem of small and fragmented landholding. But the adoption of land consolidation programme in different states of India during the late 70's has failed to achieve the set goal due to some socio-economic reasons. Farmers living in the rural areas often face severe food insecurity. Traditional agriculture practices on their small land provide employments only for 5 to 7 months, after which farmers need to migrate to

the citiesin search of employment as daily labourer. The population in these areas therefore is stricken with poverty malnutrition. This is why the migration for survival is quite high in these areas. The study reveals that over 60 percent of the small and marginal farmers left their home for nearby towns and cities to work there as migrant labour for 4 to 6 months.In a country of smallholders like India the promotion of 'high-value cropping' like vegetables could be a good option to fight poverty and malnutrition because vegetables are mostly rich in minerals and nutrient content and the farming of vegetables is economically more profitable. The empirical studies made by different scholar have established the fact that there is a positive relationship between vegetable consumption and good health. Yusuf and Islam (1994) in their study in Bangladesh revealed that increased consumption of vegetables increased vitamin A and resulted in lower incidences of blindness among children. Similar studies made by Bueno-de-Mesquita et al. 1991; Shibata et al. 1992, Hirayama 1995; Jedrychowshi et al. 1992, and Yu et al. 1995 have revealed that there is negative relationship between vegetable consumption and cancer in relatively affluent societies. It has also been seen that vegetable farming not only give higher income and nutrition security to the farmers' family but also creates employment opportunities for landless youths through inducing agri-business in the rural areas. In this backdrop, the present study tries to assess the importance of vegetable farming in improving economic and nutritional status of the farmers' family.

**Objective of the Study:** The present work aims to assess the importance of vegetable farming in improving economic conditions of the smallholding farmers. It also tried to weigh up the role of vegetables farming in improving the nutritional status of the farmers' family.

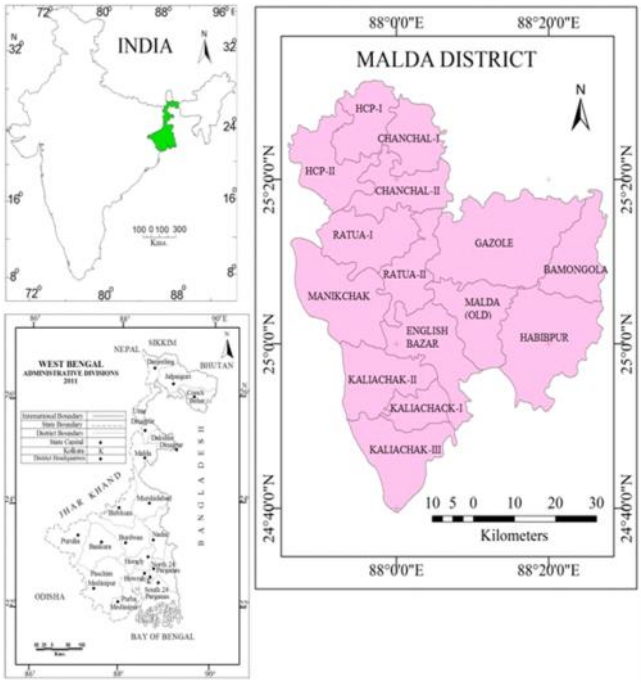
## MATERIALS AND METHODS

The present work is based on primary source of data. The relevant secondary information pertaining to vegetable dynamics and nutritional status have been collected from various government reports and websites. The primary data has been generated through a field survey which was conducted in Malda district of West Bengal in 2018. A total of 360 samples were drawn equally from three different geographical regions (The Barind, The Tal and The Diara) of the district. Out of 360 samples fifty percent were vegetable farmers and other half were non vegetable farmers. The simple random sampling technique was followed to select the sample farmers. A set of both open and close ended questions were framed to obtain the information pertaining to demographic and economic attributes, assets, food intake and nutritional status of the sampled farmers.

**Economic Impact Assessment:** In this paper economic importance of vegetable farming has been assessed through analyzing the benefit costs ratio, employment generation, net income per unit land of some selected vegetables and cereals which are popularly grown in the study area. 'Benefit-Cost ratio' (BCR) of individual crops has been calculated by dividing the gross returns by gross costs which includes variable costs and fixed cost. Variable cost includes land preparation, seedling/sapling costs, labour cost, irrigation charge, fertilizer and pesticides, harvesting and transport costs. While fixed cost includes land revenue and land rent.

