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Electricity is not just light, it entails enlightenment. In this backdrop DFID of the United Kingdom committed up to £50 million to increase the provision of electricity in rural and peri-rural areas of Bangladesh. The Program is known as *Rural Electrification Development Project (REDP)*. A special microfinance component was part of REDP. Microcredit as a tool for poverty reduction mediated through electrification of the poor household is a new concept in the development arena. To evaluate the socio-economic impact of rural electrification and microfinance program on development, it was necessary to have a sound research. Considering the need of such a study NRECA awarded HDRC with the assignment, which consisted of two Parts: *Baseline Survey* and *Impact Study*. Baseline Survey was conducted by HDRC in 2008. In the socio-economic impact phase, in 2010, the same households (interviewed at the baseline phases that were under the microfinance programme under REDP in Brahmanbaria PBS area) have been interviewed to assess the impact of electrification through the microfinance component of REDP.

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Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ANC	Ante-Natal Care
ARI	Acute Respiratory Infection
BBS	Bangladesh Bureau of Statistics
BDHS	Bangladesh Demographic and Health Survey
CBN	Cost of Basic Need
CBO	Community Based Organization
CPR	Contraceptive Prevalence Rate
DCI	Data Collection Instrument
DCI	Direct Calorie Intake
DFID	Department for International Development
EOC	Emergency Obstetric Care
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FP	Family Planning
GoB	Government of Bangladesh
HDRC	Human Development Research Centre
HH	Household
HIES	Household Income Expenditure Survey
HIV	Human Immunodeficiency Virus
IGA	Income Generation Activities
JMP	Joint Monitoring Programme
KII	Key Informant Interview
MCP	Medically Competent Person
MDG	Millennium Development Goal
MICS	Multiple Indicator Cluster Survey
NGO	Non-Government Organization
NRECA	National Rural Electrification Cooperative Association
NRR	Net Reproductive Rate
ORS	Oral Rehydration Salts
PBS	Palli Bidyut Samity
PNC	Post-Natal Care
PPP	Purchasing Power Parity
PPS	Probability Proportional to Size
RE	Rural Electrification
REB	Rural Electrification Board
REDP	Rural Electrification Development Project
REP	Rural Electrification Program
SSP	Social Safety net Program
STD	Sexually Transmitted Diseases
TFR	Total Fertility Rate
TT	Tetanus Toxoid
TTBA	Trained Traditional Birth Attendant
UNICEF	United Nations Children's Fund
UTTBA	Untrained Traditional Birth Attendant
VAW	Violence Against Women
WHO	World Health Organization

Executive Summary

Background

Electricity is not just light, it entails enlightenment. In this backdrop DFID of the United Kingdom committed up to £50 million to increase the provision of electricity in rural and peri-rural areas of Bangladesh. The Government of Bangladesh committed to contribute £ 122 million through the Annual Development Program. The Program is known as *Rural Electrification Development Project* (REDP). The project accomplished 23,000 km electric line crated 1.3 million electric connections, and provided microcredit for electrification in 2,200 households in Brahmanbaria PBS. A special microfinance component was part of REDP. Microcredit as a tool for poverty reduction mediated through electrification of the poor household is a new concept in the development arena. To evaluate the socio-economic impact of rural electrification and microfinance program on development, it was necessary to have a sound research. Considering the need of such a study, NRECA awarded Human Development Research Centre (HDRC) with the assignment followed by a competency assessment jointly done by NRECA,, REB, DFID and USAID. The assignment which consisted of two Parts: *Baseline Survey* and *Impact Study*. Baseline Survey was conducted by HDRC in 2008 in Brahmanbaria PBS- the only PBS where this unique idea of ‘electrification through micro finance’ was implemented by a partner organization named ‘Padakhep’. In the socio-economic impact phase, in 2010, the same households (interviewed at the baseline phases that were under the microfinance programme under REDP in Brahmanbaria PBS area) have been interviewed to assess the impact of electrification through the microfinance component of REDP. The basis of the findings is primary data for 377 households in impact phase and the time gap between the baseline and impact is two years.

Household Background Characteristics

The demographic characteristics have remained almost unchanged in two time periods: 2008 baseline and 2010 impact. The average household size is 5.6 in baseline and 5.8 in impact study. A 87.5% and 88.1% male-headed households have found in baseline and impact survey respectively. For male members, the literacy rate has been estimated at 58.1% in baseline and 68.3% in impact study and for female 54% in baseline and 61.7% in impact study. No distinct variation has been found for primary occupation; the pattern remained same as baseline survey. In impact study, 16.2% households have non-resident income earning members which is slightly higher than in baseline (14%).

