

# Rural Electricity's Impact on Reduction of Health Poverty in Bangladesh

Abul Barkat\*  
Murtaza Majid\*\*

## *Abstract*

*The paper analyses the impact of electricity on health-poverty reduction in rural Bangladesh. This impact has been analyzed using comparisons between 'with' and 'without' electricity situations. It has been argued that access to electricity (at household and outside household) reduces poverty in health, hygiene and sanitation. On many health indicators, the poor electrified households were found to be better off than even the rich in the non-electrified villages. The spill-over effect of electricity on the non-electrified households of electrified villages is also much pronounced. Electricity has profound impact on human capital formation through knowledge building mediated through electricity-driven media exposure. It is recommended that in order to improve the health-poverty status and to further human development in Bangladesh, access to electricity of the households and social and economic institutions should be expanded. Rural electrification should be viewed as one of the key strategies for national health-poverty reduction.*

## **1. Objective**

The key objective of this paper is to present an analysis of the impact of electricity on the reduction of health-related poverty in rural Bangladesh, based on evidences from a recently conducted comprehensive study titled "Economic and Social Impact Evaluation of the Rural Electrification Program in Bangladesh" (Barkat *et.al*, 2002): Attempts have been made to cover three broad aspects of health-poverty, namely, health, hygiene and sanitation, including education poverty. Analyses have been made to understand the rich-poor divide and the gender (male-female) divide on some crucial health indicators.

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\* Professor, Economics Department, University of Dhaka <email:becoa@bdlink.com>

\*\* Director, Primary Health Care, Human Development Research Centre (HDRC <email: hdrc@bangla.net>

## 2. Some Methodological Issues

The prime purpose of the base study was not to conduct an in-depth assessment of the impact of Rural Electricity/Electrification (RE) on health-poverty reduction *per se*. For this reason, no separate sampling was done to understand health differentials of the poor and non-poor. Whatever analysis of impact on health-poverty reduction has been presented, is based on the original data set of the households not disaggregated by poor and non-poor in the original sample.

The main objectives of the base study were to assess the economic and social impacts of Rural Electrification on four measurement objects— household, industries, agricultural equipment, and commercial activities. Accordingly, the sampling design was developed with a total of 3,718 samples of which 2,491 were households, divided into users and non-users of electricity, and dispersed through 23 Palli Bidyut Samities, (PBSs) out of 67 PBSs operating under the Rural Electrification Board.

As there was no baseline data, it was deemed most appropriate to adopt a post-test-only control group operations research design using “with-without” electricity scenario to gauge the impact of Rural Electrification.

Two types of villages (with and without electricity) with three types of household were covered in the study sample. These were:

**HE**= Household with electricity (pure experimental group; sample size 1,380),

**WE-EV**= Household without electricity in electrified villages (semi-control having spill-over effect; sample size 421), and

**WE-NEV**= Household in non-electrified villages (pure control group; sample size 690).

This classification has been done from the viewpoint of access to household level electricity connections. However, from the viewpoint of household’s benefit from electricity outside the household it is relative.

For collection of baseline data retrospective information (for 5 years preceding the time of field data collection) on certain specific indicators that suffer less from memory recall problems (e.g., ownership, property, assets-land, homestead, number of rooms, sq.ft., number of livestock etc.) were collected. It was useful in understanding the dynamics of changes in the asset situations of the sample households. Therefore, such data can be gainfully used as baseline data to perform secondary analysis on RE’s impact on overall poverty as well as on health poverty.

All the sample households covered in the study, by design, were drawn (using PPS and a statistically random technique) from the rural areas. Therefore, all three categories of households are homogeneous in terms of its location that all are rural.

Throughout this article, the category 'poor' has been used to denote 'poor household' in terms of amount of landownership (details about definition of 'poor' is presented in the note under Table 1). However, it is pertinent to mention that in the electrified villages, both the poor and non-poor households have access to electricity, although the extent of access is different. In the electrified villages, on average, 24.3 percent among the poor households and 45.4 percent among the non-poor households have electricity connections. Another recent study conducted by the authors revealed that rural household's access to electricity is not socio-economic status (or class) neutral. The actual connectivity of households to electricity declines with the declining economic status of a household; while on average 39.7 percent of households in the electrified villages are electrified, the same ratio is as high as 53.5 percent for the non-poor and only 30.6 percent for the poor; while over 90 percent rich households (those having 750 decimals and above land ownership) possess electricity, it is only 21 percent among the poorest households (Barkat et.al., 2003: 37).

It has been observed that, in terms of most community level infrastructural variables population per primary school, population per km *pucca* road, population per public health facility no pronounced differences were found between the electrified villages and the non-electrified ones. This happens so, because establishment of these infrastructural public facilities are not contingent upon the availability or non-availability of electricity in the villages. This point is extremely important due to the fact that availability status of these infrastructural facilities is usually used as explanatory variables in the analysis of economic and social impact of an intervention on the people's lives and living standards. So, these act as neutral variables. In terms of some other variables, such as distance of the upazila health complex from the village non-electrified villages, on average, were found to be placed better than the electrified ones. However, some other infrastructural facilities, like, night schools, banks, cooperative societies, were found to be better in the electrified villages compared to the non-electrified villages. Finally, it is pertinent to emphasize that the multifaceted impacts and benefits of rural electrification are both direct and indirect; and quantitatively attributing rural electrification to those impacts is a daunting research task. And this is more so for such social component as health.