**Nutritional Importance:** Vegetables are rich in vitamins, minerals and micro nutrients and have high medicinal importance. So the daily intake of vegetables can be a good indicator of nutritional status of any person. But it is very difficult to quantify the impact of vegetable farming in improving the nutritional status of vegetable growers. However, to assess the importance of vegetable farming in improving the nutritional status of farmers the frequency of vegetable servings per day of the vegetable farmer's family has been calculated and compared with that of non- vegetable farmers group. Independent T-Test has been applied to see whether there is any significant difference in daily frequency of vegetable serving between the groups. Besides, percent of household having at least one low BMI <18.5) member and percent of household experienced at least one incidence of child death in last five years among both the groups of farmers were calculated and compared. Asian cut off of BMI score has been used for categorization. Independent T-Test has been applied to see whether there is any significant difference in BMI value and frequency of child death between both the groups of farmers. Finally, a set of questions have been asked to know the perception of the farmer regarding impact of vegetable farming on their socio-economic status.

**Study Region**




**Location Map of Malda:** Malda district of West Bengal has been selected for the current study. The district is located between $24^0$40'20" N to $25^0$ 32' 08" N latitudes and $87^0$ 45' 50" E to $88^0$ 28' 10" E longitudes covering an area of 3733 sq km. It homed to 47.7 lakh population (Census, 2011) of which 2/3 are illiterate farmer and labourer (District Profile Malda 2018). The choice and selection of the study area are based on many considerations. Firstly, Malda is one of the socio-economically backward districts of West Bengal. Here agriculture is the main occupation for over 2/3 of the total population. Majority of the farmers are small and marginal category who predominantly practices subsistence form of agriculture. The district has huge unskilled labour forces who work as agriculture labourer for 3 to 4 months and rest of the months they migrate to the other states of India for work. Secondly, Malda is a featureless plain formed by the riverine deposition

of the mighty Ganga and its tributaries. The district is completely devoid of any significant mineral resources. Therefore, no such natural resource-based industries are developed. So, the only option left for the majority of the people for survival is to practice agriculture or to migrate to the cities. Thirdly, the weather condition and climate of Malda is favourable for agriculture. It experiences six different seasons in a year which enables different cropping and agriculture practices throughout the year.

## RESULTS AND DISCUSSION

**Sample Profile – Socio-Economic Status:** Table-1 shows age, sex caste categories, educational levels and family size of the respondent farmers. The mean age of vegetable growers is 43.4 years which is a lower than that of non-vegetable farmers (45.2 years). The involvement of women is higher in vegetable farmers group in comparison to non-vegetable farmers group. About one fifth (1/5) of the total vegetable farmers were female while women representation in non-vegetable farm is 3.67 percent only. The caste-wise distribution of respondents shows that the representation of lower caste Hindu is high in vegetable farming while general caste and other backward class (OBC) are dominant in non-vegetable farming activities. It is also evident from the table-1 that the vegetable farmers on an average have a higher mean year of schooling in comparison to non-vegetable farmers group. But still, 2/5 of the total farmers of both the groups are illiterate. The average family size of vegetable farmers group is relatively smaller (5.25 person) in comparison to non-vegetable farmers group (6.20 person). Non-vegetable farmers are mostly live in joint family system and all the agriculture lands are owned by the head of the family.

**Landholding Details:** Table-2 shows the size class wise distribution of respondents. As per the classification system of agriculture census of India, 2010-11, almost cent percent vegetable farmer comes under the small and marginal category. From the table-2 it is clear that vegetable farmers are predominantly small and marginal category and their average size of landholding is smaller than that of non-vegetable farmers. The average size of landholding of vegetable farmers and the non-vegetable farmers were 0.68 hectares and 1.04 hectares respectively. About half of the vegetable farmers have a landholding of less than o.5 hectare and only five percent have landholdings of over 2 hectares.

