ISSN 2663-2659
Comilla University Journal of Social Sciences
Volume 1 Number 1 June 2018

Economic Condition of Farmers: *An Empirical Evidence from Bangladesh*

Rasheda Parvin*
Tanjima Rashid Siddiqua**

Abstract: *Bangladesh has gained "Middle Income country" status very recently but this status has made a demand to roll behind the economic status of farmers and to rationalize their under-developed condition with respect to their major economic sources. And the prime inquiry of this paper lies exactly here. Earlier scholarly works regarding these issues are mainly focused on market mechanism in agricultural sector or wage determination determinants but as whole the farmers' economic condition with respect to their income sources is missing till now and this research gap is the focus standpoint of this paper. To understand this a binary regression would be run where headcount poverty status is considered as binary variable where zero denotes living under the poverty status and one denotes crossing the poverty status. Poverty is a binary variable would be regressed toward the sources of income and they are the agricultural wage, non-agricultural wage, crop income, livestock and poultry and income from non-agricultural income. The regression coefficient would demonstrate as the level of influence determined by each dependent variable. The regression coefficient would demonstrate as the level of determination by each dependent variable. From this collected data set, poverty status is formulated by using headcount poverty method based on total income. And whose income is not enough to be equal to minimum income as not to be poor as assigned as zero and that denotes that households is poor. And alternative case is assigned by one that is assigned as not to be poor. The minimum total income is per capital income multiplied by average member which is 4.5 for a year in a household considering poverty definition of 2008.*

Introduction

Agriculture is often characterized by many environmental dimensions such water management, production capacity, chemical and insecticides. And these problems are very acute in rural areas may be affected our farmers income condition. Farmers' production performance not only depends on technical efficiency but also on the environmental situation. In this paper we have attempted to examine farmers'

* M. Sc. Student, Department of Economics, Jahangirnagar University, Savar, Dhaka.
** * M. Sc. Student, Department of Economics, Jahangirnagar University, Savar, Dhaka.

poverty status as we know it has negative impact on agricultural income in Bangladesh. Since the 1990s, infrastructure and financial institution affected the rural income and poverty. Some empirical measurements are not identified through poor farmers may be benefitted from agricultural income .Overall we have found some initiatives that have differentially affected farmers income. Policy interventions through income from farm or non-farm sector can be a better opportunities to reveal farmers poverty status. Agriculture is one of the important sector for the economy where farmers play a significant role in our country. But they live below the poverty line which is measured with doorstep level of expenditure or income. As poverty line which is measured with doorstep level of expenditure or income .Because of their poor income, they do not fulfill their basic needs (food and non-food) also do not maintain productive and healthy life. As a result their misery and starvation is well established for years. They depend on agriculture for their subsistence as a producer or rented. So it is not always mean that agricultural sector have a potential outcome on poverty and food security. Bangladesh is the most densely populated country in which farmers pass the worst situation till now. Government is trying effectively to reduce poverty. Food and nutrition are the basic needs for every human beings and it is still the main challenges of our government.

Literature review

The poor condition approximately in every aspect of lives of farmers in developing or the least developed countries is recognized in the research literature and acknowledged as well. But the determinants of poor condition of these farmers are too much uncertain to determine as well. And this uncertainty as well as the vulnerability is evident from the later discussion of research literature as well.

The poor condition of the farmers of Bangladesh can be reasoned by the productivity of the firms and that productivity can be also constrained by the firm size as well. In 2008-09, a study was conducted regarding firm size specific productivity with respect to technical efficiency as well. This paper finds some interesting evidence regarding this. By using estimation procedure, this paper comes to this concluding remarks that the marginal firms have already been experienced highest rate of return comparatively with the other. And this research finding ("A Stochastic Frontier Approach to Model Technical Efficiency of Rice Farmers in Bangladesh," n.d.) has already been created a contradictory point such that if they are paid the highest rate of return, the proposition of their poor condition is either false or should be attempted to be traced by another way or by alternative means as well.