### 3. Impact on Reduction of Health-Poverty

#### 3.1. Why health and what was the enquiry about?

People's health status is the prime component of human development. This is simply because of the fact that the life expectancy at birth has already been formally accepted as the number one variable in measuring the extent of human development or human deprivation. The life expectancy at birth is basically a function of life-time health status. The linkages between health, poverty reduction and economic growth are much more powerful now a days than has been generally understood. The WHO *Commission on Macroeconomics and Health* by challenging the traditional argument that health will automatically improve as a result of economic growth argued that the opposite is true, i.e., improved health is a critical requirement for economic development in poor countries<sup>1</sup>. This commission's path breaking report states that, "Health is a priority good in its own-right, as well as a central input into economic development and poverty reduction. Increased investment in health would translate into hundreds of billions of dollars per year of increased income in the low-income countries. There are large social benefits to ensuring high level of health coverage of the poor, including spillovers to wealthier members of the society". In economic terms, health and education are the two cornerstones of human capital, which Nobel Laureates Theodore Schultz (1981) and Gary Becker (1981) have demonstrated to be the basis of an individual's economic productivity. According to Nobel Laureate Amartya Sen, health is among the basic capabilities that gives value to human life<sup>2</sup>. The global survey, Millennium Poll, UN 2000 commissioned by UN Secretary General Kofi Annan, consistently ranked good health as number one desire of men and women around the world (UN 2000).

Therefore, with recognition of the values of good health as means to human capability building and through that to human life (AK Sen), health as a cornerstone of human capital (T Schultz and G Becker), and health as a central input into economic development and poverty reduction (WHO 2001)– high emphasis has been given in our study to understand the various dimensions of health status in the electrified and non-electrified households.

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<sup>1</sup> Macroeconomics and Health: Investing in Health for Economic Development, Presented by Jeffrey D. Sachs (as Commission's Chair) to Gro Harlem Brundtland, DG-WHO, December 20, 2001

<sup>2</sup> Sen, AK (1999), *Development as Freedom*, New York: Alfred, A. Knopf (Chapter 1).

As health practice and behavior is a function of health awareness (among others), the latter has been analysed first. This awareness can be mediated through many agents, of which, television is a major one. For this reason, in all possible health related issues, the role of electricity has been identified using electricity-driven equipments especially TV as the agent. The impact of electricity on health is not only mediated through TV, but also through availability of other facilities such as refrigerator, fan, modern diagnostic facilities (possible only if electricity is available in the locality) etc.

With this view, the following broad spectrum areas of health-hygiene-sanitation were investigated: awareness on crucial public health issues, source(s) of knowledge, disease and treatment patterns, health care expenses, attendance at child delivery, access to ANC and PNC check-ups, TT immunization, maternal morbidity, child immunization, infant death (infant mortality ratio), status of intake of vitamin A capsule to prevent night-blindness among children, use of family planning, source of drinking water, type of latrine facility in use, use of hand-washing material after defecation, use of soap while bathing, role of media in changing health-hygiene-sanitation behavior and practice. All the questions pertinent to health were asked to the women (female head of the household or wife of the male head).

### **3.2. Specific Impact on Health Poverty Reduction**

It has been observed that rural electricity has multidimensional impact on poverty reduction in general and impact on health-poverty reduction in particular. The multifaceted health impact which can be attributed to rural electricity are as follows (comparative results are presented in Table 1):

- a. Due to supply of electricity in the rural areas, availability of qualified medical doctors, diagnostic centres and clinics has increased. This has accelerated the process of health-poverty reduction in the villages having access to electricity.
- b. The members in the electrified households were found much more aware than those in the non-electrified households on the crucial public health issues. Also those in the non-electrified households in electrified villages were found to be more aware than their counterparts in the non-electrified villages. Regarding knowledge on ANC, much higher proportion of the people from the households having electricity was found to have knowledge on the subject (at 5 percent level of significance d.f =1, tabular value of  $\chi^2_{5\%} = 3.8$ ;  $\chi^2_{cal}$

=155.64). The same pattern was found in case of knowledge on 3 STDs (at 5 percent level of significance d.f = 1, tabular value of  $\chi^2_{5\%} = 3.8$ ;  $\chi^2_{cal} = 136.32$ ).

- c. About 57 percent of the electrified households reported that they availed treatment from medically competent person (MCP) during the last sickness. The corresponding figure for non-electrified households was 43 percent. This means, in case of sickness, the electrified households are more likely to seek treatment from MCP (32% more) as compared to those in the non-electrified household. (at 5 percent level of significance d.f =1, tabular value of  $\chi^2_{5\%} = 3.8$ ;  $\chi^2_{cal} = 87.6$ ).
- d. The gender disparity in seeking treatment from MCP is much less pronounced in the electrified than in the non-electrified households. The male-female proportions in seeking treatment from MCP were 59% and 54.3% in electrified; 46.3% and 40.7% in non-electrified households in electrified villages, and 46.4% and 39.9% in the non-electrified villages.
- e. In 55 percent events of sickness the landless group in the electrified households sought services from MCP, while it was 42.5 percent in the non-electrified villages (a difference of 12.5% points). Similar was the pattern in case of marginal, small and medium landowner categories of households.
- f. Higher proportion of child delivery (last birth) in the electrified households were assisted by medically trained persons (36%)<sup>3</sup>. The corresponding figure for the non-electrified households in electrified villages was 23.1 percent (around national average), and for households in the non-electrified villages was 17.9 percent.
- g. Some other indicators, like the situation of availing of antenatal care (ANC) check-up during pregnancy by medically trained provider, receipt of tetanus toxoid injections during pregnancy, and post natal (PNC) check-up after delivery – all reported by a much higher proportion in the electrified households compared to those in the non-electrified households.
- h. In case of treating the maternal morbidity by medically competent person (MCP) major variations were observed by household electrification status. For over 80% cases of 3 types of maternal morbidity each, the households

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<sup>3</sup> Medically trained persons (MTP) includes MBBS doctor FWV, Nurse, MA, SACMO, other Paramedics, and trained traditional birth attendants (TTBAs) and not the untrained traditional birth attendants, UTBA).

with electricity availed treatment services from MCP. For households in the non-electrified villages, this has ranged between 48% for morbidity during pregnancy and 62% for morbidity in 42 days after delivery.

