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Aims and Scope

Asia-Pacific Journal of Rural Development is a peer-reviewed journal that provides a platform for publication of articles in all areas of rural development. The aim of this journal is to provide a platform for policy makers and academicians to promote, share and discuss various new issues and developments in different areas of rural development. The journal publishes conceptual, empirical and review papers in the form of research articles, reports of ongoing research, analyses of current and topical practice, policy issues relating to rural development field notes and book reviews. The journal is peer-reviewed and adheres to a rigorous double-blind reviewing policy in which the identity of both the reviewer and author are always concealed from both parties.

Subject areas include any thematic areas related to sustainable integrated rural development aligned with Sustainable Development Goals (SDGs). The thematic areas are including but not limited to the following:

- Sustainable use of natural resources
- Management of rural areas in transition
- Land and water resources management
- Agro processing and rural market
- Rural livelihoods and poverty reduction
- Education and skill development
- Entrepreneurship and financial inclusion
- Climate change
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- Health and hygiene
- ICT and geospatial technology for rural development
- Renewable energy for rural consumption
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Microcredit and Poverty Alleviation in Nigeria in COVID-19 Pandemic

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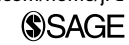

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Abstract

Microcredit is a financial service whose importance is often understated. When lack of access to microcredit is exacerbated by a public health emergency such as the COVID-19 pandemic, its real significance as an essential service in poverty alleviation becomes more apparent. The outbreak and spread of the novel coronavirus (COVID-19) has led to dramatic transformations of every sector of the Nigerian society including microcredit delivery system, where formal and informal actors co-exist often in an uneasy relationship. Unfortunately, strategies for inclusive microcredit delivery before and during the COVID-19 pandemic are lacking in Nigeria, fuelling the further exclusion of informal sector in microcredit governance and policy process in Nigeria. The paper reviews the state of the COVID-19 pandemic in Nigeria and identifies policy gaps in microcredit delivery and governance mechanism. The study also highlights the linkages between COVID-19 and microcredit in poverty alleviation with a view to catalysing increased and inclusive access to microcredit and sustainability policy in Nigeria. It is argued that acknowledging the role of microcredit in informal economy and poverty alleviation is the critical first step towards framing a sustainable microcredit policy in which primary stakeholders are involved.

Keywords

Impact, poverty alleviation, microcredit, COVID-19

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Introduction

The coronavirus pandemic that broke out in the city of Wuhan, China, on December 2019 and later spread to other parts of the world from early February, 2020 has expectedly worsened the fate of the poor in developing countries like Nigeria. The macroeconomic outlook for Nigeria and indeed the whole world has worsened since the outbreak of the pandemic (World Bank, 2020). The coronavirus pandemic affects the world in a way that has not been seen since World War II (International Monetary Fund [IMF], 2020). The pandemic has led to loss of lives, and death tolls around the world are, in many cases, unacceptably high (WHO, 2020). International trade has been disrupted as countries have shut their borders, and movement of people has been restricted in a bid to mitigate the spread of the virus across borders. International travels have been suspended with all planes grounded and cars parked. Schools have also been closed,as well as factories and workplaces (Wyplosz, 2020). Some employees are working from home, and the level of unemployment has increased tremendously all over the world even for developed economies (IMF, 2020). For a country like Nigeria, the picture is gloomier for obvious reasons.

Even before the pandemic, Nigeria was already battling the impact of poverty and was home to the highest number of poor people in the world (World Economic Forum [WEF], 2019). The pandemic has complicated the poverty situation in Africa and Nigeria, in particular, because of the multifaceted attack of the pandemic on the livelihood on the masses. This was affirmed by the African Union Ministers of Agriculture (African Union, 2020), when they remarked that:

> the COVID-19 pandemic poses significant challenges to the already strained health, food and nutrition security and broad socio-economic conditions in Africa. …With the spread of the virus in the continent, containment measures, including social distancing and lockdowns, closing of schools, the prohibition of public gatherings and the closure of non-essential businesses and economic activities, will have far-reaching consequences. (p. 1)

The immediate consequence of the pandemic in Nigeria is worsening the poverty situation especially food shortage and malnutrition. Early in the year, the Government of Nigeria had placed poverty alleviation in the front burner in the 2020 budget proposal (Budget Office of the Federation [FGN], 2020). This was the fifth year in succession that the federal government of Nigeria (FGN) has placed poverty alleviation in the front burner of fiscal discourse and the president has pledged a substantial part of the national budget on poverty alleviation in line with Goals No. 1 and 2 of the Sustainable Development Goals of the United Nations (UN, 2015).

It is estimated that 92.5 million of the country's population are poor, and half of this number lives in absolute poverty (WEF, 2019). Poverty is particularly severe in the rural areas, where up to 80% of the population there lives below the poverty line and have limited access to social services, infrastructures and credit (IMF, 2019). Women are particularly vulnerable to the scorch of poverty especially in developing countries like Nigeria (Bourguignon & Christian, 2002). The males

in rural Nigeria have comparatively higher social status and as a result have more access to formal educational training and credit. Again, the men have higher capacity for higher productivity and can usually combine a number of enterprises, which allows them to have multiple sources of income (Deaton, 2015).

It has been shown that part of the experience in poverty alleviation efforts in Nigeria is that such efforts 'almost always flounder due to scarcity of and restrictive access to loanable funds' (Ijere, 1992, p. 32). The role of financial capital as a factor of production to induce economic growth and development and the need to channel credit to rural areas for economic empowerment of the rural populace can hardly be over-stressed. This was affirmed by Soludu (2015) where he remarked that 'robust economic growth cannot be achieved in Nigeria without putting in place well-focused programme to reduce poverty through empowering the population at the rural areas by increasing their access to factors of production especially microcredit' (p. 5). According to the Central Bank of Nigeria [CBN] (2006),

> the latent capacity of the populace in the rural areas for entrepreneurship would be significantly enhanced through the provision of credit especially microcredit and microfinancial services to enable them engage in economic activities and be more self-reliant, increase employment opportunities, enhance household income and create wealth. (p. 10)

These were the reasons canvassed by the apex regulator for the re-christening and re-tooling of the erstwhile community banks to microfinance banks to enable them deliver more efficiently and effectively the services of providing microcredit and microfinance to the segments of the society who are ordinarily overlooked and under-served by the conventional banks (CBN, 2006).

The COVID-19 pandemic, like other pandemics in the past, do not only produce health shocks, but they also transmit economic shocks (Jackson et al., 2020). For instance, the IMF (2020) projects that every 10% decline in oil prices will, on the average, lower growth in oil-exporting countries by 0.6% and increase overall deficits by 0.8% of gross domestic product. For Nigeria, which is just recovering from a recession in 2016, the coronavirus pandemic effect on oil prices (the main source of revenue to the government) and lockdown on economic activities may completely wipe out the gains the country has recorded since coming out of recession in 2018. This will have impacts on the livelihood of households as well as performance of firms in Nigeria. For instance, as firm productivity dwindled due to lockdowns and closures, it feeds directly into the income and poverty level of households. To smoothen consumption, households will need a greater access to credit and this is where microfinance and microcredit will be crucial (Department for International Development, 2020; Civil Society Organization, 2020). As remarked by Gasper and Mauro (2020), there is still a blind spot in our understanding on the full impact of COVID-19 on household incomes and poverty level and the nature and quantum of support that might be needed to enable vulnerable households stay afloat.

Although there have been rapid studies on the effect of COVID-19 pandemic on households' income and poverty level in advanced and emerging economies, there is still a dearth of similar studies in Nigeria. Unarguably, there may be

on-going studies in this direction in Nigeria but currently, there is an empirical gap that provides a justification for this study to examine whether households in Nigeria are accessing credit at this time of pandemic when they needed it more than ever before. To bridge that empirical gap, this study was undertaken.

The study is divided into six sections. Section 2 is a brief review of the linkage between microcredit and poverty alleviation in Nigeria. Section 3 deals with the methodology of the study, while data for the study were presented and discussed in Section 4. In Section 5, we discuss the findings and Section 6 concludes the study with policy recommendation.

Review of Microfinance in Nigeria

Microfinance and Poverty Alleviation

Microfinance connotes provision of financial services to the poor and people at the lower strata of the society who are traditionally not served by the conventional financial institutions especially the commercial banks. Microfinance institutions are defined as institutions whose major business is the provision of microfinance services (CBN, 2006). Microfinance institutions were established to enhance the flow of financial services to the millions of the country's populations in rural areas and the urban poor who are traditionally overlooked and underserved by conventional banks. In the past, the FGN had initiated a series of publicly funded micro/rural credit programmes targeted at the poor. Some of such notable programmes include: the Rural Banking Programme in 1977, the Sectoral Allocation of Credits with concessionary interest rate in early 1980s and the Agricultural Credit Guarantee Scheme of the CBN. Other institutional arrangements were the establishment of the Nigerian Agricultural and Cooperative Bank Limited (NACB), the National Directorate of Employment, the Nigerian Agricultural Insurance Corporation, the Peoples Bank of Nigeria (PBN), the Community Banks and the Family Economic Advancement Programme (FEAP). All these initiatives and programmes achieved limited success in channelling credit to the rural populace to enhance their means of livelihood.

In 2000, the FGN merged the NACB with the PBN (and FEAP to form the Nigerian Agricultural Cooperative and Rural Development Bank Limited) to enhance the provision of finance to the agricultural sector. The federal government also created the National Poverty Eradication Programme with broad mandate of eradicating poverty through provision of credit and employment opportunities.

The interest in the provision of microcredit has burgeoned in the last three decades in Nigeria. In recent times, multilateral lending agencies, bilateral donor agencies, developing and developed countries and non-governmental organisations all support the development of microfinance services (Chen & Martin, 2009). In consequence, microfinance has grown rapidly during the last two decades from an initial low enthusiasm to occupying the front seat in development discourse on poverty reduction and poverty alleviation.

Rationale for Microfinance in Nigeria

In Nigeria, the formal financial institutions provide services to about 35% of the economically active population, while the remaining 65% are excluded from access to formal financial services (Enhancing Financial Innovation and Access [EFInA], 2018). This 65% of the population are often served by the informal financial sector, through microfinance institutions, moneylenders, friends, relatives and credit associations including age grade and town union associations. The traditional microfinance institutions provide access to credit for the rural and urban low-income earners. They are mainly of the informal groups like rotating credit schemes (CBN, 2002, 2006, 2011, 2020). Other providers of microfinance include savings collections and cooperative societies. The informal financial institutions generally have limited outreach due largely to scarcity of loanable funds.

The CBN (2006) articulated the rationale for the establishment of microfinance institutions in Nigeria. According to the apex body, providing efficient microfinance services for rural dwellers and urban poor is important for a variety of reasons. These mainly include:

a) Improved access to and efficient provisions of savings, credit and insurance facilities, in particular, can enable the poor to smoothens their consumption, manage their risks better, build assets gradually, develop microenterprises, enhance their income-earning capacity and enjoy an improved quality of life.
b) The improvement of resource allocation, promotion of markets and adoption of better technology to promote economic growth and development especially at the rural areas.
c) Permanent access to institutional microfinance by the poor households so that they can actively participate in and benefit from development opportunities.
d) Providing an effective way to assist and empower the poor women, who make up a significant proportion of the poor and suffer disproportionately from poverty.
e) Contributing to the development of the overall financial system through integration of financial markets.

For more detailed literature on microfinance and rationale of microfinance in Nigeria, see Nwosu et al. (2015).

Microfinance and Rural Development

The quest to develop the rural areas in Nigeria and alleviate poverty at that level has been the avowed commitment of successive governments in Nigeria (Anyanwu, 2004). It is contented that unless the rural areas are developed, the rural dwellers that constitute the major population of the poor will continue to drag back economic development in the country (Soludo, 2006). However, we need an inquest on the characteristics of the rural dwellers for any meaningful

policy approach Durrani et al. (2011). The World Bank defines a rural settlement as any settlement of less than 24,000 in population (World Bank, 2003). The World Bank expanded more on the features of rural communities to include those communities that lack in major infrastructural facilities, educational facilities, conservation in behaviour and access to financial services especially credit.

Okonny (2014) observed that the major difference between urban and rural communities including those located within major cities is the level of poverty. He noted that the rural people lack purchasing power enough to maintain a minimum standard of living. The rural people are known as the rural poor. An index of the poverty of this group is the low per capita outputs of agricultural produce like maize, cereals, plantains, melon seeds, fruits, vegetables, palm oil, groundnut oil and host of other Nigerian staple foods. A peasant farmer in the rural area hardly produces enough food to feed two families of about eight people (Adewunmi, 2016). According to Adewunmi (2016), the root cause of poverty in the rural areas can ultimately be linked to the low level of savings and investment in that part of the country.

It is the view of Okafor (1997) that rural development must be part of general economic development, which in itself is an increase in the material and non-material wellbeing of the people over time. The only difference between the two is the emphasis of the first on the rural sector. He argued that though agriculture is the predominant occupation in the rural areas, the rural problem is not limited to agriculture. Rural areas are inhabited by people engaged in agriculture and non-agricultural activities like services, commerce, mining and education. Indeed, a World Bank Survey in 2016 confirmed that approximately 72% of Nigerians live in the rural areas (World Bank, 2017). Since most Nigerians live directly or indirectly on the resources of the rural land, that is, rural areas, the rural economy forms the most important sector of the economy, and national economic development is dependent on them (Anyanwu, 2004). It suffices, therefore, to say that Nigeria's economic development efforts cannot achieve any appreciable goal until they focus on the rural areas (Chibuike, 1999).

Conceptualisation of the Shockfrom COVID-19

The study adopted the 'COVID-19 economic impact circular approach' by Baldwin and di Mauro (2020). This framework abstracts from the very nature of the modern economy. As Pierre-Olivier Gourinchas (cited in Baldwin & di Mauro, 2020) aptly observes: 'A modern economy is a complex web of interconnected parties: employees, firms, suppliers, consumers, banks and financial intermediaries. Everyone is someone else's employee, customer, lender, etc.'. If one of this buyer–seller links is ruptured by the disease or containment policies, the outcome will be a cascading chain of disruptions. The framework places analytical spotlight on the transmission channel of the pandemic within the macroeconomy. For instance, the COVID-19 pandemic affects economic agents and disrupts the local and global value chain. This has implication on the livelihoods of households and firms.

As firm productivity declines due to closures and lockdowns occasioned by the pandemic, it trickles down directly into the income and poverty level of households who are both the suppliers of capital, labour and consumers of goods and services produced by firms. As firms shut down due to the pandemic, they will not be able to generate income for households who supply the labour. Moreover, with the shutdown, there will be short supply of goods and services which households need to maintain their standard of living. This will affect both consumption and standard of living and increase the level of poverty for households especially for those who are unable to access credit from formal or informal sources. Poverty level is often measured using economic dimensions based on income and consumption.

Preliminary reports by the IMF (2020) and World Bank (2020) show that COVID-19 will affect household income and consumption and could worsen the poverty level in developing countries. However, access to microfinance could mitigate the impact of the pandemic on household income and consumption. Microfinance is a globally recognised poverty alleviation strategy. It is widely recognised that access to microfinance in developing countries empowers the poor (especially women) while supporting income-generating activities, encouraging the entrepreneurial spirit and reducing vulnerability. For instance, Khandker (2005) in a study using panel data from Bangladesh found that access to microfinance helped to alleviate poverty in rural communities in Bangladesh. Similar studies by Lashley (2004) in the Carribean, Akanji (2006) in Nigeria, Imai et al. (2010) in India, Nawaz (2010) in Bangladesh, Montgomery and Weiss (2011) in Pakistan and Okibo and Makanga (2014) in Kenya all came to the same conclusion that microfinance is a veritable tool to alleviate poverty by empowering the poor and supporting income-generating activities of households especially those in the rural areas.

Similar results were obtained in selected cross-country studies, namely Mwenda and Muuka (2004), World Bank (2007), Westover (2008), Durrani et al (2011), Das and Bhowal (2013) and Banerjee and Jackson (2017). These studies show unequivocally that microfinance had salutary effects on poverty reduction in the selected countries and communities covered by the studies. More recently, studies by Stephen (2020) found that access to microfinance has helped to mitigate the impact of the COVID-19 on the income and income-generating activities of households in low-income countries in Asia. Similar results were obtained by Nathan and Lise (2020) in Paraguay and Bernard (2020) in selected poor and rural communities in Sri Lanka. Unarguably, there is a broad consensus that access to microfinance could mitigate the economic shocks occasioned by the COVID-19 pandemic on households' income and means of livelihood.

Methodology

Area of Study

The area of study is Ido Local Area in Ibadan, the Oyo State capital. Oyo State is an inland state in South-Western Nigeria. It is bounded in the north by Kwara

State, in the east by Osun State, in the south by Ogun Stateand in the west partly by Ogun Stateand partly by the Republic of Benin.

Ibadan as a city was created in 1829 as a war camp for warriors coming from Oyo, Ife and Ijebu of South Western Nigeria. It was a forest site with several ranges of hills, varying in elevation from 160 to 275 m (Mabogunje, 1962). The economy of Ibadan rested largely on agriculture (yam, maize, vegetables, etc.), manufacture (mainly weapons, smithery, cloth and ceramics industries) and trade (palm oil, yam, kola for export, shea butter, salt, horses and weapons from outside).

For administrative convenience, the study was restricted to Ido Local Government Area. The area was purposely chosen because of the presence of rural and urban settlements within the community. Ido is one of the 33 Local Government Areas in Oyo State. Prominent communities in Ido Local Government Area are: Akufo, Apete, Ijokodo, Ologuneru, Oloje, Ido, Alako, Ilaju, Omi-Adio, Bako, Apata, Gbekuba, Morakinyo, Akinware and Idiiya. It has an area of 27 km^2 and a population of 156,988 according to the Oyo State Government in 2017. It also has bustling economic activities with the presence of the markets, banks, public institutions, schools and churches. By climatic conditions, Ido LGA enjoys tropical conditions, and rainfall is usually higher from April to July and September to October. Average temperature is 34°C but humidity can be as high as 90% (Mabogunje, 1962). Inhabitants of Ido Local Government Area are predominantly farmers, traders, artisans, factory workers and white-collar workers as a result of its proximity to Ibadan North and Ibadan North-West Local Government Area—the commercial hubs of Ibadan town.

Study Design and Sampling

The survey research design was adopted. Primary data were collected through structured questionnaires. The questionnaire was constructed from the World Bank 2017 Global Findex Questionnaire. The Findex Questionnaire is a standard questionnaire used to elicit information on a wide range of areas related to financial inclusion, access to credit, use of banking services and so on. The questionnaire was complemented by personal interviews. Specifically, questionnaires were administered to selected households within Ido Local Government Area, Ibadan, Oyo State, Nigeria within the period, March–April 2020. Officials of some microfinance institutions, cooperative societies and community leaders were interviewed.

The study adopted the multi-stage sampling technique to select the respondent households for the study because of the large size of the area. The first stage involves the random selection of 14 rural and semi-urban communities that make up the council. The second stage involves the random selection of 29 households per community, making a total of 400 households. The 400 households were administered with a structured questionnaire. Selected rural credit associations and well-known money lenders were interviewed to validate the responses from the questionnaires.

Administering the Questionnaire

The questionnaires were administered directly (face to face) to the respondents with the help of research assistants who are familiar with the area and the local language. The purpose of the study and items in the questionnaire were well explained to the respondents. Those who could write fill in the questionnaire themselves and others who could not write were assisted in doing so. The research assistants were given face masks and hand sanitizers and were assigned to communities that were contiguous to minimise long-distance travel because of the lockdown in Oyo State at the time of the research. All the questionnaires administered were completed and returned same day they were administered. It took the researcher and the research assistants 1 week to complete the administration.

Estimation Method

The combinations of statistical and econometric techniques were employed in analysing the data for the study. First, the socio-economic characteristics of the household respondents were descriptively analysed. Second, the technique of Foster et al. (1994) was employed to assess the poverty index, the incidence, depth and severity of poverty among respondent households. The FGT poverty measure is defined as

$$P_{\alpha} = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{Z - Y_i}{Z}\right)^{\alpha},$$

where α is a non-negative parameter (0, 1 or 2) reflecting social valuation of different degree of poverty. It takes on a value of 0 for poverty incidence, 1 for poverty depth and 2 for severity of poverty. Y_i is per capita expenditure (N/person/day), q is the number of households with per capita consumption below the United Nations defined US$2.00 per person per day which was equivalent to N720.00 per person per day (US$1 = N360) at the time of the survey. Z is the poverty line (N720.00 per person per day) and N is the number of households in the sample.

Third, we employ the Logit Regression Model to determine the influence of independent variables on the probability of being poor. The dependent variable is the poverty status that is represented with a binary dummy (0 and 1). The independent variables are age (years), age^2, gender (female = 1, male = 0), education (years), household system (number), dependency ratio, credit use (yes = 1, no = 0), credit volume (₦) and other jobs (₦).

Data and Discussion

In this section, we analyse descriptively key demographic characteristics of the respondents in the surveys that are relevant to the study. We then present and analyse the incidence, depth and severity of poverty in the area using econometric and inferential statistics.

Socio-Demographic Characteristics of the Respondents

Table 1 shows the key characteristics of the respondent households. From the table, the predominant household size is 4–6, which is approximately 58% of the total respondents. The implication is that large families still predominant in semi-urban and rural settlements such as the communities surveyed. Large families are also preferred among households that are engaged in farming. In terms of age

Table 1. Key Demographics of the Respondents

Characteristics	Frequency	Percentage
Household size		
1–3	38	9.87
4–6	224	58.18
Above 6	123	31.94
Age		
18–30	15	3.89
31–40	158	41.03
41–50	182	47.27
51–60	22	5.71
Above 60	8	2.07
Gender		
Male	215	55.84
Female	170	44.15
Marital status		
Single	95	24.67
Married	196	50.90
Divorced	28	7.27
Separated	34	8.83
Widowed	32	8.31
Educational attainment		
None	65	16.88
Adult literacy	75	19.48
Incomplete primary	50	12.98
Complete primary	62	16.10
Secondary	98	25.45
Tertiary	35	9.09
Religious affiliation		
Christianity	165	42.85
Muslim	167	43.37
Traditional	53	13.76

Source: Field Survey, 2020.

distribution, the result shows that majority of the respondents fall within the productive age bracket, that is 18–60 years. Those within the age bracket 41–50 (47%) led the pack, followed by those in the bracket 31–40 (41%). Those above 60 years of age came at the rear (2.07%). The implication is that majority of the respondents are in their productive years.

In terms of gender, the result in Table 1 shows that there was a fair spread in gender distribution of the respondents with a slightly higher number of males at approximately 56% of the total respondents. In terms of marital status, the result shows that majority of the respondents are married (50%). Those that are single constitute approximately 25% of the total respondents. Those that are divorced, separated and widowed constitute approximately 7%, 9% and 8%, respectively. In terms of educational attainments, the result in Table 1 is consistent with the level of development of the study area. Majority of the respondents had secondary school education, approximating 25% of the total distribution. There was also ample number of the respondents without any form of education. This group accounts for approximately 17% of the total distribution, while those with tertiary education constituted the least respondents in the distribution approximately 9% of the total respondents.

Finally, Table 1 shows equal distribution in the two major religions in Ibadan, namely, Christianity and Islamic religions, both of which accounted for 43%, respectively. There was also ample number of respondents who still practice the traditional religion (approximately 14%) of the total respondents.

Table 2 shows the total household income on monthly basis. The table shows that majority of the households falls within the income bracket N26,000–N60,000 (approximately US$158 at N380/US$1). The median income for households in the distribution is N80,000 (approximately US$210 at N380/US$1). Compared to average household size of 6, this comes to approximately N13,000 (US$34) monthly. The average income above the poverty level is US$2.00 daily or US$46 monthly on 23 working days. This means that majority of the household are earning income well below the poverty line. In other words, majority of the respondents are living in extreme poverty.

Table 3 shows that 71, or approximately 18%,of the respondents have no-farm income within the period of the survey. Apart from farming, trading is the next occupation that brings income to majority of the households in the distribution (approximately 32%). This is followed by other non-farm activities like hunting, fishing and wine tapping.

Table 2. Household Income Characteristics

Total Household Income (Monthly)	Frequency	Percentage
Less than N25,000 (<US$66)	35	9.09
N26,000–N60,000 (US$68–US$158)	134	34.80
N61,000–N100,000 (US$161–US$263)	120	31.16
Above N100,000 (>US$263)	96	24.93

Source: Field Survey, 2020.

Table 3. Non-Farm Income Characteristics

Non-Farm Income	Frequency	Percentage
None	71	18.44
Hunting/fishing/wine tapping	80	20.77
Trading	123	31.94
Others	111	28.83

Source: Field Survey, 2020.

Extent of Banking Depth, Use and Credit Availability

This section interrogates the respondents on the extent to which they use banking services.

Table 4 shows that 135 or 35% of the total respondents have an account at a bank or any other type of financial institution. The remaining 65% do not have any account relationship with any bank or other type of financial institution. This result is in line with the National Financial Inclusion Survey by EFInA (2018) which shows that about 65% of Nigerian adults have no bank account or any account relationship with a bank or any other type of financial institution.

Table 5 shows that out of the 135 respondents that have an account relationship with a bank, 82 or approximately 61% have an ATM/Debit card. This shows that majority of the respondents that have an account relationship with a bank also have an ATM/Debit card.

Table 6 shows that all the respondents who have an ATM/Debit card agreed that the card is connected to an account in their name. This is a regulatory requirement for account owners in Nigeria in line with the cashless policy of the government.

Table 7 shows that only about 28% of the respondents who have an ATM/Debit card have used the card to make purchase directly in the past 4 months. This means that there has been reduced use of ATM/Debit cards during this coronavirus pandemic.

Table 4. Respondents with Bank Account

Question asked	Responses	Yes	No	Can't Say	Refused	Total
An account can be used to save money, to make or receive payments, or to receive wages or financial help. Do you, either by yourself or together with someone else, currently have an account at a bank or any other type of formal financial institution? Yes or No?	Frequency	135	190	35	25	385
	Percentage	35	49.4	9.1	6.5	100

Source: Field Survey, 2020.

Table 5. Respondents with ATM/Debit Card

Question asked	Responses	Yes	No	Can't Say	Refused	Total
If you have an account at a bank/financial institution, do you have an ATM/Debit card?	Frequency	82	27	16	10	135
	Percentage	60.7	20.0	11.9	7.4	100

Source: Field Survey, 2020.

Table 6. Respondents with ATM/Debit Card connected to their Account

Question asked	Responses	Yes	No	Can't Say	Refused	Total
If you have an ATM/Debit card, is this connected to an account in your name on it?	Frequency	82	0	0	0	82
	Percentage	100	0	0	0	100

Source: Field Survey, 2020.

Table 7. Respondents Who Have ATM/Debit Card to Make Purchases

Question asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you used your own ATM/Debit Card directly to make a purchase?	Frequency	23	50	5	4	82
	Percentage	28.0	61.0	6.1	4.9	100

Source: Field Survey, 2020.

Table 8 shows that approximately 26% of the respondents have used their mobile phone or the Internet to conduct a financial transaction in the past 4 months. The majority, 68% of the respondents have not used a mobile phone or the Internet to make a payment, to buy something or to send money from their account in the bank. This shows that the level of electronic mode of making payment or other financial transaction is still very low in the area studied.

Table 9 shows that majority of the respondents have not used their mobile phone to check their accounts in the past 4 months. This also goes to show that the level of usage of electronic platforms is low in the area studied.

Table 8. Respondents Who Have Used Mobile Phone or Internet for a Transaction

Question asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, did you ever use a mobile phone or the internet to make a payment, to buy something, or to send money from your account at the bank?	Frequency	35	92	0	8	135
	Percentage	25.9	68.1	0	5.9	100

Source: Field Survey, 2020.

Table 9. Respondents Who Have Used Mobile Phone to Check Their Accounts

Question asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you checked your account balance using a mobile phone or the internet?	Frequency	62	68	2	3	135
	Percentage	45.9	50.4	1.5	2.2	100

Source: Field Survey, 2020.

Table 10. Respondents Who Have a Credit Card

Question asked	Responses	Yes	No	Can't Say	Refused	Total
A credit card is a card that allows you to borrow money in order to make payments or buy things, and you can pay off later. Do you personally, have a credit card?	Frequency	25	105	0	5	135
	Percentage	18.5	77.8	0	3.7	100

Source: Field Survey, 2020.

Table 11. Respondents Who Have Used Credit Card to Make Purchases

Question asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you, personally used your credit card?	Frequency	5	16	0	4	25
	Percentage	18.5	77.8	0	3.7	100

Source: Field Survey, 2020.

Table 10 shows that majority of the respondents, approximately 78%,do not have a credit card that can allow them to borrow money from the bank to make transactions. This shows that majority of the respondents do not enjoy this credit arrangement from their banks.

Table 11 shows that for the few of the respondents that have credit card, only about 19% have made use of the card in the past 4 months. This shows reduced credit transactions within the period under review.

Table 12 shows that only 31%of the respondents have received money in the form of cash deposit, electronic transfer or any time money by an employer or institution in the past 4 months. The 4 months coincided with the period of the onset of the coronavirus pandemic. This means that majority of the respondents have not been paid their salaries or receive any inflow of funds during this period of the pandemic.

Unbanked Section—Those With No Bank Account

Table 13 shows that majority of those who have no account with a bank was because financial institutions are too far away, because they donot have enough money to use financial institution services and because they have no need for financial services at a formal institution. Conversely, no documentation, religious

Table 12. Respondents Who Have Received Deposits From any Source

Question asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, has money been deposited into your account(s) either through cash deposit, electronic transfer or any time money by an employer, another person or institution?	Frequency	42	77	6	10	135
	Percentage	31.1	57.0	4.4	7.4	100

Source: Field Survey, 2020.

Table 13. Reason(s) for not Having an Account at a Bank Please indicate which of the following is the reason why you personally do not have an account at a bank or another type of formal institution? Is it?

Reasons	Yes(%)		No(%)		Can't Say (%)		Refused(%)		Total(%)	
Because financial institutions are too far away	138	72.6	25	13.1	7	3.7	20	10.5	190	100
Because financial services are too expensive	93	49.0	54	28.4	13	6.8	30	15.8	190	100
Because you don't have the necessary documentation (identity card, utility bill receipt, passport, etc.)	80	42.1	92	48.4	8	4.2	10	5.3	190	100
Because you don't trust financial institutions	68	35.8	98	51.6	12	6.3	12	6.3	190	100
Because of religious reasons	65	34.2	103	54.2	8	4.2	14	7.4	190	100
Because you don't have enough money to use financial institution services	87	45.8	76	40.0	7	3.7	20	10.5	190	100
Because someone else in the family already has an account	64	33.7	113	59.5	3	1.6	10	5.2	190	100
Because you have no need for financial services at a formal institution	93	48.9	54	28.4	18	9.5	25	13.2	190	100

Source: Field Survey, 2020.

reasons and because someone in the family already has an account were not among the reasons for not having an account with the bank.

Savings Section

Table 14 shows that majority of the respondents, 62.3% have not saved or set aside any money to start, operate or grow a business or farm in the past 4 months. This means that business activities for majority of the respondents have been scaled down within this period of the pandemic.

Table 15 shows that majority of the respondents, approximately 57%, have not saved or set aside any money for old age. This means that majority of the respondents are currently concerned with surviving in this period of the pandemic than thinking for old age.

Table 14. Respondents who Saved Money for Business in the Past 4 Months

Question asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you personally, saved or set aside any money to start, operate or grow a business or farm?	Frequency	122	240	5	18	385
	Percentage	31.7	62.3	2.6	9.5	100

Source: Field Survey, 2020.

Table 15. Respondents Who Have Saved Money for Old Age

Question asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you personally, saved or set aside any money for old age?	Frequency	118	220	14	33	385
	Percentage	30.6	57.1	3.6	8.6	100

Source: Field Survey, 2020.

Table 16. Respondents Who Have Borrowed Money From the Bank in the Past 4 Months

Question asked	Responses	Yes	No	Can't Say	Re-fused	Total
Do you, by yourself or together with someone else, currently have a loan you took out from a bank or another type of formal financial institution to rent an apartment, buy a house, or land in the past 4 months?	Frequency	125	260	0	0	385
	Percentage	32.5	67.5	0	0	100

Source: Field Survey, 2020.

Borrowing Section

Table 16 shows that majority of the respondents, approximately 68%, have not taken out any loan from a bank or another type of formal financial institution in the past 4 months. This means that majority of the respondents have no financial support from the bank or any other type of financial institution in this period of the pandemic.

Table 17 shows that majority of the respondents, approximately 72%, have borrowed money for health and medical reasons. This is understandable given the health challenges posed by the coronavirus pandemic and the stress occasioned by loss of jobs, lockdown and restrictions in movement.

