Mobile Phones, Household Welfare and Women's Empowerment:
Evidence from Rural Off-grid Regions of Bangladesh

Monzur Hossain, BIDS

Hussain Samad, World Bank

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Bangladesh Institute of Development Studies (BIDS)

Context and objectives

- Bangladesh has one of the highest mobile phone penetrations among developing countries

- Mobile phone subscribers currently stand at about 128 million, which is almost 80 percent of the total population of Bangladesh

- Mobile-based internet have by now grown to about 60 million or 33 percent of the population

- Surprisingly, there is no rigorous study linking mobile phones to household and individual welfare in Bangladesh.

- This study aims to assess the impacts of mobile phones on household welfare measures in terms of income, consumption smoothing and women's empowerment in rural Bangladesh.

- This is a pioneering study on the impact of mobile phone

Background: How mobile phone affects household welfare

- The use of mobile phone is likely to have a positive impact on household welfare as well as market efficiency through connecting people, businesses and across (Blauw and Franses, 2016; Jensen 2007; Aker and Fafchamps 2013; Klonner and Nolen 2008).

- Mobile-phone communication can lower transaction costs (in terms of savings in time and money) of carrying out business activities.

- Producers can use mobile phones to find out prices of their goods without physically travelling to market places, and consequently, can negotiate better with wholesalers or retailers.

- It allows remittances to be used more frequently on as-needed basis

- It allows households to smooth consumption during shocks and cope through other emergencies, and cope with production risks (Jack and Suri, 2014)

Data and Sample Survey

- This study uses the data of the IDCOL survey of 3540 households conducted during the second half of 2016.

- The sample households are taken from off-grid areas (char, river, sea and coastal), that are handicapped by rail or road networks

- The sample districts were Sirajganj, Naraynaganj, Jamalpur, Kushtia, Manikganj, Noakhali, Patuakhali, and Faridpur.

- Mobile phone plays and important role of communication in these areas

- The main sources of earning in those areas are farming (agriculture) (40 percent), small businesses (16 percent), wage or salaried employment (16 percent) and fishing (8 percent)

Methodology

- Mobile phone access has endogeneity problem: since mobile phone interventions in rural Bangladesh may be non-random, and therefore, we have to consider quasi-experimental techniques such as either instrumental variables (IV) technique, or propensity-score matching (PSM)

- Considering difficulties of IV regression, we used different variants of PSM—p-score weighted regressions

- We explore two such estimators:

- The first one is called inverse probability weighted (IPW) estimator which is based on the assumption of conditional exogeneity (Hirano, Imbens, and Ridder, 2003)

- The second estimator is called augmented inverse-probability weights (AIPW) estimator, which is doubly robust

Methodology…..

- To identify the determinants of mobile phone ownership, first we estimate a probit model which can be expressed by the following equation,

- $M_i = \alpha^m + \beta^m X_i + u_i^m + \varepsilon_i^m$ (1)

- With the availability of cross-sectional data, the outcome equation can be expressed by following equation:

- $Y_i = \alpha^y + \beta^y X_i + \gamma^y M_i + u_i^y + \varepsilon_i^y$ (2)

Results: Mobile ownership

- The marginal impact of various determinants on mobile phone ownership by household head is estimated using the Probit model

- All the control variables show expected signs and statistical significance.

- Male heads are more likely to have mobile phones than female heads. As expected, young or educated household heads have a higher probability of owning a mobile phone than the old or less educated household heads.

- More specifically, one additional year of education increases the probability of mobile ownership by household head by 2.2 percentage points.

- Having better amenities, such as electricity or sanitary latrine, increases the probability of mobile phone ownership.

Results: Impact on Income

- Findings show that that ownership of a mobile phone by the household head has positive and significant impacts on most income variables considered, based on both IPW and AIPW estimates

- The largest impact of mobile phone use is observed for nonfarm business income. The probability of receiving such income goes up by 10.4 percentage points because of mobile phone use based on IPW estimate and by 7.3 percentage points based on AIPW estimate—robustness check later confirmed by considering ATT and ATE in IPW estimates

- The ownership of mobile phones by household head increases the probability of having income from fisheries by 6.9 to 9.8 percentage points.

- These findings unambiguously show that ownership of mobile phones by household head enhances household income generation opportunities.