- i. The infant mortality rate in the electrified households was 42.7/1000 live births, in the non-electrified households in electrified villages 53.8/1000 live births, and in the non-electrified villages 57.8/1000 live births. IMR in the electrified households is 25 percent less than the national average (57/1000 LB) and 35 percent less than the national rural average (66/1000 LB). Secondly, the IMR in the non-electrified households in the electrified villages is less (53.8) than that in the non-electrified villages (57.8). And third, the estimated IMR in the electrified villages is 49.9/1000 live births and that in the non-electrified villages is 57.8/1000 live births.
- j. It was found that the full immunization coverage among children of 12-23 months was significantly higher in the electrified households (60.7%) than that in the households of non-electrified villages (36.5%). The coverage in the non-electrified households of electrified village was 54.4 percent, which is close to the electrified households. The full immunization rate also varied by household economic status of the children. In the electrified households, the full immunization rate was 52.2 percent for landless and 100 percent for large landowners. The same ranged between 28.9 percent and 66.7 percent in the villages without electricity.
- k. The vitamin A coverage (one capsule during last 6 months) among children under 5 was consistently high in all three household categories (ranging from 86% to 89%) .
- l. Among the currently married women in the electrified households about 68 percent reported their use of a contraceptive method<sup>4</sup>. The contraceptive prevalence rate (CPR) was 62.8 percent in the non-electrified households of electrified villages, and 61.7 percent in the non-electrified villages. The estimated total fertility rates are 2.54 for the electrified households, 2.87 for the non- electrified households in electrified villages, and 2.94 for the households in the non-electrified villages. Thus, in terms of attaining the national goal of NRR=1 by 2005 (which is equivalent to TFR= 2.1 by 2005), the electrified households appear to be more close-to-goal than the non-electrified households.

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<sup>4</sup> The national contraceptive prevalence rate for 1999-2000 was 53.8% with 60% in the urban and 52.3% in the rural areas (BDHS 1999-2000: 51, 52)

**Table 1: Rural electrification and poverty reduction – Selected health indicators by household electrification status**

Selected indicators	Household (HH) electrification status:		
	HH with electricity (HE)	HH without electricity (in electrified villages) (WE-EV)	HH without electricity (in non-villages) (WE-NEV)
1. Annual (net) income (in Tk. for last year):			
- Poor (landless)	58,864	35,104	38,989
- Rich (large landowner)	220,986	76,000	195,165
- All	92,963	41,110	56,524
2. Annual household expenses by food and non-food items (% share)			
- Food	47	53	53.4
- Non-food	53	47	46.6
3. Below poverty line (% population):			
- Absolute poverty (DCI)	39.9	51.2	43.4
- Hardcore poverty (DCI)	21.8	27.1	23.1
- Lower poverty line (CBN)	22.3	47.9	35.0
- Upper poverty line (CBN)	36.3	61.2	51.8
4. Availing treatment from medically competent persons (% reported for last year):			
- Sex: Male	59.0	46.3	46.4
- Female	39.9	54.3	40.3
- Both	56.7	43.6	43.3
- Rich-poor divide:			
- Poor	54.7	NA	42.5
- Rich	64.0	NA	64.3
5. Child delivery assisted by medically trained person (proportion of last birth):			
- All	36	23.1	17.9
- Poor	30.4	NA	14.7
- Rich	67.5	NA	25
6. Availing treatment from medically competent persons in last maternal morbidity:			
- Poor	79.2	56.3	57.4
- Rich	100.0	NA	66.7
7. Full immunization coverage ratio among children 12-23 months by sex:			
- Boys	64.2	48.8	31.7
- Girls	56.2	60.6	40.9
- Both	60.7	54.4	36.5
8. Contraceptive Prevalence Rate:			
- Poor	65.7	NA	55.0
- Rich	83.8	NA	61.9
9. Women's knowledge score of gender equality issues:			
- All women	0.80	0.56	0.48
- Poor	0.79	0.53	0.44
- Rich	0.84	1.00	0.64

Note: 'Poor' has been defined as those having no landownership (absolute landless) or have less than 50 decimals of landownership (functional landless). The five landowner groups adopted in the study are landless, marginal, small, medium and large. These categorization was made using official classification which is as follows: landless includes functional landless owning less than 50 decimals of cultivable land, marginal owns 50-149 decimal, small owns 150-249 decimals, medium owns 250-749 decimals, and large owns 750 decimals and more (Sources: Census of Agriculture 1996, vol.1:71, BBS 1999; Statistical Pocketbook of Bangladesh 1997: 184-185).



- m. About one-fourth (22.5%) family planning users in the electrified household mentioned TV as the most influential factor that prompted FP use. This self-reported weight assigned to TV was only 6.7 percent in the non-electrified households in electrified villages, and 5.5 percent in the non-electrified villages. Provisioning of electricity in the household combined with access to TV would most likely contribute significantly in expediting the process of reaching the national demographic goals of Bangladesh.
- n. Use of hygienic latrines (sanitary sealed closed) was reported by 61 percent of the electrified households while the corresponding figures for non-electrified households in electrified villages was only 29 percent and for non-electrified villages is was 31.7%. Another significant finding was related to the proportion reporting 'open space' for defecation: it was only 5.2 percent for the electrified, and around 20 percent for the others.
- o. The mean number of deaths was relatively less in the electrified households with 50 (ever) deaths per every 100 households, which was high in the non-electrified villages with 62 deaths per every 100 households, and 59 deaths per 100 non-electrified households in the electrified villages.
- p. Electrified households have a higher survival rate seen by the relatively low infant mortality rate in the electrified households (42.7/1000 live births) as compared to the households in the non-electrified villages (57.8/1000 live births). This IMR (among others) has positively influenced the overall survival rate of the members in the electrified households.
- q. Availability of electricity in the household contributes 15.7 percent in the reduction in overall TFR (comparison of TFRs in two extreme samples), but availability of electricity in the village but not in the household contributes only 2 percent in the reduction in TFR.