Household’s Assets Ownership

After household electrification, addition of new items (mostly electricity-run appliances- electric bulb, electric fan, TV, DVD/VCD, charger light etc.) has been found. Compared to the baseline (2008), the total valuation of household assets (movable) has been increased by 1.46 times (from Tk. 29,711 to Tk. 43,470). The valuation of household assets varies considerably while poverty level is considered- non-poor group’s asset with significantly higher valuation (TK 48,334) than that of the poor group (Tk. 38,147). This trend is similar to the baseline situation. Male-headed households possess assets with

significantly higher valuation (Tk. 44,726) than that of the female-headed households (Tk.35,297). This pattern is similar to the baseline situation. The landlessness scenario of the households in the impact phase (87.8% landless) has been remained same as that in the baseline (88% landless). The pattern of use of housing materials has been remained unchanged in last two years.

Attitude towards Household Electrification

Major benefits mentioned during impact study (2010) are using light bulbs (90.5%), using electric fans (89.1%), benefit in children's education (59.9%), watching TV (49.3%), charging cell phones at home (36.6%) and doing household chores even at night (35.5%). A 75% of the households are satisfied with the electricity connection (including 6% highly satisfied households) while a 12% are dissatisfied and remaining 13% are neutral. Although 6% are 'very satisfied' with electricity, 13% are 'neither satisfied nor dissatisfied'. The single most reason for dissatisfaction is interruption of electricity supply due to load shading. At present, the average monthly expenditure on energy is TK. 203 (which includes TK 138 as electricity bill and TK 65.3 as other fuel cost). However, in the past when the households did not have electricity they had to spend Tk. 162.1 for this purpose. A household is now spending Tk. 41 per month more than when they did not had electricity. Nearly half (45.4%) of the respondent households consider electricity bill as 'satisfactory'. Almost same percentage (45.9%) regards the current electricity bill as 'expensive'. An 8% of the households opined that they are ready to pay even higher charges if uninterrupted electricity supply could be ensured. Knowledge about the cost and process related to household electrification is still very low among the respondents. The most echoed suggestions for improving the electricity situation were related basically to a single suggestion—addressing the current load shading situation. Other suggestions were lowering electricity bill, enhancing quality of other services and stopping bribe and other anomalies in the process.

Household Income, Savings and Credit

Average household annual gross income has increased by 2.5 percentage points (from Tk. 165,000 to 169,000 at current price), while net annual income has increased by around 24% (currently constitute Tk. 104,000 which was Tk. 84,000 at baseline). In terms of monetary value, about 36% annual net income of an average household is currently produced in business sources (26% during baseline), and no major changes in other major sources (including remittance: 12% at the time of baseline and currently 13%) have been observed. Currently, about 29% households reportedly generate direct income from at least one source related with electricity, while during baseline the same was about 13%. However, the current average amount of income which can be attributed as direct contribution of electricity in household annual net income is as low as Tk. 2,363 (at baseline Tk. 544). A 2.3% of the annual net household income (and 9.1% of the incremental income) could be directly attributed to electricity; the same was 0.6% in the baseline. An average household reportedly have Tk. 11,873 as savings on the day of survey (which was Tk. 7,521 during baseline). The average amount of loan availed by households from all sources during last two years period is Tk. 36,922, while the same at the time of baseline was Tk. 20,494 (80.16% increased).

Household Food Consumption

In terms of food intake, an average person in respondent household is still consuming low compared to recommended by Bangladesh Nutrition Council, a balanced combination of 934 gm (Baseline 2008: 764 gm and Impact 2010: 815 gm , food per day). About 52% of current consumed food constitutes rice, the same was about 55% at baseline, but the recommended share of cereal is about 42%. Daily food intake of an average female member currently constitutes about 746 gm of food, while the same during the baseline was about 710 gm. The average per person food energy per day consumption at the time of impact study 2010 is 1872 k. cal. which was 1761 k.cal. at baseline.

Household Expenditure

Annual average household expenditure has increased by 25.7% (currently Tk. 113,809 which was TK 90,560 during baseline). Food expenditure constitutes the major part of the expenditure – both at the time of impact and baseline studies (Tk. 78,120 and Tk. 59,832 at current price respectively). Daily per person expenditure is around Tk. 54 at present which was Tk. 44 during baseline (at current price). Currently, the average household annual expenditure for the female members (2.8 persons) is Tk. 54,942 which was Tk. 43,763 (2.7 persons) in baseline. At both the points of observation, the expenditure for females was less compared to male household members.