If the rate of productivity is to the reason, we can latter trace another aspect and that is productivity efficiency as a whole. Discussion(Rahman, 2003) related production efficiency or inefficiency can be traced through the view point of both technical efficiency and allocative efficiency as well. Inferential analysis run on the data set of high yielding varieties of rice spread across twenty-one villages in three agro-

ecological regions of Bangladesh has showed that there does exist high levels of inefficiency in modern rice cultivation as well. For the combination of inefficiency reasoned through technical as well as production phenomenon, it is estimated that almost twenty-three percent of entire production has been lost roughly over the time frame. But this paper suggested how to fill up the intuitive gaps existing between them as well. And this has been filled by this manner that the firm size has nothing to trace the poor condition of the farmers but production loss due to inefficiency reasoned from technical as well as production phenomenon as well.

The above stated technological change by the means of efficiency or inefficiency discussion can be narrowed down to technological change on the aspect of green revolution type and wellbeing of small household's type. Data from two different regions(Mendola, 2007) of Bangladesh by using P-value non-pragmatic matching analysis as well. This analysis results by favoring the green revolution and suggests that it can be the pathway of poverty alleviation as well.

In rural areas of Bangladesh, there have been observed another fact as well. In rural areas, a shift for poverty alleviation has been observed in larger manner and this great shift has not been observed in larger scale as well. Nationally representative longitude survey(Nargis & Hossain, 2006) of rural households in Bangladesh conducted in three waves in 1988, 2000 and 2004. The shift that has been observed that can be traced within the framing of occupational shift. This scholarly works suggests that the entire change is not reasoned by farming activities. Rather it can be reasoned by the occupational shift that can be result of searching new dimension of work and its respective dimension as well.

The lack of research literature regarding this issues is not too much serious on context of other south Asian region and this is especially truer fact for India as well. Agricultural growth(Mahendra Dev, 2014), cultivation pattern, participation of small holding farms, linking small holders with market by the means of value chain system and related many more issues have been traced but the attempt of viewing the entire system as a determinant of poor situation is not present at all. And the gap of the absence of that research perspective is also true but in another dimension as well.

Technology can pave the way of poverty alleviation for rural people as the importance of the existence of such technology is vivid as well. Slopping land conversion program is an example of such thing as well. And this slopping growth program has two individual aspects. First aspect comes with the impact in the growth where the later one comes as labor transfer as well. Labor transfer can be determined as a function of local economic conditions, program range, political leadership and degree of impact on their respective salary range as well. A panel data(Yao, Guo, & Huo, 2010) analysis of 600 households over three different regions have showed that participation status. Local economic condition, program extent and political leadership pattern have significant effect for off-farm

employment as well as household income. On the context of china, this paper has made its attempt to go forward with respect to the introduction of new project that is named as slopping project as well.

Sometimes, new projects are introduced in order to alleviate poverty and sometimes it may come as a part of entire process as well. In 1990s, Chinese government (Liu, Lu, & Yin, 2010) has undertaken some projects aiming to ecological protection assisting with poverty alleviation project as well. And it is also known as priority forestry programs or PFPs as a whole. Different other minor scaled or sub projects were included under the broader title of priority forestry programs. On the context of such existing multi-dimensional programs, a question can be generalized as well and that generalized inquiry can be the effect of that bundle of programs for farmer's income and poverty alleviation. A fixed effect panel dataset of 1968 households covering almost four different regions has demonstrated that all other does not affect in homogenous order or in homogenous magnitude as well. Some have been observed to affect positively where some are seen to affect negatively as well. And that depends upon other heterogeneous factor as well.

Sometimes especially Marxian literature claims that farmers poor condition can be resolved if they are paid what they owe to and this proposition can be thought to be as a subset application of Marxian proposition of capital accumulation as well. And in this scenery, revisiting the contract existing on different phases of this sector can be a point of fact in this regard as well. A subjective wellbeing approach to evaluate the welfare impact of contract farming can be subjected to experiment for this approach. A panel data analysis(Dedehouanou, Swinnen, & Maertens, 2013) over household survey from different regions of Nigeria shows that there does exist divergent effect for such cases. And this paper ends with arguing that contract farming has possessed more positive outcome on subjective well-being.