### Economic Importance of Vegetable Farming

**Income:** Table-3 shows overall as well as size class wise average annual income of vegetable farmers and non-vegetable farmers. The result shows that average annual income of vegetable farmers' group is higher than that of the non-vegetable farmers' group. Although the mean annual income of vegetable farmers' group is higher than the non vegetable farmers' group the class size wise comparison shows the different picture. For the marginal, small and medium landholders vegetable farmers have higher income than the non-vegetable farmers group. But for large landholders it the non-vegetable farmers who have a higher income compared to that of vegetable farmer's group. This is because the landholding size of vegetable farmers is much smaller in comparison to that of the non-vegetable farmers' group.

**Employment:** Questions have been asked about the work availability and employment status of the respondent in the last 12 months. The result shows that overall vegetable farmers have higher work availability in comparison to that of the non-vegetable farmers. Over 2/3 of the vegetable farmers have remain employed for over 200 days in a year while only 1/3 of the non-vegetable farmers remain employed for 200 days or more. Vegetable farmers recorded higher work availability because they practice multi-cropping in a year while non-vegetable farmers mostly practices mono-cropping or two cropping. Among vegetable farmers group marginal and small farmers have reported higher working availability in comparison to the medium and large farmer.

The reason behind higher work availability of marginal and small vegetable farmers is because they practice multiple cropping throughout the. Most of the smallholder vegetable farmers sell their produce at the nearby market directly to the consumer. While large farmers mostly perform specialized form of agriculture and usually cultivate two or three crops in a year and left their land uncultivated for two to three months in a year. About four to six months in a year non-vegetable farmers remain unemployed and during that off-season farmers had to migrate to cities to work as daily wager for the survival. The higher rate of seasonal migration among the non-vegetable farmers' group is the clear indication of that. It is found that about 1/3 of the total non-vegetable farmers move to the cities to work as a labourer while for vegetable farmers this rate is just 1/10. The engagement of women and family labour is also very high among the vegetable farming group. This is simply because vegetable farming requires more human labour in comparison to cereal crops.

**Benefit-Costs Ratio:** The benefit-cost ratio of vegetables and other top grown cereal crops clearly reveals the fact that vegetable farming is much more economically beneficial for the farmer, especially small and marginal ones. The BCR of top four vegetables (Brinjal, Tomato, Cauliflower, and Potato) and two major cereal crops (rice and wheat) were calculated based on the information gathered from the respondents. The BCR or the input-output ratio is calculated by dividing gross return by gross costs. A gross cost includes land preparation, seed/ seedling, irrigation, fertilizer and pesticides, weeding, labour cost, harvesting and transportation costs. The result shows that vegetable farming has high economic return per unit area and requires high manual labours from seedling to harvesting. Among four vegetable (potato, tomato, brinjal, and cauliflower) and two cereals (rice and wheat), tomato has the highest benefit costs ratio 2.6 followed by brinjal 2.56, cauliflower 2.21, potato 2.12, wheat 1.71, and rice 1.67.

Moreover, vegetables are mostly quick-matured and have higher yield in comparison to cereal crops. The maturity time period of vegetables ranges from 60 to 120 days. While for cereals it varies from 120 days to 140 days. This has enabled the farmers to practice multiple cropping instead of mono-cropping of two cropping system. From this, it can be assumed that the farmers who engaged in vegetable farming must have higher income compared to that of non-vegetable farmers. Therefore, the annual average income of vegetable farmers and non-vegetable farmers were estimated based on the information gathered from the respondents.

**Improving Nutrition and Health Status:** Vegetable farming is considered one of the major sources of nutrition security because vegetables are mostly rich in vitamins, minerals, and micronutrients.