Table 18 shows that borrowing from a bank or other type of formal financial institution was the least source of borrowing for the respondents. This has implication for financial inclusion strategy of the government.

Table 17. Respondents Who Borrowed Money for Medical Reasons in the Past 4 Months

Question Asked	Responses	Yes	No	Can't Say	Re-fused	Total
In the past 4 months, have you, by yourself or together with someone else, borrowed money for health or medical purposes?	Frequency	277	85	10	13	385
	Percentage	71.9	44.7	2.6	3.4	100

Source: Field Survey, 2020.

Table 18. Sources of Credit (Loans) for Health or Medical Reasons In the past 4 months, have you, by yourself or together with someone else, borrowed any money from any of the following sources?

Reasons	Yes(%)		No(%)		Can't Say (%)		Re-fused(%)		Total(%)	
From a bank or another type of formal financial institution	25	6.5	345	89.6	5	1.3	10	2.6	385	100
From informal savings groups/club such as esusu, co-operative, age grade or town union meeting	284	73.8	95	24.7	1	0.26	5	1.3	385	100
From family, relatives or friends	223	57.9	124	32.2	8	2.1	30	7.8	385	100

Source: Field Survey, 2020.

Financial Resilience Section

Table 19 shows that majority of the respondents, approximately 62%, stated that it is not possible for them to come up with the sum of N30,000 (US$79 at N380/US$1) over the next 1 month in the event of emergency. This shows that the financial resilience of majority of the respondents is very low at this time of the pandemic.

From Table 20, majority of the respondents stated that their main source of income/money in the case of emergency will be from work or labour. The next source of money will be from family, friends and relatives and followed by money from personal savings. Selling assets and some other sources followed in that order. Remarkably, borrowing from a bank, employer or private lenders were the least source of money in the case of emergency. This implies that financial inclusion and microcredit are yet to take root in the informal sector.

Table 19. Respondents' Ability to Handle a Financial Emergency Imagine that you have an emergency and you need to pay N30,000. [a]Is it possible or not possible that you could come up with the N30,000 within the next month?

Reasons	Yes(%)		No(%)		Can't Say (%)		Refused(%)		Total(%)	
Possible	125	32.5	240	62.3	10	2.6	10	2.6	385	100
Not possible	289	75.0	87	22.6	2	0.5	7	1.8	385	100

Source: Field Survey, 2020.

[a] N30,000 (US$79) is the minimum monthly wage in Nigeria for Federal and State Government Employees and also serves as benchmark for setting employees' wage by most private sectors (ProShare Economy, 2019). It reflects the minimum amount that an employee needs to live above the poverty rate in Nigeria. The National Poverty Rate in Nigeria is estimated at US$1.70/day and for rural communities, it is estimated at US1.25/day (NBS, 2017). The National Poverty Rate was adopted by this study because the survey covered both urban and rural communities.

Table 20. Respondents' Main Source of Money in Case of Emergency What would be the main source of money that you would use to come up with N30,000 within the next one month?

Reasons	Yes(%)		No(%)		Can't Say (%)		Re-fused(%)		Total(%)	
Savings	125	32.5	233	60.5	7	1.8	20	5.2	385	100
Family, relatives or friends	222	57.7	120	31.2	13	3.4	30	7.8	385	100
Money from work or labour	250	64.9	98	25.5	17	4.4	20	5.2	385	100
Borrowing from a bank, employer or private lender	35	9.1	340	88.3	2	0.5	8	2.1	385	100
Selling assets	90	23.4	245	63.6	20	5.2	30	7.8	385	100
Some other sources	88	22.9	290	75.3	0	0	7	1.8	385	100

Source: Field Survey, 2020.

Table 21 shows that majority of the respondents, approximately 68%, have not received any salaries from their employers for the past 4 months, which coincided with the onset of the coronavirus pandemic which have seen offices and shops closed in Nigeria. Only about 30% of the respondents have received salaries from their employers for the period under review.

Table 22 shows that an overwhelming majority of the respondents, approximately 80%, have not received any kind of financial support from the government for the past 4 months. In other words, only very few people may have benefitted from the conditional cash grants from government for vulnerable households. The implication is that majority of Nigeria are left to cater for themselves as this critical period of the pandemic.

Table 21. Respondents Who Have Received Money From Employers in the Past 4 Months

Questionnaire Item	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you received any money from an Employer, in the form of Salary or Wages for doing work? Please do not consider any money received directly from clients or customers?	Frequency	120	260	0	5	385
	Percentage	31.2	67.5	0	1.3	100

Source: Field Survey, 2020.

Table 22. Respondents Who Have Received Any Financial Support From Government

Question Asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you personally received any financial support from the government? This money could include payments for educational or medical expenses, unemployment benefits, subsidy payments or any kind of social benefits. Please do not include wages or any payments related to work?	Frequency	45	309	15	16	385
	Percentage	11.7	80.2	3.9	4.2	100

Source: Field Survey, 2020.

Table 23 shows that majority of the respondents, 54%, has relied on income from the sale of agricultural products, crops, produce or livestock for survival in the past 4 months.

Table 24 shows that majority of the respondents, approximately 76%, have means of identification in the form of national identity card, voters' card or international passport. Majority have voters' card as a means of identification. The reason for the preponderance of voters' card is that it is used to access 'stomach infrastructure'[1] from politicians during electioneering campaigns.

Table 25 summarises the level of access of households to microcredit from different sources. The table shows that a larger percentage of the respondents sampled access microcredit from informal sources like family, friends, local money lenders, esusu arrangements and so on. In terms of loan request, the mean amount usually required are N125,000 from informal sources, N140,000 from co-operatives, N162,000 from Microfinance institutions and N250,000 from commercial banks. However, on the average, N80,000 are usually accessed from the informal sources, N82,000 from co-operative societies, N120,000 from microfinance institutions and N160,000 from commercial banks. Moreover, the average loan duration for loan facilities from informal sources is 2 and 3 months for co-operatives, microfinance institutions and commercial banks, respectively.

Table 23. Respondents Who Have Received Money From Agricultural Produce

Question Asked	Responses	Yes	No	Can't Say	Refused	Total
In the past 4 months, have you personally received money from any source for the sale of agricultural products, crops, produce or livestock?	Frequency	208	150	8	19	385
	Percentage	54.0	39.0	2.1	4.9	100

Source: Field Survey, 2020.

Table 24. Respondents Who Have Means of Identification

Questionnaire Item	Responses	Yes	No	Can't Say	Refused	Total
Do you personally have a National Identity Card, Voters Card or International Passport?	Frequency	294	80	0	11	385
	Percentage	76.4	20.8	0	2.9	100

Source: Field Survey, 2020.

Table 25. Level of Access of Households to Microcredit (Different Sources)

	Informal Sources	Co-operative Societies	Microfinance Banks	Commercial Banks
Credit users	187	88	70	40

(*Table 25 continued*)

(*Table 25 continued*)

	Informal Sources	Co-operative Societies	Microfinance Banks	Commercial Banks
Loan request (Mean)	N125,000	N140,000	N162,000	N250,000
Amount approved (Mean)	N80,000	N82,000	N120,000	N160,000
Loan duration (months) (mean)	2.10	2.84	3.00	3.00
Interest rate per month	62	60	60	35

Source: Field Survey, 2020.

Again, the interest rate ranges up to 62% per annum from the informal sources like the local money lenders, 60% per annum for co-operative societies and microfinance institutions, respectively, and 35% for commercial banks.

The implication of the foregoing is that the informal sources of microcredit still predominate in our local communities. Although they charge higher rate of interest, their availability and ease of accessibility make them more attractive to the rural populace than the formal financial institutions.

Incidence, Depth and Severity of Poverty

To ascertain the incidence, depth and severity of poverty among the households sampled, the study used the expenditure approach. To achieve this, the study aggregated the total expenditure on food and non-food items by the households sampled. The households were divided into two, namely those that access and use microcredit and those that did not use credit. The Foster–Greer–Thorbecke (FGT) technique described previously was employed to assess the poverty index, the incidence, depth and severity of poverty among respondent households. The following estimates were obtained as reported in Table 26.

Table 26. Household Expenditure

Expenditure (Nwk)	Did Not Have Access/or Use Credit	Have Access and Use Credit	Total
Total food expenditure	6,611.60(0.038811)	9,899.12(0.267814)	6,510.72(0.027816)
Non-food expenditure	2,875.80(0.106453)	3,453.65(0.297321)	2,765.88(0.027612)
Total expenditure	9,487.40(0.213863)	13,352.77(0.016924)	9,276.60(0.028774)
Per capita expenditure	2,476.23(0.096126)	3,976.55(0.019895)	2,543.22(0.003616)
Per capita expenditure/day	420.22(0.043928)	655.66(0.243403)	376.34(0.003672)
Po (incidence)	0.85(0.038811)	0.60(0.147960)	0.64(0.011219)
P1 (depth)	0.48(0.096468)	0.21(0.085101)	0.32(0.059192)
P2 (severity)	0.22(0.053322)	0.15(0.036742)	0.13(0.046244)

Source: Computation based on field data (2020).

Table 26 shows that households that had access to microcredit has higher total aggregate expenditure (N13,352.77) that households that did not access and use microcredit (N9.487.40)—a difference of approximately N387 (or 40%). Again, the per capita expenditure (derived by dividing the total expenditure of household by the total size of the household) shows that those who have access to microcredit have higher per capita expenditure, all other things being equal. It should be noted that per capita expenditure is influenced by the total expenditure and the size of the household. In other words, the higher the household size, the lower would be the per capita expenditure and vice versa.

To this end, the per capita expenditure for households that did not access or use microcredit was N2,476.23 per week, while for the households that use microcredit it was N3,976.55 per week. This translates to an average of N420.22 and N655.66 for households without microcredit and households with microcredit, respectively. This again shows that households with microcredit have higher per capita expenditure per week. In terms of incidence of poverty among the respondent households, the data in Table 26 shows that the incidence of poverty was higher on the households without access to microcredit (0.85) than the households with access to microcredit (0.60). There was similar trend for depth and severity of poverty. For instance, for households without access to microcredit has higher depth of poverty (0.48) than households with access to microcredit (0.21), more than doubled. The severity of poverty was also higher for households without access to microcredit (0.22) than for the households with access to microcredit (0.15).

In terms of households that are living below the poverty line, estimated at US$1.70/dayon purchasing power parity (World Bank, 2019), the data in Table 31 shows that the average per capita expenditure for all the households was N420.22 for households without access to microcredit and N655.66 for households with access to microcredit, respectively. The implication is that access to microcredit increases the chances of households not being poor. For the households without access to microcredit, their fate is different and requires urgent government attention with appropriate poverty alleviation strategies and programmes. Unfortunately, the study showed that majority of the households surveyed (approximately 80%) have not received any form of government assistance or palliatives during this period of the coronavirus pandemic.

Impact of Microcredit on Poverty Alleviation

To ascertain the impact of microcredit on poverty alleviation, we estimated the influence of access to microcredit on the probability of being poor or non-poor. Poverty as the dependent variable was proxied by average per capita expenditure of US$1.70/day or NGN614. A household with average per capita expenditure less than US1.70/day is considered poor and household with average per capita expenditure above US$1.70/day is considered non-poor. Microcredit was proxied by the natural logarithms of the quantum of microcredit accessed by a household. Other explanatory variables that could influence the probability of being poor or

Table 27. Summary of Logit Regression

Variables	*B*(Coefficients)	Std Error	Odd Ratio
Age	0.312*	0.122	1.232
Age^2	−0.005*	0.003	0.233
Gender	−0.322	0.125	0.544
Education	0.142**	0.045	0.888
Household size	0.742*	0.172	2.003
Access to microcredit	1.045***	0.544	2.914
Quantum of credit accessed	0.0001**	0.000	1.002
Non-farm income	0.522	0.403	1.677
Constant	14.133***	4.202	0.000
Log likelihood	−112.434		
Cox & Snell R^2	0.370		
Overall % prediction	82.8		

Source: Computation based on field data (2020).

*Correlation is significant at 0.01, ** at 0.05 and *** at 0.10 level (two-tailed).

non-poor were also analysed. Using the logit regression model previously, the following information was obtained as shown in Table 27.

Table 27 is a summary of logit regression on a model that incorporates explanatory variables that could influence the likelihood of a household being classified as poor or non-poor. These explanatory variables include age, age^2, gender, education, household size, access to microcredit, quantum of microcredit accessed and non-farm income. As remarked above, a household is either poor or non-poor based on a poverty line defined as the average per capita expenditure of US$1.70 or NGN641/day. A household is considered poor if the average per capita expenditure is below US$1.70 or NGN641/day.

The logit model is significant in predicting the likelihood of a respondent household being poor or non-poor based on the expenditure approach. The predictive power at 82.8 is high and reliable. The model shows that microcredit use or access to microcredit increases the likelihood of not being poor and living above the poverty line. The result also showed that the quantum of microcredit accessed has positive and significant influence on the probability of not being poor. In other words, the higher the quantum of microcredit accessed, the lower the probability of being poor.

Moreover, most of the explanatory variables in the model were significant at 1% ($p < 0.01$). These include age of head of household, square of the age and household size. Others were significant at 5%level ($p < 0.05$) and 10% level ($p < 0.10$). These include educational level of head of household. For instance, the model shows that the likelihood of being poor rises initially with increase in household size but decline afterwards, perhaps, as more family members enters

the productive age bracket or become more productive in their occupation, all other things being equal. The result also shows that education is a significant variable. The coefficient is positive and significant at 5%level ($p < 0.05$). It means that the higher the level of education of the head of household, the higher the likelihood of the household not being poor, other things being equal.

The most important observation in the model is that access to and the quantum of microcredit accessed by a household lowers the odd of being poor. This result meets theoretical expectations.

Various policies on poverty alleviation by development partners including the World Bank and IMF emphasised the need for access to credit by households especially those in the rural areas. The expectation is that access to microcredit will enable the populace in the rural areas to enhance their means of livelihood and increase their odds of escaping from the trap of extreme poverty. Unfortunately, the study shows that majority of the households sampled (approximately 68%) lacked access to microcredit and are unable to access microcredit from formal financial institutions.

Discussion of Findings

In discussing the findings of this study, the key question is to what extent has the coronavirus pandemic impacted on access to microcredit and hence poverty alleviation in Nigeria. To put the discussion in context, we compare the findings of the study with the result of the survey on 'Access to Financial Services in Nigeria 2018 Survey' conducted by Enhancing Innovation and Access (EFInA, 2018).[3] The 2018 survey by EFInA is the largest, most comprehensive and up-to-date survey on access to financial services in Nigeria.

Findings from the study showed that:

a) About 35% of adults in the survey have account or banking relationship with a financial institution. The remaining 65% are currently excluded from the financial system. This is approximately 200 basis point decline in the number of adults with account relationship based on the country-wide survey in 2018 by EFInA (2018). In the 2018 survey, the number of adults with no account or banking relationship was 39.7% out of the estimated 99.6 million adults in Nigeria (EFInA, 2018). This means that the financial inclusion strategy launched by the government in 2012 has not yielded much result in bridging the gap of unbanked population especially at the rural areas.
b) About 40% of those who have account relationship with banks are making use of electronic platforms like ATM/Debit cards, phone or the Internet in financial transactions. This represents an increase of 6% from the 36% level in the 2018 survey by EFInA (2018). This shows that the coronavirus pandemic has forced more people to use electronic platforms like ATM/Debit cards, phone or the Internet in financial transactions as a result of the

lockdown ordered by various tiers of governments in Nigeria to contain the spread of the virus.

c) Approximately 19% of account holders have credit cards that allow them to borrow money to make payments and pay later. This represents a decline of 12% from the 31% recorded in the 2018 nationwide survey by EFInA (2018). This means that the coronavirus pandemic has worsened the state of credit accessibility from banks and other formal financial institutions in Nigeria.

d) The COVID-19 pandemic has affected households' income. Only about 20% of households have received any form of income in the past 4 months—the period that coincides with the onset of the coronavirus pandemic. This contrast sharply with the 82% of households that receive income within the same period in the 2018 survey by EFInA (2018). Elsewhere, a study by Stephen (2020) showed that low-income and poor households across Asia have been hard hit by the coronavirus pandemic. According to the study, the economic and financial impacts flowing from lockdowns to curb the spread of COVID-19 have been severe in most Asian countries, with substantial declines in the incomes of people at the base of the economy, many of whom rely on microfinance to manage their household or microenterprise cash flows with average declines in income in Pakistan (85%), Bangladesh (75%) and India (70%).

e) There has been very little financial support from the banks by way of credit to households during the past 4 months. Less than 5% of the households surveyed have received any form of credit facilities from formal financial institutions like the microfinance banks and commercial banks. This represents a decline of 26% from the figure in the 2018 survey. According to the 2018 survey, 31% of the 99.6 million adult populations in Nigeria had access to credit in 2018 (EFInA, 2018). Moreover, 32% of the households that accessed credit did so through informal sources like the co-operative societies and local rotating credit associations.

f) Government support to households by way of palliatives has been very little or non-existent. Only about 12% of the households have received any form of support from the government during this time of the pandemic. Moreover, government palliative consisting mainly of conditional cash grant of N5,000 (approximately US$13) for average household size of 5.2 is grossly inadequate and amount to merely scratching the surface.

g) The level of financial resilience is low among households surveyed. Only about 32% of the households can handle financial emergencies involving sums up to N30,000 (US$78) in a month should the need arises. The lack of insurance coverage for most households in Nigeria has also complicated matters in a health emergency such as the coronavirus pandemic. According to the 2018 survey, approximately 98 million adult Nigerians have no insurance coverage of any kind (EFInA, 2018).

h) Households' general welfare and wellbeing has deteriorated within this period of the pandemic. However, households who have access to microcredit have fared much better than those with no access to

microcredit. This finding corroborates the findings of the study by Nathan and Lise (2020) who found that rural households in Paraguay and Myanmar that had access to microcredit fared better during this coronavirus pandemic than the households that did not have access to microcredit. Moreover, a study by Bernard (2020) in three rural districts in Sri Lanka, namely Gampala, Amara and Affna, found that out of the 500 women sampled, those who receive credit from Microfinance Banks had little problem smoothing household consumption, engaging in trade and generally not badly affected by the coronavirus pandemic than those who did not receive any credit from any financial institution.

i) Overall, in majority of the households surveyed, approximately 83% are living below the poverty line measured by household income of US$1.70 per day. If this figure is weighted to provide for the total adult population and benchmarked to national population estimates, this translates to approximately 96 million people living below the poverty line with 63.3% of this number living in the rural areas.

Conclusion and Recommendations

From the foregoing, we can conclude that the coronavirus pandemic has affected the means of livelihood of majority of the masses, with majority living in extreme poverty. The situation is compounded by lack of access to microcredit from the microfinance banks and other formal financial institutions. The government has not helped matters either. Government palliatives are non-existent in most of the communities surveyed with only about 12% of the households surveyed had received some form of government support within the period under review.

Based on these findings, the study recommends as follows:

a) Government should rethink its policy on microcredit delivery through the microfinance banks and rural banking scheme of commercial banks. The findings of this study have shown that these formal institutions have not lived up to expectations especially at this period of the coronavirus pandemic. Government may consider bringing in the informal sector groups like co-operative societies and local thrift associations in microcredit framework. These informal groups have co-existed with the formal financial institutions in an uneasy relationship. The time has come for government to formalise this existence and perhaps channel microcredit support through these informal institutions.

b) Government should re-gig the financial inclusion framework. The number of adults with no bank account or any banking relationship with banks is still unacceptably high. In most of the cases, having a bank account is the necessary first step to accessing bank credits. Majority of the respondents who have no bank account blamed it on the absence of banks within their communities. The government may have to reintroduce the rural banking

scheme or reinstate the community development ownership model for microfinance banks to encourage more communities to open and operate their own microfinance banks.

c) The government should also ensure the provision of infrastructures, especially electricity and good roads in the rural communities. No bank would want to set up a branch in a community where these key infrastructures are lacking; neither would a community-based microfinance banks survive in that type of business environment.

d) The government should spread its net to cover more people in the distribution of palliatives. The COVID-19 has wreaked havoc on the means of livelihood of the masses especially those in the semi-urban and rural communities. The government should, therefore, increase the quantum and coverage of its palliative measures especially the conditional cash grants to vulnerable families.

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Notes

1. Stomach infrastructure is a local parlance in Nigerian politics that refers to the practice of politicians bribing electorates with consumables especially rice and condiments during electioneering campaigns in order to induce the electorates to vote for them during elections as opposed to providing physical infrastructure and other productive assets (Mohammed, 2019).
2. The National Poverty Rate in Nigeria is estimated at US$1.70/day and for rural communities, it is estimated at US1.25/day (NBS, 2017). The National Poverty Rate was adopted by this study because the survey covered both urban and rural communities.
3. Enhancing Financial Innovation & Access (EFInA) is the largest financial sector development organization in Nigeria. Their major role is to promote financial inclusion in Nigeria. Since their establishment in 2007, EFInA has facilitated the emergence of an all-inclusive and growth-promoting financial system in Nigeria through training, research and conducting surveys on financial inclusion in conjunction with the Nigeria Bureau of Statistics (NBS) on a biennial basis (EFInA, 2018).

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Article

Education and Inequality in Rural Bangladesh: A Longitudinal Study

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Abstract

Education develops human skills, raises human productivity and, consequently, enables them with higher monetary incentives and better jobs. But the realisation of benefits may differ across income groups due to various limiting factors to achieve it. This article estimates the impacts of education on income and consumption of rural households in Bangladesh, using mean differential approach and unconditional quantile regression approach. It utilises Bangladesh Integrated Household Survey (BIHS) data for the years 2012 and 2015 to estimate the impact of education on the income and consumption of rural households. To address the potential endogeneity problem in impact estimation, 'total distance from school' is used as an instrumental variable (IV) in the case of the fixed-effect regression model applied here. Though education affects mean differentials of income and consumption positively, the fixed-effect regression coefficients are surprisingly insignificant. However, quantile regression results suggest that education contributes to income and consumption of lower quantile households more than that of uppermost quantile households. Consequently, these indicate a decline in inequality in rural areas of Bangladesh. Interestingly, education has diminishing positive returns for lower quantiles, implying a declined inequality with an increase in education, but at a diminishing rate, confirming that the impact is non-linear in nature.

Keywords

Returns to education, income inequality, consumption inequality, rural households of Bangladesh, mean differential and quantile regression

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Introduction

Education provides various types of tangible and/or intangible and/or monetary and/or non-monetary and/or instant and/or dynamic returns to individuals and their societies. It develops human skills, raises human productivity and, consequently, enables them with higher monetary incentives and greater scopes for better jobs. Thus, it provides greater economic opportunities, especially to the poor (Blanden & Machin, 2004). In addition, education refines human thoughts, broadens their outlook and enriches them with knowledge, and all these returns motivate non-educated people to educate their descendants so that they can benefit from such returns in future. Therefore, analysing the returns to education for a society or a country is crucial in terms of policy formulation and resource allocation.

Returns to education can be analysed from three different perspectives: the direct financial returns to education that include all the financial benefits education directly contributes to, the indirect monetary returns to education that include all the other monetary incomes that are not directly associated with education[1] and the non-monetary returns to education achieved through uplifting individuals and societies (McMahon, 2009). Another aspect of returns to education is that it is likely to differ across rural and urban areas due to their differences in terms of economic hardship, available educational facilities, quality of teachers, imperfect job market, etc. (Heyneman & Loxley, 1983). Thus, it is interesting to explain how education is related with human development in rural areas and investigate how it facilitates the returns to education in rural settings.

Spill-over effects of education deserve attention for its implication in terms of income inequality. The educated people with higher income are more aware of the returns to education and more capable to bear the expenses of education for their descendants (Goldin & Katz, 2009). But the non-educated people are less aware of the benefits that education offers. With lower income and thus lower education, they engage their children in low-paid jobs from the very beginning (Autor, 2010). This differential level of awareness and capability triggers further inequality between the educated and the non-educated group of people. However, government policies and supports to the descendants of lower-income people may change the scenario. In such cases, inequality may go up for the periods of completing education and then go down when working after completion of education. The net effect of education on inequality depends on whether a particular individual continues his/her education in spite of his/her economic insolvency or not. That is why, it is worth verifying the impact of education on the distribution of financial and non-financial well-being.

This article investigates the direct and indirect impacts of education on distribution of financial well-being, measured by income and consumption inequalities. The article follows two approaches for the investigation: the mean-differential approach and the unconditional quantile regression approach. The main finding is that education reduces inequality in per capita income and consumption for particular groups of people. The organisation of the article is as follows. The following section, the second section, reviews the literature, the third

section presents the methodology along with data and estimation method, the fourth section analyses the findings and the fifth and final section concludes with policy recommendation.

Literature Review

This study aims to assess the impact of education on the level of inequality in terms of income and consumption and a number of existing literatures are relevant in those contexts. Most of the literatures, that is, Abdullah et al. (2011), Abdullah and Doucouliagos (2015), Gregorio and Lee (2002), Karim (2015), Park (1996), Sylwester (2002), Winegarden (1979), Wodon (2000), etc., estimate a negative straightforward relationship between education and income inequality, while very few hold a mixed non-linear relationship (e.g., Checchi, 2001).

Of the literatures in the first category (providing a linear negative relationship), Winegarden (1979), Park (1996) and Sylwester (2002) use the cross-sectional survey data to investigate the nexus. Winegarden (1979), the very first study, concludes that education raises the income share of the bottom quintile and, therefore, lessens income inequality. Another cross-sectional study by Park (1996) applies ordinary least squares (OLS) regression for 59 countries and finds that the higher level of educational attainment of the labour force has an equalising effect on income distribution. Park (1996) also finds a positive association between the dispersion of educational attainment and income inequality: the larger the dispersion of educational attainment among the labour force, the greater the income inequality. The very recent cross-sectional study carried out by Sylwester (2002) finds that devoting more resources to education can positively affect the distribution of income (measured by Gini coefficient) within a country, and such effect seems to be larger in high-income nations.

A very similar and consistent outcome is obtained by Gregorio and Lee (2002), using the panel data framework, which extends further support for the findings obtained under cross-sectional studies. Using a cross-country panel data set for the years from 1960 to 1990, Gregorio and Lee (2002) apply seemingly unrelated regression (SUR) technique and find that both higher education and equal distribution of education ensure more equal income distribution. Almost a similar story is explored by two meta-regression analyses by Abdullah et al. (2011) and Abdullah and Doucouliagos (2015). Abdullah et al. (2011) report that education reduces the income share of the top earners and raises that of the bottom earners, leaving the middle class unaffected. In addition, Abdullah et al. (2011) find that inequality in income rises due to inequality in education, while Abdullah and Doucouliagos (2015) reveal that secondary schooling leaves stronger effect when compared to primary schooling. However, such results are always not that robust, since different econometric specifications can produce heterogeneous estimates.

Though Gregorio and Lee (2002) find a linear negative association, a slightly different outcome is available by Checchi (2001), another panel study. By estimating a non-linear fixed-effect model with a balanced panel of 94 countries within the period from 1960 to 1995, Checchi (2001) concludes that, despite the

existence of a stronger negative impact of education on income inequality, once the negative correlation between average educational achievement and its dispersion is controlled in multivariate regression, the relationship between average schooling years and income inequality turns to be U-shaped.

Both observed and unobserved variables play an important role in the case of school choice, as individuals have different perception about returns to education. In the case of estimating the returns of education, semiparametric IV approach can generate a marginal treatment effect (MTE) with similar shape, indicating diminishing returns to education with larger standard errors (Carneiro et al., 2011). Estimates of returns to education in instrumental variable (IV) analysis tend to be higher when compared to OLS if we introduce compulsory education law, heterogeneity of school accessibility or other features as IVs in our regression (Card, 2001). It has been also shown that supply-side factors such as geographic proximity of educational institutions, mandatory education laws, cost of education and other institutional features can be exogenous determinants of outcome of education.

All the aforementioned literatures have been carried out for the countries other than Bangladesh. In the context of Bangladesh, Osmani and Sen (2011) is a prominent study that analyses the Household Income and Expenditure Survey (HIES) data to examine the patterns of inequality in rural Bangladesh and finds that the income distribution has become more unequal during the period from 1990 to 2000, due to foreign remittance, despite the stability of the consumption distribution, due to the consumption smoothing effect of microcredit. With relevance to education, a prominent study is carried out by Wodon (2000) that calculates the Gini coefficient for the Household Expenditure Surveys (HES) for the years from 1983 to 1984, 1985 to 1986, 1988 to 1989, 1991 to 1992 and 1995 to 1996. Applying the probability regression, the author concludes that education (in urban areas) and land (in rural areas) contribute the most to the between-group inequality. The latest relevant study carried out by Karim (2015) applies benefit incidence analysis (BIA) and finds that the income inequality decreases due to public education spending.

Therefore, reviewing all the above-mentioned literatures, due to dearth of some panel survey data, we find that almost all of the studies are cross-sectional. But we do believe that, since the full returns to education should be studied from a dynamic perspective, the cross-sectional data are inadequate to capture such impacts. In fact, using panel data is necessary as put forth by Khan (2005), 'the cross-sectional data do not constitute an adequate basis for reliable measurement of trends in poverty and inequality'. Only two of the aforementioned studies, that is, Checchi (2001) and Gregorio and Lee (2002) use some country-level panel data; however, neither use any household-level panel survey data. Moreover, their findings are not so conclusive and robust.

Studies on the same issue in Bangladesh, as discussed earlier, are based on household survey data (HES or HIES), which are of repeated cross-section by type. Therefore, these studies also fall short of the same problems, as we mentioned earlier. The other study by Karim (2015) uses some secondary data and those data are not nationally representative. Another shortfall is to limit the analysis within

income inequality only, though Osmani and Sen (2011) focus on consumption as well. Researchers, like Khan (2005), acknowledge that income is not a very good measure of well-being and is often subject to errors in measurement. Here, consumption can be a good potential proxy for income. That is why, for a comprehensive picture, it is better to analyse inequality from both income and consumption perspectives.

There are several dimensions of inequality, including social, political, economic, etc. The very important dimension of inequality is the economic inequality. The difference in economic well-being between different population groups is termed as economic inequality. This economic well-being can be measured using different economic indicators relating to different economic variables, including income, consumption and wealth, and are treated accordingly. Inequality measures are illustrated using different graphical tools, including histograms, density functions (Kernel density estimates), quantile functions and, most prominently, the Lorenz curve. Lorenz curve is a diagram to explain income inequality, based on income and population in a country, where the horizontal axis measures the cumulative share of the population and the vertical axis measures the cumulative proportion of income, both in the ascending order.

There are several techniques to measure income inequality, and these tools vary in ease of computation, ease of comprehension and how accurately they represent the socially relevant dimensions of inequality. The most popular technique is the Gini coefficient, which varies between 0 and 1. A 0 Gini coefficient against income means the distribution of income is perfectly equal/uniform (e.g., where everyone has the same income), and a Gini coefficient of 1 (or 100%) expresses maximal inequality among values (e.g., for a large number of people, where only one person has all the income or consumption, and all others have none, the Gini coefficient will be very nearly 1).

The Gini coefficient for Bangladesh indicates that income inequality rises before 2000, and after 2000, it remains almost unchanged. It shows that the value of Gini coefficient for Bangladesh remained almost stable over the past 15 years (Figure 1). This conclusion remains unchanged even if we consider the ratio of

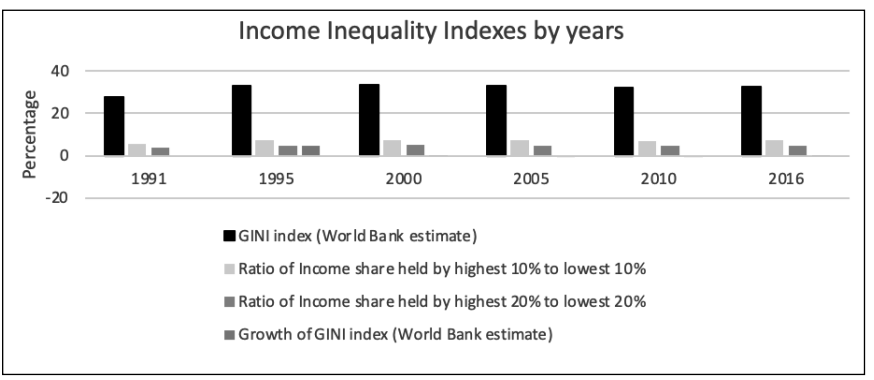

Figure 1. Income Inequality Indices.

Source: World Development Indicators, WB (2019).

Table 1. Gini Coefficient of Income (Per Capita) Inequality for Rural Households.