But performance for different heterogeneous perspectives can be influenced by the gender condition. And this can be of three probable effects. These effects are positive effect, negative effect or neutral effect consecutively. Technology based solutions are being undertaken frequently but the adoption of these technological facts may not be similar always and this adoption behavior can be subjected to be analyzed in broader manner. Data collected on the usage of the new rice of Africa (A.R, F.M, & A., n.d.) has clearly showed evidence that women are more successful and more interested to adopt new technology in terms of using that kind of rise comparatively with men of homogenous groups.

Research literature discussed in this section is showing clear evidence that research regarding poor condition of farmers are mainly concerned with impact analysis of the programs undertaken and the susceptible reasoning of poverty with respect to their respective determinants. And this two broader category can be broadened to Gender, Contract, New project for poverty, Small Scale agriculture, Rural

household, Production efficiency, Slopping land technology, Farm Size and productivity, technological change, of the Green Revolution type, and wellbeing of smallholder farm.

But this all have a missing point and that missing point is not to trace farmers' poor condition through their source of income. If income generated from source of income is not regressed toward their poor condition, the poverty dynamics with respect to their earning vulnerability would not be understood at all. This existing gap in the midst of current research literature framing is the point of major inquiry for this paper.

Poverty status of farmer

In rural areas, poverty rate is higher comparing to assessment of urban-centric development project. Many farmer's economic status or poverty status has yet been improved and would be a sorrowful matter. In our analysis we have tried to see that poverty status is a function or can be determined by five determinants. These variables we would be seen that have significant role to effect the poverty status of farmers. Poverty status not only based on farmer's wages but also based upon their income level that's our main findings. In this paper we took 2010(Hossain, 2017) total observation, poor household frequency 1665 and non-poor household 345 where 82.84% poor and 17.16% non-poor. But as we know poverty line index $1,25("Poverty threshold," 2018) and average family member 4.5("Bangladesh Average Household Size," n.d.) then 1 year their total income is (365*1.25*4.5*68.578 = 140798.59) 140798.58 Taka. We have set that 1=non poor and zero= poor as whole when they live below this income level they are poor. And when they cross this line they are not remain in poor. And the valuation of Dollar("Bangladesh taka to US dollar exchange rate history (June 2008)," n.d.) is 68.578 Taka per dollar.

Sources of income

1. Agricultural wage: In Bangladesh agricultural wage (Emran, M. S., & Shilpi, F. 2016,). has increased by 3.8 percent and 2.1 percent per annually respectively 2000 to2010. In rural areas, marginal farmers disproportionately depend on agricultural wage. The determination of agricultural wage is often determining the living standard of the poor that reveals over time.
2. Crop income with average price: In most developing countries crop production takes place an important strategy economic status not only farmers but also economic transformation. In this case farmer's willingness to pay their crop income is one of the crop extension service related to agricultural extension services. Sometimes crop income has positive and significant impact on the agricultural extension services.

3. Livestock and poultry income: In recent years, livestock and poultry farm plays a significant role to generate income and diversity. Many educated young generations are most likely to engage this sector approximately more than 70%. Rural women are directly or indirectly involved in this sector but in his scenario now-a-days this scenario has changed.
4. Nonagricultural wage: nonagricultural sector mainly departs from formal sight of agricultural area. And mainly related with industry, transport, construction, cottage and domestic services. Over the past many year Bangladesh economy has undergone structural change through non agro sector. Besides industrial sector mass transit facilities, constructional facilities, cottage industries, domestic services become more effective. Nonagricultural sector has grown importance in rural areas that reflect livelihood and income level of rural people.
5. Income from non-farm sector: In Bangladesh, recent non-farm sector grows faster than the agricultural sector. In rural areas since the slothful activities of agricultural sector in the development of the economy. Non-farm sector becomes a major component to generate demand for non-farms goods and service.

Mathematical modeling

As our goals to examine the poverty status of farmers. So for this regarding we have classified followings mathematical model and econometric model in order to assess the impact of poverty status on farmer's income with some variables. Mathematical model is stated as follows:

Poverty status: (agricultural wage, crop income, livestock and poultry income, non-agri wage income, income from non-agricultural sector.)

Here, poverty status depends on agricultural wage, income from crop, livestock and poultry income, non agri wage income, income from non-agricultural sector which are knows to be an explanatory variable.