Household Poverty Status

The poverty situation among the households has been improved significantly in last two years. Using the DCI measure (head count), in the baseline 84.3% of the households were absolute poor which decreased by 11.6 percentage-points in impact reaching 72.7%. The hardcore poverty situation has been improved more sharply. Hardcore poverty has been decreased by 15.8 percentage-points during this period (from 63.3% to 47.5%). These imply that the food-poverty has been decreased among this group of people in Brahmanbaria. The poverty situation among the households has been improved in last two years using the CBN measure. In baseline, about 52% of sample households were situated below the upper poverty line which has been decreased by 6 percentage-points (46%). Estimates for lower poverty line showed that about 38% households fell below this line in baseline which has also been decreased by 2 percentage-points (36%). The poverty situation among the households has been improved in last two years using the international poverty line. Estimates based on international poverty line of US PPP \$1.25 a day per person shows that 78.5% of the households were poor in baseline, which has been decreased by 7.4 percentage-points (71.1%). The poverty rate with US PPP \$ 2 a day per person was 94.3% in the baseline which has been decreased by 8.4 percentage-points (85.9%). Land-poverty is highly pronounced among the sample households- 88% of the households are landless (both in impact and baseline). A 38% of the households have reported facing crisis in last two years, which was 24% in baseline. The major loss reported by the households is high loss due to illness, trend being similar to baseline. A 67% household has faced high expenditure due to illness, which was 82% in baseline. The major strategy for crisis coping has been reported as loan in 75% cases, which was 63% in

baseline- which shows, somewhat leaning towards loan taking tendency. Electricity indirectly contributes in reducing the household crisis of illness and loss of income mediating through its direct contribution to improved hygiene behavior. Also utilization of savings has been in a decreasing swing since the baseline (from 22% to 10%).

Health, Hygiene and Sanitation: Knowledge and Practice

An overall increase in awareness over the crucial public health issues has been found with the overall knowledge coefficient increases from 0.25 at baseline to 0.40 at impact. On an average 5 out of 20 crucial public health issues were known to the respondents during baseline as opposed to 8 out of 20 at end line. The occurrence of illness among the respondents or someone in their household has been reduced from 24% at baseline to 18% at impact. The most commonly encountered illnesses at impact are fever (69%) and diarrhea (17%). The corresponding figures were 48% and 20% at baseline. Between baseline and impact, practice of ante-natal care (ANC) has increased from 21% at baseline to 33% at impact and post-natal care (PNC) from 19% at baseline to 23% at impact. The full immunization coverage of the children aged 12-23 months is 78% at impact as compared to 75% at baseline. As in baseline, Tube-well is the sole source of drinking water in impact. The proportion of households depend on drinking water from tube wells not tested for arsenic or contaminated with arsenic has decreased from 36% at baseline to 26% at impact and from 9% at baseline to 2% at impact respectively. Currently, some more than 50% household members use soap for washing hand after defecation as compared to only 23% at baseline.

Education: Literacy, Enrolment and Quality

Literacy rate among the population of all ages has been increased by almost 9 percentage points (increased from 47% to 56%). Impact of intervention is higher on the population living below the upper poverty line and below lower poverty line than the population above upper poverty line. After the intervention, the overall primary and secondary gross school enrolment ratio has been increased by 17 percentage points (from 61% to 78%). The impact of intervention on enrolment ratio of girls is higher as compared to their counterpart boys. Intervention has positive impact on the quality of education in terms of the attendance ratio and school dropout rate. After the intervention, overall attendance rate among the children between 6 years and 15 years has been increased by 7.4 percentage points and school dropout rate has been decreased by 0.6 and 2.2 percentage points respectively in primary and secondary school levels. After the intervention, the most common lighting source for the students for study after sun set has become electric light (89%). Extensive load shedding of electricity has been reported as major dissatisfaction in using electric light for study purpose. Hence, the use of Herican lantern and kerosene lamp for study purpose is still highly pronounced in the intervened area.

Women Empowerment and Gender Issues

The overall women's empowerment status has changed positively compared to the baseline phase. The status of women empowerment in regard to their decision making issues has increased to a high degree. Women's decision making status is significantly higher in female-headed than that in the male-headed households. The observation about women's mobility has come out in greater numbers. The overall mobility status of the women is a bit better in the female-headed than the male-headed households. The condition of domestic and community violence against women has shown positive changes. On a scale of 0-100 (where 100 is worst situation and 0 is the ideal status), the impact score of this issue is obtained as 13.6 (baseline score was 20.3) which signifies that, the situation of violence against women has been improved compare to the baseline phase. The overall state of women's knowledge about gender equality issues has come out with an improved direction. Television is the major source of knowledge on these issues for the women. The trend of having more knowledge about the legal age at marriage (for both boys and girls) has gradually increased. About more than half of the women (58%) took credit in the last year which remained near the same in the baseline (53%). The average amount of credit taken in last year by a woman in a household has been found as Tk. 9,067, which was Tk. 5,217 in the baseline- which shows a significant increment.