Year	Khan (2005)	Osmani and Sen (2011)	Ferdousi and Dehai (2014)	Matin (2014)
1991–1992	0.276	0.276	-	0.36
1995–1996	0.310	0.310	0.385	0.36
2000	0.356	0.356	0.393	0.393
2005	0.404	0.404	0.428	0.428
2010	-	0.465	0.430	0.431

Source: Respective authors' calculation are based on HES and HIES of Bangladesh.

income share held by the highest 20% to the lowest 20% or the ratio of income share held by the highest 10% to the lowest 10$. However, these findings are valid for the national level, not separately for rural areas.

In order to get a more insightful and accurate picture about income inequality and its symbiosis with education, a more sophisticated quantitative method should be employed. Gini coefficients for the rural areas of Bangladesh are available in the works of Khan and Sen (2001), Khan (2005), Osmani and Sen (2011), Ferdousi and Dehai (2014) and Matin (2014). Following table compiles the Gini coefficient estimates of the aforementioned researchers for nationally representative rural households.

Table 1 shows that, based on per capita income of rural households, the Gini coefficient is rising gradually in rural Bangladesh. Statistics presented in Table 1 are based on cross-sectional HES/HIES surveys conducted since the period from 1991 to 1992 with a 5-year interval. Moreover, in analysing the usefulness of the HIES data in measuring inequality and poverty trends, Khan (2005) concludes that the HIES surveys 'do not provide reliable estimates of personal income (or consumption) and their changes over time'. Khan (2005) also states that measurement of poverty and inequality needs estimates of both income/consumption and their distribution and, henceforth, as per Khan (2005), the HIES data 'do not constitute an adequate basis for reliable measurement of trends' in poverty and inequality because of the cross-sectional nature of data sets.

Therefore, to address all the requirements, studying a nationally representative panel data will be most appropriate to address these limitations. A nationally representative panel household survey in Bangladesh that fulfils our requirement is the Bangladesh Integrated Household Survey (BIHS). For all of the aforementioned grounds, this current article aims to utilise BIHS 2011–2012 and BIHS 2015 panel survey data for this analysis.

Methodology and Data

Data

The educated people, with higher income, are well aware of the positive returns that stem from education and are more able to bear the expenses of education of

their descendants. According to Abdullah et al. (2011), higher education has not equally expanded in many countries (e.g., Brazil as depicted in World Bank, 1977), and the resulting benefits are enjoyed by those in higher-income brackets. Blanden and Machin (2004) also have found a significant association between family income and university degree attainment in Britain. Therefore, people with higher income are more likely to grasp the returns generated from education, which is termed as 'endogeneity'. To escape this endogeneity problem, this study utilises some panel data models and, therefore, requires information from panel survey of Bangladeshi households, with sufficient dynamics in education and proper representation of the whole country.

BIHS is the most comprehensive household survey in Bangladesh to date, and this was conducted throughout the country during the 2011–2012 period. The second round of the survey was conducted in 2015. A sound and appropriate statistical method was used to collect the data of the total 6,503 households from 377 primary sampling units (PSUs), that is, villages in the first round and 6,715 households in the second round. The sample design of the BIHS followed a stratified sampling in two stages, using the sampling frame developed from the community series of the 2001 population census of Bangladesh. Later, sampling weights were adjusted on the basis of the latest population census of 2011. Additionally, BIHS survey collected all in-depth information for each of the household members and put special focus on their educational information.

Specification of Empirical Model

We intend to estimate the effects of education on inequality, and for doing this, three things are very much important to decide: (a) inequality estimates to be used as the outcome, (b) set of factor variables to be controlled in the estimation model and (c) the econometric specification of the estimation model. The first issue in estimation is to decide on the inequality estimates to be used as the dependent variable in the estimation model. There are two ways to proceed: (a) the deviation from sample mean as the indicator for inequality and (b) using the quantile regression approach. Since we have panel data, we can examine both the approaches for robust estimation.

For the first approach, this article defines mean differential as the difference from mean for each of the variables, per capita income and consumption. For example, if x is a variable and the value of x for ith household is x_i, then the mean differential for the variable x for ith household is $x_i - \overline{x}$. Therefore, this can be quite a good candidate to serve as an indicator in inequality measurement. Such mean differential is available for different economic grounds, including income, and consumptions where each of these grounds are directly associated with education.

In the case of quantile regression approach, the distribution of outcome variables will be reflected by the respective outcome variables themselves, and in such a case, we can consider the per capita income and consumption as the outcome variables. Household total income is calculated by considering all the

possible incomes from yearly earnings, agricultural and other non-agricultural tasks, received safety nets, remittances and other net transfers (including land revenue; rents from other assets; interest earnings; payments received from insurance, profits and dividends from share/ownerships; gratuity and retirement benefits; income from lottery and prizes; charity and other assistances, etc.). Household total consumption expenses are constructed by considering all food and non-food consumption expenses, where we include house rents and other related supplies, expenses on household durables and personal belongings, cosmetics, washing and cleanings, travel and transport, clothing and tailoring, textiles and footwear, educational and health expenses, expenses on recreational activities, taxes, interest on ceremonial expenses and other transfers, etc., as non-food items. Per capita household income and per capita household consumption are calculated by diving total income and consumption by the number of household members.

The second issue is to prepare a set of controls, and the existing literature suggests a lot of such factor variables. For example, as per Abdullah et al. (2011), the impact of education on inequality depends on so many factors, such as urbanisation, the level of development, political regime, social attitude (e.g., Malaysia), government intervention and land inequality. In another almost similar study, Wodon (2000) has identified that geolocation, sex of household head, level of education, nature of occupation, amount of land, etc., significantly affect poverty, living standard and inequality. Besides, it has also been found in some literature that income inequality is also negatively related to per capita income and positively related to capital to output ratio and government expenditure in education. Moreover, as per Gregorio and Lee (2002), Ram (1981), Londoño & World Bank (1996) and IDB (1998), as supported by Abdullah et al. (2011), Wodon (2000) and Checchi (2001), the relationship between education and inequality can vary across different social, regional and political backgrounds.

Consulting all these literatures, a number of time-variant and time-invariant variables can be relevant as the factor variables. But this study estimates the impact of education on different measures on inequality. Therefore, we consider education as the main factor variable. We measure education in terms of total years of schooling by all household members. Since we also aim to explore the implication of non-linearity, we use quadratic polynomial of education. There can be some other purely exogeneous controls, such as age, religion, gender of household head, etc., in use. Moreover, education is presumed to be correlated with experience. The survey does not have any information on years of experience in the case of any job, and thus we construct a proxy for experience. We treat zero experience for the enrolled individuals and calculate years of experience for the non-enrolled by taking the difference of their ages and respective education years, adjusted for preschooling time of 6 years.

The most important issue is the specification of the estimation model. The effects of education on income are largely estimated, applying the technique proposed by Mincer (1974). Mincerian specification for time series is used to show the long-run relationship among schooling, earnings and post-school investments in human capital and, hence, examines how investment in human

capital affects its returns over time. Mincer (1974), first, considers schooling as the only factor that decides earning. Assuming E(S, t) as the earnings at time *t* with *S* years of schooling, Mincer (1974) derives that

$$\ln \mathrm{E}(\mathrm{S},\mathrm{t}) = \ln \mathrm{E}(0) + \mathrm{rS} + \mathrm{pk} * \mathrm{t} - \mathrm{pk} * \frac{\mathrm{t}^2}{2\mathrm{T}} \tag{1}$$

This gives a relationship between potential earnings and schooling. With Taylor expansion around $t = T$ and some simplification, the regression model, explaining how earnings depend on schooling (S) and years of experience (t), becomes the following:

$$\ln \mathrm{Y} = \alpha + {}^{2}{}_{1}\mathrm{S} + \delta_1 \mathrm{t} + \delta_2 \mathrm{t}^2 + \mu \tag{2}$$

Moreover, since the existing literature presents a non-linear association between education and earning/income, we can use a second-order polynomial in education (S) and thus can directly estimate the following model for quantile regression estimation:

$$\begin{gathered} \ln \mathrm{Y}_{jt} = \alpha + \gamma_1 S_{jt} + \gamma_1 S_{jt}^2 + \delta_1 E_{jt} + \delta_2 E_{jt}^2 + X_{jt}\beta_j + \theta_j + \tau_t + \epsilon_{jt} \\ j = 1, 2, 3, \ldots; t = 2012, 2015 \end{gathered} \tag{3}$$

where Y represents earning/income/consumption for jth household at time *t, S* represents the total years of schooling, E stands for the household total years of experience, X stands for the exogeneous household characteristics (gender and marital status of household head), θ captures the time-invariant household idiosyncratic characteristics, τ measures the time fixed effects and ϵ represents the time-variant unspecified components.

However, for the mean-differential approach, we cannot utilise the above-mentioned specification (3), as we mainly aim to examine how education affects the distribution of income (the inequality indicators), not the absolute income. Therefore, a different specification is required to implement the purpose of the current study and from this perspective; the model proposed by Gregorio and Lee (2002) is the most relevant one, where we assume that the distribution of income relates to the population's average schooling and its dispersion.

Gregorio and Lee (2002) propose as follows:

$$\log Y_s = \log Y_0 + \sum_{j=1}^{s} \log\left(1 + r_j\right) + u \tag{4}$$

where, Y represents the level of earnings of an individual with S years of schooling, r_j is the rate of return to the jth year of schooling and u represents the other unconsidered factors other than education that might influence earnings. Gregorio and Lee (2002) also state that the above-mentioned function can be approximated as follows:

$$\log Y_s = \log Y_0 + rS + u \tag{5}$$

To obtain the distribution of earnings, Gregorio and Lee (2002) take variance and obtain that

$$\mathrm{Var}(\log Y_s) = \mathrm{r}^2\mathrm{Var}(\mathrm{S}) + \overline{\mathrm{S}}^2\mathrm{Var}(\mathrm{r}) + 2\mathrm{r}\overline{\mathrm{S}}\,\mathrm{cov}(\mathrm{r},\mathrm{S}) + \mathrm{Var}(u) \tag{6}$$

Here, S stands for the years of schooling, r for the rate of return to schooling and $\overline{S}$ for the average (mean) years of schooling. As per the above-mentioned equation, we observe that if the rate of return (r) and the level of schooling (S) are independent, an increase in the level of schooling will lead to a more unequal income distribution. But the covariance of the rate of return (r) and the level of schooling (S) can be positive, zero or negative and, therefore, an increase in the level of schooling might present a society with more equal income distribution if the covariance is negative (when more and more people get educated and the return from education gradually declines).

Moreover, Ram (1981), Londoño & World Bank (1996) and IDB (1998) state that the relationship between average educational attainment and income inequality is non-linear. These findings are also supported by Checchi (2001), Chiswick (1968), Schultz (1963), and Knight and Sabot (1983).

Therefore, for the mean-differential approach—that attends the distributional feature to some extent, generalising Gregorio and Lee (2002) and most of the other aforementioned literature, we estimate the following regression:

$$I_{ijt} = \alpha + \gamma_1 S + \gamma_1 S_{jt}^2 + \rho_1 s_{jt} + \delta_1 E_{jt} + \delta_2 E_{jt}^2 + X_{jt}\beta_j + \theta_j + \tau_t + \epsilon_{ijt}$$
$$i = 1,2,3;\ j = 1,2,3,\ldots.;\ t = 2012, 2015 \tag{7}$$

where, I represents the ith inequality indicator for jth household at time t (measured in terms of mean deviation for per capita household income and consumption, respectively), S stands for the household total years of schooling, s represents the mean deviation for the household total years of schooling, E is for household total years of experience, X stands for the exogeneous household characteristics (gender and marital status of household head), θ captures the time-invariant household idiosyncratic characteristics, τ measures the time fixed effects and ϵ represents the time-variant unspecified components.

Therefore, estimation of specification (3) for quantile regression and specification (7) for mean-differential version give the effects of education on income and consumption as well as on their respective distribution. Since richer people can attain more education, endogeneity problem can arise. Moreover, there are justified reasons that education can be correlated with unobserved component like ability; thus, there is every reason, its impact on income can be upward biased. On the other hand, if the actual return varies across population, then the measurement can be negatively biased due to measurement error for low-educated group if their marginal return is higher. To solve this endogeneity concern, we use 'total distance from school' as a IV for education. For two endogenous variables (education and education squared), we have used two instruments (distance and distance squared). There are a number of papers that justify school proximity as proper instrument for education (Card, 1993; Currie & Moretti, 2003; Kane & Rouse, 1995; Kling, 2001).

Empirical Findings

Descriptive Statistics

This study estimates the effect of education on inequality, and before we do that, this is customary to present some relevant descriptive findings. Table 2 presents the socio-economic backgrounds of the households for the years 2012 and 2015. People are getting educated gradually as evident from Table 2. Households

Table 2. Summary of Household Information.

Variables	2012 (A)	2015 (B)	Increase (B–A)
# Household	6,503	6,715	
# Household member	4.20	4.91	0.71***
	(1.63)	(2.05)	(0.00)
Years of schooling for household head	3.35	3.38	0.03
	(3.98)	(3.98)	(0.67)
Total years of schooling for all household members	12.87	14.86	1.99***
	(11.07)	(12.09)	(0.00)
Total school–home distance for all enrolled members (km)	1.60	4.12	2.52***
	(1.70)	(8.50)	(0.00)
Total years of experience for all household members	70.00	70.51	0.51
	(34.89)	(37.71)	(0.42)
Per capita Income (BDT)	88.39	88.03	−0.36
	(0.32)	(0.32)	(0.53)
Per capita Consumption (BDT)	33,159.87	32,072.74	−1,087.14**
	(27,704.04)	(27,913.11)	(0.02)
Land (decimal) owned by household	28,915.03	30,558.15	1,643.12***
	(18,304.96)	(22,534.73)	(0.00)
Muslim (%)	91.27	97.50	6.24**
	(145.43)	(155.52)	(0.02)
Live in own house (%)	93.48	95.79	2.31***
	(0.25)	(0.20)	(0.00)
Have loan (%)	79.78	92.96	13.18***
	(0.40)	(0.26)	(0.00)
Have a migrant member (%)	20.64	8.31	−12.32***
	(0.40)	(0.28)	(0.00)
Have a member currently overseas	7.12	2.14	−4.98***
	(0.26)	(0.14)	(0.00)

Source: Authors calculation using BIHS 2012 and 2015.

Notes: Standard errors are in brackets, and *p*-values of rejecting H_0 (no difference over the years) are shown in parentheses. Legend: ***$p < 0.01$, **$p < 0.05$ and *$p < 0.1$.

enjoyed a better standard of living in 2015 as compared to 2012, except with respect to per capita income and consumption. Over the years, both per capita income and consumptions have fallen. These might be because of higher growth of a number of household members over the duration, and we are dealing with only rural sample. Moreover, almost 60% of households now have electricity, while this was below 50% in 2012. It is also found that, for both the survey years, less than 50% of household members were the sole earning members for the households imply that dependency ratio is still high in rural areas.

Since this article focuses on the impact of education on income and consumption inequalities, it is necessary to keep a look on the associated inequality measures across different education groups. Table 3 presents the calculated Gini coefficients of income and consumption:

From Table 3, it can roughly be concluded that inequalities, whether it is with respect to income or consumption, have increased over the years from 2012 to 2015, and this is true for all the education groups. It is also observed that inequality is higher with respect to per capita income and lower with respect to per capita consumption for all the education groups for both the years. However, above-mentioned coefficients do not give us any definite pattern about the relationships of education and Gini coefficients.

Table 4 presents the rising mean differentials with respect to per capita income and consumption, respectively, for different education groups for the years 2012 and 2015. For all the differentials for both years, the results are highly consistent with the results for the Gini index in Table 3, for almost all the education groups. And this consistency strongly supports the relevance of differentials as the household-level indicators of inequality indices.

Table 3. Gini Coefficients of Income and Consumption by Education.

Education (Years)	Income		Consumption	
	2012	2015	2012	2015
0	0.43	0.66	0.29	0.58
1–5	0.41	0.41	0.29	0.3
6–10	0.41	0.4	0.3	0.31
11–20	0.39	0.39	0.31	0.33
21–30	0.4	0.39	0.31	0.32
31–40	0.37	0.37	0.3	0.32
40+	0.36	0.35	0.27	0.32
All	0.41	0.43	0.31	0.36

Source: Author's calculation using BIHS 2012 and 2015.

Table 4. Mean Differentials of Income and Consumption by Education.

Education (Years)	Income Differentials		Consumption Differentials	
	2012	2015	2012	2015
0	18,895.09	23,809.93	11,653.15	20,492.11

(*Table 4 continued*)

(*Table 4 continued*)

Education (Years)	Income Differentials		Consumption Differentials	
	2012	2015	2012	2015
1–5	18,020.91	17,225.23	11,977.58	13,125.19
6–10	19,332.25	17,842.49	12,244.91	13,162.29
11–20	18,958.66	18,838.29	12,834.81	14,826.84
21–30	22,654.57	21,622.31	14,541.28	17,121.11
31–40	21,007.35	19,667.79	15,692.81	18,027.86
40+	22,910.13	23,046.84	15,994.06	19,281.43
All	19,527.02	19,664.57	12,858.51	15,686.88

Source: Author's calculation using BIHS 2012 and 2015.

Regression Results

Regarding the nature of causality, Ram (1981), Londoño & World Bank (1996) and IDB (1998) state that the relationship between average educational attainment and income inequality is non-linear and inverse u-shaped; this implies a non-linear inverse u-shaped relationship between income inequality and education inequality. This view is also supported by Checchi (2001) and Gregorio and Lee (2002). Since inequality indices have 'inverse u-shaped relationship' with education, and total household education is positively correlated to household total home-to-school distances (as per the IV assumption later), we expect some 'inverse U-shaped relationship' between inequality indices and household total home-to-school distance. This is depicted in Figure 2, where household total home-to-school distance increases income and consumption initially, but they increase at a decreasing rate, implying some inverse U-shaped relationship[2] between the income–consumption differentials and the instrument for education.

As mentioned earlier, this study uses 'total distance from school' as a IV for education. The first requirement to use distance as IV for education is the relevance assumption. Here, we assume that households with higher home-to-school total distance have higher total education (years), and, thus, the instruments are positively correlated to the endogenous variables. The other IV requirement is the exclusion restriction assumption, which requires that the instruments does not affect household income and consumption as long as we control for education, and thus, the instruments can be excluded from the model.

Tables A2 and A3 provide some suggestive evidence in favour of the IV assumptions. As per the results, the instruments (total distance from home to school for all enrolled members and its squared) are very significantly correlated to the endogenous variables (total years of education for all household members and its squared). Higher number of educated members correspond to higher distance values, ensuring a positive association between these two (coefficient values not shown). The *p*-values of under-identification tests suggest that we can

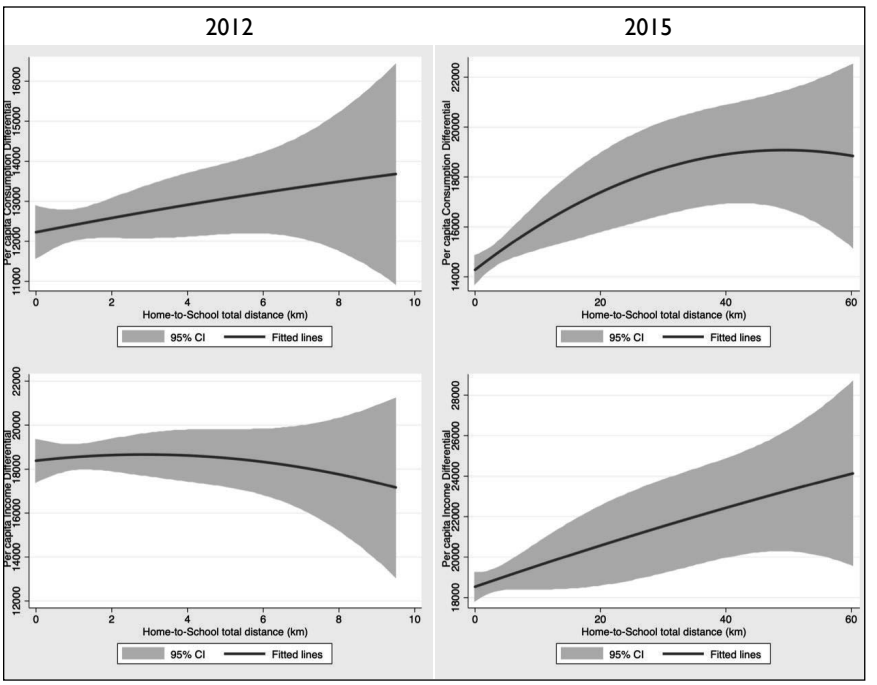

Figure 2. Relationship Between Mean Difference and Home-to-School Distance.

reject the null of under-identification. The Sanderson–Windmeijer *F* statistics are greater than 10, specifically for the fixed-effects model, implying that the instruments are sufficiently strong.

No direct suggestive evidence in favour of exclusion restriction assumption is available. However, this study investigates two scenarios under which the instruments might affect household income and consumption. First, educated parents (with higher purchasing power) may live in the vicinity of educational institutions; thus, total distance from educational institution can be low for those households. However, living in the vicinity of a school does not guarantee increase in income and consumption if household members do not attend schools. Moreover, since birth in the proximity of an educational institution should not have any direct impact on income or consumption, except through education, this possibility is less likely to violate the exclusion restriction. Second, total distance from an educational institution can be high in urban areas as compared to rural areas. But it may not be true if modern transportation and communication services are available near home. However, we can discard this possibility for this analysis as BIHS data cover only rural areas.

As mentioned earlier, this study uses both mean-differential approach and quantile regression approach. Table 5 presents the results under mean difference approach, where the first four columns report the mean difference regression for

Table 5. Results for Mean-Differential Approach.

Model	2012		2015		Fixed Effects	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	A: Impact of education on mean differential of per-capita income					
Education (years)	141.385	3,042.252	233.675***	−925.329	275.964***	−320.532
	(104.701)	(5,999.692)	(81.498)	(1,310.689)	(105.605)	(1,111.121)
Education^2	−0.617	−103.992	−2.139	29.967	5.015*	12.501
	(3.255)	(202.831)	(2.192)	(39.986)	(2.617)	(27.688)
Education mean (education)	64.671	3463.084	31.753	−924.675	−137.992	−405.826
	(95.473)	(6,378.959)	(77.059)	(1,317.534)	(99.966)	(702.301)
IV	No	Yes	No	Yes	No	Yes
Observation	6,503	4,099	5,501	4,756	12,004	6,664
R-squared	0.008	−0.711	0.011	−0.037	0.002	−0.005
Variables	B: Impact of education on mean differential of per-capita consumption					
Education (years)	215.946***	117.940	269.429***	−988.855	−108.322	−72.817
	(44.100)	(2,442.959)	(78.702)	(1,184.784)	(86.100)	(936.624)
Education^2	−3.166**	−1.849	−2.810	35.770	6.629***	16.614
	(1.257)	(82.813)	(2.154)	(36.459)	(2.218)	(23.705)
Education—Mean (education)	133.381***	138.984	108.979	−1186.820	−111.439	−664.323
	(45.692)	(2,582.090)	(68.029)	(1,210.567)	(75.935)	(609.512)
IV	No	Yes	No	Yes	No	Yes
Observation	6,503	4,099	5,501	4,756	12,004	6,664
R-squared	0.018	0.015	0.023	−0.080	0.008	0.003

Source: Authors calculation using BIHS 2012 and 2015.

Notes: (a) Mean differentials are the difference of respective value from its sample mean. (b) Coefficient estimates for experience, squared experience, gender and marital status of household head, and the regression intercepts are suppressed. (c) Distance of School from Home has been used as IV for Education. (d) Robust standard errors clustered at household level are in parentheses. Legend: ***$p < 0.01$, **$p < 0.05$ and*$p < 0.1$.

a cross-sectional data, while the first two columns are for the year 2012, and the second two columns are for 2015 data. The last two columns report fixed-effect regressions in mean difference approach, where the fifth column contains results in absence of instrument, and the very last column contains results in presence of IV. Coefficient estimates for experience, squared experience, gender and marital status of household head, and the regression intercepts are suppressed for the sake of preciseness and to keep things focused.

It is observed that, in the absence of instrument, education increases income inequality (measured in terms of mean differential of per capita income), but at a diminishing rate, in the case of cross sections. Results show that the mean differential in income declines at an increasing rate due to education under fixed effects even though our results are not statistically significant. It can also be observed that the results are not that credible due to potential endogeneity issue and the IV results confirm such potential. Neither of the coefficients of education terms are statistically significant in the presence of instrument and *R*-squared becomes negative.[3] The results are quite impressive in the case of consumption. It is observed that the mean differential of per capita consumption increases due to education under cross-sectional analysis, while the result is totally opposite in the case of fixed-effects estimation. All effects evaporate when we consider the endogeneity issue; this is also true for fixed-effects estimation.

This indicates that education and distribution of education are highly endogenous and, thus, the OLS and fixed-effects estimations are not that fully reliable. Thus, it is required to test the hypothesis from distributional or disaggregated point of view for both income and consumption. For doing this, we consult the quintile regression approach as an alternative tool.

Table 6 presents the results of impact of education on consumption and income using unconditional quantile regression, following Firpo et al. (2009). Once again, coefficient estimates for experience, squared experience, gender and marital status of household head, and the regression intercepts are suppressed to focus on purpose. The results demonstrate that households with higher education years in the lower quantiles have a greater increase in per capita incomes and consumptions as compared to other households with fewer education within that respective quantiles. Additionally, almost all coefficients are statistically significant for lower quantile. In contrast to Table 5—where we struggled to show the statistical significance after introduction of IV—Table 6 establishes our hypothesis with expected sign and greater disaggregation. The coefficients of education hold expected positive sign through all quantiles. Nonetheless, returns to education are not statistically significant for the upper quantiles. In fact, for the uppermost quantile, education decreases per capita income and consumption, though the effect is not statistically significant. For most of the cases, especially for lower few quantiles, education has diminishing positive returns, implying that inequality declines for education, but at a diminishing rate, ensuring a non-linear impact. This result is more interesting than the cross-sectional regressions with fixed effects and quintile regressions.

Table 6. Results for Unconditional Quintile Regression.

Quantiles	0.1		0.2		0.5		0.8		0.9	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Variables	A1: Impact of education on log (per capita income)—2012									
Education (years)	0.023***	0.048	0.023***	0.020	0.026***	0.064	0.024***	0.043	0.017***	0.019
	(0.005)	(0.101)	(0.003)	(0.053)	(0.003)	(0.061)	(0.004)	(0.056)	(0.005)	(0.099)
Education^2	−0.000***	−0.001	−0.000***	−0.000	−0.000***	−0.001	−0.000**	−0.001	−0.000	−0.000
	(0.000)	(0.003)	(0.000)	(0.001)	(0.000)	(0.002)	(0.000)	(0.001)	(0.000)	(0.003)
IV	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observation	6,482	4,087	6,482	4,087	6,482	4,087	6,482	4,087	6,482	4,087
R-squared	0.068	0.047	0.075	0.063	0.061		0.032		0.017	0.001
Variables	A2: Impact of education on log (per-capita income)—2015									
Education (years)	0.047***	0.066	0.037***	0.097*	0.027***	0.071	0.026***	0.002	0.021***	−0.032
	(0.005)	(0.064)	(0.004)	(0.056)	(0.002)	(0.047)	(0.003)	(0.039)	(0.003)	(0.063)
Education^2	−0.001***	−0.001	−0.000***	−0.002	−0.000***	−0.001	−0.000***	0.000	−0.000**	0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
IV	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observation	5,488	4,744	5,488	4,744	5,488	4,744	5,488	4,744	5,488	4,744
R-squared	0.068	0.004	0.058		0.052		0.035	0.016	0.020	
	A3: Impact of education on log (per-capita income)—Fixed effects									
Education (years)	0.046***	0.036**	0.035***	0.024**	0.014**	0.006	0.005	−0.001	−0.001	−0.004
	(0.012)	(0.015)	(0.008)	(0.010)	(0.006)	(0.007)	(0.007)	(0.008)	(0.007)	(0.010)
Education^2	−0.001***	−0.001**	−0.000***	−0.000*	−0.000	−0.000	−0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IV	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes

(*Table 6 continued*)

(*Table 6 continued*)

Quantiles	0.1		0.2		0.5		0.8		0.9	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Observation	10,628	6,626	10,628	6,626	10,628	6,626	10,628	6,626	10,628	6,626
R-squared	0.624	0.612	0.624	0.634	0.670	0.670	0.645	0.661	0.625	0.639
Variables	B1: Impact of education on log (per capita consumption)—2012									
Education (years)	0.016***	0.042	0.016***	0.050	0.020***	0.021	0.021***	0.039	0.022***	0.052
	(0.002)	(0.040)	(0.002)	(0.042)	(0.002)	(0.025)	(0.002)	(0.038)	(0.004)	(0.126)
Education^2	−0.000***	−0.001	−0.000***	−0.001	−0.000***	−0.000	−0.000	−0.001	−0.000	−0.001
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.003)
IV	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observation	6,503	4,099	6,503	4,099	6,503	4,099	6,503	4,099	6,503	4,099
R-squared	0.022		0.037		0.068	0.074	0.068	0.027	0.041	0.012
Variables	B2: Impact of education on log (per capita consumption)—2015									
Education (years)	0.029***	−0.015	0.026***	−0.007	0.027***	−0.006	0.030***	−0.042	0.025***	−0.004
	(0.003)	(0.019)	(0.002)	(0.017)	(0.002)	(0.027)	(0.003)	(0.044)	(0.004)	(0.063)
Education^2	−0.000***	0.000	−0.000***	0.000	−0.000***	0.000	−0.000***	0.001	−0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)
IV	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observation	5,501	4,756	5,501	4,756	5,501	4,756	5,501	4,756	5,501	4,756
R-squared	0.050		0.063	0.018	0.103	0.049	0.077		0.039	0.026
	B3: Impact of education on log (per capita consumption)—Fixed effects									
Education (years)	0.027***	0.017***	0.021***	0.010*	0.017***	0.010*	0.009	0.002	0.001	-0.005
	(0.005)	(0.005)	(0.005)	(0.006)	(0.004)	(0.005)	(0.006)	(0.008)	(0.008)	(0.010)

(*Table 6 continued*)

(*Table 6 continued*)

Quantiles	0.1		0.2		0.5		0.8		0.9	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Education^2	−0.000***	−0.000***	−0.000***	−0.000	−0.000**	−0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IV	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Observation	10,686	6,664	10,686	6,664	10,686	6,664	10,686	6,664	10,686	6,664
R-squared	0.612	0.618	0.627	0.648	0.681	0.686	0.655	0.668	0.618	0.618

Source: Authors calculation using BIHS 2012 and 2015.

Notes: (a) Estimates are from unconditional quantile regression following Firpo et al. (2009). (b) Coefficient estimates for experience, squared experience, gender and marital status of household head and the regression intercepts are suppressed. (c) Distance of school from home has been used as IV for education. (d) Bootstrapped standard errors with 100 replications are in parentheses. Legend: ***$p < 0.01$, **$p < 0.05$ and *$p < 0.1$.

Conclusion and Policy Implications

This article finds that the effects of education on income inequality in Bangladesh is non-linear: but it is only semi-inverse U-shaped. It means that inequality is high at the initial level of education and then goes down as education increases. In particular, education contributes to earning, consumption and income inequality for households in lower quantile inequality. This is also evident from our findings that intra-group inequality rises among the lowest segment of poor as a result of education. So, education is productive, on the one hand, and, on the other hand, a major contributor of inequality among the poorest groups in rural Bangladesh. However, this inequality ameliorates as education rises, and the coverage of education increases. Thus, providing education to all family members of the poorest groups may reduce the prevalence of intra-group inequality in rural Bangladesh. Besides, policymakers should extend the education coverage for poorest groups to save themselves from dire consequences of inequality. Interestingly, for lower few quantiles, education has some diminishing positive returns, implying that inequality declines for education, but at a diminishing rate, ensuring a non-linear impact.

However, some avenue of underestimated impact of education on inequality may be an outcome of our estimation due to multiple grounds. First, inequality in income or consumption is presumed to be more acute in urban areas than in rural areas, in general. Since BIHS covers only the rural areas, the magnitude of our coefficients may be underestimated. Second, educated households in rural areas are dispersed and are not concentrated. Once they complete a certain level of education, the probability of migration increases due to lack of formal employment opportunity in rural areas. That is why, the inequality in income and consumption may be under-reflected to some extent in our results. Lastly, BIHS panel data span between the years of 2012 and 2015 suggesting that it can provide only 3 years of variation. We have argued earlier that the returns to education should be analysed dynamically, and this three-year gap may be insufficient to capture the entire dynamics of inequality that originates from education. Thus, our results may reflect lower returns to education.