Econometric modeling and result interpretation

Poverty Status

$= \beta_0 + \beta_1$ (The agricultural wage) $+ \beta_2$ (crop income)
$+ \beta_3$ (livestock and poultry income) $+ \beta_4$ (Non-agri wage income)
$+ \beta_5$ (income from non-agriculture income) $+ \mu i$

and by running regression, we can find following table of coefficients:

Table 1: Regression coefficient table

Variables	Variable Full Name	(OLS) Poor or Not Poor	(Logit) Poor or not Poor	(Probit) Poor or not Poor
incnagwg	Income from non-agriculture Wage	3.93e-06***	2.13e-05***	1.31e-05***
incnag	Income from non-agricultural sector	(4.74e-07) 1.01e-07	(4.69e-06) 1.73e-05***	(2.80e-06) 1.06e-05***
inclsplt	Income from livestock and poultry	(2.08e-07) 4.12e-06***	(3.14e-06) 1.60e-05**	(1.88e-06) 9.96e-06**
incagwg	Income from agricultural wage	(1.01e-06) -4.13e-07	(7.79e-06) 1.02e-05**	(4.69e-06) 6.26e-06**
inchh	Income with average crop price	(7.17e-07) 1.05e-06***	(4.30e-06) 1.99e-05***	(2.61e-06) 1.22e-05***
Constant		(1.71e-07) 0.493*** (0.0151)	(2.31e-06) -1.484*** (0.121)	(1.37e-06) -0.904*** (0.0720)
Observations R-squared		2,009 0.133	2,009	2,009

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Before going to interpreting this regression table, we need to consider whether the adopted intrinsic assumptions associated with this and these assumptions are as follow:

1. For binary logistics regression model or binary regression model, the dependent variable is confined to take two outcomes and they are either zero or one. And in our model, dependent variable can be either not poor or poor where not poor is expressed as one or poor is expressed by one simultaneously. Thus this assumption is satisfied in this modelling.
2. Binary regression model assumes the observation as to be independent with respect to other independent variables consecutively. This assumption can be repeated in this manner that observations must not come with the repeated experiment. This assumption is also satisfied as every single observation by definition is representing particular individual household and there does exist no possibility of being repeated.

3. Logistic regression assumes to be little or no multicollinearity among the independent variables that denotes independent variables should not be highly correlated along with that. Checking Variance Inflation Factor would work to test the existence of multicollinearity. The table for multicollinearity is attributed as below:

Table 2: Variance Inflation Factor Table

Variable	Variable Full Name	VIF	1/VIF
inchh	Income from non-agriculture Wage	4.54	0.220505
incnag	Income from non-agricultural sector	4.51	0.221549
inclsplt	Income from livestock and poultry	1.16	0.863252
incagwg	Income from agricultural wage	1.06	0.947166
incnagwg	Income with average crop price	1.03	0.970182
Mean VIF		2.46	

Here mean of VIF is 2.46 and that is moderate. This moderate value denotes that this sort of problem is not serious and that can be ignored as it is not too much.

4. Binary regression model assumes linearity of independent variables and log odds ignoring the condition of dependent variable as it is confined either to be zero or one.

5. Binary logistic model needs to possess a large sample size and the larger sample size must lead to us for more accurate result as well. Our sample size is 2010 and it is enough to produce reportable research outcome as well.

So now we can explain the coefficients presented in table 1 as the entire regression procedure has satisfied the inherent assumptions discussed above as valid. But the coefficients here presented in scientific manner as they are too much small in other formats to present. But this being too much small is reasoned from the variation remaining in the observation as it is too tough to find a large dataset of homogenous character without this sort of variation. According to the characteristics of dataset, we have to ignore that as well.

The above mentioned table presented there shows the significant existence of constant coefficient. The econometric interpretation of such significant constant coefficient denotes that if these all five sources of income does not remain present, there would exist an autonomously generated income but this autonomously generated income does not mean that they would reject any single possibility of being determined through other exogenous variables.

Other five variables have showed that they are significant in order to determine poverty status. It has become a research norm for binary regression model to report OLS, Log it and Prob it simultaneously and that is what is reported in table 1 as well.