**Table 1. Socio-Demographic Variables of Respondents**

| Variable | Description | Vegetable Farmer (N=180) | Non-Vegetable Farmers (N=180) |
|---|---|---|---|
| Mean Age | | 43.4 Years | 47.2 Years |
| Gender | Male | 143 (79.4) | 174 (96.7) |
| | Female | 37 (20.6) | 6 (3.3) |
| Caste | General | 63 (35) | 49 (27.2) |
| | ST/SC | 75 (60) | 60 (33.3) |
| | OBC | 42 (23.3) | 71 (39.4) |
| Educational Qualification | No formal Education | 72 (40) | 77 (42.8) |
| | Primary School Education (1-8 | 83 (46.1) | 72 (40) |
| | Secondary School Education (9-12) | 18 (10) | 26 (14.4) |
| | College and Above(>12) | 7 (3.9) | 5 (2.8) |
| Family Size (Persons) | ≤4 Person | 21 (11.7) | 19 (10.6) |
| | 5-6 Person | 98 (54.4) | 84 (46.7) |
| | 7-8 Persons | 43 (23.9) | 48 (26.7) |
| | >8 Person | 18 (10) | 29 (16.1) |
| Size of Landholding | < 0.5 ha | 86 (47.8) | 37 (20.6) |
| | 0.5-1.0 | 54 (30) | 64 (35.6) |
| | 1 to 2 | 31 (17.2) | 52 28.9) |
| | >2 | 9 (5) | 27 (15) |

Source: Field Survey, 2018Note: * within parenthesis shows % to total

**Table 2. Landholding Size/Class wise Distribution of Respondents**

| Landholding size (hectare) | Frequency (N) | Percentage | Mean | Frequency (N) | Percentage | Mean |
|---|---|---|---|---|---|---|
| < 0.5 | 86 | 47.78 | 0.34 | 37 | 20.56 | 0.39 |
| 0.5-1.0 | 54 | 30.00 | 0.68 | 64 | 35.56 | 0.71 |
| 1 to 2 | 31 | 17.22 | 1.19 | 52 | 28.89 | 1.20 |
| >2 | 9 | 5.00 | 2.24 | 27 | 15.00 | 2.92 |
| All Size Class | 180 | 100.00 | 0.68 | 180 | 100.00 | 1.04 |

Source: Field Survey, 2018

**Table 3. Estimated annual Income by Farmer Groups**

| Size-Class/ Farmer Groups | Income in Rupee | |
|---|---|---|
| | Vegetable Farmers | Non Vegetable Farmers |
| Marginal (<0.5ha) | 67650 | 36560 |
| Small (0.5-1.0 ha) | 74800 | 47500 |
| Medium 1 – 2 ha | 124050 | 11900 |
| Large>2 ha | 196300 | 206500 |
| All Size Class | 108979 | 64866 |

Source: Field Survey, 2018

**Table 4. Work Availability of Vegetable and Non-Vegetable Farmers Group**

| Farmer Size/Class | Vegetable Farmers' Group (% of Respondents) | | | Non Vegetable Farmers' Group (% of Respondents) | | |
|---|---|---|---|---|---|---|
| | <100 days | 100-200 days | >200 days | <100 days | 100-200 days | >200 days |
| Marginal | 0 | 28 % | 72% | 15% | 64% | 21% |
| Small | 0 | 37% | 63% | 09% | 63% | 28% |
| Medium | 0 | 31% | 69% | 2% | 61% | 37% |
| Large | 0 | 35% | 65% | 0% | 56% | 44% |
| All Class | 0 | 32.75% | 67.25% | 6.5% | 61% | 32.5% |

Source: Field Survey, 2018

**Table 5. Differences in daily intake of vegetables between vegetable and non-vegetable farmer Groups**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | F | Sig. | T | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| No. of Serving per day | Equal variances assumed | 90.212 | .000 | 10.316 | 358 | .000 | .33472 | .03245 | .27091 | .39853 |
| | Equal variances not assumed | | | 10.316 | 263.546 | .000 | .33472 | .03245 | .27084 | .39861 |

**Table 6. Differences in Vegetable intake and Health outcomes of Sampled Households**

| Indicators | Vegetable Farmers (N=180) | Non-vegetable Farmers (N=180) | Difference (VF-NVF) |
|---|---|---|---|
| No of Vegetable Servings in a day | 2.0230 | 1.6650 | 0.358 |
| Percent of Family having at least one malnourished Child | 32.8 | 40.6 | -7.8 |
| Percent of Family having at least one under nourished Adult member (BMI<18.5) | 19.4 | 21.1 | -1.7 |
| Percent of Family reported at least one child death in last 5 years | 11.7 | 11.6 | -3.9 |