Appendix A. Validation of IV

Table A1. Reduced Form.

	Log (per-capita income)			Log (per-capita consumption)		
	2012	2015	Fixed Effect	2012	2015	Fixed Effect
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Education (years)	0.040*	0.020***	0.018***	0.049***	0.017***	0.004
	(0.021)	(0.004)	(0.006)	(0.013)	(0.003)	(0.003)
Education^2	−0.004	−0.000***	−0.000***	−0.004**	−0.000***	−0.000
	(0.003)	(0.000)	(0.000)	(0.002)	(0.000)	(0.000)

(*Appendix A continued*)

(*Appendix A continued*)

	Log (per-capita income)			Log (per-capita consumption)		
	2012	2015	Fixed Effect	2012	2015	Fixed Effect
Variable	(1)	(2)	(3)	(4)	(5)	(6)
Observation	4,087	4,744	6,626	4,099	4,756	6,664
R-squared	0.064	0.016	0.681	0.018	0.039	0.760

Source: Authors calculation using BIHS 2012 and 2015.

Notes: (a) Outcome variables are in natural logarithm. (b) Coefficient estimates for experience, squared experience, gender and marital status of household head, and the regression intercepts are suppressed. (c) Distance of school from home has been used as IV for education. (d) Robust standard errors clustered at household level are in parentheses. Legend: ***$p < 0.01$, **$p < 0.05$ and *$p < 0.1$.

Table A2. Summary of First-Stage Results for Log (per capita income).

	2012		2015		Fixed Effect	
Characteristics	Education	Education^2	Education	Education^2	Education	Education^2
	(1)	(2)	(3)	(4)	(5)	(6)
p-Value of distance	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
p-Value of	(0.00)	(0.40)	(0.00)	(0.00)	(0.00)	(0.00)
Under id: Sanderson–Windmeijer chi-sq stat. (*p*-value)	7.96 (0.00)	6.44 (0.01)	15.28 (0.00)	13.63 (0.00)	20.62 (0.00)	17.99 (0.00)
Weak id: Sanderson–Windmeijer *F* stat. (*p*-value)	7.94 (0.00)	6.43 (0.01)	15.26 (0.00)	13.61 (0.00)	20.59 (0.00)	17.97 (0.00)
Underidentification test: Kleibergen–Paap rk LM statistic (*p*-value)	5.01 (0.02)		10.65 (0.00)		16.07 (0.00)	

(*Appendix B continued*)

(*Appendix B continued*)

Characteristics	2012		2015		Fixed Effect	
	Education	Education^2	Education	Education^2	Education	Education^2
	(1)	(2)	(3)	(4)	(5)	(6)
Weak identification test: Cragg–Donald Wald *F* stat.	13.01		24.60		24.63	

Source: Authors calculation using BIHS 2012 and 2015.

Notes: (a) Education is measured in completed years. (b) Distance of School from Home has been used as IV for Education. (c) *p*-Value implies the probability at which the corresponding H_0 can be rejected.

Table A3. Summary of First-Stage Results for Log (Per Capita Consumption).

Characteristics	2012		2015		Fixed Effect	
	Education	Education^2	Education	Education^2	Education	Education^2
	(1)	(2)	(3)	(4)	(5)	(6)
p-Value of Distance	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
p-Value of	(0.00)	(0.47)	(0.00)	(0.00)	(0.00)	(0.00)
Under id: Sanderson-Windmeijer chi-sq stat. (*p*-value)	9.23 (0.00)	7.41 (0.01)	15.93 (0.00)	14.21 (0.00)	21.40 (0.00)	21.38 (0.00)
Weak id: Sanderson–Windmeijer *F* stat. (*p*-value)	9.22 (0.00)	7.40 (0.01)	15.91 (0.00)	14.19 (0.00)	18.70 (0.00)	18.68 (0.00)
Under-identification test: Kleibergen–Paap rk LM statistic (*p*-value)	5.70 (0.02)		11.09 (0.00)		16.68 (0.00)	

(*Appendix C continued*)

(*Appendix C continued*)

	2012		2015		Fixed Effect	
Characteristics	Education	Education^2	Education	Education^2	Education	Education^2
	(1)	(2)	(3)	(4)	(5)	(6)
Weak identification test: Cragg–Donald Wald *F* stat.	14.73		25.20		24.99	

Source: Authors calculation using BIHS 2012 and 2015.

Notes: (a) Education is measured in completed years. (b) Distance of School from Home has been used as IV for education. (c) *p*-Value implies the probability at which the corresponding H_0 can be rejected.

Declaration of Conflicting Interest

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Notes

1. For example, education raises human productivity, and such productivity raises the assets management skills. As a result, if an increase in productivity and skills generates any other incomes, then such returns are treated as the indirect returns to education.
2. A linear line is both concave and convex. Thus, it confirms our claim of inverse U-shaped relationship.
3. Negative *R*-squared implies that the fitted values are worse than average value of the data set. Since the objective is to establish causality, not goodness of fit, negative *R*-squared does not cause major harm.

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Article

Determinants of Off-Farm Labour Participation and Time Allocation: Double-Hurdle Results in the Case of Fiji

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Abstract

This study analyses the determinants of off-farm labour participation decisions of the agricultural households in Fiji. The analysis of joint decision to participate and the amount of time allocated to work is undertaken by using the double-hurdle model based on the Household Income and Expenditure Survey 2008–2009. The results show that household head status, age, marital status, ethnicity and education influence off-farm participation decisions of the farm households. On the households' time allocation decisions towards off-farm income-generating activities, the family size, remittances, income and several types of agricultural outputs influence the labour supply decisions. These households and farm characteristics are important in creating better returns, reducing risks from land constraints and natural disasters, managing income and consumption uncertainties and providing quality farm inputs. The results highlight some important policy implications that would help address low agricultural productivity and render increased support for off-farm income earning activities.

Keywords

Off-farm labour participation, time allocation, double-hurdle model, Fiji

Introduction

Agriculture has been the main source of income and employment for the majority of the low-income households in Fiji since independence in 1970 with a key focus

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being predominantly on farming activities. The employment contribution of the agricultural sector constitutes about 28% in the formal sector with a higher indirect employment share (Fiji Bureau of Statistics (FIBOS), 2016). The agriculture to gross domestic product ratio fell from 14.85% in 2001 to 12.70% in 2008 and declined further to 12.22% in 2013 (FIBOS, 2010, 2016).[1] Fiji's low level of agricultural productivity has been affected by several development challenges, such as limited expansion of arable land, land tenure system, political instabilities and its geographical, socioeconomic and environmental circumstances (Asafu-Adjaye, 2008; Gounder, 2002; Haszler et al., 2010).[2] The agricultural households in resource-poor economies face a complex set of issues that influence their livelihoods and strategies to improve living standards (Ellis, 1993, 2000; Singh et al., 1986; Taylor & Adelman, 2003).

To meet the households' consumption and production demands, the labour market participation as a source of income for many landless and small farm households have compelled households to diversify their off-farm income to improve wellbeing. In this study, we empirically assess the efficacy of labour market participation in Fiji's off-farm economic activities and the factors that influence time allocation decisions of the agricultural households. The behaviour of farm households is therefore influenced by their level of production (i.e., output level, demand for factors, choice of technology), and their consumption decisions (labour supply, commodity demand) that are taken simultaneously. Understanding the households' behaviour is therefore critical when considering the level of government interventions and external changes in the market conditions on rural economy, livelihoods, poverty and the households' decisions on both production and consumption.

A common situation faced by the agriculture-dependent households in Fiji, is the decision to engage in off-farm income-generating activities as a means to improve their farm income and to reduce the risks and uncertainties (Anderson, 1968; Barbour & McGregor, 1998; Low, 1984, 1985). The rural households make a significant input to off-farm income by contributing to food security, which is consumption smoothing achieved by creating better access to food. It also has positive spin-offs on agriculture performance by providing much needed cash to enhance productivity inputs and ease credit constraints. Thus, creating a more dynamic agricultural sector that is capable and aids in further enhancing the scope and scale of off-farm sectors (Ellis, 1998; Food and Agriculture Organisation, 2011; Isgut, 2004; Matshe & Young, 2004; Salazar et al., 2016). As agriculture is Fiji's third largest sector and is vital for economic growth, concerted efforts to address poverty reduction and food security has a wide societal and economic ramification.[3]

Previous studies in the case of Fiji have used small survey samples to observe off-farm income share and employment to explain a range of off-farm activities at the household level. A survey of 227 households comprising of Indo-Fijian farmers by Anderson (1968) indicates that 71% of these farm households obtained their income from outside of farm activities. Low (1984) notes that off-farm income improves the level of income inequality amongst farmers in Fiji. Another

study by Low (1985) on two sugar cane farming areas (Olosara and Cuvu) indicates that income from off-farm employment and economic activities improved the households' standard of living and reduced the level of risk in their total portfolio's income-earning assets.

Attention on the new agriculture for development framework targeted at the rural poor aims to improve their prospects of moving out of poverty by 'focusing on smallholder farming and animal husbandry, employment in the "new agriculture" of high-value products, and entrepreneurship and jobs in the emerging rural off-farm economy' (World Bank, 2008, p. 1). Hence, increasing the productivity and competitiveness of agriculture in general and creating better opportunities for rural off-farm employment and raising the assets and capabilities of small-scale farm households are important initiatives, at both the national and household levels. Some vital actions of new agricultural development focus on innovations in planting of new crops, facilitate smallholders' access to modern marketing chains, improve their interactions and strengthen its success to enhance growth and agriculture development. Hence, coordinated and collective actions for agricultural innovation are crucial through building the capacity of farmers, supporting agricultural organisations and rural development (World Bank, 2012). The participation in and returns from rural non-farm activities provide households an opportunity to earn money. However, Fiji's agricultural sector has faced various challenges in terms of risks from land constraints, adverse effects of droughts and cyclones, uncertainties in households' income-consumption, quality of farm inputs and declining agriculture contribution. The determinants of Fiji's off-farm labour participation analysis fill the current gap in the literature on small islands' agricultural sector, particularly on the lack of focus on households' decisions to participate in off-farm income-generating activities.

The key question addressed in this study, using the household level data, analyses the determinants of off-farm labour participation decisions of the agricultural households in Fiji, which is further disaggregated by gender. As no previous empirical analysis on the determinants of off-farm labour participation has been undertaken in the case of small island developing state, this study contributes to the quantitative investigation using the household income and expenditure survey (HIES) data set. We examine the income diversification behaviour of agricultural households that integrates the decisions applied to a microeconomic analysis on Fiji's rural economy. Various characteristics of the participants, farm, family, gender, ethnicity and the off-farm employment-related spatial factors indicate the unique covariates that explain off-farm labour participation decisions of the households. The use of a double-hurdle approach demonstrates two separate decisions that explain the results of agricultural households that determine off-farm participation (first hurdle: whether to participate in labour market) and the labour supply decisions (second hurdle: hours of work). The underlying empirical model addresses some important implications for the demand for labour, wages and earnings and the role of a dynamic rural economy that are integral in addressing the development of targeted agricultural policies and rural off-farm income generating activities.

Literature Review

The agricultural household model was developed by Chayanov in 1923 and applied by Nakajima in 1957 (cited in Ellis, 1993), and it noted the behaviour of farm households that could be understood using a household-firm framework. This model extended and formalised by Becker (1965), shows the time allocation of household members when labour has an opportunity cost and its utility is derived not only by market goods but also by the household-produced goods and total household time endowment. The model extended by Barnum and Square (1979) considered the agricultural household models as the basis of a new-classical farm household model. De Janvry et al. (1991) have further developed this model under the assumption of missing or incomplete markets.

In dealing with risk smoothing and income variability, an individual will participate in the off-farm work when his/her reservation wage is lower than the off-farm wage rate (Benjamin & Guyomard, 1994). Thus, in a farm household, the adult male and female jointly decide on the household consumption (C), and their time endowment (T) between farm work, off-farm work and leisure (l) (Benjamin & Guyomard, 1994; Matshe & Young, 2004). The household produces agricultural products on fixed land using labour, seeds and other inputs (fertilisers, pesticides). As such, the household's maximisation problem, linked to utility function, indicates the production level, time and income constraints (Matshe & Young, 2004).

The first order conditions of farm household model provide a system of supply and demand functions that formulate labour allocation decision between different agricultural and non-agricultural activities (de Janvry et al., 1991). The marginal rate of substitution between consumption and leisure is equal to the ratio of wage rate and price of consumption goods. For an individual household member, the off-farm labour participation decision is based on the comparison of market wage rate and the individual's reservation wage.[4] For the variables that increase both the likelihood of off-farm participation and the amount of off-farm working days allocated, the outcome is *a priori* uncertain. Given the welfare-enhancing role of off-farm income in the agricultural households, engaging labour in off-farm activities is important for their livelihood and long-term private investment.

The households involved in agriculture, particularly in the resource-poor economies, face a complex set of issues that influence their livelihoods and livelihood strategies (Singh et al., 1986; Taylor & Adelman, 2003). They often consume at least a small portion of their own output, and the household labour is often an important input into the production process. The households are characterised by a mixture of both production activities (the level of output, the demand for factors and the choice of technology) and consumption activities (labour supply and commodity demand). Their household assumption of perfect market (referred as separable household model), combines the consumer and producer model into a single model, where the production decisions are independent of consumption and how much total labour would be used in their own farm to maximise profits from farm production (Singh et al., 1986). Second,

the level of utility is maximised by choosing between the different levels of consumption and leisure, given the level of profits realised. The agricultural households are also willing to participate in off-farm employment activities as long as the off-farm wage rate is greater than the marginal value of farm labour (Taylor & Adelman, 2003). However, due to market imperfections the separable assumption collapses as the households' consumption decisions are affected by production decisions.

The off-farm income in many developing countries is aimed at reducing poverty and hunger and ensuring that environmental sustainability needs look beyond the households' agricultural activities (Barnum & Square, 1979). Thus, off-farm activities can play a direct and significant role by contributing to household income and indirectly by shaping agricultural activities, which have implications on the sustainability of natural resources. These reduce the pressure on the household, as they have alternative sources of off-farm income. Barrett et al. (2001) propose a three-way classification of off-farm income, and it includes sectors, locations (rural-urban areas) and self-employment or wage labour.[5] These categories allow the examination of rural households' dependence on local or more distant economies, inter-sectoral linkages, rural and urban linkages and the importance of remittances.

The major risks in agriculture have been classified as production risk, prices or market risk, financial risk, institutional risk and human or personal risk (Organisation for Economic Co-operation and Development, 2009). The personal risk is associated with problems of health/personal relationships that may affect the operation and success of farm businesses (accident, illness, death, wildlife damages, pest infestations, events of fire and theft). The institutional risk arises from uncertainties in government policies and actions, whereas the financial risk refers to the risk facing a farm business that borrows money and the obligations to repay these loans (interest rates, credit constraints and other hidden costs for acquiring loans). The price or market risk relates to price fluctuations of both produced commodities and production inputs, which may vary from country to country or commodity to commodity. The analysis on how fertiliser subsidies affect farmer demand for commercial fertiliser has been investigated using the double-hurdle model applying panel data from Malawi (Ricker-Gilbert et al., 2011). In addition, a study by Okoffo et al. (2016) has utilised the double-hurdle model to examine the cocoa farmers' willingness to pay for crop insurance.

Several empirical studies have reported that a high degree of farm income variability is associated with risks of various forms in the developing countries.[6] Townsend (1994) observes high yearly fluctuations in output value of major agricultural crops per unit of land, based on the 10-year panel data for one of the three International Crops Research Institute for Semi-Arid Tropics villages in India. Bliss and Stern (1982) show that a two-week delay in the onset of production is associated with a 20% decline in yields in Palanpur village. Several ways in how rural households in developing countries mitigate rural sector risks are associated with their income earnings. It includes making conservative production decisions and employment choices and diversifying economic activities through

participation in off-farm employment. In addition, the households smoothen their consumption by borrowing and saving, depleting and accumulating of the financial assets, adjusting labour supply and employing the formal/informal insurance arrangements to insulate consumption patterns from income variability during the after-shock period.

The literature on farm household income diversification and off-farm labour employment has focused on various factors that affect their participation behaviour. Using the factors that influence off-farm decisions of husbands and wives from French agricultural households, Benjamin and Guyomard (1994) find that age, education, household composition and farm characteristics contribute to off-farm labour participation. In addition, the young wives are more likely to engage in off-farm work than their older counterparts, and the number of children decreases the likelihood of a wife's participation in off-farm labour market, which in turn increases her reservation wage. Higher education levels of farm operators and their spouses correlate to higher off-farm participation, and the male farm operators are more responsive to farm characteristics than their wives.[7] Off-farm activities in rural Mexico show that education, ethnic origin and regional off-farm employment are the primary determinants of off-farm participation (de Janvry & Sadoulet, 2001). Higher levels of education enable the household members to partake in more remunerative off-farm activities and increase their participation in income-generating activities, thus reducing poverty and income inequality.[8] An analysis on the environment and demographic factors has been explained using the double-hurdle model of health effects in Indonesia (Irianti & Prasetyoputra, 2017).

Using a bivariate Probit approach, Abdulai and Delgado (1999) analysed the determinants of cash-income-oriented off-farm work participation decisions of farm households (husband and wife) for Northern Ghana. They found a positive effect on the probability of labour supply to the off-farm sector at younger ages, and a decline in off-farm participation at older age. In addition, education and experience are essential in raising off-farm earnings influencing time allocation of rural families and diversifying the rural economy away from agriculture. Beyene (2008) uses a similar econometric approach for individual, household and locational characteristics in Ethiopia, and notes that education levels of the household head have no effect on off-farm work decisions, as most of the off-farm activities do not require formal education. Health condition of a household is found to be a crucial factor that affects time allocation decision. Similar results are also noted in Western Ethiopia (Bedemo et al., 2013) and Kenya (Mathenge & Tschirley, 2015).[9] An analysis on the determinants of household petrol and diesel expenditures in Ireland has been estimated utilising the double-hurdle model (Eakins, 2016) indicates that households living in urban areas spend money on public transport and those who do not possess a car will spend less on both petrol and diesel to households with higher number of cars, more occupants working, and those with higher levels of household spending will spend more on petrol and diesel.

Methodology and Data

The off-farm labour participation hypothesis evaluated for Fiji's agricultural households using the HIES 2008–2009 data set includes 6,094 persons from 1,201 agricultural households. Applying the double-hurdle model includes two sets of off-farm participations to address an individual household's decision to participate in off-farm work (first hurdle) and the factors that influence the number of days allocated to off-farm income-generating activities (second hurdle). The next set of specifications assess the gender impact of these households on participation in off-farm activities.

Estimation Method

An individual will participate in off-farm work when his/her reservation wage is lower than the off-farm wage rate (Benjamin & Guyomard, 1994; Matshe & Young, 2004). The farm household's adult male and female members jointly decide the household consumption (C) and time endowment (T) between farm work, off-farm work and leisure (l). The household's maximisation problem is derived from the utility function based on production constraint, time constraint and income constraints defined as follows:

$$\text{MaxU} = U(l_m, l_f, V_m, V_f, V_h, A) \tag{1}$$

where lm and lf are leisure time of adult male and female, Vm and Vf are vectors of individual characteristics, Vh is a vector of household characteristics and A includes other farm fixed inputs. Equation (1) is subjected to the following constraints:

$$\text{Production constraint}: \quad Q = Q\left(L_F^j, X\right), \left(j = m, f\right)$$

$$\text{Time constraint}: \quad T^j = L_F^j + L_{OF}^j + l^j, \left(L_F^j \geq 0, L_{OF}^j \geq 0, l^j \geq 0\right)$$

$$\text{Income constraint}: \quad P_c C = P_q Q + w\left(T - l\right) + K$$

where Q is the quantity of farm outputs, X is a vector of production inputs except labour, T is labour time endowment between farm work (L_{F}), off-farm work (L_{OF}) and leisure (l), P_{c} and P_{q} are the prices of consumptions goods and farm outputs, Q_{c} is the quantity of goods and services consumed by the household, w is wage rate and K represents the off-farm labour income and m and f refer to male and female participant, respectively.

The first order conditions noted by de Janvry et al. (1991) applied in this analysis, indicate the marginal rate of substitution between consumption and leisure for off-farm labour participation decisions. This is based on the comparison of market wage rate (w) and the individual's reservation wage (w_i^j). To analyse

what motivate an individual household member to engage in off-farm work and what factors influence the number of days allocated to off-farm employment, the double-hurdle regression model is adapted.[10]

The double-hurdle model with independent error terms considers the participation decision d^*, and the level of participation (days) y^* as a linear function of first-hurdle regressor x_1 and the second-hurdle regressor x_2, respectively, as follows:

$$d^* = x_1'\beta_1 + \varepsilon_1, \varepsilon_1 \sim N(0,1) \tag{2}$$

$$y^* = x_2'\beta_2 + \varepsilon_2, \varepsilon_2 \sim N(0, \sigma^2) \tag{3}$$

where β_1 and β_2 are the parameter vectors to be estimated. Given the assumption that the error terms are normally distributed in the double-hurdle model the inverse hyperbolic sine (IHS) transformation of the observed dependent variable is frequently applied and the λ represents an additional parameter (Burbidge et al., 1988; Yen & Jones, 1997).

The IHS double-hurdle model considers two aspects of the decision-making process for participations in off-farm employment or economic activities where the likelihood function of the independent IHS double-hurdle model takes the following form:

$$L = \coprod_{i\in\Omega_0}\left\{1-\Phi\left(x_1\beta_1\right)\Phi\left(\frac{x_2\beta_2}{\sigma}\right)\right\}\times\coprod_{i\in\Omega_1}\left\{\frac{1}{\sqrt{1+\lambda^2 y^2}}\Phi\left(x_1'\beta_1\right)\frac{1}{\sigma}\phi\left[\frac{T(y)-x_2'\beta_2}{\sigma}\right]\right\} \tag{4}$$

where $\Omega_0 = \{i|y_i = 0\}$, $\Omega_1 = \{i|y_i \neq 0\}$ and $\Omega_0 \cup \Omega_1 = \{1,2,\ldots,N\}$. In Equation (4), when λ equals to zero, the likelihood function reduces to that of independent double-hurdle model (Blundell & Meghir, 1987; Cragg, 1971). The likelihood function of the IHS double-hurdle has been applied along with estimating the marginal effects of the two decision making process. The joint maximum likelihood estimation in Equation (4) shows the probability to participating (first hurdle) and the number of off-farm days (second hurdle); for details see (Hamilton, 2013).

The Probit model is applied for the first hurdle (Wooldridge, 2009) followed by the truncated regression analysis for the second hurdle (Cragg, 1971; Greene, 2008). An alternative approach to the double-hurdle model is the Tobit model. Tobin's (1958) assumption noted that the same probability mechanism generates both the zero and positive values. However, there is a possibility that zero and positive values are generated by different decision mechanisms (Atamanov & van den Berg, 2012). Several studies point out that double-hurdle model provides a better fit by relaxing Tobit model assumptions, and note that estimates under maximum likelihood estimation procedure are more efficient and capture other desirable properties (see Atamanov & van den Berg, 2012; Matshe & Young, 2004 and literature cited therein).

The model identification and estimation checks apply three model adequacy tests to examine the two-part participation decision-making process. The first test

of relevance is the estimation of Tobit restriction likelihood ratio (TRLR). The TRLR tests the joint log likelihood λ values of the double-hurdle model (i.e., Probit estimation in the first-hurdle and truncated regression techniques in the second-hurdle) and Tobit model. As such, the Tobit model will be rejected in favour of the double-hurdle mode if the estimated λ value is greater than the critical value of the chi-square (Greene, 2008). The second test, pseudo *R*-square shows the goodness of fit for participation (binary) model. The third Heckman (1979) selection model tests for robustness check for first-hurdle decision process by excluding the exogenous variables in the off-farm labour time allocation equation (second hurdle). We excluded the variables that could have substantial impacts on the probability of off-farm participation decision (first hurdle), and it may not directly affect off-farm time allocation, thus an individual's disability status (disable) and socio-economic status (decile3 and rooms) are excluded (Table 2).[11] The double-hurdle model allows for separate hurdles that reflect (binary) participation decision and (continuous) off-farm working days. The uncorrelated error terms of stochastic processes of participation and the level of participation decisions reflects the two independent models.[12]

The non-linear regressions apply two dependent variables to capture the factors that influence one's decisions on off-farm participation and the completed number of off-farm working days in 2008–2009 year.[13] Once the decision is made to participate in off-farm activity, a truncated regression estimates the number of working days an individual allocates for off-farm employment (second hurdle). The dependent variable takes the value of one if an individual participates in off-farm work, and zero otherwise (first hurdle). The dependent variable in the second-hurdle decision process is the number of working days an individual allocates to off-farm work. The zero observations of off-farm labour days may arise for a number of reasons. First, an individual may not be a participant in the labour market because of personal preferences, inadequate qualifications or disabilities. Second, some individuals may be off-farm potential workers who chose not to work at the current level of economic climate and incentives. Third, it is possible that an adult member of an agricultural household undertakes off-farm work on an infrequent basis due to other household commitments. Such 'off-participation' decisions considered here are in addition to corner solution outcomes. Thus, the double-hurdle models best explain the participation decisions, determined by the different stochastic processes.

Data and Descriptive Statistics

Based on the literature, various socio-economic and demographic indicators for off-farm labour participants are utilised to investigate the core hypotheses (see Table A.1, variable definitions). The household characteristics are categorised by farm, location variables and gender. The latest available HIES 2008–2009 data set consists of a total of 3,573 households (16,815 persons) from each of the 15 provinces.[14] The total number of persons identified as on-farm participants is 6,094 persons from 1,210 agricultural dependent households (Table 1). The

off-farm participants spent on average 32 days on non-farm income generating activities in 2008–2009, and are mostly engaged in casual or temporary contracts in line with their designated farming cycle. In addition, the households produce more than one agricultural product and at least one member engages in some form of non-farm paid employment.

The individual characteristics include age, age square, ethnicity, marital status, education (level of schooling) and being the head of household (see data definition in Appendix A). On the gender basis of agricultural households from 1,845 persons identified as off-farm labour participants, 1,439 are male and 406 female adults. The education level of an individual averages to almost 10 years. On average 70% of the participants are married, and the average age is 40 years. The ethnic and gender-participant groups consist of 75% Fijian males and 21% Indo-Fijian males, and 81% are Fijian females and 14% Indo-Fijian females.

Table 1. Agricultural Households' Off-Farm Participants, Economic and Social Characteristics.

	Off-Farm Participants (1,845)		Male (1,439)		Female	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Age	39.81	13.68	39.80	13.83	39.87	13.15
Age^2	1772.06	1181.31	1774.90	1193.90	1761.98	1136.92
Fijian	0.76	0.42	0.75	0.43	0.81	0.39
Indo_Fijian	0.20	0.40	0.21	0.41	0.14	0.35
Married	0.70	0.46	0.71	0.45	0.67	0.47
Schooling	9.90	3.79	9.83	3.77	10.18	3.85
Hhld_Head	0.51	0.50	0.62	0.49	0.12	0.33
Size	5.64	2.48	5.64	2.48	5.61	2.46
Infant	0.08	0.12	0.08	0.12	0.08	0.12
Child	0.11	0.14	0.11	0.14	0.12	0.14
Youth	0.13	0.15	0.12	0.15	0.14	0.16
Elderlies	0.08	0.15	0.08	0.15	0.08	0.16
Disable	0.01	0.10	0.01	0.10	0.005	0.07
Decile3	0.40	0.49	0.41	0.49	0.35	0.48
Hhld_Exp	2661.89	1983.55	2557.04	1780.23	3033.51	2546.31
Income_NL	1195.00	1174.03	1147.95	1082.32	1361.77	1442.48
Income_Farm	1032.53	1084.50	1072.34	1129.86	891.40	892.63
Remittances	0.26	0.44	0.25	0.43	0.30	0.46
Welfare	0.08	0.27	0.07	0.26	0.09	0.28
Rooms	0.71	0.55	0.72	0.52	0.72	0.66
FFV	0.39	0.49	0.38	0.48	0.44	0.50
Root crops	0.53	0.50	0.55	0.50	0.48	0.50

(Table 1 continued)

(Table 1 continued)

	Off-Farm Participants (1,845)		Male (1,439)		Female	
Variable	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Livestock	0.33	0.47	0.31	0.46	0.38	0.49
Rice	0.02	0.15	0.02	0.15	0.03	0.16
Sugarcane	0.12	0.32	0.13	0.34	0.06	0.24
Ownership	0.92	0.27	0.92	0.27	0.91	0.28
Wage	27.46	1.57	27.53	0.73	27.21	3.04
Central	0.24	0.43	0.22	0.41	0.32	0.47
Northern	0.27	0.44	0.29	0.45	0.20	0.40
Western	0.30	0.46	0.30	0.46	0.29	0.45

Source: Authors' estimation.

Notes: Values in parentheses are the number of observations used in the truncated second-hurdle model. FFV = fresh fruit and vegetables; Hhld_Head = head of household; Hhld_Exp = mean annual household expenditure; Income_Farm = farm income per adult equivalent; Income_NL = non-labour income.

The farm household is characterised by size and composition, status of household head, level of household consumption and assets (i.e., off-farm income, farm income, remittances and welfare payment recipients), household living conditions and types of agricultural products a household grows. The off-agricultural daily mean wage rate (wage) is based on 2007 data, ranging from F$24.39 for the manufacturing sector to F$33.58 in the utility sector (FIBOS, 2013). The mean household size, number of children (infant, child, youth), number of elderlies and rooms are distributed quite evenly by the gender of household head. This confirms that agricultural households are homogenous. In terms of disability (disable), 32 males and 12 females have some degree of disability, while 41% of the male and 35% female participants are from the bottom three household income deciles (decile3).[15] In the case of agricultural development in India, Michler (2020) points out that agriculture output has increased despite more households engage in off-farm labour.

The mean annual household expenditure (Hhld_Exp) for male off-farm participants is F$2557.04 and F$3033.51 for the female group. Male participants earn on average F$1147.95 from off-farm activities, whereas female participants receive about F$1361.77 (Income_NL). The farm income per adult equivalent (Income_Farm) of male and female group is F$1,072.34 and F$891.40, respectively.

In terms of receiving financial assistance, 25% male and 30% of female participants are from the remittance-recipient households, while 7% of the male and 9% female participants are from the government welfare-recipient households. In all, 90% of the participants own their dwelling, and a similar ownership proportion is shown for both male and female participants. A larger ratio of male participants is from the sugarcane and root crops households. The female proportion makes up a larger number of the fresh fruit and vegetables (FFV), livestock and rice producing households.

The mean off-agricultural daily wage to a male member is paid slightly more (F$27.53 per day) than a female participant (F$27.21 per day), this, non-agricultural daily mean wage rate is provided by FIBOS (2013). The agriculture value added per worker shows that agricultural productivity per worker (constant US$2000) has declined from $191.47 in 1987 to $149.26 in 2007 (FIBOS, 2013).[16] The location variable by provinces (Central, Northern and Western areas) indicate that a higher percentage of off-farm male participants are from the Western and Northern divisions, while most of the female participants are from Central and Western areas.

Empirical Results

A decision on whether to participate in off-farm income-generating activities (Probit results) and how many off-farm working days (the level of participation) an individual spends on this activity (truncated and Heckman results) are reported for all participants (Table 2) and by gender (Table 3) which provides robust results.[17] Test result of TRLR (TRLR=622.16) strongly rejects the hypothesis that all participation and off-farm labour supply allocation decisions are based on the same set of decision process (Table 2). The insignificant Heckman selection likelihood ratio (HSLR) test value (0.11) suggests that off-farm participation and labour supply allocation are two independent decisions made by an individual. The TRLR estimates for male (414.76) and female (82.66), and HSLR values (0.001 and 0.43) are indicative of using double-hurdle model (Table 3).

Off-Farm Decisions: Overall

The first set of results (Table 2) for all off-farm labour participants show that age and age square (Age^2) coefficients are important factors in both the decision-making process. For labour participation, the probability of off-farm work increases for younger members and the Age^2 captures the opposite effect (first hurdle). The negatively significant Age^2 coefficient in the second-hurdle labour supply allocation decision indicates that older participants reduce the number of off-farm days. The estimated ethnicity coefficients for Fijian and Indo-Fijian workers do not affect off-farm participation decisions; however, in terms of the level of labour participation, the Fijian participants tend to significantly reduce their labour supply allocation, while the Indo-Fijian coefficient though positive, is insignificant. marital status (married) has significant negative impacts on both the decisions.[18] The first hurdle shows that married workers are highly unlikely to engage in off-farm work compared with single members; this may be due to their domestic commitments. For the off-farm labour supply days' decision, the married workers significantly reduce their number of working days.