The determinants as a source of income is chosen here are consecutively income from non-agriculture wage, income from non-agriculture wage, income from livestock and poultry, income from agricultural wage and income from crop price. These five determinates have showed that they all are significant in order to the magnitude for determination of their poverty level as binary format. But of them all, only income from agricultural wage has negative affect from poverty status. And this negative effect could be interpreted further in this way that the possibility of rising their economic condition in the form of graduating from poor to not poor has ended and it would guide us in alternative way. This is not the all and it can be reasoned to the consumption pattern and the expectation associated with that. Later other four major sources of income have been observed to affect the whole scenario in more effective order as well as they are showing positive attitude in at least 95 percent confidence interval on average.

Policy suggestion and concluding remarks

It is imperative for any country to take steps in such pattern that would ensure the economic well being of its people at least in the terms of poverty reduction if the poverty alleviation is not the feasible case at all. This study has already showed some important evidence in this regard and this evidence has been generated from tracing their source of income as determents of their poverty.

Different kinds of steps can be taken in order to make them graduate from poor to not poor status and they should be in such a way that can trigger to improve monetary payment in these four sectors. Any poverty reduction program that aims to raise increase payment in these source of income could be expected to work more efficiently to graduate the respective farmers from poor to not poor status at least. And exactly here the concluding remark lies as well.

Bibliography

A Stochastic Frontier Approach to Model Technical Efficiency of Rice Farmers in Bangladesh: An Empirical Analysis | The Agriculturists. (n.d.). Retrieved from https://www.banglajol.info/index.php/AGRIC/article/view/13132

A.R, A.-N., F.M, K.-M., & A., D. (n.d.). Gendered impact of NERICA Adoption on Farmers' Production and Income in Central Benin. In AAAE Conference Proceedings (p. 190). Ghana.

Bangladesh Average Household Size. (n.d.). Retrieved December 29, 2018, from https://www.arcgis.com/home/item.html?id=692cee7e5a5e47dd86531ab0c6a00cff

Bangladesh taka to US dollar exchange rate history (June 2008). (n.d.). Retrieved December 27, 2018, from https://www.calcprofi.com/exchange-rate-history-bangladesh-taka-to-us-dollar.html?date=2008-06

Dedehouanou, S. F. A., Swinnen, J., & Maertens, M. (2013). Does Contracting Make Farmers Happy? Evidence from Senegal. Review of Income and Wealth, 59(S1), S138–S160. https://doi.org/10.1111/roiw.12041

Hossain, M. (2017). Livelihood Systems in Bangladesh (2008) [Data set]. https://doi.org/10.7910/DVN/26207

Liu, C., Lu, J., & Yin, R. (2010). An Estimation of the Effects of China's Priority Forestry Programs on Farmers' Income. Environmental Management, 45(3), 526–540. https://doi.org/10.1007/s00267-010-9433-2

Mahendra Dev, S. (2014). Small farmers in India: Challenges and opportunities (Working Paper). Retrieved from http://oii.igidr.ac.in:8080/xmlui/handle/2275/262

Mendola, M. (2007). Agricultural technology adoption and poverty reduction: A propensity-score matching analysis for rural Bangladesh. Food Policy, 32(3), 372–393. https://doi.org/10.1016/j.foodpol.2006.07.003

Nargis, N., & Hossain, M. (2006). Income dynamics and pathways out of rural poverty in Bangladesh, 1988–2004. Agricultural Economics, 35(s3), 425–435. https://doi.org/10.1111/j.1574-0862.2006.00188.x

Poverty threshold. (2018). In Wikipedia. Retrieved from https://en.wikipedia.org/w/index.php?title=Poverty_threshold&oldid=875093034

Rahman, S. (2003). Profit efficiency among Bangladeshi rice farmers. Food Policy, 28(5), 487–503. https://doi.org/10.1016/j.foodpol.2003.10.001

Yao, S., Guo, Y., & Huo, X. (2010). An Empirical Analysis of the Effects of China's Land Conversion Program on Farmers' Income Growth and Labor Transfer. Environmental Management, 45(3), 502–512. https://doi.org/10.1007/s00267-009-9376-7

yaseen, M. R., Dronne, yves, & Ahmad, I. (2011). Estimates Supply Response of Major Crops in Bangladesh. The Bangladesh Development Studies, 34(4), 55–64.