Table: Impact on income…

Outcome variables	IPW estimates (ATT)	AIPW estimates (ATE)
HH receives remittance	0.054** (2.46)	0.039* (1.78)
HH receives income from rental properties	0.037** (2.97)	0.027 (1.39)
HH receives income from nonfarm business	0.104** (3.84)	0.073** (3.60)
HH receives income from livestock and poultry	0.038* (1.97)	0.038* (1.78)
HH receives income from fishery	0.098** (3.01)	0.069** (2.45)

Estimation controls for household characteristics (age, sex, and education of the household head, number of adult males, number of adult females, log of agricultural land, access to piped water or tube well, access to flush toilet), village-level infrastructure (paved roads, schools, markets, banks, NGOs, development programs, and so on), and village prices of essential food items (staples, meat, fish, vegetables, and so on).

Impact on women empowerment

- Two models are estimated: one with hh head having mobile phone and two both HH head and the woman have mobile phone

- Outcomes are influenced by the ownership of mobile phones by both household head as well as by the woman, although their effects vary by outcomes and models.

- Based on Model 1, a 0.8 percentage point increase in women's labor force participation which is 1.1 percentage point in Model 2

- The beneficial effects of women's mobile phones are higher for the indicators like mobility to marketplaces, purchase of household goods, and employment.

- It is likely that mobile phones facilitate women empowerment through the income channel.

- For some cases like family planning and children's education, model 1 matters

Table: Women empowerment

Explanatory variables	Labor force participation		Can go to the market alone		Can decide alone about children's education		Can decide alone about children's health	
	Model 1	Model2	Model 1	Model2	Model 1	Model2	Model 1	Model2
Head has mobile phone	0.008** (1.99)	0.011** (2.94)	0.028** (2.98)	0.024** (3.32)	0.034** (5.22)	0.033** (4.56)	0.055** (2.32)	0.051* (1.88)
Women herself has mobile phone		0.015** (3.16)		0.035** (5.84)		0.012* (2.27)		-0.022 (-0.90)
R^2	0.232	0.253	0.292	0.334	0.302	0.449	0.222	0.367
N	4,968	4,968	2,784	2,784	2,784	2,784	2,784	2,784

Impact on shock

- The outcome equation capturing the effects of shocks and mobile phones can be expressed as

- $Y_i = \alpha^y + \beta^y X_i + \gamma^y S_i + \delta^y (S_i * M_i) + u_i^y + \varepsilon_i^y$

- Because of shocks, household food consumption goes down by 7.7 per cent, the probability of having a food deficit increases by 3.1 percentage points, and the number of months of food deficit goes up by 0.31 or about 9 days per year.

- Ownership of mobile phones seems to lessen the harmful effects of shocks.

- Having mobile phones increases per capita food expenditure among the households subject to shocks by 3.5 per cent and lowers the probability of having food deficits by 2.8 percentage points.

- Overall, the findings clearly show that mobile phones have a consumption-smoothening effect for the households in the face of shocks.

Table: Impact on shock

Explanatory variables	Log per capita food exp. (Tk./year)	HH faced food deficits last year	Months faced food deficit
Village was subject to shocks	-0.077** (-2.07)	0.031* (1.64)	0.310* (1.88)
Village was subject to shocks X Head has mobile phone	0.035** (3.15)	-0.028** (-3.63)	-0.313** (-2.63)
R^2	0.283	0.260	0.115

Conclusions

- The findings suggest that people make use of mobile phones for enhancing their income from livestock and poultry, fisheries, rental services and general businesses in off-grid rural areas in Bangladesh.

- The channels through which mobile phone improves income by facilitating marketing of products, eliminating travel costs, and saving time. As the physical communication is handicapped in rural remote areas, mobile telecommunication fills in the gap.

- Mobile phone also enhances women empowerment—perhaps through income channel. This is the first study to the best of our knowledge that casts light on this

- Mobile phone smoothen consumptions during any shocks

- The findings are robust and consistent with other available studies

- Finally, further investment in mobile network expansion, favorable policies to make mobile phone technologies affordable to the poor, and expansion of mobile innovations could reduce communication bottlenecks in lagging regions and help leapfrog households economic status into a higher level

Thank you

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