The schooling coefficient significantly increases the participation decision of workers in off-farm activities. For the labour supply allocation (second hurdle),

though the coefficient is negative it is not significant. While rural off-farm jobs may not require higher educational levels, the average schooling years is about 10 years (Table 1), thus it does not significantly reduce the duration of off-farm employment. The finding implies that the participants' level of education enhances their adaptability and capability in the range of tasks they perform in off-farm work where the case of learning by doing provides work experience and expertise.

Being the head of household increases the likelihood of engaging in off-farm work, though it does not significantly affect the number of days worked in off-farm activities. The larger household size contributes positively to the probability of higher participation as well as labour supply in off-farm jobs. The second-hurdle marginal effect of size coefficient shows that participants from larger families are likely to have more labour time allocated to off-farm work compared to smaller families. A 10% increase in household size would increase off-farm participation decision by 0.04%, and a 2.9% and 1.9% increase in the probability of farm households' labour supply allocation in off-farm income-generating activities (or an increase in the Probit index by 0.001 standard deviation). Okoffo et al. (2016) indicate that age, marital status and education positively influenced cocoa farmer's willingness to pay insurance for their farms, while the household size and cropped area negatively influenced the farmers' willingness to insure their farms.

The effect of the number of infant and youth in the household does not affect one's decision in taking up off-farm work or the level of participation. However, the households with a larger number of children between the age of 5 and 10 years (child) are less likely to engage in off-farm work. This may reflect the greater time commitment of the participants, especially women as caregivers. The estimated interactive term female × infant has a negative and significant impact on the probability of engaging in off-farm work and the level of participation, implying that domestic commitments are an important determinant of females' participation decisions. Low yield of cocoa production leads to various risks that affect the livelihoods of smallholder farmers, thus worsening unemployment and poverty (Okoffo et al., 2016). Moreover, they note that crop failure results in children's dropping out of school and poor health and nutrition of the family as a whole.

The estimated elderly and disable coefficients though positive are insignificant in the two participation decision-making models. The farm households ranked in the bottom three-income deciles (decile3), a proxy for socio-economic status, show a negative impact on both the likelihood of off-farm participation and the number of days worked. Thus, the individuals from these lower-income households are relatively worse-off and less likely to participate in off-farm jobs. However, when they do take part in off-farm income-generating activities their labour supply is significantly less compared to those from the relatively higher-income households. The disable, decile3 and rooms variables are excluded in the hurdle two Heckman selection model to estimate if an individual suffers from some form of discrimination or social exclusion. The truncated model shows that the decile3 coefficient is negative and significant implying that individuals may be discouraged or excluded from participating in off-farm economic activities due to their low socio-economic status. Thus, being economically disadvantaged leads to

fewer opportunities available for those who are poor. Demographic factors of the households have significant health effects in Indonesia (Irianti & Prasetyoputra, 2017). On the behavioural differences of farm households, a study by Weltin et al. (2017) note that young farm holders with organic production are more likely to diversify activities in the on-farm activities, while diversifies and part-time farm holders are least likely to diversity farm activities.

The Hhld_Exp coefficient is positively insignificant for the participation decision model; however, an increase in the level of household expenditure increases the participants' off-farm labour time. The marginal effect shows that a 10 percentage point increase in household consumption would contribute a 0.04 percentage point rise in off-farm labour time or one unit increase in household expenditure would lead to an increase in the Probit index by 0.004 standard deviation. The off-labour income (Income_NL) is negative and insignificant. The Income_Farm coefficient per adult equivalent is negative and statistically significant for both the likelihood of off-farm participation and the level of participation. Thus, as the farm income increases by 10% (or by 1 unit), it reduces to the probability of taking part in off-farm income-generating activities by 0.01% (or a decrease in the Probit index by 0.001 standard deviations, see Wooldridge (2009) on the interpretation of marginal effects of Probit regressors by standard deviation equal to the magnitude of the coefficient). It also contributes to the likelihood of reducing labour time in off-farm work by 0.04%. This is consistent with the work of Matshe and Young (2004) rendering support to the argument that the probability of off-farm income participation reduces the ability to increase agricultural output and therefore agricultural income. The study by Ricker-Gilbert et al. (2011) find that on average a one additional kilogram of subsidised fertiliser crowds out 0.22 kg of commercial fertiliser, and that crowding out range from 0.18 among the poorest farmers to 0.30 among the relatively non-poor farmers.

The remittance recipient households' coefficient for the participation decision though positive is insignificant; however, it significantly reduces off-farm labour time allocation compared to non-recipient households. The marginal effect of remittances (second hurdle) shows that the households receiving remittances are likely to reduce labour time allocated to off-farm work. As such, a 10% increase in remittances would decrease off-farm participation decision by 0.03%, and a 1.5% and 1.3% decline in the probability of farm households' labour supply allocation in off-farm income-generating activities (or a decrease in the Probit index by 0.001 standard deviation). This supports the view that remittances assist in easing farm households' income constraints as they reduce the need to undertake off-farm activities. The result is consistent with the consensus by a number of studies that remittances to rural households have contributed directly to their income and indirectly to crop production and diversification (Adams, 1996; de Brauw et al., 2001). The government's welfare support has an insignificant impact on off-farm participation and labour supply decision. This suggests that welfare assistance may not be sufficient to meet the required expenditure share; therefore, the workers are inclined to participate in off-farm jobs to increase their income levels.

Table 2. Double-Hurdle Models for Overall Participants, HIES 2008–2009.

	Hurdle One Off-Farm Participation Probit Regression		Hurdle Two Level of Participation			
			Truncated Regression		Heckman Regression	
Explanatory Variable	*Z*-Statistic (*P*-value)	Marginal Effect	*Z*-Statistic (*P*-value)	Marginal Effect	*Z*-Statistic (*P*-value)	Marginal Effect
Age	8.04 (0.000)***	0.0070	1.34 (0.18)	0.1127	1.07 (0.28)	0.0865
Age^2	–8.74 (0.000)***	–0.0001	–2.04 (0.04)	–0.0020	–1.7* (0.08)	–0.0016
Fijian	–0.16 (0.87)	–0.0018	–2.72 (0.01)***	–2.6212	–2.84 (0.000)***	–2.4927
Indo-Fijian	1.24 (1.24)	0.0191	0.11 (0.93)	0.1206	0.18 (0.85)	0.1863
Married	–2.53 (0.011)**	–0.0148	–2.28 (0.02)**	–1.1462	–2.12 (0.03)**	–0.9825
Schooling	1.72 (0.08)*	0.0011	–0.76 (0.45)	–0.0377	–0.74 (0.46)	–0.0339
Hhld_Head	11.99 (0.000)***	0.1367	0.7 (0.48)	0.3576	0.43 (0.67)	0.2313
Size	3.53 (0.000)***	0.0042	3.02 (0.003)***	0.2883	2.27 (0.02)**	0.1935
Infant	1.5 (0.13)	0.0430	0.83 (0.48)	1.5753	0.79 (0.43)	1.3724
Female × infant	–3.6 (0.000)***	–0.1245	–1.69* (0.09)	–5.3004	–1.56 (0.12)	–4.4679
Child	–2.52 (0.012)**	–0.0435	–1.27 (0.20)	–1.8038	–1.21 (0.23)	–1.5567
Youth	–1.33 (0.18)	–0.0229	1.47 (0.14)	1.9662	1.27 (0.21)	1.5571
Elderly	1.06 (0.27)	0.0166	0.29 (0.77)	0.4147	0.28 (0.78)	0.3543
Disable	0.16 (0.87)	0.0050	0.61 (0.54)	1.1541		
Decile3	–2.75 (0.006)***	–0.0147	–3.22 (0.001)***	–1.3894		
Rooms	–1.41 (0.16)	–0.0068	1.31 (1.31)	0.5192		
Hhld_Exp	1.35 (0.17)	0.0001	2.87 (0.004)***	0.0004	3.99 (0.000)***	0.0005
Income_NL	–1.56 (0.12)	0.0001	–0.73 (0.47)	–0.0002	–0.65 (0.51)	–0.0001
Income_Farm	–2.52 (0.01)**	–0.0001	–2.33 (0.02)**	–0.0005	–1.77* (0.08)	–0.0003
Remittances	0.57 (0.56)	0.0030	–3.52 (0.000)***	–1.5047	–3.39 (0.000)***	–1.3010

(Table 2 continued)

(Table 2 continued)

	Hurdle One Off-Farm Participation Probit Regression		Hurdle Two Level of Participation			
			Truncated Regression		Heckman Regression	
Explanatory Variable	*Z*-Statistic (*P*-value)	Marginal Effect	*Z*-Statistic (*P*-value)	Marginal Effect	*Z*-Statistic (*P*-value)	Marginal Effect
Welfare	0.95 (0.34)	0.0082	–0.98 (0.32)	–0.7099	–1.12 (0.27)	–0.7188
FFV	3.2 (0.001)***	0.0161	–3.05 (0.002)***	–1.1720	–3.18 (0.000)***	–1.1207
Root Crops	–1.71 (0.08)*	–0.0092	0.33 (0.0.74)	0.1428	0.29 (0.77)	0.1165
Livestock	0.56 (0.57)	0.0030	–3.26 (0.001)***	–1.3929	–3.14 (0.002)***	–1.2075
Rice	0.29 (0.77)	0.0064	2.39 (0.02)**	2.9895	2.22 (0.03)**	2.6053
Sugar	–0.79 (0.0.43)	–0.0083	2.02 (0.04)**	1.4925	2.38) (0.02)**	1.6374
Ownership	–1.32 (0.19)	–0.0143	–0.79 (0.47)	–0.5371	–0.86 (0.39)	–0.5386
Wage	24.24 (0.000)***	0.0095	3.27 (0.001)***	1.0089	2.91 (0.000)***	0.3869
Central	–0.33 (0.79)	–0.0020	0.01 (0.99)	0.0031	0.21 (0.84)	0.1087
Northern	6.72 (0.000)***	0.0619	4.32 (0.000)***	2.5523	4.14 (0.000)***	2.3085
Western	8.96 (0.000)***	0.1053	7.24 (0.000)***	4.3541	6.56 (0.000)***	3.9036
Constant	–14.18 (0.000)***		–1.37 (0.17)		1.18 (0.24)	
Rho:					–0.33	
Pseudo-R^2:	0.6984					
No. Observation:	6094		1845			
Log-likelihood:	–1127.048		–6149.926		–7318.591	
Log-likelihood of Tobit Model:			–7588.055			
Tobit restriction likelihood ratio test:			622.162**			
Heckman model selection likelihood ratio test:					0.11 (0.741)	

Source: Authors' estimation.

Notes: ***, ** and * are significant at 1%, 5% and 10% levels, respectively, and the critical values for *Z*-statistic at the 1%, 5% and 10% levels are 2.58, 1.96 and 1.65, respectively. The *p*-values are in parenthesis. The 5% significance level for TRLR is $\chi^2_{(30)} = 43.77$, and HSLR is $\chi^2_{(0.05,1)} = 3.81$. FFV = fresh fruit and vegetables;

Hhld_Head = head of household; Hhld_Exp = mean annual household expenditure; Income_Farm = farm income per adult equivalent; Income_NL = non-labour income.

A production mix of cash crops of FFV, root crops, livestock, rice and sugarcane represents the main agricultural outputs in the case of Fiji. The estimated positively significant FFV coefficient indicates that agricultural households have family members undertaking off-farm work.[19] However, the negatively significant FFV coefficient for labour supply suggests that households reduce their off-farm labour supply days. It suggests that participants pulled back from off-farm activities during the harvesting season. The negatively significant coefficient from the traditional root crops workers show that they are less likely to engage in off-farm activities. It implies that they tend to generate cash income from market sales and income from exports for this agricultural output.

The participants involved in rice and sugar production significantly reduce their labour supply off-farm days. The positive rice and sugarcane coefficients are insignificant for the decision to participate in off-farm work; however, those who participate in off-farm activities tend to significantly increase labour supply time to maximise household income. This increase in labour time allocation on off-farm activities are due to a decline in rice and sugarcane productions since 2000, owing mainly to land lease constraints. These farm households thus engage in an alternative off-farm employment.[20] The marginal effects estimated in the truncated and Heckman models show that a one-unit increase in the rice plantation increases the likelihood of off-farm working days by 2.99% and 2.61%, respectively, and in the sugarcane households it rises by 1.49% and 1.64%, respectively.

The impact of dwelling ownership does not have a significant effect on off-farm participation and labour time allocation decisions. The off-agricultural daily wage coefficients are positively significant for both the off-farm participation and labour supply allocation decisions. These results are consistent with the findings by Bedemo et al. (2013). The higher wage rate and earnings from off-farm activities indicate that off-farm wages positively contribute to off-farm participation by 0.01% (or an increase in Probit index by 0.001 standard deviation), and the likelihood of raising off-farm labour time by 1.01% as the off-agricultural wage rate increases by 1% (or one-unit increase in Probit index).

The estimated Northern and Western coefficients are significant for the farm-households located in these divisions, and these households participate more in off-farm income-generating activities and allocated more labour supply days. Both these divisions have a larger number of sugarcane farms and the participants are mainly from the farming communities. The availability of more off-farm jobs and the improvements in rural areas in these regions (better roads, transportation and communication) have improved access to off-farm jobs.[21] Tourism sector is the largest industry in the Western division that supports many households by expanding service sector employment and income through labour supply in off-farm activities. The central coefficient is negative and insignificant for the participation decision, and positively insignificant for the number of days allocated to off-farm work. To gain a better understanding of the participation and labour allocation behaviours by gender, we next present the off-farm employment results by male and female participants.

Off-Farm Decisions: Results by Gender

The computed TRLR test values confirm the relevance of separate double-hurdle model estimations by male and female adults.[22] The estimated results by gender (Table 3) indicate differential impacts for the two decision-making processes based on the individuals, farms and location variables. The younger (Age) male and female participants have significant impacts on both their decisions to participate in off-farm work and increase their labour supply. The older females' (Age^2) labour supply decline significantly compared to older male participants. The Fijian males' decision to participate in off-farm activities is positive and insignificant, and they tend to significantly reduce their number of off-farm working days. The estimated coefficient for the Fijian females' decision to engage in off-farm activities is negative and insignificant as their labour supply allocation. Indo-Fijian males significantly increase their likelihood to engage in off-farm jobs while the Indo-Fijian females' participation decision coefficient is negatively insignificant, and their time allocation decision is positively insignificant.

The married male members have a higher likelihood of participation in off-farm activities than married females; it confirms that domestic commitments determine female members' participation level. Both the gender-household heads indicate positive impacts on the decision-making process to participate in off-farm income-generating activities. In addition, the female members' education (positive and significant schooling coefficient) increases the likelihood to engage in off-farm work. A 10% increase in the schooling level increases off-farm participation decision by 2.6% (or an increase in the Probit index by 0.001 standard deviation).

For the household composition (size) coefficient (Table 3), a female member from a large family has a higher tendency to engage in off-farm participation to that of male counterpart, while the male members of larger households are more likely to allocate a higher number of labour supply days. The positive insignificant infant coefficients do not alter both genders' behaviour to off-farm participation and labour time allocation decisions. The number of children aged between 5 and 10 years (child) significantly reduce both the decisions of females' off-farm participation and labour supply time. The likelihood of increasing working days allocated to off-farm activities for the males increases with the number of older children (youth) aged between 11 and 17 years. Both youth and fewer dependents in the family increase the households' capacity to increase their off-farm labour supply. The positive elderly coefficients are insignificant for both genders' participation decision. The marginal impact of female participants shows a weak positive significant increase in off-farm employment.

Disability coefficients are insignificant for the male and female members. Both the gender groups from lower-income brackets are relatively worse-off (decile3) in terms of participation in off-farm activities, and the male members spend less time than those from relatively high-income households for labour supply allocation. The households' living standard (rooms) reduces the male members' participation level and increases labour supply time. The Hhld_Exp coefficient for females' participation increases as the level of household expenditure rises;

Table 3. Off-Farm Labour Participation and the Level of Participations for Male and Female Adults, HIES 2008–2009.

Variable	Hurdle One Off-Farm Participation Probit Regression				Hurdle Two Level of Participation							
					Truncated Regression		Heckman Regression		Truncated Regression		Heckman Regression	
	Male		Female		Male				Female			
	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect
Age	7.36***	0.020	4.38***	0.001	0.86	0.077	0.89	0.0807	1.33	0.304	0.83	0.176
Age^2	–7.77***	–0.001	–4.36***	–0.001	–1.32	–0.001	–1.31	–0.0013	–1.69*	0.005	–1.15	–0.003
Fijian	1.18	0.037	–1.12	–0.003	–2.05**	–2.214	–2.23**	–2.2574	–1.15	–2.446	–1.03	–1.901
Indo-Fijian	2.82***	0.154	–1.01	–0.002	0.61	0.730	0.78	0.8835	0.31	0.780	0.39	0.858
Married	2.03**	0.047	–2.02**	–0.003	–1.43	–0.877	–1.34	–0.7682	–1.11	–1.427	–1.06	–1.181
Schooling	0.05	0.001	2.56***	0.001	–0.94	–0.050	–0.8	–0.0402	0.15	0.019	–0.2	–0.023
Hhld_Head	2.01**	0.058	3.99***	0.038	–0.5	–0.349	–0.51	–0.3323	–0.61	–1.125	–1.05	–1.832
Size	0.08	0.001	2.81***	0.001	2.66***	0.288	1.60*	0.1563	1.11	0.254	0.95	0.191
Infant	0.13	0.010	0.05	0.002	1.12	2.119	1.08	1.9037	–1.02	–4.184	–0.98	–3.396
Child	–0.24	–0.014	–1.72*	–0.01	–0.43	–0.660	–0.53	–0.7463	–1.96**	–7.023	–1.59	–4.801
Youth	–0.54	–0.031	–0.22	–0.001	2.19**	3.226	1.92*	2.6542	–0.14	–0.441	–0.1	–0.284
Elderlies	0.08	0.004	0.36	0.001	–0.52	–0.814	–0.46	–0.6579	1.59	5.404	1.45	4.134
Disable	0.03	0.002	0.2	0.003	1.07	2.052			–0.04	–0.232		
Decile3	–2.04**	–0.036	–2.19**	–0.003	–3.47***	–1.608			–0.73	–0.780		
Rooms	–2.31**	–0.036	0.21	0.001	2.62***	1.191			–0.83	–0.727		
Hhld_Exp	–1.06	–0.001	2.98**	0.001	2.50**	0.001	3.96***	0.0007	1.73*	0.001	1.24	0.001
Income_NL	–0.92	–0.001	1.39	–0.001	–0.86	–0.001	–0.93	–0.0002	–0.42	–0.001	–0.25	–0.001
Income_Farm	–3.87***	–0.001	–0.57	–0.001	–1.58	–0.001	–0.88	–0.0002	–2.37**	–0.001	–2.34**	–0.001
Remittances	–0.81	–0.014	1.6	0.002	–2.96***	–1.363	–2.72***	–1.1599	–1.95*	–1.973	–2.17**	–1.876
Welfare	0.54	0.0158	0.48	0.001	–1.13	–0.880	–1.26	–0.9026	–0.35	–0.608	–0.52	–0.741
FFV	2.47***	0.0400	2.49**	0.0028	–1.47	–0.5985	–1.68*	–0.6411	–3.85***	–3.670	–4.0***	–3.321

(Table 3 continued)

(Table 3 continued)

Variable	Hurdle One Off-Farm Participation Probit Regression				Hurdle Two Level of Participation							
					Truncated Regression		Heckman Regression		Truncated Regression		Heckman Regression	
	Male		Female		Male				Female			
	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect	Z-Statistic	Marginal Effect
Root Crops	–0.9	–0.0158	–1.79*	–0.0021	–0.83	–0.3976	–0.91	–0.4026	1.94*	2.020	2.10**	1.910
Livestock	–0.71	–0.0121	1.64*	0.0020	–3.07***	–1.4121	–2.97***	–1.2626	–1.47	–1.525	–1.59	–1.403
Rice	–1.88*	0.0001	1.33	0.0001	0.41	0.0002	0.29	0.0001	2.16**	0.002	2.13**	0.002
Sugarcane	–0.3	0.0001	–1.56	–0.0001	0.79	0.0001	0.85	0.0001	–1.44	–0.001	–1.15	–0.001
Ownership	–0.59	–0.0192	–1.95*	–0.0060	0.11	0.0818	0.04	0.0311	–1.55	–2.393	–1.39	–1.985
Wage	11.96***	0.0254	17.74***	0.0012	1.45	1.3645	2.00**	0.5369	2.70***	1.011	1.06	0.250
Central	–2.55**	–0.0471	2.94***	0.0049	0.77	0.4992	0.92	0.5461	–1.42	–2.016	–1.56	–2.049
Northern	2.8***	0.0678	6.2***	0.0221	5.47***	3.4083	5.75***	3.2857	–0.25	–0.390	–0.76	–1.360
Western	4.63***	0.1378	7.72***	0.0347	8.09***	5.1279	8.11***	4.8568	1.69*	2.525	0.59	1.138
Constant	–9.76***		–9.29***		–0.89		0.01		–0.84		1.23	
Pseudo-R^2	0.723		0.620								0.69	
Rho							0.03					
No.			2890		1439				406			
observation	3204											
LR	–609.91		–4759.23		–4759.23		–5398.61		–1357.65		–1821.35	
LR Tobit Model					414.76**				–1894.43			
Tobit Restriction LR Test									182.66**			
Heckman Model Selection LR Test							0.0001 (0.98)				0.43 (0.51)	

Source: Authors' estimation.

Notes: ***, ** and * are significant at the 1%, 5% and 10% levels, respectively. Critical values for Z-statistical significance levels at the 1%, 5% and 10% levels are as follows: 2.58, 1.96 and 1.65, respectively.

Critical value for at the 5% significance level for TRLR test = 43.77. The *p*-values in parenthesis are the Heckman model selection LR test. FFV = fresh fruit and vegetables; Hhld_Head = head of household; Hhld_Exp = mean annual household expenditure; Income_Farm = farm income per adult equivalent; Income_NL = non-labour income; LR = Likelihood ratio.

the marginal effect shows that a 10% increase in household consumption leads to a 0.05% increase in off-farm labour time.

The off-farm income does not influence both genders' decisions on off-farm participation and labour supply time. The negatively significant Income_Farm coefficient of male members suggest that as farm income increases by 10%, it reduces their likelihood of engaging in off-farm work by 0.01% and also reduces the female's off-farm labour allocation by 0.01%. The Remittances recipient households reduce their participation in off-farm income-generating activities, and the marginal effect is higher for females (–1.97) than male members (–1.36), as remittances provide extra financial support to ease the constraints of households' income. The government welfare assistance does not significantly affect both genders' decisions on off-farm participation and labour supply allocation.

The male and female members producing FFV crops significantly increase their participation in off-farm income-generating activities, while the female participants significantly reduce the amount of labour supply than their male counterparts. For the households producing traditional root crops, the female participants are less likely to engage in off-farm work than the males from the same household type. The females allocate more working days to generate income from off-farm activities. For those from the livestock farming households, the female members' off-farm participation increases, while the male participants on the other hand allocate significantly less off-farm labour working time. The negative Rice coefficient suggests that females from these households significantly reduce their participation while those involved in off-farm activities increase their labour supply allocation. Both the gender groups from sugarcane households do not actively participate in off-farm employment and labour supply allocation. The property-owning characteristic (ownership) does not affect both the decisions on off-farm activities.

The results of off-agricultural daily wages for the male and female off-farm participation show that a 1% increase in off-farm daily wage rate increases the probability of their off-farm participation by 0.254% (or 0.0254 standard deviations) and by 0.012% (or 0.0012 standard deviations), respectively. The females on the other hand significantly allocate more labour time for off-farm work. The location characteristic shows that females in the Central division are more likely to engage in off-farm income-generating activities than the males. In the Northern division, both gender members are more likely to be involved in off-farm income generating activities. However, the male participants allocate higher levels of off-farm labour time than female members do. In the Western division, both the gender participants take part in off-farm activities and allocate significantly higher number of working days as this division has a higher tourism job opportunity.

Conclusion

A two-stage double-hurdle model is used to examine the level of participation and hours of work decisions for Fiji, and provide some key insights into labour market decisions of the agricultural households. Based on the micro-level analysis, the Probit, and truncated and Heckman results show various socio-economic

characteristics that have differential impacts on the households' off-farm labour participation and supply allocation decisions. An increase in off-farm work is important in the rural areas to address the effects of low agricultural productivity. As off-farm income forms an essential source of earnings of farm households, the disaggregated gender results show various influential factors affecting female participants' decisions on income-generating activities.

A key finding is that a decline in farm income significantly increases the household's participation in off-farm income-generating activities. As education, household head status, gender, age, marital status and family size characteristics influence the off-farm participation decisions, policies could entail providing incentives to the households to participate in non-farm activities by developing the rural economy as a whole. The customary land ownership has led Fijian males to reduce their labour supply, while Indo-Fijian males who mainly lease land increase the decision to participate in off-farm jobs. The public-private sector support for higher wages in the manufacturing and services will tend to influence the households' decisions to allocate more labour time towards employment. The participation and labour supply decisions mainly due to a culturally collective decision impacts both the Fijian and Indo-Fijian females' lower involvement in off-farm employment. Women's participation is crucial which can be facilitated by accessing into the wage-earning agro-industry and services sectors, as developing countries evidence show that microenterprises provide fewer opportunities to advance the progress of women.

The seasonal nature of crops-production influences the decision to engage in off-farm employment, thus rural households with productive assets have the capacity to diversify into off-farm employment. The results confirm that lower farm income stimulates both off-farm participation and labour supply allocation. Other vital finding is that household locations contribute to higher incidence of participation in the Northern and Western divisions in off-farm activities. Targeted policies to support investments, obtain secure land lease, strengthen agriculture extension and research, promote marketing of the niche tropical products can expand income-earning capacity and financial capability of the households so they can start viable and sustainable income-generating farm activities. Farm household characteristics of adults and youth in the households and remittances ease income constraints on the farm households, utilisation of this income can assist in crop diversification and purchase of farm inputs. Policies are to aim at promoting modern agriculture development and enhance the developmental impact of households and the economy.

As evidence that agricultural households' off-farm higher income earnings and wage rate contribute to a higher level of participation in off-farm jobs, expanding the skills development programmes would increase wage employment in the rural sector. As an increase in participation in off-farm employment mitigates income risks, and developing of rural labour markets, financial services, technology and social capital through an increase in women's participation are important to improve wellbeing and rural development. Policies are necessary to improve farm income and employment levels crucial for agriculture diversification, increasing agricultural productivity and the nexus of agro-based industry clusters in achieving increased farm production for the tourist industry, exports and attaining sustainable growth.

Appendix

Table A1. List of Variables and Definitions.

Variables	Definition
Dependent variables	
OF_Part	Off-farm labour participation (Yes = 1, No = 0)
OF_Day	Off-farm labour time allocated (completed number of days in 2008–2009 year)
Explanatory variables	
Individual characteristics	
Age	Age of the household member (completed years)
Age^2	Age squared
Fijian	The household member is Fijian (Yes = 1, No = 0)
Indo_Fijian	The household member is Indo-Fijian (Yes = 1, No = 0)
Married	The household member is married (Yes = 1, No = 0)
Schooling	Number of years of schooling of individual member (completed years)
Hhld_Head	The household member is the household head (Yes = 1, No = 0)
Household and farm characteristics	
Size	Household size (number of people)
Infant	Proportion of children below the age of 5 years in the household
Female	The person is female (Yes = 1, No = 0)
Female × Infant	The interaction of gender and the number of infants in the household
Child	Proportion of children between the age of 5 and 10 years in the household
Youth	Proportion of children between the age of 11 and 17 years in the household
Elderly	Proportion of the adults aged 60 years and above in the household
Disable	The member of household is disabled (Yes = 1, No = 0)
Decile3	Household in the bottom three income deciles (Yes = 1, No = 0)
Hhld_Exp	Household expenditure per adult equivalent (in F$ per annum)
Income_NL	Household non-labour income (in F$ per annum)
Income_Farm	Household farm income per adult equivalent (in F$ per annum)
Remittances	Household receives remittances either from overseas or within the country (Yes = 1, No = 0)
Welfare	Household receives government welfare (Yes = 1, No = 0)
Rooms	Ratio of the number of rooms per adult equivalent in the household

(Table A1 continued)

(Table A1 continued)

Variables	Definition
FFV	Household grows fresh fruit and vegetables (Yes = 1, No = 0)
Rootcrops	Household grows root crops (Yes = 1, No = 0)
Livestock	Household rears livestock (Yes = 1, No = 0)
Rice	Household grows rice (Yes = 1, No = 0)
Sugar	Household grows sugar crops (Yes = 1, No = 0)
Ownership	Household owns the dwelling (Yes = 1, No = 0)
Wage	Off-agricultural daily wage rates (in F$ per day)
Location characteristics	
Central	The member lives in the Central division (Yes = 1, No = 0)
Northern	The member lives in the Northern division (Yes = 1, No = 0)
Western	The member lives in the Western division (Yes = 1, No = 0)

Source: Variables are derived from HIES 2008/09 dataset.

Notes: FFV includes banana, pineapples, watermelon, beans, cabbage, cucumber, copra, eggplant, pumpkin, tomato and yams. Root crops include cassava, dalo and yagona, and the livestock includes fish farming, rearing of cattle, pig and goat and poultry farming.

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Notes

1. Decline in agriculture to gross domestic product share has been due to reductions in sugar production (Prasad & Narayan, 2003), the adverse effects of coups in 2000, besides a reduction in rural population from 52% in 2000 to 48% in 2008.
2. See an earlier study by de Boer and Chandra (1978). The adverse growth performance from 1987 to 2010 period was marked by political instability, financial economic crisis and natural disasters (Gounder & Xing, 2012). Rural poverty of 35% in 2002–2003 increased to 37% in 2008–2009 (Narsey et al., 2010).
3. Since the deregulation of product market in 1988, Fiji has pursued a policy of trade liberalisation and structural reform that became part of the economic reform agenda (Gounder, 2002).
4. A person may participate in off-farm work if the difference of expected off-farm labour income between the off-farm wage rate and reservation wage is greater than zero.

The variables that raise the reservation wage (endogenous variable) tend to reduce the probability of off-farm labour participation, while variables that raise the off-farm wage rate increase the probability of seeking off-farm employment (exogenous variables).

5. Barrett et al. (2001) and Reardon et al. (2001) note various reasons that lead to the households engaging in several off-farm activities.
6. Small-holder farmers face a high degree of income instability and risk due to the variability of weather, yields, prices, government policies, global markets and individual-specific shocks (Alderman & Paxson, 1992; Bliss & Stern, 1982; Dercon, 2002; Morduch, 1995; Newbery & Stiglitz, 1981; Townsend, 1994).
7. Education plays a vital role in the decision on labour time allocation of the households (Huffman, 1992).
8. The effects of education are different depending on the type of off-farm activities in Nicaragua (Corpal & Reardon, 2001). Similarly, land scarcity and access to roads have an effect on the households' off-farm participation decision. Fafchamps & Quisumbing (2003) find that education raises off-farm productivity and induces rural households to shift labour resources from farm to off-farm activities in Pakistan.
9. Other country-specific off-farm labour participation studies include Zimbabwe (Matshe & Young, 2004), rural households in Shandong province of China (Huang et al., 2009), rice farmers in Taiwan (Chang & Wen, 2011), agricultural household in Kyrgyz Republic (Atamanov & van den Berg, 2012) and households in rural Poland (Falkowski et al., 2014).
10. Using the double-hurdle regression model developed by Cragg (1971), the estimation in the case of developing nations extended the model to address the labour decisions of rural agricultural households (see empirical studies by Atamanov & van den Berg, 2012; Bedemo et al., 2013; Beyene, 2008; Matshe & Young, 2004; Scharf & Rahut, 2014; Shi et al., 2007, and the literature cited therein).
11. The rationale is that from the social perspective an individual may be excluded from off-farm participation due to his/her disability and low socioeconomic status. Barry (1998, cited in Stewart et al., 2007, p. 76) notes that 'groups be considered socially excluded if they are denied the opportunity of participation, whether they actually desire to participate or not.' See also Haggblade et al., 2007.
12. The exclusion restrictions are not required for a separate identification of stochastic process of independent double-hurdle model (Blundell & Meghir, 1987).
13. See Table A.1 for definitions.
14. The 2013–2014 HIES data set is not available for the purpose of academic research yet, as far as Fiji government agency concerns.
15. Number of rooms indicate the standard of living of the household. Disability variable takes into consideration any level of discrimination in accessing non-farm income generating activities.
16. Agriculture productivity is the value added of final agriculture output less value added of intermediate inputs.
17. On the agrarian households off-farm earnings determinants, disaggregating by gender between and within the households explain the differentials in labour allocation behaviour (Abdulai & Delgado, 1999; Matshe & Young, 2004).
18. This result supports the view that Fiji is a collectivistic society; hence, it is a normal practice to have an individualistic decision made by the household members and communities.
19. FFV households with a short interval time between sowing and harvesting undertake off-farm activities.