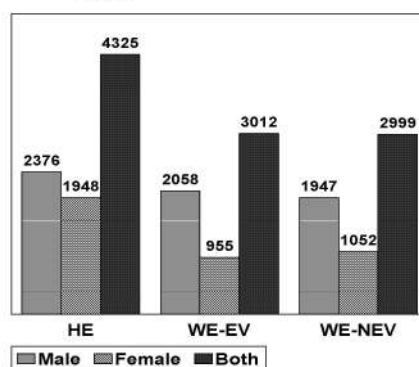
### **3.3. Impact on Health Care Expenditure**

Because of relatively higher income the electrified household can expend more for their health. The average annual health care expenditure reported by the electrified households was Tk.4325, which is 44 percent higher than their non-electrified counterparts (Tk.3,012 and Tk.2,999) (Figure 1).

The same pattern is observed when compared with non-electrified villages in terms of gender. The annual healthcare expenses for the males of electrified households (Tk. 2,376) were 22 percent higher than their counterpart in the non-electrified households of electrified villages and about 16 percent higher than

those in the households of non-electrified villages. A much higher level of gender-gap was evident in case of health care expenses for the females. The annual health care expenses for the females of electrified households (Tk.1,948 ) was 85% higher than those in the households of the non-electrified villages and 104 percent higher than those in the non-electrified households of electrified villages (estimated from data in Figure 1).

Figure 1: Average annual household expenditure on health care by male-female by household electrification status



As observed, the male-female gap in household health expenditure was much less pronounced in the electrified households than that in the two other sample categories. For example, while in the electrified households, the annual average health expenditure for the males was 22% higher than the females, the corresponding health expenses were as high as 85% higher for males than females in non-electrified households (of electrified villages), and more so, 116% higher for males than females in the households of the non-electrified villages (estimated based on data in Figure 1). Thus, as compared to the non-electrified households, the electrified households not only spend more on health but also exhibit less gender disparity on that.

In this situation, it would be pertinent to draw further inferences about the health-poverty reduction impact of electricity, through presenting analysis of the various aspects of incidences of poverty (below poverty line situations). The head-count index measured in terms of DCI and CBN methods<sup>5</sup> shows distinctively that

<sup>5</sup> Economic-poverty has been estimated using the head count measures. The direct calories intake (DCI) and the cost-of-basic-needs (CBN) methods were used. In order to ensure comparability of the estimated values, the official methodology used by the Bangladesh Government in the Household Income and Expenditure Survey 2000 (published by BBS in 2001) was adopted. Also, to ensure comparability, the relevant correction factors were applied (e.g., Taka value per person per month for 2001 in estimating the lower and upper poverty lines using CBN method).

poverty situation is much better in the electrified than in the non-electrified households

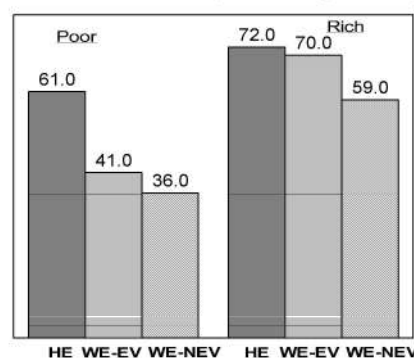
### 3.4. Impact on Public Health Knowledge

Health inequity is a major poverty issue across the low-income countries. This is usually termed as 'health divide' among the poor and the rich. This divide is pronounced in knowledge<sup>6</sup> > first. "Access to electricity" can be a major means to address and resolve this problem. This is evident from the low-gaps in public-health-knowledge coefficient among the poor and rich in the electrified households and high gaps in that in the non-electrified villages; as well as from the relatively high knowledge coefficient among the poor in the electrified compared to that in the non-electrified villages.

The rich-poor divide in health knowledge indicates the following:

**First:** The overall public-health-knowledge coefficient in the electrified households ranged between 0.61 for landless and 0.72 for large landowning households, i.e; the gap is 11% points (Figure 2). The corresponding values for households in the non-electrified villages are only 0.36 (landless) and 0.59 (large

Figure 2: Rich-poor divide in public health knowledge by hh electrification status (overall knowledge coefficient)



<sup>6</sup> Twenty (20) crucial public health issues against which awareness (knows or don't know situation) was measured included symptom of diarrhoea (01), preparation of oral rehydration solution/labon-gur-sarbat (ORS/LGS) (02), symptoms of acute respiratory infection (ARI) (03), Child vaccination against 6 diseases (04), place to go to for child's vaccination (05), place to go to for ANC checkup (06), five danger signs of pregnancy (07), place to go to for emergency obstetric care (EOC) (08), need for PNC checkup (09), prevention of goitre using iodized salt (10), name of three sexually transmitted diseases (STDs) (11), place to go to for treatment of STD (12), what is HIV/AIDS (13), how HIV transmission can be stopped (14), effect of arsenic in drinking water (15), avoidance of arsenic problem (16), reason for nightblindness in child (17), place to go to for TB treatment (18), place to go to for leprosy treatment (19), and necessity to use sanitary latrine (20).

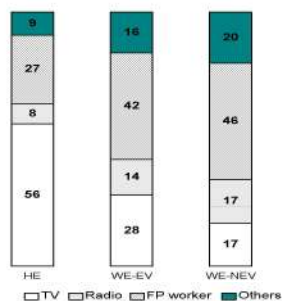
landowner) with a gap of 23% points. Thus, the poor and rich in the non-electrified households are not only less aware than their counterparts in the electrified households, but also the poor-rich gap is twice as high. This means access to electricity (driven media or media exposure) at the household level

impacts significantly in reducing the knowledge-in-health poverty by increasing the knowledge-base among the poor.