Access to Information, Awareness and Knowledge

Percentage of respondent watching Television has been raised dramatically (by almost twice), while popularity of listening radio has declined among the respondents after getting electricity connection. Not only proportion of respondents who watch Television has been increased but also average time spent on watching Television has been increased to almost four times among the respondents who watch Television. However, change in exposure to Television is not the same for male-headed and female-headed household. The impact of electrification in terms of the exposure to Television is higher on male-headed household than that on the female-headed household. Elites and neighbors have been losing their significance as sources of important national and regional news among the respondents after electrification. As a source of important national and regional news Television is taking the place of elites and neighbors. Before the intervention 54.3% respondents were not receiving any important educative information, while after the electrification only 14% respondent are not receiving important educative information. In this regard, Television has played the exclusive role in providing educative information to those people who had no access to educative information prior to the intervention. Television also has become the main source of entertainment among the respondents after the electrification.

Lessons learned

Electricity brings some immediate, mid-term and long term impacts to households who have been able to get the connections. Studies have revealed that even in the electrified villages, the poor are less likely become able to bear the initial cost which is needed to get the access to

electricity. Considering the researchers observation and aiming at uplifting livelihood of the non-electrified poor, REDP has devised a provision of micro-credit for enabling poor households' affordability of getting access to connectivity. Brahmanbaria PBS has been selected as pilot. The targeted poor households are provided with Tk.3000 as micro-credit for meeting up one-time expenses related for electrification and electricity bill payment for first 6 months, which, in turn, is repaid to the micro-credit management agency along with Tk.60 as service charge for the entire credit utilization period in 20 equal installments.

Although, the socio-economic impacts of micro-credit mediated electrification study has been conducted within two years of providing connection to targeted poor households in Brahmanbaria reveal that the connectivity within the short period has generated multifarious immediate impacts.

It is observed that it has reduced the dependency on getting national, regional and local information on elites and rich. Currently, about 41% of targeted population has TV in their house (1.5% had the same during the baseline), and average daily TV-watching hour has increased noticeably, which, in turn, acts as a change-agent in increasing community awareness on different issues (including national and international socio-political developments, health-hygiene, newly innovated technology that increases productivity in the agriculture sector, environment related issues, and others).

It is also found that a new category have been included in household asset list (i.e., various electric gadgets) after electrification. In spite of long load-shading hours round the day, people are still getting some comfort due to presence of electric fan when they have the electricity compared to the period when they were not connected. It is worthy to mention that the overall health condition has, especially that of older people and children, comparatively improved to a certain extent.

The study has revealed that despite limited hours of power supply the daily routine of household members, especially those who are related with home making, has changed to a large extent. Many of the house-keeping activities those were previously done in day time has been shifted after the sunset and being performed using the electric light. A new pattern of elongation of study hours has been observed among the school going children. At present, more children study after sunset using the electric bulb instead of kerosene fired lantern or *kupi bati* (traditional kerosene lamps). Moreover, children also enjoy the comfort of electric fan during their study hours in times when power supply is not interrupted.

The overall knowledge, attitude on crucial public health (including primary health, water, sanitation, and hygiene, and others) issues and their

practice have meaningfully changed due to increased access to TV mediated world of mass communication. Similarly, the women at present are more aware of their rights in the society and are performing more proactive role in gender related issues. Their access to TV have played impressive role in attaining changes.

Beside the indicated changes in knowledge and comfort factors/front, an increase in income, savings, food consumption and expenditure have been revealed during the study period on a targeted group comprising poor people who received micro-credit mediated connectivity. Net household annual income has increased by around 24%, while the directly attributable to electricity household net income has increased over six folds (from Tk. 544 to Tk. 2,363). Furthermore, near about one-tenth of the total (9.1%) household incremental income is net direct contribution of electrification. On average, the poverty level of the targeted connection holders has started decreasing. Currently, the per capita daily calorie intake has increased from 1,732 k.cal to 1,872 kcal, indicating that on average the households have shifted from below hard core poor level to absolute poor level. The increase in household yearly expenditure has been attained due to increase in food expenditure which is a common phenomenon among the poor in countries having similar to Bangladesh socio-economic parameters.

With all the positive impacts reported above, it is revealed that the micro-credit mediated households are mostly ignorant of various information that a connection holder should know, like membership fee, connection fee, wiring charges, tariff of a unit of electricity consumed by domestic connection holders. It is learnt that neither the micro-credit management agency nor PBS has taken adequate initiatives for making the connection holders aware about the issues as well as roles and responsibilities of the consumers.

Considering the positive and negative learning of micro-credit mediated electrification of the poor, it appears that hence indication of greater impacts have been observed, the pilot may be recommended for wide replication coupled with provisioning of IGA training and IGA micro-credit at similar and/or at flexible terms.

The shorter duration of intervention (household connectivity) has not provided the opportunity to capture many other impacts, which would be visible after a longer period of time. It is therefore, recommended to undertake another panel study (involving the same households, methodology and instruments) on impacts of micro-credit mediated electrification after at least five years after electric connectivity.