20. Sugarcane household workers in the Western division also participate in tourism activities to improve their income, and those in the Central division where rice is mainly produced find employment in off-farm activities.
21. Narsey et al. (2010) note that in 2003–2009 period, an estimated 42% share of poverty alleviation resources were injected in the Western division, 28% in the Northern division and Central division had 24%.
22. TRLR test values of 414.76 and 182.66 reject Tobit models. Insignificant HSLR test *p* values of 0.98 for males and 0.51 for females accept the null hypothesis that off-farm participation and labour time allocation are two independent decisions.

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Article

Can Organic Agriculture Feed the Smallholders? Experience from Rural Bangladesh

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Abstract

This study empirically tests the benefit of the smallholders from organic farming in Bangladesh through their improved food security which is realised from their increased productivity and farm income. The respondent smallholders were picked up from two districts of Bangladesh namely Mymensingh and Bogra. The respondents (80) were the beneficiaries of the organic agriculture promotion project of Bangladesh Agricultural University. Three years data were collected by the project staff and were crosschecked with the base line. Findings of the study explored that before joining with the project extreme majority (93%) of the small farmers were involved in rice mono-culture and more than half (67%) of them were food deficit. The study also revealed that at the initial year of joining organic agriculture project their farm productivity was 10–12% lesser and it increased continually in the successive years. In some cases, it crossed the yield compared to conventional farming. The findings of the study showed that 100% of the farmers have followed crop diversification with high value vegetables and spices along with rice. Due to adoption of organic practices, the cost of production of the smallholders has declined from 27% to 36% and additionally they enjoy 10% to 15% premium prices which have enhanced their farm income significantly. The study shows that 62.5% of the smallholder farmers had attained household food security due to adoption of organic agriculture. Thus, adoption of organic agriculture effectively increased smallholders' access to surplus safe food. However, the study also explored that farm size, extension media contact, access to assured market and access to institutional support are the most

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important factors in improving smallholders' household food security through participation in organic agriculture programme. Thus, it can be concluded that organic agriculture can feed the smallholders in a better way.

Keywords

Organic farming, farm income, food security, smallholders farmers in Bangladesh

Introduction

Throughout the history, people of different cultures have recognised the wonderful relationship between food and health. Many people believe that what we eat affects the way we feel and behave. Thus, without good quality (safe and nutritious) food it is nightmare to think about healthy nation which is one of the pillars of sustainable development goal (GoB, 2012). Bangladesh is a small agrarian country of 170 million people in the South-Asia, struggling with poverty and malnutrition along with an imminent threat posed by global climate change (BBS, 2017). A study by the World Bank (2016) showed that 35% of the country's rural population live below poverty line and another 29% of the rural population live close to the poverty line income. Among the smallholders (holding less than 1.0 ha land) who make 88.5% of the country's farming community (BBS, 2014) are vulnerable to various risks and shocks, and they are pushing hard to realise the potential of agriculture to enhance their livelihood. The agriculture is the key to its economy in terms of meeting the demand for food of its huge population (BBS 2016). Although the overall economy is largely dependent on the industry and service sectors, agriculture still remains the lifeblood for this economy. Agriculture has been functioning as a catalyst for sustainable development and growth of the country for long (Rahman, 2017).

To overcome these sorts of risks and challenges of agriculture and to enhance their farm production, the small farmers in Bangladesh are mostly dependent on costly agrochemicals. However, the large-scale as well as non-judicious use of agro-chemicals by the farmers has been affecting the country's natural habitat and species for long time. It has led to soil nutrient depletion, loss of biodiversity, potential health hazards, environmental pollution and other socio-economic problems (Ferdous et al., 2020; Sarker & Itohara, 2009). The soil of the country is losing its fertility gradually due to over and inefficient use of agro-chemicals in raising its crops. In some places, soil organic matter content has been reduced up to 0.5% while the acidity of the soil has also been increased (SRDI, 2014). However, it can be understood that chemical-based agricultural system of the country is aggravating environmental degradation considerably, while environmental degradation was the cause of 5–10% of the GDP cost of the country and environmental health impacts account for around 20% of the total burden of diseases (Bangladesh Environment Strategy Review, 2008).

From the microeconomic perspective, it has been argued that improving productivity, profitability and sustainability of smallholder farming is the main pathway to reduce poverty in the developing countries (World Bank, 2008). However, in the recent years the price hiking of farming inputs is considered as the severe problem to the majority of the smallholders in the country, thereby increasing crop production costs and leading them into debt (Sarker & Itohara, 2010). However, the International Federation of Organic Agriculture Movements (IFOAM, 2015) defines organic agriculture as a production system that maintains soil health, ecosystems and humans. Organic production system is one that addresses both macroeconomic aspect relating sustainability and microeconomic aspect of economic incentives with a high profitability. According to Lampkin (1990), organic agriculture can be defined as 'an approach to agriculture which aims at social, environmental and economic sustainability and animal welfare by minimizing the use of external resources, maximizing the locally-derived renewable resources and agro-ecosystem management and using market to compensate for internationalizing external costs'. Organic agriculture has three dimensions—social, economic and environmental. These three dimensions can improve food security of the farm families (FAO, 2016).

In the social dimension, organic agriculture requires more compact work and has the potential to contribute to long-term employment in rural areas. Organic agriculture plays the vital role in employment generation due its labour-intensive nature. It promotes entrepreneurship and decreases rural migration. Thus, it enables new and different groups in the society to be involved in agricultural activities that helps to improve employment (Ward & Reynolds, 2013). Additionally, organic agriculture is a sustainable and environmentally friendly production system that offers poorer communities a wide range of economic, environmental and social benefits. Though it produces lesser yield compared to conventional agriculture in its conversion period (Bawden, 2014). However, organic agriculture can increase productivity and income, thus helps to improve food security. Food security means having adequate physical and economic access to enough safe and nutritious food to meet people's needs for a healthy and active life (FAO, 2013). There are a significant number of economic opportunities that lead to increase the added value of organic products through processing and marketing activities and the improvement of food security in the long-run (Bahramian & Mirdamadi, 2011).

Having all sorts of positive impacts of organic agriculture on food security and rural livelihood, there is a strong debate that organic agriculture can feed the world or not? According to Smil (2001) organic agriculture can feed only half of the people of the world. On the other hand, Willer and Yussefi (2007) recommend that organic agriculture is useful to poorer as it can give purposeful socio-economic and ecologically sustainable development. This study takes into consideration the arguments put forwarded on the debate of the benefit of organic agriculture and empirically test the benefit of the smallholders from such farming in Bangladesh through their improved food security which is realised from their increased productivity and farm income. More specifically, the study addresses two related questions. First, does organic agriculture serve as the means of

household food security of the smallholder farmers? Second, whether organic agriculture can contribute to improved food security of the small farmers, then what factors are responsible for this?

Data and Estimation Method

Study Location and Sampling

The study was conducted at Kamarpara village of Sajahanpur *upazila* (sub-district) from Bogra district and Ujankashiarchar village of Gouripur *upazila* (sub-district) under Mymensingh district of Bangladesh (Figure 1). The study followed a participatory action research and was performed under research project entitled 'Fostering Women Voices through Videos in Bangladesh' funded by Centre for Development Research, University of BOKU, Austria. The study was jointly implemented by the Department of Agricultural Extension Education of Bangladesh Agricultural University, Mymensingh and Rural Development Academy, Bogra.

The reasons for selecting these two areas were purposive. The selected areas are very fertile for vegetable cultivations and farmers of these areas were used to with huge amount of chemical pesticides utilisation in vegetable cultivation. Thus, with the view of changing their attitude towards pesticide free vegetable production, the project was implemented in the selected areas.

The project introduced organic agricultural practices (i.e., vermi-composting, preparation and use of botanical pesticides and crop rotations in high value vegetables and spices cultivation and create market linkages) among the smallholder farmers through video-mediated extension from 2010 to 2012. A summary of the project interventions are shown in Table 1.

Due to time and resource constraints the research team worked with farmers' group (formed with representative sample) rather than the population. There were about 500 households in the selected two villages. The household heads (Hh) of the selected villages were considered as the population of the study. From these population 16% of the respondents were selected as sample of the study. Thus, the 80 Hh constituted the sample of the study. The research team visited the selected areas several times to identify the interested and relevant farmers for forming the group. Consulting with the local extension agents of the Department of Agricultural Extension the sample farmers were selected finally. Following criteria were taken into consideration while selecting farmers for the project:

- Resource poor
- Should be either small or marginal farmers
- Should be keen to learn climate change issues
- Should have interest to participate in organic agriculture programme and to cultivate organic vegetables following environmentally friendly farming practices
- Should have readiness to work in a group
- Should have preparedness to provide data to the research team whenever they needed

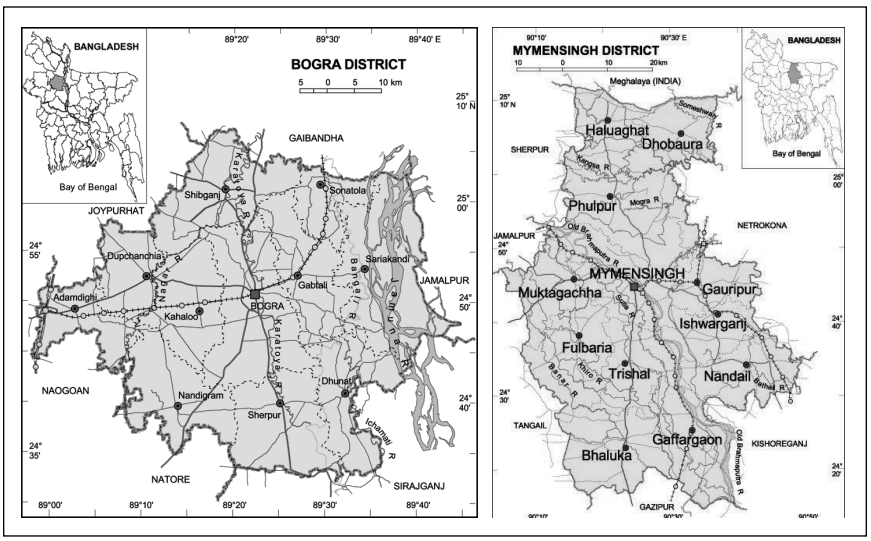

Figure 1. Study Areas of Bogra District (left) and Mymensingh District (right).

Source: Bogra district Wikipedia and Mymensingh district Wikipedia.

Table 1. Summary of Project Interventions.

Interventions	Specific Activities
1. Group formation	• Consultation meeting with stakeholders • Group discussion (farmers' group)
2. Participatory research	• Experimentation on botanical pesticide • Experimentation on vermi-compost
3. Video development	• Script writing, filming, editing • Video demonstrations in wider communities
4. Farmers' training	• Video-mediated learning sessions for building blocks of capacity building processes (video demonstration). • Day-long learning session on vegetable cultivations following organic methods
5. Linking with market	• Training on grading and packaging • Introducing with potential buyers

Source: Project data source.

Following the above-mentioned guidelines finally two groups were formed consisting of 40 members in each group.

Data were collected from the respondent organic farmers once in a year by the research team using structured interview schedule keeping in view the research objectives. The study compared the household food security status of the intervention groups based before and after scenario. Collected data were coded, categorised and analysed accordingly. For analysing data, SPSS v.16 software was used.

Table 2. Detailed About the Sample Size and Formation of Farmers' Group.

District/Sub-district	Name of the Village	Types of Group	Number of Farmers in Each Group
Bogra-Shajahanpur	Kamarpara	Mixed group	F 08 M 32
Mymensingh-Gouripur	Ujankashiarchar	Mixed group	F 08 M 32
	Total		80

Source: Project data source.

Note: F, female; M, male.

Estimation Method

Descriptive statistics like mean, standard deviation and percentage were used to describe the data. While binary logistic regression analysis was used to explore the factors responsible for explaining household food security of the smallholder organic farmers due to adoption of organic vegetable cultivation. The dependent variable of the study was dummy dependent (1 for household having surplus food production and income improvement and 0 otherwise). The logistic model is used to estimate the probability of a binary response based on one or more predictor variables. Logistic regression is a classification algorithm used to find the probability of event success and event failure. It is used when the dependent variable is binary (0/1, True/False, Yes/No) in nature. Logistic regression is easier to implement, interpret and can easily extend to multiple classes (multinomial regression) and a natural probabilistic view of class predictions. However, it has major limitations of assumption of linearity between the dependent and the independent variables. Mathematically, logistic regression estimates a multiple linear regression function defined as

$$\text{logit.}\,(p) = \log\left(\frac{p(y=1)}{1-(p=1)}\right) = \beta_0 + \beta_1 - x_2 + \beta_2 - x_2 + - + \beta_p - x_{\min}$$

for $i = 1 \ldots n$

The study deal with the following 10 independent variables:

Name of the independent variables	Unit of measurement
Age	Actual years
Education	Year of schooling
Household size	Number of the persons
Farm size	Hectare
Family labour force	Number of the persons
Ownership of cattle	Number of cattle
Extension media contact	Scale score
Training received on OA	Number of days
Access to assured marketing	Dummy (1 for having access to assured market and 0 otherwise)
Having institutional support	Dummy (1 for having institutional support and 0 otherwise)

Descriptive Statistics of the Respondents

For getting a clear scenario about the respondent farmers, their socio-economic profile has been calculated carefully and presented in Table 3. In the structured questionnaire sufficient questions were incorporated to analyse their socio-economic profile. Data presented in the Table 3 show that the average age of the respondent farmers was 39.72 years. The average household size of the respondent farmers was 5.45. The average household size was 5.48 and 5.42 in case of farm families of Bogra and Mymensing, respectively. However, the average household size of the study area is a bit higher than the national average of 4.89 (BBS, 2016).

Table 3 also shows that the average farm size of the respondent farmers was 0.38 ha and it was relatively larger among the farmers of Bogra. The average annual farm income of the respondent farmers was 81.01 thousand BDT (Bangladeshi Currency; US$1 = ~80 BDT). Like farm size, farmers of Bogra had better average annual farm income compared to Mymensingh. As presented in Table 3, about one-fifth of the respondents are female while rest are male. The mean educational score of the respondent farmers was 4.75 along with a standard deviation of 3.30. It is demonstrated that a little less than half (45%) of the respondent farmers had primary education and one-third (32.5%) of them had secondary education. However, a significant portion (19%) of the respondents were illiterate. This is smaller than the national adult illiteracy rate of 27.24% (UNESCO, 2016). It is also evident that in terms of educational qualification, the farmers of Bogra district were relatively better than Mymensingh.

Table 3. Salient Features of Selected Characteristics of the Respondent Farmers.

	Respondent Farmers (n = 80)		
Characteristics	Bogra	Mymensingh	All Farmers
Age (mean ± *SD*) (years)	39.77 ±7.44	39.68±6.01	39.72 ± 6.72
Household size (mean ± *SD*)	5.48±3.18	5.42±1.17	5.45± 1.25
Farm size (ha) (mean ± SD)	0.40±0.16	0.36±0.17	0.38± 0.16
Annual farm income ('000' BDT) (mean ± *SD*)	83.55±28.85	78.48±13.38	81.01± 22.45
Gender	20.0	20.0	20.0
Female (%)	80.0	37.0	80.5
Male (%)			
Education	5.15±3.24	4.42±3.40	4.75±3.30
Illiterate (%)	15.0	22.5	18.75
Primary (%)	45.0	45.0	45.0
Secondary (%)	35.0	30.0	32.5
Above secondary (%)	5.0	2.5	3.75
Ownership of cattle (mean ± *SD*)	3.75±1.8	2.7±1.8	3.2±1.88
Family labour force (mean ± *SD*)	1.9±0.97	2.05±1.01	1.98±0.98
Training on OA (mean ± *SD*)	2.12±1.22	1.7±1.07	1.52±1.41
Extension contact (mean ± *SD*)	8.57±2.08	8.58±3.29	8.37±2.66

Source: Project data source.

Note: OA, Training on organic agriculture.

Descriptive statistics also reveal that the mean cattle ownership of the respondent farmers was 3.2 along with a standard deviation of 1.88. However, the mean cattle ownership of the farmers of Bogra is found higher than that of Mymensingh. However, the average number of family labour forces of the farm families had 1.98. It is exhibited in Table 3 that, in terms the family labour forces, farmers in Mymensigh were relatively better than Bogra. The average score of training on OA was 1.52 associated with a standard deviation of 1.41. It is clearly demonstrated in Table 3 that farmers of Bogra had received more training on OA compared to Mymensingh. While the average score of extension media contact of the farmers of Bogra and Mymensingh was almost similar.

Findings of the Study

Main findings

Impact on the yield

The project introduced organic vegetable cultivation practices among the respondent farmers of Bogra and Mymensingh. After getting necessary training on preparation and use of vermi-compost and botanical pesticide, the selected farmers had started to grow a number of high value vegetables in their family farm. From the project record it was confirmed that the farmers of both places cultivated eight selected vegetables. The selected vegetables were brinjal (*Solanum melongena*), beans (*Phaseolus vulgais*), bottle gourd (*Lagenaria siceraria*), cabbage (*Brassica oleracea var. capitata*), cauliflower (*Brassica oleracea var. botrytis*), carrot (*Daucus carota*), spinach (*Spinacia oleracea*) and tomato (*Solanum lycopersicum*). The yields of the selected vegetables were recorded year-wise and compared with the previous year of adoption of organic agriculture and are presented in Figures 2 and 3.

It is clearly demonstrated in Figure 2 that five vegetables out of the selected eight vegetables showed a yield declination in the first year among the farmers of Bogra. However, there was highest yield declination in the case of brinjal (2%) and lowest declination was in the case of cauliflower. On the contrary, yield enhancement occurs continually in the succeeding years. Figure 2 also explored

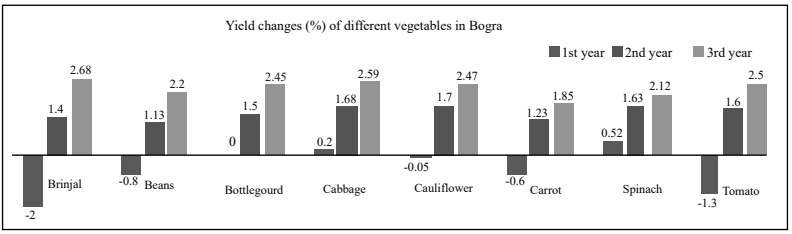

Figure 2. Year-wise Yield Changes of Selected Vegetables in Bogra.

Source: Project data source.

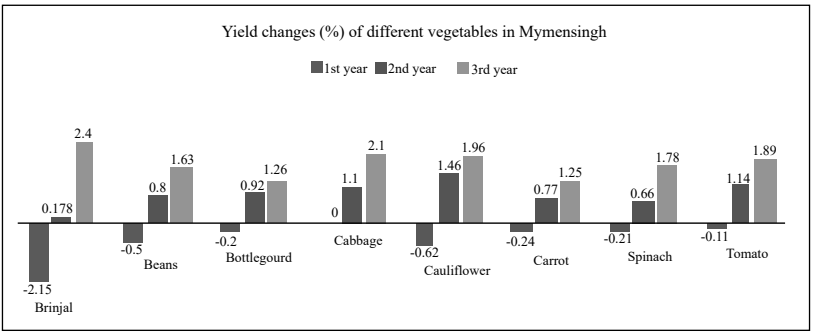

Figure 3. Year-wise Yield Changes of Different Vegetables in Mymensingh.

Source: Project data source.

that the highest yield enhancement was attained in the case of brinjal (2.68%), followed by cabbage (2.59%), tomato (2.5%) and cauliflower (2.47%). However, in the case of Mymensingh seven vegetables out of eight selected vegetables showed yield declination in first year and only cabbage showed stable yield performance compared to previous year (Figure 3). On the other side, all of the selected vegetables showed yield enhancement in second and third year, respectively.

It is shown in Figure 3 that the highest yield improvement was observed in the case of brinjal (2.4%) followed by cabbage (2.1%), cauliflower (1.97%) and tomato (1.89%). However, carrot showed least (1.25%) yield improvement among the farmers of Mymensingh. The findings of the study is supported with the findings of the studies of Yadav et al. (2013) and Sharma and Mitra (1990).

Impact of Organic Farming on the Income of the Farmers

The main purpose of introduction of any enterprise among the people of the farming community is to contribute in improving their farm income. Keeping this purpose in mind, organic agriculture programme was promoted in two selected villages of Bogra and Mymensingh districts. Organic agriculture contributed in improving farmers' income through reduction of cost of production, ensuring premium price as well as enhancing farm production (Figures 2 and 3 and Tables 4 and 5).

Table 4. Contribution of Organic Agriculture on Reduction of Cost of Production and Price Premium Enjoyment by the Farmers.

	Reduction of Cost of Production (%)			Premium Price Enjoyment (%)		
	Minimum	Maximum	Mean	Minimum	Maximum	Mean
Bogra	27	36	31.3	10	15	12.4
Mymensingh			27.5			11.6
All farmers			29.4			12.0

Source: Project data source.

Table 5. Farm Income of the Respondent Farmers (000' BDT).

	Average Farm Income in (000' BDT)			
	First Year	Second Year	Third Year	Income growth (%)
Bogra	56.23	65.33	83.55	48.59
Mymensingh	54.12	57.24	78.48	45.01
All farmers	55.18	61.29	81.01	46.81

Source: Project data source.

Table 4 shows that the respondent farmers had gained 27–36% reduction of cost of production due to adoption of organic agriculture with the mean score of 29.4%. On the other hand, the respondent organic farmers had enjoyed 10–15% premium price with an average of 12% premium price. However, respondent organic farmers of Bogra were in better position in terms of reduction of cost of production and getting premium price. However, due to getting price premium, yield enhancement and reduction of cost of production respondent organic farmers had enjoyed substantial income improvement from organic vegetable farming (Table 5).

Table 5 showed that organic farmers had enjoyed continuous income improvement due to adoption of organic vegetable cultivation. It is evident from Table 5 that average farm income of the organic farmers was 55.18 thousand BDT in the first year while it was 81.01 thousand BDT that confirmed 46.81% growth in income due to adoption of organic vegetable cultivation. However, the farmers of Bogra district had enjoyed better farm income from organic vegetable farming compared to Mymensingh.

The study also focused on exploring the number of organic farmers attained farm income improvement due to adoption of organic farming. Figure 4 demonstrated that only 20.5% respondent organic farmers were attained income improvement in the first year and it was 70.5% in the third year. However, among the organic farmers of Bogra district, 22%, 55% and 72% were enjoyed farm income improvement in the first, second and third year, respectively. On the contrary, among the organic farmers of Mymensingh district 19%, 48% and 69% were enjoyed farm income improvement in the first, second year and the third year, respectively. Thus, it is clear that the farmers of Bogra district enjoyed better farm income due to adoption of organic vegetable cultivation compared to Mymensingh district.

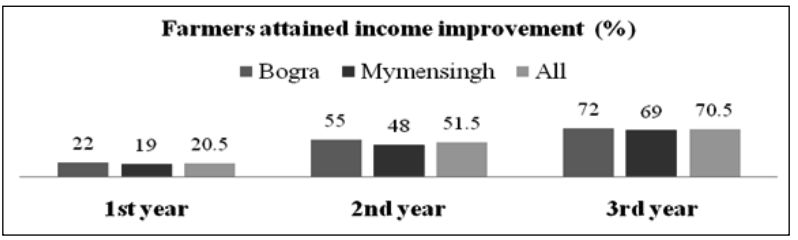

Figure 4. Percent of Farmers Experienced Improved Income Due to Organic Farming.

Source: Project data source.

Impact of Organic Farming on the Food Security of the Farming Household

Adoption of organic vegetable cultivation has a significant effect on household food security among the respondent organic farmers and a clear-cut scenario of household level food position has been exhibited in Figure 5.

Figure 5 showed that in the first year of adoption of organic vegetable cultivation, around a quarter (28%) of the organic farmers were with food deficit. However, over time the situation of household level food security changed significantly. In the third year majority (85%) of the organic farmers were with food surplus means food secured. However, the household level food security was relatively better among the farmers of Bogra district compared to Mymensingh. Additionally, due to cultivating diversified crops under organic system, all of the respondent households had better access to nutritious food that actually ensured their household level food security.

It is clear from Figures 4 and 5 that a substantial amount of the smallholder organic vegetable growers have attained surplus food production and/or better income due to the adoption of organic agriculture as a means of their livelihood. However, the farm families who had achieved both surplus food and better income due to adoption of organic agriculture as introduced by the project interventions were only treated as food secures household and otherwise considered as non-food secured household (Table 6).

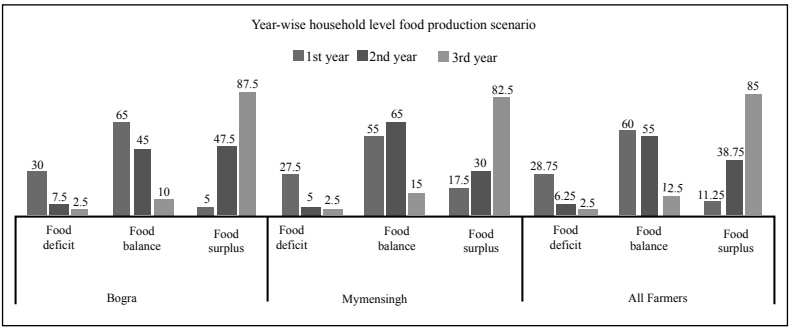

Figure 5. Percent of farmers Ensured Food Security at Household Level.

Source: Project data source.

Table 6. Status of Household Food Security of the Smallholder Organic Vegetable Growers.

Areas of Improvement Due to Adoption of OA	Bogra (n = 40)		Mymensingh (n = 40)		All (n = 80)	
	Frequency	%	Frequency	%	Frequency	%
Food surplus	35	87.5	33	82.5	68	85.0
Better income	29	72.5	27	67.5	56	70.0
Food surplus + better income (food secured household)	26	65.0	24	60.0	50	62.5

Source: Project data source.

It is evident from Table 6 that the highest majority (85%) of the respondent organic farmers had attained surplus family food production after three years of their journey of continuing organic vegetable farming. This scenario was a bit better in Bogra (87.5%) compared to Mymensingh district (82.5%). While less than three-fourths (70%) of the respondent smallholder organic growers had enjoyed better income due to adoption of organic vegetable farming. Like surplus family food, organic farmers of Bogra had better income (72.5%) compared to Mymensingh district (67.5%). On the contrary, the findings of the study revealed that a bit smaller than two-thirds (62.5%) of the respondents had attained household food security due to adoption of organic vegetable farming. Among them 65% of the respondent smallholder organic vegetable growers of Bogra district and 60% from Mymensingh district.

Factors Behind Improved Food Security Through Organic Farming

Another objective of the study was to explore important factors responsible for explaining household food security of the smallholder farmers due to adoption of organic farming. Thus, a binary logit analysis was performed and is shown in Table 7.

Table 7. Estimates of the Logit Regression Model to Explain the Household Food Security of the Smallholders Due to Adoption of Organic Agriculture.

Variables	Estimator	Standard Error	Significance
Age (years)	–1.98	0.733	0.001**
Education (years of schooling)	0.216	0.614	0.642
Household size (number)	0.117	0.472	0.291
Farm size (ha)	3.536	0.621	0.000**
Family labour force (number)	0.634	0.782	0.201
Ownership of cattle (number)	0.991	0.427	0.158
Extension media contact (scale score)	6.168	0.612	0.000**
Training received on OA (number of days)	0.103	0.122	0.749
Access to assured marketing (dummy: 1/0)	3.10	0.453	0.000**
Institutional support (dummy: 1/0)	2.99	0.667	0.003**
Constant	–6.67	1.41	
-2 Loglikelihood	46.02		
Cox and Snell R^2	0.551		
Neglekarke R^2	0.708		
Chi-square statistics	93.13		

Source: Project data source.

Note: ** Significance at 5 % level.

The logit model showed that Cox and Snell R^2 value is 0.551 and the Neglekarke R^2 value is 0.708 with the chi-square statistics of 93.13 which indicates that the model is significant. The findings of the study also showed that 5 independent variables out of 10 showed significant relationship with household level food and nutritional security. The significant variables were farm size, extension contact, access to assured market, access to institutional support and age of the respondent farmers. Among the significant variables, age of the respondents alone showed negative relationships while other four variables showed positive and significant relationship.

Discussion of Results

The findings of the 3-year study substantially established the fact that organic agriculture has the potentiality to improve farm productivity, farm income and household level food supply for the smallholding farm families. It is reported from the study that the farmers had cultivated high value organic vegetables following crop rotations which has resulted to –0.5% to 2% yield declination in the first year of adoption of organic vegetable cultivation, whereas it has showed yield enhancement in the succeeding years and reached up to 2.68% in the third year. This result is supported by Morshedi et al. (2017), Roychowdhury et al. (2013) and Sarker and Itohara (2011). This is due to the reason that organic agriculture contributes to improved soil health and soil fertility that ultimately bring in improved crop production and yield in the long-run (Najafabadi, 2014).

The findings of the study also showed that organic vegetable cultivation has contributed in improving farm income of the respondent farm families. It has explored that 70% of the respondent organic vegetable farmers have attained farm income improvement due to adoption of organic agriculture. It was lower (20.5%) in the first year, however, increase significantly in the following years. This is due to the reason that the farmers' cost of production was reduced up to 36%. On the other hand, they have enjoyed 10–15 price premiums on their organic vegetables. These two cases contributed in improving household farm income of the respondent families up to 46%. These findings are also supportive of the study of Charity (2015), Roychowdhury et al. (2013) and Sarker and Itohara (2009).

The findings of the study finally showed that due to adoption of organic vegetable farming the respondent farm families have attained household level food security. Results of the study also showed that 62.5% of the farm families were food secured after three years of adoption of organic vegetable farming. The household level food security scenario was quite frustrating in the first year of adoption of organic vegetable farming in the study villages. It is noticed that more than a quarter (28%) of the respondent farm families were food deficit in the first year of adoption of organic agriculture. Morshedi et al. (2017), Charity (2015), Azadi et al. (2011) and Sarker and Itohara (2010) reported similar findings in their respective studies.

The study also reported that majority (85%) of the respondent farmers had achieved surplus food production due to adoption of organic agriculture. It is also revealed that 70% of the respondent organic vegetable growers had farm income improvement that actually contributes in ensuring their household food security. This finding was supported by the findings of Rundgren (2016) and Sarker and Itohara (2009, 2011). The present study also explored the significant factors like age, farm size, extension media contact, access to assured market and access to institutional support as the responsible factors for explaining for attaining household level food security due to adoption of organic agriculture. This finding was partially supported by the findings of the studies of Peramaiyan et al. (2011), Sarker and Itohara (2010), Sarker et al. (2009) and Smil (2001).

The results of this study demonstrate that organic agriculture can contribute significantly to improve farm productivity and farm income which is the key pillar of achieving household food security of the smallholder organic producers. It also ensures sustained income through higher price premiums and reduced cost of crop production. Farmers of the study areas perceived that organic farming could lead to improved supply of safe food through reduction of production cost and providing sustainable income for better living. These perceptions are based on the analytics that expensive agro-chemicals are not used in organic farming; consequently, the cost of production is relatively lower in organic farming system and the price premium attained by organic produces lead to increased profit. Thus, it can be concluded that the adoption of organic farming is an efficient farming option for smallholders to ensure their household food security. Finally, it can be concluded that the effectiveness of organic agriculture is beyond debate and it can feed the smallholders in a better way. However, to let it happen, more research and development initiatives are needed from all concerned agencies.