**Second:** The poor in the electrified households were found more knowledgeable (61%) about the public health issues than even the rich (large landowner) in the non-electrified villages (59%). This also means, in terms of knowledge-poverty, the economically poor people become knowledge-rich if access to electricity is ensured.

**Third:** The gaps in overall knowledge coefficients vary substantially for the same landownership category depending on the availability of electricity in the household. The overall knowledge coefficient of the landless in electrified villages is 25 percent points higher than the landless in the non-electrified villages. Such gaps were 23 percent points, 21 percent points, 19 percent points, and 13 percent points for the marginal, small, medium and large landowning households, respectively. This means that, ensuring access to electricity will have profound impact in reducing the existing knowledge gaps in the non-electrified households, and the rate of such impact will be higher for those who are poor. Thus, in transforming poor people into rich in public health knowledge – access to electricity can be a potential answer.

Figure 3: Share of major sources of knowledge about 20 public health issues (aggregate share)



Electricity has high contribution to the knowledge building about crucial public health issues. Overall, as high as 56 percent of those having knowledge in the electrified households reported TV as the main source of knowledge, the

corresponding figure for TV was 28 percent in the non-electrified households in electrified villages, and 17 percent in the non-electrified villages (Figure 3).

Thus, it can be inferred that people in the electrified households and their neighbours, compared to those in the non-electrified villages, are more aware about the crucial public health issues, and electricity (through TV) had played an important role— as the major source— in enhancing such knowledge.

### **3.5. Impact on Availing Treatment from Medically Competent Person (MCP)**

The pattern of sickness (12-months' incidence) did not vary by status of access to electricity. But, the distinctions indicating impact on health-poverty were pronounced, when it was compared in terms of treating sickness by medically competent persons (MCP)<sup>7</sup>.

It was found that availing treatment from the MCP was much more pronounced in the electrified households compared to that in the non-electrified households (Table 1). About 57 percent of the electrified households reported that they availed treatment from MCP. The corresponding figure for non-electrified households was 43 percent. This means, in case of sickness, the electrified households are more likely to seek treatment from MCP (32% more) as compared to those in the non-electrified household.

Secondly, gender disparity in seeking treatment from MCP is much less pronounced in the electrified than that in the non-electrified households. The male-female proportions in seeking treatment from MCP were 59 percent and 54.3 percent in electrified; 46.3 percent and 40.7 percent in non-electrified households in electrified villages, and 46.4 percent and 39.9 percent in the non-electrified villages (Table 1). The percentage points disparity was 4.7, 5.6 and 6.5 percent respectively for the three categories respectively. Thus, although disparity existed in all categories, it was more pronounced in the non-electrified households; and females in the non-electrified were taken to MCP while sick in a much lesser proportions than those in the electrified households (difference being 14% points). A much encouraging finding in this regard was that the females seeking treatment from MCP in HE was about 8 percentage points higher than even that of the males in non-electrified villages.

Third, the landless (poor) group in the electrified households reported that in case of 55 percent events of sickness they sought services from MCP, while it was only

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<sup>7</sup> Medically competent persons (MCP) include MBBS doctor, Family Welfare Visitor (FWV), Nurse, Medical Assistant (MA), Sub-assistant Community Medical Officer (SACMO), other Paramedics.

42.5 percent in the non-electrified villages (a difference of 12.5% points). Similar was the pattern in case of marginal, small and medium landowner categories of households. The rich-poor gap between utilization of MCP in sickness was 9.3 percentage points in the electrified households, and as high as 21.8 percentage points in the households of the non-electrified villages (Figure 4). Thus, availability of electricity in the households influences the status of seeking treatment from MCP (while sick) much more in the poor households than in the rich households. This means that health poverty reduction— both in terms of awareness in public health issues and utilization of medically competent persons while sick— is possible with ensuring access to electricity in the non-electrified households.

### 3.6. Impact on Maternal Health

A much higher proportion of child delivery (last birth) in the electrified households were assisted by medically trained persons (36%)<sup>8</sup>. The corresponding figure for the non-electrified households in electrified villages was 23.1 percent (around national average), and for households in the non-electrified villages was 17.9 percent (Table 1). The rich-poor disparity was clearly evident: Among the last deliveries in the electrified households, 30.4 percent in the landless group and 67.5 percent in the large landowning group were assisted by medically trained persons. The rich-poor gap was 37.1 percent points (with a base of 30.4%). However, the same in the non-electrified villages were only 14.7 percent (for landless) and 25 percent (for large landowners) respectively. The rich-poor gap being only 10.3% points (with a low base of 14.7%). Thus, in terms of assistance in child delivery by medically trained persons the electrified households show a much better situation – both overall, as well as by landownership categories. On this count, the poor with electricity is better-off even than the rich in the non-electrified villages (Table 1).

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<sup>8</sup> Medically trained persons (MTP) includes MBBS doctor FWV, Nurse, MA, SACMO, other Paramedics, and trained traditional birth attendants (TTBAs) and not the untrained traditional birth attendants, (UTBA). According to the most recent Demographic and Health Survey (BDHS 1999-2000), almost all births (92%) in Bangladesh occur at home; 12.1% of births are assisted by medically competent persons and 21.8% by trained persons; antenatal check-up coverage by medically trained provider is 33%; and TT coverage (2 or more TT injection) is 64% (BDHS, 1999-2000: 112, 114-115, 117-118). These recent national figures would be of use in comparing the same with our survey findings. However, a caveat to note is that the BDHS data quoted above are national data (not rural ones). Findings from this survey are mostly rural and were collected recently.