Source: Field Survey, 2018

**Table 7. Perception Survey**

| Questions | Percentage of Respondents Nodded Positive | |
|---|---|---|
| | Vegetable Farmers (n=180) | Non Vegetable Farmers (n=180) |
| Does your Annual Income have Increased? | 81.67 | 47.22 |
| Does Employment status has improved? | 85.00 | 20.0 |
| Do you think input-output ratio is satisfactory? | 57 | 32 |
| Does Women of your family participate in the farming activity | 78 | 46 |
| Does your overall socio-economic condition have improved? | 82.5 | 63.67 |
| Are you satisfied with your present economic activity | 53 | 32 |

Source: Field Survey, 2018

Therefore, the national institute of nutrition (Hyderabad) recommends a eating of 300gms of vegetables a day to maintain a balanced diet. Here the question is whether there is any impact of vegetable farming in the nutritional status of the family who are engaged in vegetable farming or not. Vegetable intake being a good indicator of nutritional status can be a good measure of the nutritional status of a family. Therefore, the average daily serving of vegetable of the vegetable farmers' group and non-vegetable farmers' group has been estimated based on the information of their last seven days intake. Independent Sample T-Test has been run in SPSS version 20.1 to see whether there is any significant mean difference in the daily serving of vegetable between the groups. The 'test' revealed that there is a significant difference in the daily number of servings of vegetables between those who grow vegetable and who don't, $t(358)= 10.316$, $p= <0.01$. It means that the farmers who grow vegetables have a higher daily vegetable intake in comparison to farmers who don't grow vegetables.Health status of both the group of farmers has been analyzed using two outcome indicators such as the nutritional status i.e. presence of any malnourished/undernourished member in the family and incidence of child death.

Family having a single malnourished child or an adult is considered as nutritionally deprived. Malnourished people are identified with the help of Body Mass Index for adult and weight for age in case of a child. A person having a BMI value of below 18.5 and above 24.5 is considered as malnourished. Similarly, a Family which has experienced any child death in the last five years is also categorized as a nutritionally deprived family. The result shows that overall 38 percent of the farmer households are nutritionally deprived. Percent of Nutritionally deprived (in terms of presence of any malnourished, stunted, or low weight for height children) household of vegetable farmers group is quite low (32.8%) in comparison to non-vegetable farmers group (41.1 %). Percentage of households having at least one malnourished adult member (BMI<18.5) for vegetable growers' group is 19.4 and for non-vegetable farmers 21.1. About 12 percent of households among the vegetable growers experienced child death in last five years while it is 11.6 percent for non-vegetable farmers' group.

Table-7 shows the perception and opinions of farmers regarding the benefits and impacts their respective farming practices. About 92 percent of the vegetable farmers have viewed that their income has increased while only 47.2 percent of the non-vegetable farmers nodded positively. Opinions regarding employment generation, improvement of overall socio-economic status and profitability of their farming practices vegetable growers nodded more positively in comparison to non-vegetable farmers. The women participation is also found in favour of vegetable farming in comparison to non-vegetable farming.

## Conclusion

The present work has revealed vegetable farming as a boon for the smallholder farmers of Malda and the districts alike as it provides higher income and employment opportunities (both on-farm and off-farm) throughout the year and also ensures the nutritional security of the farmer's family. Vegetables are important not only because of their higher economic return but also because of their quicker period of maturity. It is found that most of the vegetables are quick-matured in comparison to cereal crops which enabled the farmers to practice multiple cropping instead of earlier mono-cropping or two cropping system. Hence, vegetables can also be a good option to crop diversification which is a key to achieve food security, improved nutrition, and rural employment and ensures farmers not to suffer complete ruin if the weather behaves unpredictably.

Additionally, vegetable farming would induce agri-business in the rural areas and generates huge off-farm employment to the landless rural youths. But the only problem with vegetable farming is that as vegetables are highly perishable so it needs immediate marketing once harvested and if there is any delay in marketing those items then farmers had to face complete loss. Secondly, the prices of vegetable reduce drastically with an increase in supply. So the vegetable farmers had to face double problem. Therefore, to avoid the post-harvest loss and price instability efficient marketing system should be developed. Only then vegetable farming would enhance the economic efficiency and stimulate socio-economic development.

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