Conclusion

It is evident from the study that organic agriculture is an efficient farming practice to ensure household food security of the smallholders. Organic farming system leads to improve farmers' income and better supply of safe food for the smallholder organic vegetable growers. These beliefs are based on the logic that expensive agro-chemicals are not used in organic farming; consequently, the cost of production is also relatively low and the price premium attained by organic produce leads to increase profit of the smallholders. With the better income from organic agriculture, smallholder organic growers get better purchasing capacity of food items rather than food produced from their farm that actually sustained their household food security. Thus, it is essential to make smallholder farmers aware of the enormous benefits of organic farming through intensive non-formal education campaigns by the agricultural extension service providers. Thus, it can be concluded that the adoption of organic agriculture is likely to be providing benefits to the smallholder organic growers through ensuring their access to assured marketing system with premium prices and ultimately through ensuring

better income. Hence, rapid expansion of organic agriculture among the smallholder growers in the country is needed for ensuring their household food security rather than providing them the additional pressure of debt due to dependency on costly agro-chemicals of conventional farming. As there was no policy for organic agriculture in the country earlier, thus it was hard to promote it among the interested farmers. However, this study strongly recommends taking necessary steps for sooner implementation of the National Organic Agriculture Policy 2016 with the view of ensuring household food security of the majority of the smallholder farmers of the country. It may also help the Government of Bangladesh in achieving the Sustainable Development Goals. It is also crucial of taking into account the factors explored as influential in this study.

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Declaration of Conflicting Interests

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Article

Improving Effectiveness of Rural Information and Communication Technology Offices: The Case of Qazvin Province in Iran

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Abstract

The information and communication technology (ICT) offices in rural areas of Iran have been developed as government provided counters under a national project in the past decades. The rural ICT offices were expected to benefit the rural people in various socio-economic dimensions such as health, social connectivity, crop diversity, agricultural productivity, occupational capability and the lifestyle in general. However, these middle range offices in Iran did not perform as expected, and thus they require an urgent restructuring to boost up their performances and to enhance their acceptability. This study investigates the effectiveness of the ICT systems and services in place in the Qazvin province of Iran with the purpose of identifying the major requirements needed to fix up the system. The focus of this study was around 10,000 people organised through rural ICT agents and their users in the rural area of Qazvin. The survey involves 138 rural ICT offices operated by 103 cooperative agents. Of them, 16 rural ICT offices were selected randomly, and 165 rural users connected with the selected offices were interviewed by the research team. Collected data have been analysed with structural equation modeling. The study shows that education, policy and management requirements deserve the highest attention, and therefore the best ways to improve the effectiveness of rural ICT offices. This study suggests that the effectiveness of rural ICT offices can be improved

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significantly through providing in-service education for ICT experts, arranging regular training programme for ICT office agents and using mass media to educate villagers on various aspects of ICTs.

Keywords

Effectiveness of rural ICT office services, Qazvin province of Iran, rural ICT users and office agents, structural equation modeling (SEM), importance-performance matrix analysis (IPMA)

Introduction

Information and communication technologies (ICTs) are used as a revolutionary means globally to upgrade the rural areas, that act as a gateway in providing various opportunities to enhance productivity in rural society (Zhou et al., 2021). Over the last decade, rural society in Asia have achieved significant economic, social and cultural growth by leveraging ICTs (Dubé et al., 2020; Min et al., 2020). With the rapid development of ICT in developing countries, the demand for ICT services such as access to high-speed Internet and broadband wireless networks has been rapidly increasing in rural communities than the urban areas (Ng & Tan, 2018; World Bank, 2017). About one-third of the population of Iran who live in the rural areas are less advantaged due to the constraints that they face in accessing ICT platforms and associated infrastructures. These specialised services in rural communities offer a range of opportunities to overcome many challenges and limitations in various areas of livelihood (Duncombe, 2006; Stratigea, 2011). To help the rural people in availing these opportunities, the government expanded the delivery of ICT services in the rural areas.

In the past decades, authorities in developing countries have been struggling to develop ICT and related infrastructure, achieve sustainable service delivery and to expand communication networks through providing cable Internet, fibre optics and mobile broadband (Rosenberger, 2014; Townsend et al., 2013) and also through establishing ICT offices in the rural areas (Amini et al., 2015). To respond to the challenges that rural people face, the Ministry of Information and Communications Technology in Iran in cooperation with the telecommunication companies in the country, set up rural ICT offices in 10,000 villages throughout the country since 2004 (Seddigh, 2004). According to the Ministry of Information and Communications Technology reports, the number of these offices has reached more than 16,000 in 2018 along with about 47,000 km fibre optics network.

Providing various ranges of e-services in such a way that the villagers can benefit from these services in the rural areas and reducing their physical presence in the cities are important goals of rural ICT offices (Alshehri & Drew, 2010). These offices provide the necessary communication facilities to cover all organisational services (Lashgarara et al., 2012). In other words, rural ICT offices are general places where people can use computers, Internet, media and other types of communication services to benefit from (Tripathi et al., 2012). In fact,

these offices have been developed as governmental counters under an important national project to deliver several types of e-Services such as e-government, e-education, e-health and other public services (Saraei &Amini, 2012). However, these rural offices have been struggling to keep up with the developments in areas such as health monitoring, social growth, crop productivity, occupational capabilities and the lifestyle.

Performance evaluation of these rural ICT offices in the past years indicated that despite the relative success of these offices in offering various services, the overall performance of these offices as governmental counters was in the lower-middle range (Amini et al., 2015). Molaeihashjin et al. (2013) and Bahari et al. (2016) reveal that their performance is mainly concentrated on finance related aspects of ICT services (such as banks), and that they have a poor performance with regard to social, economic and cultural aspects of ICT services (educational, health, agricultural, etc.). However, these middle range offices are not functioning as expected, and thus they require an urgent restructuring to boost up their performances and to make them more acceptable to the rural people in general. Therefore, the broad objective of the study is to analyse the ways of enhancing the effectiveness of rural ICT offices.

Even though the 210 ICT offices have been constructed and equipped in Qazvin province of Iran since 2006, their performance for providing effective services from social, cultural and economic aspects have never been seriously investigated, and thus the requirements for improving their effectiveness have not been explored and identified. This study, therefore, aims to analyse the factors that limit their performances and identify the ways to improve the effectiveness of rural ICT offices using a structural equation modeling (SEM) approach.

Conceptual Framework

Globally, the number of publications focusing on ICT for development has been growing in recent years (e.g., Heeks, 2018; Palvia et al., 2018; Walsham, 2017). However, there are scarce literatures in the field of requirements to improve effectiveness of rural ICT offices in developing country, especially in the context of Iran. We have reviewed (Figure 1) available literature related to design and implementation of physical and technical structure (Food and Agriculture Organization of the United Nations & International Telecommunication Union, 2016; Heeks, 2018; Heeks & Stanforth, 2015; Ng & Tan, 2018; World Bank, 2017), social, organisational and cultural studies related to ICT (e.g., Duncombe, 2006; Gaved & Anderson, 2006; Gigler, 2015; Gow, 2018; Grimshaw & Kala, 2011; Harris & Harris, 2011) and policy and management related ICT studies (e.g., Rosenberger, 2014; van der Velenden, 2018; World Bank, 2016).

We have also reviewed literatures which focused on requirements of improving effectiveness of rural ICT offices in the context of Iran. However, these studies are scattered and limited and have not addressed this issue comprehensively and centrally. For instance, Charmchian Langroudi (2012) in his research presented the requirements of developing rural ICT offices in Iran. He believed that an

education programme for rural ICT agents could help them to know how to pay facilities to villagers, how to use ICT and increase the level of their awareness and culture about ICT, how to decrease costs and so on. Also, Alibaygi et al. (2010) identified the most important indicators for assessing the effectiveness of rural ICT centres. They revealed that this effectiveness has been mostly related to a few services, such as increasing household income, e-commerce, access to information regarding agricultural production and marketing, agricultural subsides, cooperatives, insurance, finances, relevant training courses to the staff of rural ICT centres and rural households prior to and after their establishment can improve their effectiveness.

Lashgarara et al. (2012), in a research about determining factors affecting the use of ICT by villagers from rural telecasters, indicated that the challenges of these offices are: lack of adequate skills personnel to use ICT equipment, the lack of permanent accessibility to rural ICT centres, lack of knowledge and information to use rural ICT services. Also, Imani et al. (2012) revealed that the challenges of rural ICT development are high costs of Internet, the lack of technology, social-cultural problems, lack of investment and financial support, lack of proper telecommunication infrastructure and lack of acquaintance with computer skills among rural users.

The literature in the Iranian context mainly focused on challenges or factors influencing effective use of rural ICT centre in Iran. As there is a scarcity of literature focusing requirements to improve effectiveness of rural ICT offices, we decided to gather further information through some qualitative methods including in-depth interview. Using snowball sampling 15 participants, including 10 rural ICT office agents from various rural areas of Qazvin and five rural ICT experts from Qazvin Telecommunication Company were selected and interviewed. After writing the interviews content and comparing the constants, and then confirming the concepts with previous literature, the research framework was formed consisted of five categories and several subcategories of requirements to improve effectiveness of rural ICT office outlined in Figure 1.

The framework included policy and management requirements, cultural and social requirements, educational requirements, economic requirements and technical requirements. We will assess which of the requirements have significant effect on effectiveness of rural ICT office services. Therefore, we propose the following hypotheses:

H1: Cultural and social requirements positively affect effectiveness of rural ICT office services in Qazvin province.

H2: Economic requirements positively affects effectiveness of rural ICT office services in Qazvin province.

H3: Educational requirements positively affects effectiveness of rural ICT office services in Qazvin province.

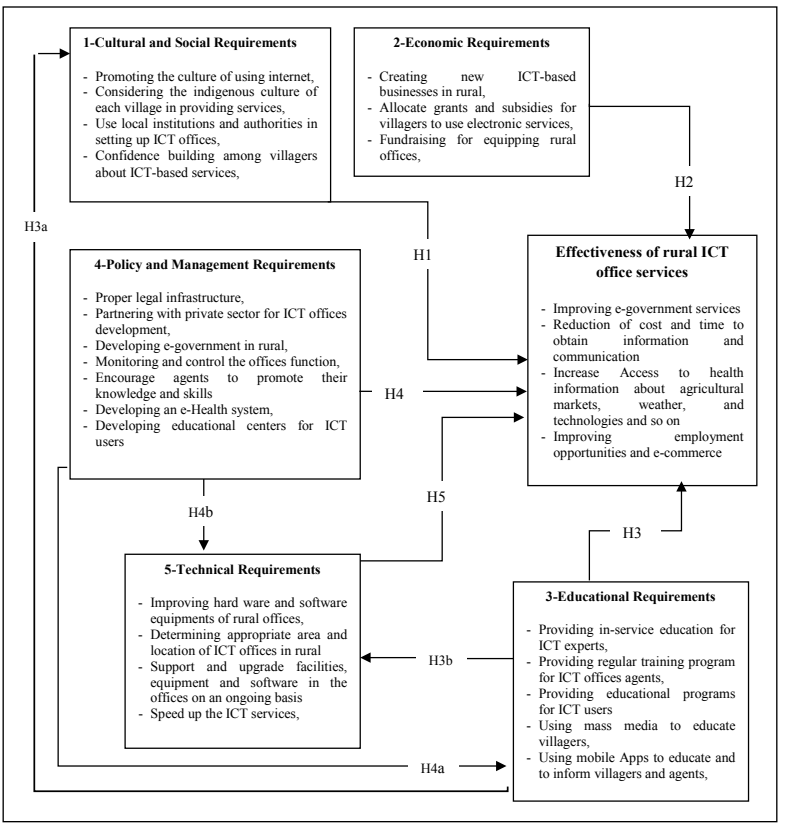

Figure 1. Conceptual Framework: The Framework of Effective Rural ICT Services.

Source: Based on literature review and interviews.

Note: This framework has concentrated on five main requirements which could drive the rural ICT office effectiveness.

H3a: Educational requirements positively affects cultural and social requirements in Qazvin province.

H3b: Educational requirements positively affects technical requirements in Qazvin province.

H4: Policy and management requirements positively affects effectiveness of rural ICT office services in Qazvin province.

H4a: Policy and management requirements positively affect educational requirements in Qazvin province.

H4b: Policy and management requirements positively affect technical requirements in Qazvin province.

H5: Technical requirements positively affects effectiveness of rural ICT office services in Qazvin province.

Methodology and Data

Methodology

In this research, a questionnaire has been developed for data collection. A mixed method approach involving diverse data sources and key informants was applied. As mentioned earlier, first, we gathered information through in-depth interview with 15 participants, including 10 rural ICT office agents from various rural areas of Qazvin and five rural ICT experts from Qazvin Telecommunication Company. After writing the interviews content and comparing the constants, and then confirming the concepts with previous literature, the conceptual framework was formed consisted of five categories (as the requirements include: policy and management requirements, cultural and social requirements, educational requirements, economic requirements and technical requirements) and several subcategories (as the indicators of requirements) to improve effectiveness of rural ICT office (Figure 1). Then to develop the questionnaire based on the identified requirements and indicators, further information was gathered from the scoping review to selection and development of appropriate item(s) for every indicator of requirement that proposed in the conceptual framework. Therefore, the questionnaire included demographic questions and statements which were developed based on the indicators. Independent constructs included policy and management requirements (13 items), cultural and social requirements (10 items), educational requirements (11 items), economic requirements (7 items), technical requirements (12 items) and also dependent construct included effectiveness of rural ICT offices (9 items). Respondents had opportunities to respond to each statement on 5-point Likert scales.

Questionnaire validity and reliability was measured through pre-test after it was designed. Validity explains how well the collected data cover the actual area of investigation, and it means 'measure what is intended to be measured' (Taherdoost, 2016); in this way the developed questionnaire was first distributed among 30 respondents (not included in the sample) who were ICT experts, rural ICT office agents and rural ICT users. After collecting pre-test's questionnaire, data were analysed using Smart partial least squares (PLS) 3.0 to ensure that the measurement items were valid and reliable. In this regard we assessed construct validity. Construct validity means that a questionnaire designed to measure a particular construct is actually measuring that construct. Convergent and discriminant validities are two fundamental aspects of construct validity. Convergent validity refers to how closely the new scale is related to other variables and other measures of the same construct.

To measure convergence validity of each construct, factor loadings, average variance extracted (AVE) and composite reliability (CR) were used. where CR indicates consistency of the constructs, while AVE measures the amount of variance attributed to the construct relative to the amount due to measurement error (Azwa Ambad & Wahab, 2016). It was performed using confirmatory factor analysis. According to Barclay et al. (1995), the values of AVE for each construct should be greater than 0.50. The results showed that the value of AVE of all

constructs were greater than 0.50. In addition to satisfying convergence validity, CR for all constructs should be higher than 0.70 as suggested by Hair et al. (2010). CR for all construct was above the acceptable value of 0.70 in this study. On the other hand, discriminant validity is demonstrated by evidence that measures of constructs theoretically should not be related to each other. Discriminant validity for each construct was obtained by comparing the squared correlations between latent variables and the AVE scores for each of the pairwise constructs. For adequate discriminant validity, AVE should be larger than squared correlation (Pervan et al., 2018).

According to the result of the discriminant validity of all constructs, each square root of the value of AVE was more than correlation coefficient (Fornell & Larcker, 1981), thus discriminant validity was also supported. Additionally, Cronbach's alpha is a way of assessing reliability by comparing the amount of shared variance, or covariance, among the items to demonstrate that scales that have been constructed or adopted for research projects are fit for purpose (Taber, 2018). Cronbach's alpha coefficient was used to assess the inter item consistency of measurement items. The results suggested that the Cronbach's alpha of all statements was more than 0.70. After verifying the validity and reliability, questionnaires were distributed among respondents, and were used for data analysis purposes.

This study used PLS technique of SEM using Smart-PLS 3.0 (Ringle et al., 2014). A path model is a diagram that displays the hypotheses and variable relationships to be estimated in an SEM analysis. The reason to use the PLS technique was its suitability with the exploratory nature of this study. PLS path modelling provides robust solutions, especially when the objective is prediction, the model is relatively complex, the sample size is small and the phenomenon under study is new or changing (Chin & Newsted, 1999). A two-step process has been applied: (a) outer model assessment (measurement model), which reveals the relationships between latent indicators and their variables to evaluate reliability and validity of the research model and (b) the inner model assessment (structural model), to evaluate the relations among the constructs (latent variables) and significance of the path coefficients in the research model (a model which developed based on research framework) by bootstrapping technique (Henseler et al., 2009). Bootstrapping is a type of statistical resampling that can be used to determine the sampling distribution of relationship (correlation and regression coefficient) when these sampling distributions are extremely difficult to obtain analytically (Ratick & Schwarz, 2009).

Predictive relevance (Q2) and goodness of fit (GoF) index were assessed to provide evidence supporting the research model. Predictive relevance (Q2) is critical to assess the predictive validity of a complex model and can effectively be used as a criterion for predictive relevance (Geisser, 1974; Stone 1974). GoF index is defined as the geometric mean of the average communality and average R^2 for all endogenous constructs that can be used to determine the overall prediction power of the complex model. The GoF represents index for validating the PLS model globally such as χ^2 and related measures in SEM-ML (Akter et al., 2011).

Finally, the Importance-Performance Matrix Analysis (IPMA) of path modelling was carried out extending the findings of the basic PLS-SEM in order to determine the areas that need to be considered and improved. However, IPMA is a different way of presenting path information by assessing the impact of latent variables with a high importance (structural model total effect) and low performance (average values of the latent variable scores) on the endogenous latent variable (Hock et al., 2010). In this case, IPMA is useful to introduce the requirements which should be focused in order to improve effectiveness of rural ICT office services. We used IPMA for prioritising both constructs and indicators separately and identifying the most important areas regarding the effective rural ICT office services. The first step in using an IPMA is checking the requirements. In this way, we reviewed the questionnaire and we found that all the indicator data were on an interval scale from 1 to 7, a higher value represents a better outcome. Next, we checked the signs of the outer weights, all of which were positive. Thus, all requirements for conducting the analysis have been fulfilled. Then, we selected 'effectiveness of rural ICT offices' as the target construct and chose all the predecessors and specified each indicator's value that was required for the rescaling. Smart-PLS computes the performance and important values and maps the constructs and indicators' importance (by using unstandardised total effects) and performance (based on rescaled performance values) dimension.

Data

Sample Selection

The population size (potential beneficiary of ICT service centres) of the study is 10,000 people, organised through rural ICT agents and their users in Qazvin rural area. In total, there are about 210 rural ICT offices in Qazvin province. Of them 138 are located in villages with more than 150 households (in this study, villages with more than 150 households (N=138) were considered). The survey involved 138 rural ICT offices operated by 103 cooperative agents. Then, 16 rural ICT offices were selected randomly (due to the increased accuracy of interviews and not wasting time in commuting between villages) and 165 rural users (who referred to these offices within 6 days) were interviewed by the research team.

Characteristics of the Respondents

From the ICT offices agents' sample, 39.7% were 20 to 30 years old, 41.6% aged from 31 to 40 years and 18.7% were over 41 years old. In all, 55.9% of the agents were men and 44.1% were women. In terms of educational level, most (50%) of them have diploma degree while 20.6% of agents have a bachelor's degree and 29.4% have secondary degree. From the rural users' sample, 40.7% of rural users were 20 to 30 years old, 39.3% aged from 31 to 40 years and 20% were over 41 years old. In all, 70% of rural users were men and 30% were women. In terms of educational level, 9.3% of rural users have a bachelor's degree, 11.3% have postgraduate diploma, 77.4% have a diploma and 2% are illiterate.

Comparing Mean of Requirements Between Respondents

Independent *t*-tests were used to compare significant difference in means of independent constructs (requirements) between ICT offices agent's and rural user's point of view. The findings indicate that there was no significant difference in mean policy and management requirements ($t = 1.413$, sig = 0.167), cultural and social requirements ($t = 0.837$, sig = 0.409), educational requirements ($t = 1.616$, sig = 0.116), economic requirements ($t = 0.902$, sig = 0.374), technical requirements ($t = 1.947$, sig = 0.061) for both ICT offices agent's and rural user's (Table 1).

Results

PLS-SEM Analysis

The developed model based on research model (Figure 1) in Smart-PLS 3.0 assessed with a two-step process as follows:

Measurement Model

Initially, confirmatory factor analysis was executed to examine the reliability, convergent validity and discriminant validity of the constructs for achieving the optimum values of parameters. As revealed in Table 2, all factor loadings are higher than 0.5, and the AVE of all the reflective constructs are higher than required value of 0.5. Besides, CR values of all the constructs are higher than the cut-off value of 0.7.

Table 1. Independent *T*-Tests to Compare Mean of Requirements to Improve Effectiveness of Rural ICT Office Services Between ICT Office Agents and Users.

	Levene's Test		*T*-Test			
Constructs	*F*	Significance	*t*	Significance	Mean Difference	Standard Error
Cultural and social requirements	0.027	0.871	0.837	0.409	0.349	0.417
Economic requirements	0.072	0.791	0.902	0.374	0.402	0.445
Educational requirements	2.841	0.102	1.616	0.116	0.936	0.579
Policy and management requirements	1.320	0.259	1.413	0.167	0.834	0.590
Technical requirements	1.063	0.310	1.947	0.061	1.082	0.556

Table 2. Results of Measurement Model Based on Confirmatory Factor Analysis.

Variables	Indicators	Loadings	AVE	CR
Cultural and social requirements	Promoting the culture of using Internet	0.700	0.674	0.891
	Use local institutions and authorities in setting up ICT offices	0.748		
	Considering the indigenous culture of each village in providing services	0.906		
	Confidence building among villagers about ICT-based services	0.909		
Economic requirements	Fundraising for equipping rural offices	0.816	0.556	0.880
	Creating new ICT-based businesses in rural	0.823		
	Allocate grants and subsidies for villagers to use electronic services	0.570		
Educational requirements	Using mobile Apps to educate and to inform villagers and agents	0.722	0.576	0.892
	Using mass media to educate villagers	0.688		
	Providing educational programmes for ICT users	0.703		
	Providing regular training programme for ICT offices agents	0.780		
	Providing in-service education for ICT experts	0.720		
Policy and management requirements	Developing educational centres for ICT users	0.744	0.547	0.864
	Encourage agents to promote their knowledge and skills	0.767		
	Developing an e-health system	0.762		
	Proper legal infrastructure	0.738		
	Developing e-government in rural	0.810		
	Partnering with private sector for ICT offices development	0.643		
	Monitoring and control the offices' function	0.702		
Technical requirements	Improving hardware and software equipment of rural offices	0.792	0.753	0.927
	Determining appropriate area and location of ICT offices in rural	0.869		
	Support and upgrade facilities, equipment and software in the offices on an ongoing basis	0.873		
	Speed up the ICT services	0.931		

Discriminant validity of the constructs was assessed and each square root of the value of AVE was more than the correlation coefficient. In other words, according to Table 3, the diagonal values of the correlation matrix were greater than the off-diagonal values (Barclay et al., 1995). Discriminant validity was also assessed using heterotrait-monotrait criterion (Henseler et al., 2009), in which all the values were below the threshold of 0.85.

Structural Model

Structural model was assessed by evaluating the R^2 and path coefficient (β) values. The R^2 value of endogenous latent variable (effectiveness of rural ICT office services) was 0.733, which indicates that all the constructs significantly affect the endogenous latent variable. For the path coefficients, β values of each path were found to be 0.019 for policy and management requirements, 0.294 for cultural and social requirements, 0.316 for educational requirements, 0.223 for economic requirements and 0.150 for technical requirements, as the main independent constructs (Figure 2).

Then, for assessing the significance of all the paths, bootstrapping was performed. The path coefficient is significant if the *t*-value is larger than 1.96. The results showed that the relationship among policy and management requirements on effectiveness of rural ICT office services, and educational requirements on technical requirements, are not significant (Table 4, Figure 2). All other path coefficients are significant, specifically, educational requirements (*t*-value = 2.806; $p = 0.005$), cultural and social requirements (*t*-value = 2.051; $p = 0.041$) and economic requirements (*t*-value = 2.265; $p = 0.024$), each has significant and positive effects on the effectiveness of rural ICT office services. Educational requirements have a significant effect on cultural and social requirements (*t*-value

Table 3. Discriminant Validity and Correlation Between Constructs.

Constructs	1	2	3	4	5	6
Cultural and social requirements	0.821					
Economic requirements	0.692	0.746				
Educational requirements	0.667	0.708	0.724			
Effectiveness of rural ICT offices	0.759	0.745	0.757	0.810		
Policy and management requirements	0.882	0.712	0.701	0.751	0.740	
Technical requirements	0.553	0.543	0.481	0.600	0.609	0.868

Notes: Correlation is significant at the 0.05 level (2-tailed). Diagonal values are the square roots of the AVE and below the diagonal values are the correlations between the construct values.

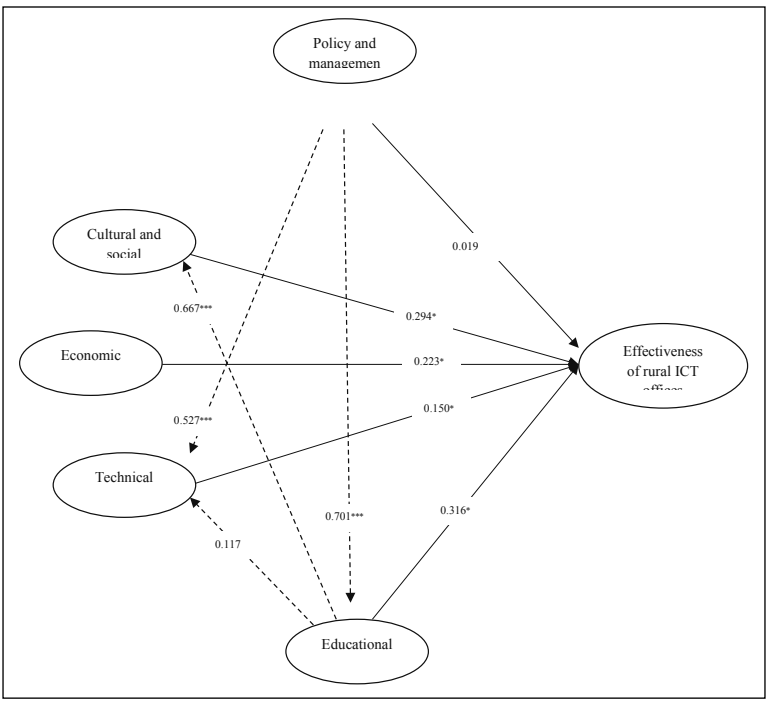

Figure 2. Structural Model Results for Research Model.

Note: *$p < .05$; **$p < .01$; ***$p < .001$.

= 9.631; $p = 0.000$). Also, the policy and management requirements have a significant effect on educational requirements (t-value = 10.230; $p = 0.000$) and technical requirements (t-value = 4.215; $p = 0.000$). Thus, policy and management requirements have indirect effect on the effectiveness of rural ICT office services. Therefore, H1, H2, H3, H3a, H4a, H4b and H5 are supported, whereas H4 and H3b are not supported.

Importance-Performance Matrix Analysis

We used IPMA for prioritising and identifying the most important effective requirements to improve effectiveness of rural ICT office services. In constructs level, educational requirements (0.594), and policy and management requirements (0.498), had high importance values. As indicated, the direct effect of the policy and management requirements on effectiveness of rural ICT office services is not significant, but it leaves significant indirect effects through educational requirements and technical requirements. Therefore, the total effect (importance) of policy and management requirements is of the high importance. In other words, the best way to improve effectiveness of rural ICT office services can be achieved by considering the educational requirements and policy and management requirements.

Table 4. Hypothesis Testing, Relationships Between Constructs.

Hypothesis		Coefficients (β)	Standard Deviation	*T*-value	*P*-value	Decision	R^2
H1	Cultural and social → Effectiveness of rural ICT offices	0.294	0.143	2.051	0.041	Supported	0.733
H2	Economic → Effectiveness of rural ICT offices	0.223	0.098	2.265	0.024	Supported	
H3	Educational → Effectiveness of rural ICT offices	0.316	0.113	2.806	0.005	Supported	
H4	Policy and management → Effectiveness of rural ICT offices	0.019	0.136	0.142	0.887	Not-supported	
H5	Technical → Effectiveness of rural ICT offices	0.150	0.064	2.342	0.020	Supported	
H3a	Educational → Cultural and social	0.667	0.069	9.631	0.000	Supported	0.445
H3b	Educational → Technical	0.117	0.126	0.930	0.353	Not-supported	0.378
H4b	Policy and management → Technical	0.527	0.125	4.215	0.000	Supported	
H4a	Policy and management → Educational	0.701	0.069	10.230	0.000	Supported	0.492

Note: * $p < .05$; ** $p < .01$; *** $p < .001$.

Also, we decided to use IPMA in order to further investigate the indicators (or items of the requirements) and generate additional findings and conclusions. We found that indicators include (a) providing in-service education for ICT experts (0.134), (b) providing regular training programme for ICT offices agents (0.128) and (c) using mass media to educate villagers (0.128), were the top three items enjoying high importance that could be focused by rural ICT managers to improve effectiveness of rural ICT office services in Qazvin.

Based on blindfolding procedure, Q2 evaluates the predictive validity of a large complex model using PLS (Akter et al., 2011). Blindfolding is a sample re-use technique that allows calculating Stone-Geisser's Q^2 value (Geisser, 1974; Stone, 1974), which represents an evaluation criterion for the cross-validated predictive relevance of the PLS path model. The rule of thumb indicates that a cross validated redundancy $Q2 > 0.5$ is regarded as a predictive model (Chin, 2010). In this study estimates cross validated redundancy Q2 of the research model (Figure 2) using an omission distance of 7, a Q2 of 0.527 was obtained which is an indicative of a highly predictive model. This is showed that prediction of observables or potential observables is of much greater relevance than the estimation of what are often artificial construct parameters (Akter et al., 2011).

The value of GoF that is generated through the standardised root mean squared residual that is 0.072 and the normed fix index 0.820 which means the model fits the empirical data. Also, GoF index has a descriptive nature, so there are no inference-based criteria to assess its statistical significance (Vinzi et al., 2010). This index is bounded between 0 and 1 and Wetzels et al. (2009) suggested GoF small (0.10), GoF medium (0.25) and GoF large (0.36) (Akter et al., 2011). For the research model in this study, a GoF value of 0.589 was obtained, which exceeds the cut-off value of 0.36. It indicates that the model has a very good prediction power.

Discussion of Results

The main objective of this study is determining major requirements to improve effectiveness of rural ICT office services in Qazvin province by using PLS-SEM and IPMA. The discussion of the results has been performed keeping eye on the main objective of the study.

Key Findings

First, according to the results, educational requirements had a strong and positive effect on the effectiveness of rural ICT office services. This finding was consistent with Charmchian Langroudi (2012) and Alibaygi et al. (2010), which suggested that good education programmes for rural ICT agents and rural households could be responsible for improving effectiveness of rural ICT office services. This result also validated the findings of Lashgarara et al. (2012) and Imani et al. (2012), revealed that lack of knowledge and information to use rural ICT services and

lack of adequate skills personnel to use ICT equipment are the challenges of rural ICT development in Iran.

Second, according to IPMA, the educational requirements and policy and management requirements, had highest importance; therefore, the best way to improve effectiveness of rural ICT office services can be achieved by considering the educational requirements and policy and management requirements. The results suggested that appropriate education and training programmes raising rural ICT agents' and rural households' knowledge, attitudes and skills, which were accordance with previous studies (Alibaygi et al., 2010; Charmchian Langroudi, 2012; Imani et al., 2012; Lashgarara et al., 2012). This result also indicated that, policy and management requirements through developing e-government in rural, developing an e-health system, proper legal infrastructure, encourage agents to promote their knowledge and skills and so on, could more effective in terms of improvement in rural ICT office services in Qazvin province, which were accordance with previous studies (Gigler, 2015; Gow, 2018; Grimshaw & Kala, 2011; Harris & Harris, 2011; Stratigea, 2011).

Third, the result of IPMA in indicators level showed that providing in-service education for ICT experts have the highest importance in improving effectiveness of rural ICT office services. This result validated the finding of Bluestone et al. (2013), which indicated that in-service training represents a significant financial investment for supporting continued competence of the workforce. The IPMA results further revealed that, providing regular training programme for ICT offices agents play a crucial role in improving their performance, which was consistent with the result of the study of Alibaygi et al. (2010), they believed that the relevant training courses to the staff of rural ICT centres and rural households could be more effective. This finding was accordance with Charmchian Langroudi (2012), he believed that an education programme for rural ICT agents could help them to know how to pay facilities to villagers, how to use ICT and increase the level of their awareness and culture about ICT, how to decrease costs and so on.

In addition, the IPMA results confirmed that using mass media to educate villagers is one of the areas enjoying great importance, which was consistent with the result of the study of Nazari and Hassan (2011), which indicated that mass media is an effective channel for communicating messages which increases knowledge and influences behaviour. In this regards, Kassem et al. (2019) revealed that the print media such as pamphlets are highly qualified for disseminating information, and the findings of Rezaei et al. (2017) revealed a significant relationship identified among networks and media on perception and activities. These findings, in fact, were the top three items enjoying high importance that could be focused by rural ICT managers to improve effectiveness of rural ICT office services in Qazvin.