The situation of availing of **antenatal care** (ANC) check-up during pregnancy by medically trained provider, receipt of tetanus toxoid injections during pregnancy, and **post natal** (PNC) check-up after delivery – all reported by a much higher proportions in the electrified households compared to those in the non-electrified

Figure 4: Percentage reported ANC checkup, TT immunization and PNC checkup by medically trained providers by hh electrification status

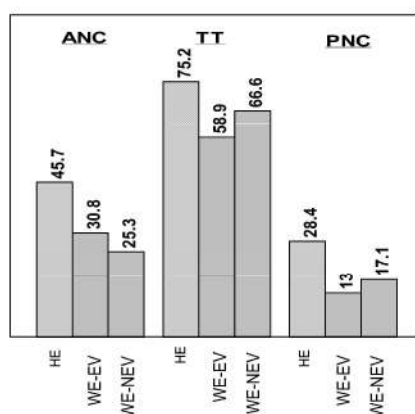
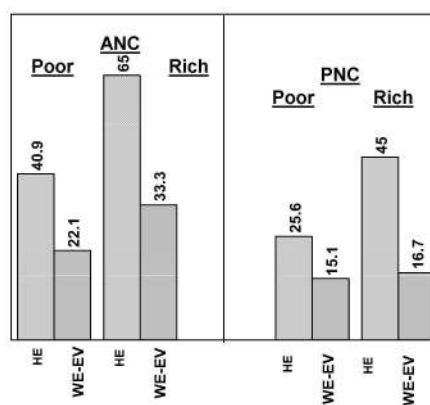


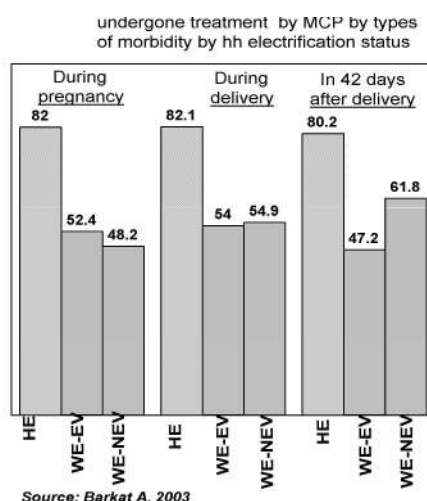
Figure 5: Rich-poor divide in access to ANC and PNC checkup services by medically trained provider (% reported in connection with last childbirth)



households (Figure 4). The disparity in access to ANC and PNC by rich and poor is distinctly evident (Figure 5). But, significant enough that, even the poor in the electrified households had received more ANC check-up

services than the rich in the non-electrified villages. Thus, in general, the women in the electrified households, irrespective of rich-poor had received more ANC and PNC services as compared to the national averages; and women in the non-electrified villages received relatively very little ANC and PNC services as compared to those in the electrified villages. All these imply that having electricity in the households positively influences the utilization of ANC and PNC services, and also acts as a health-mediated poverty reduction factor by motivating poor people (through radio/TV) to use ANC and PNC services in need. It is also to be mentioned that the annual income of the poor (landless) in the electrified households is 51% higher than that of the poor (landless) in the non-electrified villages implying higher financial affordability of the poor in the electrified villages. Therefore, for the poor people, electricity works in both ways, the income and thereby affordability, and increase in knowledge-base about the value of good health.

Maternal morbidity during pregnancy, delivery, and within 42 days of delivery (postpartum period) is a serious public health concern in Bangladesh<sup>9</sup>. As expected, the proportions of women reported maternal morbidity by household electrification status were similar for each type of morbidity – during pregnancy, during delivery, and in 42 days after delivery. But in case of treating the morbidity by medically competent person (MCP) major variations were observed by household electrification status with distinct advantageous situation in the electrified households (Figure 6).



Reduction in the maternal morbidity by ensuring treatment by medically competent person as a major health-mediated poverty reduction strategy of the Government of Bangladesh has worked better in the households having electricity compared to those in the non-electrified villages.

This is evident from the following:

**First:** Women from landless group (poor) in the electrified households availed maternal morbidity related treatment services from medically competent persons 38 percent more than their counterparts in the non-electrified villages.

<sup>9</sup> The situation is extremely distressing and unacceptable because, each year about 600,000 pregnant women in Bangladesh develop reproductive morbidities, which diminish women's fertility, productivity, quality of life, and the health and survival of the next generation. See: Government of Bangladesh (1999), *Population and Development – Post ICPD Achievements and Challenges in Bangladesh*, MOHFW, presented at Special Session of the UN General Assembly, NY June 30 - July 02, 1999: 195.



Second: The landless women in the electrified households availed more services (79.2%) than even the rich in the non-electrified villages (66.7%) (Table 1).

One of the best influences of electricity was found on the infant mortality rate (IMR)<sup>10</sup>. The infant mortality rate in the electrified households is 42.7/1000 live births, in the non-electrified households in electrified villages 53.8/1000 live births, and in the non-electrified villages 57.8/1000 live births. IMR in the electrified households is 25 percent less than the national average (57/1000 LB) and 35 percent less than the national rural average (66/1000 LB). Secondly, the IMR in the non-electrified households in the electrified villages is less (53.8) than that in the non-electrified villages (57.8). Third, the estimated IMR in the electrified villages is 49.9/1000 live births and that in the non-electrified villages is 57.8/1000 live births<sup>11</sup>. Finally, our estimates show that if access to electricity is 100 percent ensured in the rural households, and those electrified households maintain the same IMR as the current electrified households, the annual number of infant deaths that could be saved will be around 36,818, i.e., a savings of 101 infant deaths everyday.

Among children aged 12-23 month, the full immunization coverage<sup>12</sup> was significantly higher in the electrified households (60.7%) than that in the households of non-electrified villages (36.5%) (Table 1). The coverage in the non-electrified households of electrified rate was 54.4 percent, which is close to the electrified households. The full immunization rate varied by household economic status of the children. In the electrified households, the full immunization rate was 52.2 percent for landless and 100 percent for large landowners. The same ranged between only 28.9 percent and 66.7 percent in the villages without electricity. Thus, not only the overall full immunization coverage, but also, the coverage by rich - poor were high in the electrified households compared to the households in the non-electrified villages.

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<sup>10</sup> Infant mortality rate (IMR) is the probability of dying before the first birthday. IMR is a key reflector of a country's level of socio-economic development and quality of life. IMR is usually associated with antenatal care, delivery care, breastfeeding practices, immunization status, and nutritional status of the would-be-mother, among others. IMR is a powerful determinant of life expectancy as well, especially in a country with high IMR. The national average of IMR for 1998 was 57/1000 live births, with 47 for urban and 66 for rural (GoB 2002c: 140). The data bases on Birth Death Sample Registration. The IMR quoted in BDHS 1999-2000 for five-years periods preceding the survey is 66.3/1000 live births (BDHS 1999-2000: 101).

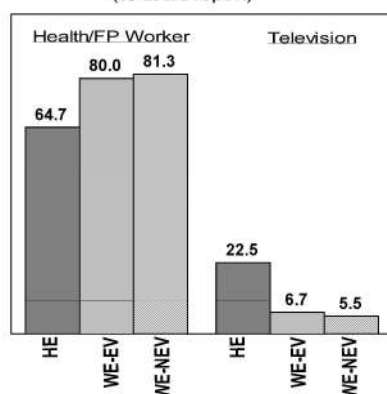
<sup>11</sup> Among the total households in the electrified villages (in Bangladesh) the electrified households constitute 34.8%, and non-electrified households, rest 65.2%.

<sup>12</sup> Full immunization includes a BCG vaccination against tuberculosis; three doses of DPT vaccine for the prevention of diphtheria, pertussis (whooping cough), and tetanus; three doses of polio vaccine; and a vaccination against measles (WHO recommended guideline).

### 3.7. Impact on Fertility and Family Planning Use

Access to electricity not only contributes to the overall increase in the Contraceptive Prevalence Rate (CPR)<sup>13</sup>, but also influences significantly in raising CPR among the poor-landless. The CPR among electrified poor-households (65.7%) was found 19.5 percent higher than that among the poor in the non-electrified villages (CPR being 55%). The CPR in the electrified poor-

Figure 7: Self-reported most influential factors prompted use of family planning (% users report)



household was even higher (by 6%) than that of the rich households in the non-electrified villages (CPR being 61.9%).

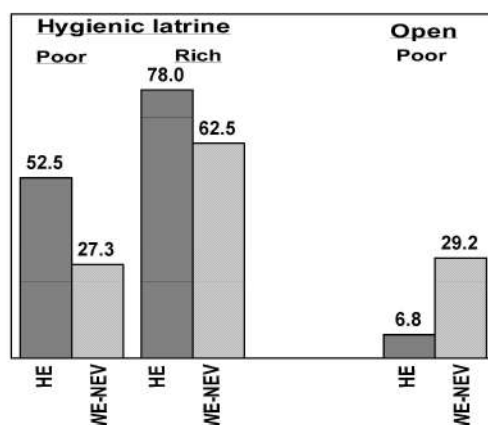
The impact of electricity in accelerating the process of attainment of the demographic goal of Bangladesh is clearly evident from the fact that a large share of FP use was contributed by the television. As for 22.5 percent of the family planning users in the electrified household, TV was mentioned as the most influential factor prompted FP use. This self-reported weight assigned to TV was only 6.7 percent in the non-electrified households in electrified villages, and 5.5 percent in the non-electrified villages (Figure 7). Thus, it can be concluded that provisioning of electricity in the household combined with access to TV would most likely contribute significantly in expediting the process of reaching the national demographic goals of Bangladesh (NNR=1 or TFR=2.1 by 2005).

<sup>13</sup> The national contraceptive prevalence rate for 1999-2000 was 53.8% with 60% in the urban and 52.3% in the rural areas (BDHS 1999-2000: 51, 52).

### 3.8. Impact on Use of Hygienic Latrines

One of the most notable findings having far-reaching cultural, public health and poverty reduction implications is related to the rich-poor divide in the use of hygienic latrines and open spaces for defecation. Over 50 percent of the poor households having electricity use hygienic latrine, while it was only 27.3 percent among their counterpart poor in the non-electrified villages. The rich-poor gap in the use of hygienic latrines was 25.5 percent points in electrified households and 35.2 percent points in the non-electrified villages. More spectacularly, while only 6.8 percent of the electrified poor-households reported use of open place for defecation, it was as high as 29.2 percent for the poor in the non-electrified villages (Figure 8).

Figure 8: Percentage of poor and rich households using hygienic latrine and open space for defecation purpose



There has been distinct cultural changes in the hygienic practices due to household electrification, which include, among others, the use of soap after defecation. The use of soap as a hand-washing material after defecation was reported by a higher proportion of the poor households (60.7%) in the electrified villages, than even the rich in the non-electrified villages (58.3%). Such use of soap was influenced much by information-education- communication through television.