Limitation of the Study

All studies have limitations that impact the findings; we also had the major limitations in this study that it should be interpreted. First, we developed and

introduced the 'Model of effective rural ICT services' as the new theory in this area and then, we examined it as the conceptual framework in this study. To confirm the validity of this model, future study should examine this model as a conceptual framework in other provinces. Second, the size of the sample in this study is relatively small, which may affect the generalisability of the findings. Third, in this study we concentrated on rural ICT offices agents and rural users in Qazvin province. So, we can't generalise the findings to other areas. Finally, we suggest future studies investigate the role of educational requirements and policy and management requirements, which were found as the highly important areas to improve effectiveness of rural ICT office services in Qazvin province.

Conclusion

In this study, the 'Model of effective rural ICT services' was added to previous literature about rural ICT services as the new theory in this area. In addition, this study showed how the educational requirements and policy and management requirements, had highest importance; therefore, the best way to improve effectiveness of rural ICT office services can be achieved by considering these requirements. However, this study suggested that effectiveness of rural ICT office services can be improved significantly through providing in-service education for ICT experts, providing regular training programme for ICT offices agents and using mass media to educate villagers, which were the three important approaches. It is necessary for future research to identify and examine other effective requirements that could aggravate the effectiveness of rural ICT office services in Qazvin province.

From a practical perspective, educational programmes to rural households could be offered in proper time and appropriate manner in local media such as radio, TV, newspaper and pamphlet. It can be concluded that due to expansion of mobile applications and ICT even in the rural areas, training and educational programmes can be placed through popular communication apps. So, using communication apps have become common ways of transmitting voice, video, documents and other services in the form of groups and channels. Therefore, managers and specialists can use this capacity to improve their training services while they can receive comments and feedbacks.

Declaration of Conflicting Interests

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Article

Livelihoods of Vulnerable People: An Ethnographic Study Among the *Birhor* of Chhattisgarh

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Abstract

Vulnerable people (VP) lack in access to resources, development benefits, such as education, health, infrastructure and basic means of livelihoods. They are considered disadvantaged in comparison to other groups in relation to access to resources and other entitlements. VP, such as women, person with disability, people living with HIV/AIDS, sexual minorities, poor migrants, Scheduled Castes and Scheduled Tribes often face numerous discrimination. One such vulnerable group known as Birhor, a Particularly Vulnerable Tribal Group from the Chhattisgarh state of central India, is the focus of this article. The main purpose of the article is to look into their livelihood complexities in the contemporary period. This article is an outcome of an ethnographic fieldwork among *Birhor*, in Umaria Dadar Tribal settlement, Kota block of Bilaspur District, Chhattisgarh. The article draws its inferences based on both primary and secondary data. The primary data is collected from the study area by using different anthropological tools and techniques. The secondary data is gathered from the *Birhor Vikas Abhikaran* (*Birhor* development agency), Bilaspur, and both published and unpublished reports of the government and civil society agencies, and other sources. The article looks into the inherent intricacies of livelihood approaches and vulnerability looking at the vicissitudes of livelihoods of *Birhors*. The major finding of the article is that Birhor people are slowly and steadily moving towards a settled life from their traditional life of hunting and gathering. They are accepting now the new sociocultural lifestyles in the study area.

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Livelihoods, vulnerable people, *Birhor*, PVTG, ethnography and Chhattisgarh

Introduction

Vulnerable people (VP)[1] are swelling innumerably across the globe and more so is the case of South Asian societies. There has been a plethora of research work, which explains, theoretically and empirically, about the conditions of the VP. Scholars, such as Lange et al. (2013) have described the sources of vulnerability as inherent, situational or pathogenic, and the likelihood of their happening as 'recurrent' or 'dispositional'. Earlier, Rogers et al. (2012) went further beyond the use of principles and regulation. They have theorised that the concept of vulnerability is vehemently inherent in all of human life and arises by virtue of our embodiment—our social, biological, environmental, cultural and political nature, which are subsequently unavoidable events. Some other forms of vulnerabilities are those which are related to lack of access to health care facilities, which are the result of unjust prioritisation of social arrangements. In order to bring VP into the mainstream development discourse, there was an attempt from the development agencies, such as both governmental and non-government, to implement livelihoods approach. These development agencies have popularised and recommended that livelihoods approach is the answer for all the ills of VP living across the world. They observed that livelihoods approach is useful to analyse the lives and livelihoods of VP, vulnerability contexts and the direction of change. The main features of livelihoods approach is that it focuses upon people's assets. For improving the situation of the VP, many development programmes were initiated by the government. A sizeable body of the work significantly addresses the focus towards explaining the conditions of VP. These studies have also explained both the conditions of the VP and the development programmes directed at them. Despite these initiatives by the state and other development agencies and the academia, the precarity of these people still persists to a larger extent. Keeping these discussions in the background, the article aimed at understanding the livelihood systems of Birhor, a marginalised community, and shocks, stresses and trends involved in their livelihood processes.

The sustainable livelihoods approach goes back to the mid 1980s when Robert Chambers and Carney first initiated thinking in this area. Aid agencies such as UNDP, DFID, CARE and OXFAM and development scholars such as Diana Carney and Scoons have believed that livelihood approach is the panacea and need of the hour to address backwardness, vulnerability, conditions of poor and VP. The main feature of livelihood approach is to focus on the people's assets. These assets include physical, natural, financial, human, social and political capitals. Further, it also focuses on how the people utilise their assets and deal with their problems. Few other scholars[2] were emphasising on the issues of sustainability and its ramifications on livelihoods framework in their studies on Asia and African countries. Many attempts can be traced to define the livelihoods. Chambers and Conway defined livelihoods as 'the ways in which people satisfy their needs, or gain a living' (1991, p. 5).

Literature Review

Attributes of Livelihoods

Scholars such as Carney, Ahmed and Lipton, and Chambers have tried vividly to explain the vicissitudes of livelihoods. For Carney (1998, p. 2) 'the capabilities, assets of both material and social resources and activities required for a means of living comprise a livelihood'. Further, she elaborated that 'a livelihood is sustainable when it can cope up with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base'. For Ahmed and Lipton (1988) 'livelihood consists of a set of flows of income, from hired employment, self-employment, remittances or (usually in developing rural areas) from a seasonality and annually variable combination of all these'. Thus, for them, livelihood implies systems of how people make a living or in other words, how they be able to maintain it to cope with the risks during the crisis. Later, Chambers (1988, p. 2) elucidated that the livelihood security is the 'Secure ownership of, access to, resources and income- generating activities, including reserves and assets to offset risk, ease shocks and meet contingencies'.

Livelihoods in the Context of Tribal India

Sustainable livelihoods approach brings together various perspectives. For instance, Farrington et al. (1999) argued that sustainable livelihoods approach helps to understand the underlying constraints and links micro-level understanding of poverty into policy and institutional change processes. They have shared their experience while working in western Orissa and they found that livelihoods were less dependent on natural resources than expected, partly because the poor had such limited access to these resources. Earlier, Bagchi et al. (1998) offered comparative perspective through a sample survey of 15 villages in eastern India and western Nepal. For them, livelihood trajectories meant to provide insights into the changing welfare and capabilities of individuals and of groups; make it possible to bridge the supposed micro–macro divide by a process of aggregation upwards from the lives of individuals; and combine insights in a seriously inter-disciplinary spirit, from the many different paradigms prevalent in development studies. The sustainable rural livelihoods approach of the Department for International Development (DFID) puts 'people at the centre of development'. For instance, DFID and Indian state, Andhra Pradesh, have initiated Andhra Pradesh Rural Livelihoods Project (APRLP) which aims to scale up ongoing watershed programme activities in the State and adopts a participatory sustainable rural livelihoods strategy, which is based on an analysis of the capital assets (physical, social, human, natural, financial and political) from which the rural poor make their livelihoods (APRLP, 1999).

The sustainable livelihoods approach takes into account the vulnerability context in order to understand the way people cope up with those contexts. There have been many attempts to define 'Vulnerability'. 'Vulnerability is best defined

relative to some benchmark of ill-being' (Alwang et al., 2001). Vulnerability related to dimensions, such as educational opportunities, mortality, nutrition and health could be measured as well (Decon, 2001). To briefly explain, 'vulnerability' is understood as the trends, shocks and seasonality over which people have limited or no control. Yet, these critically affect their livelihood status and possibilities.

The sustainable livelihoods approach is useful to analyse the tribal livelihoods, vulnerability contexts and the direction of change. It adopts a holistic approach and analyses livelihoods in the culture of a people, emphasises on people-oriented development and abandonment of top–down approach. Thus it emphasises on a need for evolving people-friendly/culture-specific policies. The sustainable livelihoods approach has been widely identified as an instrument to eradicate poverty. However, our study seeks to use this approach as a means to understand not only poverty but all the other forms of deprivations and vulnerability contexts. The tribal communities in India are overwhelmingly marginalised not only economically but also spatially, culturally and otherwise. Chhattisgarh has a significant proportion of tribal population. For instance, Gregory (2013, p. 47) observed that 'Chhattisgarh represents the deep history of economy and culture. Its uniqueness is defined by its position at the crossroads of a north/south division of India into Indo-Aryan and Dravidian speaking linguistic regions and an east/west division into wet-rice and dry-grain producing farming regions'.

Material and Methods

Methodology

The article is primarily based on an ethnographic data collected from the village of Umariya Dadar district in Block-Kota of Bilaspur during the year 2018–2019. This study is a qualitative micro-level study. In order to fulfil the objectives of the study, qualitative anthropological tools and techniques are employed. These are mainly observation (participant and non-participant type), interviews (formal and informal) using detail checklist, key-Informant interviews, case studies, focus group discussions, etc. The secondary data is gathered from books, articles, published reports, census reports and the government documents from the respective departments. Quantitative data with regard to demographic and economic aspects, and accessibility and availability of services in the study area, and other information regarding the study was collected from primary sources through detailed census schedules.

Area and the People

Area

Selection of the sample and study area:

This study was carried out among Birhor tribes inhabiting Umariya Dadar village of Kota Block, Bilaspur, Chhattisgarh. Depending upon the size of the

population, an attempt is made to study the livelihood of Birhor. Umariya Dadar is one of the 152 villages situated in the Kota Block of Bilaspur, Chhattisgarh. The village is located in a remote area with a tough geographical terrain. Sekar, Piparpara, Darsagar, Rigwar, Tendubhatha, Pachra, Majhwani, Bansajhal, Khaira, Chapora and Birgahni surround the village Umariya Dadar. Umariya Dadar of Kota district of Bilaspur has a higher proportion of Scheduled Tribe populations than the other districts in the region, which made me to select the district for the study.

Demographic details of Birhor people:

The population of the Birhor in Chhattisgarh shows considerable variation in the Census of 2001–2011. In Chhattisgarh, Birhor people are mainly found in Bilaspur, Korba, Jashpur, Raigarh and Surguja districts. According to Census 2001, their population was 3,744 and a slight decrease is noticed in their population in Census 2011 and it was 3,104. In Census 2011, Birhor total households in Chhattisgarh were 838. According to Tribal Research Institute data, Birhor population is slightly higher than the Census 2011 data (Tables 1 and 2).

There is a considerable variation of Birhor population in data of Census 2011 and data of the Tribal Research Institute, Raipur, Chhattisgarh. During our interaction with the researchers of TRI, they mentioned that this variation could be due to the migration of the people during the off-seasons to the nearby urban areas. It is also evident from the table that Birhor population in the study village is also very less in comparison to the other villages.

Table 1. Population of Birhor in Various Parts of Chhattisgarh, 2017.

District	Population
Jashpur	527
Raigarh	962
Korba	1,556
Bilaspur	459
Total	3,504

Source: Tribal Research Institute, Raipur (Chhattisgarh).

Table 2. Population of Birhor in Bilaspur, Block-Wise, 2017.

District	Block	Gram Sabha	Village and Population
Bilaspur	Kota	Saktibahra	Belgehna 41
–	–	Umaria Dadar	Umaria Dadar 80
–	–	Koilari	Koilari 141
–	–	Semriya	Semriya 74
–	Masturi	Takhatpur	Khaikharpara 30
–	–	Jewra	Jewra 93

Source: Tribal Research Institute, Raipur (Chhattisgarh).

People

Life of the Birhor people:

The name Birhor is derived from the word 'bir' meaning *jungle* (forest) and 'hor' meaning man and thus the word means the people of the *jungle* (forest). As mentioned by Nadal (2014), these people are usually referred to as Birhor in the government demographic reports of Jharkhand, Chhattisgarh, Bihar and West Bengal. The Birhor is one of the Particularly Vulnerable Tribal Groups (PVTGs) of the State of Chhattisgarh. In the Seventh Five-Year Plan 'Birhor' was also listed in the primitive tribal groups (PTGs) of India. Birhor is also found in the states of Jharkhand and Odisha. According to Ota and Sahoo (2010), Birhor is a little known forest-dwelling tribe in Odisha. They are mostly wandering group with simple, shy and god-fearing people. They live in bands. They are originally considered as a semi-nomadic and hunter-gatherer group and represent the early stage of human life in the forest ecosystem.

Ethnology: The Birhors belong to the same dark-skinned, short stature, long-headed, wavy-haired and broad-nosed race to which the Munda's, the Santhal, the Bhumi's, the Ho's and other allied tribes belong. Like other allied tribes, the Birhors speak a language classed within the mandarin group in the Austro-Asiatic sub-family of language.

Language: Linguistically, they belong to the Austro-Asiatic (Mundari) group, and their language has been related to Australoid (Mundari) group by many linguistics but they are well versed in Chhattisgarhi language, when they talk to others. Birhors can be regarded as bilingual but when we ask about their language generally, they say it is 'Birhori'.

Clans: The Birhors are divided into five totemistic endogamous clans.

As observed from the study area, the clans of the Birhor are exogamous and totemic. Informants have mentioned that Birhor get spouses through negotiation, with mutual consent, by exchange and sometimes through intrusion as well. Marriage rituals continue for two days. They pay bride-wealth as part of the marriage ceremony. It is also observed from the field that they have their own community council known as *Jati Panch*, headed by *Malik*, where their socio-economic and political disputes are settled. *Jati Panch* also sanctions divorce, which is allowed among the *Birhor* people.

Clan	Totem
Sonwani	Gold
Bandi	Fish
Badi	Banyan Tree
Baghel	Tiger
Kosandi	Cocoon

Discussion and Analysis

Livelihood of Birhor in the Study Settlement

The Birhor tribe is a classic example of a hunting-gathering tribe, which is in a rapid transitional phase, facing many problems to sustain their livelihoods. S. C. Roy in the year 1925 wrote an account of the Birhor. The Birhor claim that they have descended from the Sun. They are also known as semi-nomadic tribe as they move from one place to another when the food supply in a particular place is exhausted. It was also believed that they hunt monkeys to tame them to do acrobatics. Nowadays due to the impact of modernisation, the mixture of forest economy and wage labour can be seen amongst the Birhor people. The livelihoods of Birhor mainly depend on the forest as well as local market. They strongly believe that 'they can't live without forest and can't manage without going to the market' (Ota & Sahoo, 2010). As explained by Nadal (2014) that 'the forest is fundamental to their identity in reference to the other neighbouring groups in the area Birhor place other communities as being in the agricultural side of the world occupied by fields, markets and villages'. The main purpose of their visit to market is to dispose their products and for procurement of their daily provisions. The eventual movements from forest to market have a direct bearing on their livelihoods in the settlements of Birhor.

They live in their traditional settlement known as *Tanda* or *Basa*. The huts are of conical shape, which are covered with leaves and branches. Birhor people build an earthen ridge around the outer circumference of the *Basa* to prevent seepage of water and entry of reptiles into it. They are skilled in constructing the *Basa* quickly within two to 3 h. Due to contact with non-tribal people and impact of modernisation, many of them have switched to a settled life in the study area. The shift in their life is also evident from the study of Pankaj among the Birhor of Jharkhand. Pankaj (2008) in his study mentioned that due to the exhaust of forest resources, their mobility is restricted and as their movement is cyclical. It is found in the study area that Birhor are settling down in one place and subsequently exploring additional means of livelihoods available in their vicinities. They involve in the subsidiary and diverse occupations such as tractor driving, agricultural labour, part-time agricultural work, household labourer work, brick-kiln industries labour work, etc.

Economic Classification of Birhor in the Settlement

According to their economic habit, the Birhor are classified into two groups: UTHLUS—the wandering Birhors, and JANGHIS—the settled Birhors. The Birhor of Umariya Dadar are not involved monkey hunting. As mentioned by Ota and Mohanty (2008) they are also called Mankirdia in the official reports of the Odisha state. They lead a semi-nomadic lifestyle and involve primarily in hunting and food gathering. For their traditional skill of rope making, trapping and eating monkey, their neighbours call them as 'Mankidi' or 'Mankirdia'. Pankaj (2008)

also mentions about their skill of monkey trapping. Birhors make ropes out of a particular fibre known as *udal*. They prepare various ropes for various purposes. They make ropes for tying their cattle and for other commercial purposes. As mentioned by Ota and Sahoo (2010), Birhor economy revolves around the forest and forest resources especially the minor forest produce (MFP). They are very skilful in preparing a variety of ropes from the material they collect from the forest. Sometimes, they use jute as a raw material in preparation of ropes according to the needs and requirements of local farmers. Informants from the Birhor settlement also mentioned that these products have a very good demand in the area and through which they manage their livelihoods.

The Uthlu Birhors do not practice any form of agriculture and are entirely dependent upon the collection of forest products for their living. Occasionally, they also do a little bit of hunting with small basket traps. The Birhor women are hardy and industrious by nature. They are the custodian of family income, expenditure, customs and traditions. They not only do household chores and rearing, caring of children, but they also take active part in the collection of food, trapping of birds, agriculture, agriculture labour and basketry and rope making.

The women make *topa* (basket) out of cane. The cutting of cane is done by the males of the family with sickle. The cutting of cane is not an easy task, so men help the women. The women make beautiful baskets of various designs. They also make some fish trap made up of cane. Some baskets are also made up of barks of the trees. They also collect *mahua* and firewood and sell that in the market. Daily wage works, and petty business (chai stall) follow this.

In the study area, Birhor economy at present revolves around small game and rarely get an opportunity to take anything larger than wild pigs, small varieties of deer, rabbits and few varieties of wild birds. They primarily hunt animals such as hare, wild hen and wild birds. Further, it is noticed from the study area that Birhor economy since past few years shows a shift towards agriculture. In Umariya Dadar village, where they practise agriculture, though on a smaller scale the government has given them land on the basis of the number of households present and also some animals for ploughing. These people produce primarily for their own consumption. Another important and significant observation made during the field work by the researcher was regarding their habit of begging. In the interaction with the community they mentioned that begging is so strongly rooted in them and it could be also considered to be one of their economic activities in the contemporary times.

Few of the Birhor now depend on agricultural labour, construction or repair works in and outside the village. Since the type of land available is dry land, they have to depend upon monsoon for their cultivation. Frequent failure of the monsoons made the people to migrate to other areas. People from the Thanda explained that seasonal migration is high in the area as majority of them are marginal farmers and landless agricultural labourers. Almost half of the households in the Thanda migrate to towns in the off-season, according to the Gram Panchayat Sarpanch. One informant stated that they are helpless and there is no other way except to migrate to other areas. It is also found from the fieldwork that few of the

younger people migrate to towns in the off-seasons and come back to Thanda during rainy season, to cultivate land or work as farm labourers.

Development Schemes

The Government of India is also running a central sector scheme exclusively for the development of the PVTGs. Government of India grants special funds under Central Sector Scheme for the development of the PVTGs. This fund is mainly utilised for the construction of the houses for them and execution of infrastructure development schemes such as road, bridge, minor irrigation, construction, renovation of ashram and school building in PVTGs dominated areas and also to create income generation through various schemes such as goatery, piggery, agriculture, ginger cultivation, etc.

The Chhattisgarh Government has implemented various schemes during the 11th Five-Year Plan period (2007–2012) with a huge budget of Rs. 108.70 lakhs. But all these development schemes proved to be a failure, due to lack of proper management by State Government. The condition of the Birhor has not changed yet. Some of the schemes are:

- *Chief Minister Security Plan:* Under this, the Birhor tribe with their below poverty line (BPL) card can avail 35 kg of rice for free, every month.
- The Chhattisgarh Government has also taken up some housing schemes, such as *Indira Awas Yojana.*
- All families are provided with an *Antyodaya* card which they use to get rice, wheat and kerosene per family per month.
- Social Security Scheme is also provided to them in which they get Rs. 400 as pension.
- Government agencies also provide hens and goats to them for their welfare.

It is observed from the fieldwork that the Birhor have been provided basic infrastructure, like houses under Indira Awas Yojana, community houses, wells, tube wells, supplementary nutrition feeding centres, kitchen gardens and social welfare measures, such as voter identity cards, ration cards, BPL cards, old age/ widow pensions and assistances under different income-generating schemes. The Birhor community has shown good response to the development programmes initiated by the government and other agencies. By the impact of these interventions some of them have crossed the poverty line; turned literates, sharecroppers, businessmen, tractor drivers and are sending their children to schools. The main thrust of the schemes is to strengthen the assets base of the Birhor tribe in the study area. It is apt to mention here Mishra et al.'s (2016) argument that state and non-state actors must play pro-active role to help them to settle in a place. Voluntary organisations such as Bharat Sevashram Sangha and Ramakrishna Mission have started to rehabilitate them in permanent camps in different villages with built houses also providing food grains, clothes, blankets, mosquito nets, free

education, mid-day meal for the children and employment in the locally established handlooms and so on.

Issues and Challenges Faced by Birhor

Being PVTGs, Birhor tribe is known for their distinct culture. They are considered as the people of forest. Their life also represents the man–nature–culture bond in their vicinities. But the Birhor tribe residing in Umariya Dadar live in a very poor socio-economic condition. Many of them do not have their own land. Most of them are living in *non-patta* (unrecognised) land with fear in their mind of displacement. The Prime Minister's *Awas Yojana* scheme is availed by few people in the area. Majority of them are illiterate in the settlement. They still lead their life in the primitive economic stage of development. Due to the lack of money their kids roam with almost tattered outfit or with the uniform which is provided by the government school. Due to the lack of sufficient money many of them eat once in a day. Rice is their staple food in the study settlement. They consume half of the 35 kg of rice, which they use to get under BPL and *Antyodaya* schemes, and sell the rest of the rice and wheat to the nearest market for money. This is the reason most of them are malnourished and may fall prey to diseases. It is also observed during our fieldwork that the pension schemes are full of loopholes. The old people in the Birhor family are not getting pension on a regular basis. The *Sarpanch* of the village asks them bribe to process their forms for pension in the settlement.

The goats and hens are also not productive in nature as they are not able to provide them proper grazing area and lack of veterinary facilities nearby their habitats. Most of the animals die due to the seasonal diseases in the study area. They also lack knowledge about the services of veterinary due to their illiteracy and backwardness. Mainly, it is said that the tribes never show discrimination against other tribes. But the scenario is different in the study settlement. The major tribes of the village are Gond, Kawar and other non-tribals or caste groups such as Yadav and Thakur who treat them badly and discriminate against them in their day-to-day activities. The dominance of upper castes is clearly visible in the study settlement. Many times Birhors are not even allowed to put their words in the Panchayat dominated by the upper castes and other backward classes (OBCs).

On the other hand, the modernisation is also affecting their lives and livelihoods. Earlier they used to engage in the agricultural activities as wage labourers during agricultural operations. But now due to the advancement and arrival of new tools and machines, Birhor people lost their livelihoods in their settlement.

The resultant of prevailing situations in the village is migration. Since the male members migrate to the towns, women are the major sufferers, as they have to take care of their families. The conditions of women are very poor in the village. Due to poor sanitation, they are frequently affected by several diseases, and more often prone to ill health, and sometimes they lose their lives as revealed by the respondent of the settlement.

The majority of youth of Birhor have to go to nearby towns in search of their livelihoods. Once, they obtain some kind of works in the towns, the majority are not returning to their settlements except to attend functions and ceremonies in their families. Due to the lack of works in the summer seasons, remaining lot of youth form groups and go to Ratanpur and Bilaspur for wage works. They normally engage themselves in the works related to construction activities. Their daily wage rates are Rs. 250 for each person. Few of them stay in their worksite and return to their settlement during off-seasons or in emergencies. They save some money and send it to their parents. Some of the youth have turned to bad habits due to their peer group in the cities and towns. There are around 15–20 families who regularly migrate to the towns during off-seasons. Thus, these things have drastically affected the lives and livelihoods of Birhor people of the settlement.

Are PVTGs Lives and Livelihoods at Stake?

Srivastava (2008, p. 30) in his critical essay 'Concept' of 'Tribe' in the Draft National Tribal Policy argued that the word 'primitive' to be used for certain kinds of societies came into vogue in the latter half of the 19th century during the colonial era. The Victorian scholars were interested in finding out the stages through which human society had passed before it reached its then extant state. It was also thought that the non-western societies (of Africa, Asia, Oceania and Latin America) of that time were the 'remains' 'survivals', 'social fossils' and 'vestiges' of the prehistoric ages, and their intensive study would illuminate the past of the Victorian society. The term 'primitive' was, therefore, used in a temporal sense. Nevertheless, in later course of time, post-independent nation state along with the then academia carried the word to denote the people who are vulnerable in all their spheres of life.

A growing body of literature over the past few decades has tried to explain the PTGs and their classification, but they could not succeed in neither defining it nor providing new dimension to the term. Nevertheless, in the year 1973, the Ministry of Tribal Affairs (MoTA) set up the 'Debar Commission' that named the PTGs as a separate category among the tribes who are lesser developed among all the tribal groups. The PTGs were again renamed as PVTGs in the year 2006 as researchers felt that calling them primitive is derogatory and inhumane.

Earlier, Radhakrishna (2009, p. 14) in her paper vividly discussed that PTGs are a subgroup identified for special attention by the government within the larger category of scheduled tribes (STs). The identification of ST itself is done on the basis of the following characteristics: (a) primitive traits; (b) distinctive culture; (c) geographical isolation; (d) shyness of contact with the community at large; and (e) backwardness (Standing Committee on Labour and Welfare, 2002). It was recognised by the government in the year 1975 that there were certain communities even within this vulnerable category which were at a much lower level of development compared to the other ST communities, and that the major share of funding went to those communities among them who were more assertive. Hence,

certain groups were identified for the first time in 1975–1976 (and then some more again in 1993) within the ST category, as the 'poorest of poor amongst the STs' and were called PTGs. The criteria fixed for identification of the PTG were: (a) pre-agricultural level of technology, (b) very low level of literacy and (c) declining or stagnant population (Radhakrishna, 2009).

According to Xaxa (2014), these tribes have been characterised based on their 'vulnerability'. He also argued that despite of their classification as vulnerable, vulnerability has not been defined properly by any of the scholars. There are 75 PVTGs identified on their few characters:

- Livelihood totally depend on the forest
- Pre-agricultural existence level
- Low rate of literacy
- Stagnant or declining rate of population
- Subsistence based economy

Many Social Science scholars have argued that is this classification enough for categorising PVTGs. With the changing definitions of tribe the PVTGs have lost in a classification trap. According to the recent report by Anthropological Survey of India (AnSI) no base-line surveys have been conducted among more than half of PVTGs. AnSI researcher also added that, of the 75 PVTGs, base-line surveys take place for only 40 PVTGs, even after declaring them PVTGs. These surveys are done to identify the habitat and socio-economic status of the PVTGs, to initiate the development schemes and policies for them, based on the accurate facts and figures.

Earlier, Misra (2016) in his study clearly mentioned the requirement for the revision of the PVTG list as the present list has overlaps and repetitions. The list contains synonyms of the same groups such as Birhor and Mankidia in Odisha, as both of which refer to the same group, because of their traditional monkey hunting practices. The nearby tribal people also call them Jomsara for their custom of eating monkeys (in Mindari, 'jom' means 'to eat' while 'sara' means monkey) (Mishra et al., 2016, p. 61). However, in his pioneering work, S. C. Roy (1925) wrote an account of the Birhor about nine decades ago. He stated categorically that Birhor is peripatetic and semi-nomadic, hunter-gatherer community and inhabiting in the midst of thick forest and jungles of Chotanagpur region of the then state of Bihar. According to Nadal (2014) the 'Mankirdia' are usually referred to as Birhor. This name is also used by peoples of various states which they inhabit.

As a final note, it can be said that the PVTGs in India are the representatives of the rich ancient culture. Misra (2016) in his study said that the PVTGs, despites of all odds, have survived to this day. So, development programmes and base-line surveys are needed for them to bring them to the mainstream of the society. The measures of the state are clearly echoed in the Draft National Tribal Policy. According to the Draft National Tribal Policy, tribal communities witnessing

> [T]heir habitats and homelands fragmented, their cultures disrupted, their communities shattered, the monetary compensation which tribal communities are not equipped to handle slipping out of their hands, turning them from owners of the

> resources and well-knit contented communities to individual wage earners in the urban conglomerates with uncertain features and threatened existence. (Dev Nathan & Xaxa, 2012)

In this article, Mishra et al. (2016) vividly highlight the ethnographic outline of the Birhor Tribe Jharkhand, Chhattisgarh, Bihar, Odisha and West Bengal. Further, they mentioned that livelihoods of Birhor people primarily revolve around the rope making out of fibres of a particular species of vine called as *Lamah* and *Udal*. They prepare different varieties of ropes, such as collar ropes for tying cattle, ropes for pulling water from wells, and a long rope having a number of loops leading from the main rope for tying cattle while treading them over paddy grains, a rope for the decoration of the cattle head, and a kind of narrow rope for use in bullock carts. A few of the Birhor people work as labourers in agricultural fields for weeding grass, ploughing, harvesting, transportation, and so on. In this article, Pankaj (2008) is primarily focused on the changing economy of Birhor tribe. Due to their contacts with neighbouring non-tribal people, Birhor are also looking for other avenues, such as tractor driving, construction work labourers, brick-kiln workers, etc. In this article, Firdos (2005) captured the kinds of changes experienced by Birhor people in their livelihoods patterns in the Central India.

Conclusion

To conclude our argument, it is apt to quote the report of the World Indigenous Peoples. The World's Indigenous Peoples' Report (2009) has made it clear that although the countries where these groups reside are making efforts to move ahead on account of some of the social and economic indicators, they are squarely failing on account of improving their education, health and living conditions in order to bring them to the manifolds of social and economic development. It has also stated that these groups suffer from disproportionately high levels of poverty, illiteracy, poor health and human rights abuse. The situation of Birhor tribe is similar to the other south Asian region tribal and indigenous peoples. Anthropologists of colonial and post-colonial India intimately tie the livelihoods of Birhor with the forests, which was evident from the numerous ethnographic works. However, the forests are also intimately tied up with the Indian state and commercially minded multi-national corporations (MNCs) who are only interested in its value as a commodity. It is also evident that the large-scale exploitation of forests by the MNCs in the name of development has never augured well with its small-scale usage by tribes to collect their MFP and to eke out their means of livelihoods (Gregory, 2013, p. 55).

It was also evident that since Independence, majority of the programmes meant for the upliftment of the marginalised have not yielded the desired results so far and VP are still becoming more vulnerable and poor. Thus, they are looking at the state for help and aid (Kasi, 2011). The development programmes and schemes are broad encompassing various issues, integrative and ideal efforts to stamp out vulnerability, poverty and to eliminate inequalities in distribution of

assets and resources equally, by creating favourable infrastructures and offering support to individuals and individual households. Further, the programmes are beset with problems relating to coordination of various elements that necessarily intervene and intersect the areas of operation. These include human elements—discharging the duties of the functionaries, location of the institutions, power politics and natural local conditions. By all these vicissitudes, the life of Birhor in Chhattisgarh is still looking beamy and they are still hoping for a positive change in the years to come.

Though, nowadays, Birhor started a settled life due to the restrictions on their movement by the forest laws and also exhaust of forest resources, their traditional occupation of hunting and gathering is still in the back of their mind as revealed by the one of the informants during our fieldwork. It is apt to mention here the statement of Firdos (2005) that due to massive degradation of forest resources and reduction of forest cover, the traditional livelihoods of Birhor are altered significantly and they are now moving towards alternative forms of livelihoods available in their vicinities. It shows that they need the support of the state and non-state actors to provide them better access to forest resources and equal distributions of land and other natural resources. To conclude, we propose that proper coordination and cooperation between the state and non-state actors to implement the interventions in a meaningful way is the only way out to free the VP from the clutches of poverty and social and economic inequalities.

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Note

1. The term ‘people’ is used interchangeably with tribe and community or group to refer to *Birhor* in the article.

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