## 4. Some Conclusions and Suggestions

Ascertaining accurately the extent of impact of rural electricity on health-poverty reduction is a complex and difficult task. However, on the basis of the comparison

between 'with' and 'without' electricity situations, the direct-indirect and tangible-intangible benefits of electricity in health-poverty reduction have been ascertained. Health-poverty reduction impact mediated through electricity is evident in enhanced employment generation, increased income of the poor, increased savings, progressive pattern of food-non food expenditure, relative high share of education and health expenses, and increased influence over asset building. Household possession of electricity significantly influences the shift of a household from poor to non-poor category. Human poverty reduction impact of electricity is evident in enhanced literacy, improved quality of education, relatively higher empowerment status of women, better health status of the poor in the electrified households compared to those in the non-electrified ones. People's exposure to electricity-driven media (most importantly, TV) matters much in human capital formation and in improving the knowledge-base, which in turn, influences their education and health practices. The impact of electricity on reducing economic and health poverty and transforming human poverty produces a type of synergy, which is a powerful catalyst in accelerating the process of sustainable poverty reduction. Therefore, in order to accelerate the process of reducing health poverty, strengthening pro-poor orientation in growth process and to further human development, access to electricity of the households and social and economic institutions should be expanded.

Our knowledge-base about the empirically firm causal relationships between access to electricity and many crucial dimensions of health-poverty is still at the embryonic stage. One feasible way to minimize our knowledge-gap could be to undertake relevant secondary analyses of the huge empirical and high quality database produced in the Bangladesh Study (Barkat et.al, 2002). Moreover, in order to minimize our knowledge-gap and to expedite the process of informed policy and decision making, research studies having high national and global utility should be launched to understand more accurately the complex relationships between the availability of electricity and various dimensions of health-poverty reduction including women's empowerment, mortality-morbidity including maternal health, child health, nutrition, microcredit/ microfinance potentials, and strategies for expanding poor people's access to electricity.

## References

- Barkat Abul, SH Khan, M Rahman, S Zaman, A Poddar, S Halim, NN Ratna, M Majid, AKM Maksud, A Karim & S Islam. (October 2002), *Economic and Social Impact Evaluation Study of the Rural Electrification Program in Bangladesh*, Human Development Research Centre (HDRC), undertaken for NRECA International Ltd., partners with the Rural Electrification Board of Bangladesh and USAID for the Rural Power for Poverty Reduction (RPPR) Program.
- Barkat Abul, S. H. Khan, M. Haque, R. Ara, S. Zaman and A. Poddar. (2003), *Impact Study of Rural Electrification Project: Mechanism of Poverty Alleviation Fostered by Rural Electrification*, Prepared for Japan Bank for International Cooperation, Dhaka.
- Barkat Abul. (2003), *Rural Electrification and Poverty Reduction: A case of Bangladesh*, *Social Science Review*, [The Dhaka University Studies, Part-D], Vol. 21, No.1, June 2004.
- Becker, G. S. (1981), *A Treatise on Family*, Cambridge, Mass.: Harvard University Press.
- Government of Bangladesh. (1999a), *Bangladesh Population Census 1991, Vol.4*, Bangladesh Bureau of Statistics, Statistics Division, Planning Division, Ministry of Planning, Government of Bangladesh, Dhaka.
- Government of Bangladesh. (1999c), *Population and Development-Post ICPD Achievement and Challenges in Bangladesh*, prepared for Ministry of Health and Family Welfare, presented at Special Session at the UN General Assembly, New York: June 30-July 2002.
- Government of Bangladesh. (1999d), *Statistical Pocket Book of Bangladesh 1997*, Bangladesh Bureau of Statistics, Statistics Division, Planning Division, Ministry of Planning, Dhaka.
- Government of Bangladesh. (2001a), *Bangladesh at a Glance*, National Accounting Wing, Bangladesh Bureau of Statistics, Statistics Division, Planning Division, Ministry of Planning, Dhaka.
- Government of Bangladesh. (2001b), *Performance of Bangladesh Economy 1991-2001*, General Economics Division, Planning Commission, Ministry of Planning, Dhaka.
- Government of Bangladesh. (2001c), *Population Census 2001: Preliminary Report*, Bangladesh Bureau of Statistics, Statistics Division, Planning Division, Ministry of Planning, Government of Bangladesh, Dhaka.

- Government of Bangladesh. (2001d), *Preliminary Report of Household Income and Expenditure Survey 2000*, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Dhaka.
- Government of Bangladesh. (2002b), *Statistical Pocketbook of Bangladesh: 2000*, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning, Dhaka.
- National Institute of Population Research and Training (NIPORT), Mitra and Associates and ORC Macro (ORCM). 2001. *Bangladesh Demographic and Health Survey 1999-2000*, Dhaka, Bangladesh and Calverton, Maryland, USA: NIPORT, MA and ORC Macro.
- Schultz, T.P. (1981), *Economics of Population*. New York: Addison -Wesley.
- Sen, A. K. (1995), "Gender Inequality and Theories of Justice," in Martha, C. Nuesbaum and J. Glover (eds), *Woman, Development: A Study of Human Capabilities*, India: Oxford University Press.
- Sen, A. K. (1999), *Development as Freedom*, New York: Alfred A. Knopf.
- United Nations. (2000), *Millennium Poll* (Global Survey Commissioned for the Millennium Summit of the United Nations by UN Secretary General Kofi Annan). New York: United Nations.
- United Nations Development Program.(1998), *Human Development Report 1998*, Oxford University Press, New York, USA.
- United Nations Development Program. (2001), *Human Development Report 2001; Making New Technologies Work for Human Development*, New York: Oxford University Press.
- United Nations Development Program. (2002), *Human Development Report 2002: Deepening Democracy in a Fragmented World*, New York: Oxford University Press.
- World Bank. (1990), *World Development Report 1990:Poverty*, Washington D.C: Oxford University Press.
- World Bank. (1998), *Bangladesh: From Counting the Poor to Making the Poor Count*, Washington D.C: Oxford University Press.
- World Health Organization (2001), *Macroeconomics and Health: Investing in Health for Economic Development*, Prepared by Jeffrey D. Sachs, Chairman, Commission of Macroeconomics and Health, Geneva: World Health Organization.