Influence of Electricity Access on Gender: Evidences from Nepal

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Abstract

Access to modern energy has been found to especially benefit rural women, in terms of reducing their drudgery and increasing their efficiency of time use. This paper draws from the findings of a primary household survey and qualitative study in Nepal in order to analyse how access to modern energy affects gendered aspects of health, education, income generation, and decision-making.

It was found that a higher percentage of children (boys and girls) from households with electricity access were enrolled in schools and spent more hours studying. Further, electricity access in health centres assisted them to offer medical services to the people. Though these facilities helped in enhancing the overall quality of life of women, decisions regarding health and education were found to be taken mostly by men or sometimes jointly with their spouses. It was also seen that decisions regarding expenditure of income earned by women, were not taken by them independently.

Further, households that have had access to electricity for a longer period of time were more likely to send a higher number of their children to school as compared to those who got access to electricity later. This means there is a time lag between the time a household gets access to electricity and the time when improvement in socioeconomic and developmental attainments (like school enrolment) begin to show up.

Keywords: *Modern energy, education, health, income, decision-making*

JEL Codes: Q40, Q42, I15, I25, J16, O10, O15

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1. Introduction

Access to modern forms of energy is essential for the overall development of a country as well as for human wellbeing. It is often deemed as an important pathway for improving gender equality and social inclusion, particularly in contexts where women experience harsh living conditions and discriminatory norms. The (Beijing Declaration, 1995) identified the need for inclusion of women's priorities in public investment programmes for economic infrastructures, such as electrification, energy conservation, water, and sanitation. More recently, the Sustainable Development Goals (SGDs), specifically SDG 7 and SDG 5, are encouraging national and international initiatives globally towards providing access to 'affordable, reliable, sustainable and modern energy for all' and in achieving 'gender equality and empowering women and girls', respectively (UNDP, 2016).

Access to electricity has been found improve the overall well-being of women, who have traditionally been responsible for household chores, through reduced drudgery[4], increased income and reduction in poverty (Grogan & Sadanand, 2013; Standal & Winther, 2016). This paper draws from the findings of the research project, ***Exploring Factors that Enhance and restrict Women's Empowerment through Electrification (EFEWEE)*** under the 'Gender and Energy Research Programme' of ENERGIA supported by DFID. The study aimed to examine the links between electricity access and women's empowerment, for both grid and off-grid electricity sources. The research was conducted in three countries- India, Kenya, and Nepal through mixed methods involving primary surveys supported by qualitative interviews. While for the broader EFEWEE study an understanding of women's empowerment by studying changes in women's and men's relative rights, decision-making power and control over various types of resources was adopted (Kabeer, 1999); this paper borrows the idea of women's empowerment as '*the ability of women to access the constituents of development—in particular health, education, earning opportunities, and political participation'* (Duflo, 2012).

This study focusses on understanding the gender and power relations within households as well as the influence of some indicators of human development in the context of rural Nepal. The Himalayan country of Nepal is characterized by difficult terrain, extensive and complex riverine systems, and remote and scattered population settlements. The political history of Nepal reflects

[4] See Annex 1.1

decades of instability and frequently changing governments, leaving the nation largely under-developed and the population mostly poor. Around 25% of the population of Nepal is below the poverty line (ADB, Country Poverty Analysis, 2017). As for the development of the electricity sector, it has come a long way in terms of installed capacity. The country has vast water resources, making hydro power the main source of electricity (92%), while fossil fuels (5%) and renewables other than hydro (3%) form a very small fraction of the energy basket (CIA World Factbook, 2017). However, owing to difficult terrain, grid extension to remote, rural and hilly areas becomes expensive and unfeasible (Mainali & Silveira, 2011). Therefore, off-grid renewable energy, such as small or micro-hydro and solar PV are being promoted extensively by the Government of Nepal for electrifying remote rural areas.

Deeply embedded structural conditions determined by gender, caste, religion and geography influence access and benefits of electricity and it has been noted that women and the disadvantaged groups experience energy poverty differently and more severely than those from relatively advantaged groups (World Bank, 2013). Women, as a section of society, have been socially and economically disadvantaged due to years of discriminatory customs and practices. Practices such as male child preference, early marriage, dowry[5], isolation during menstruation (Chhaupadi) accusations of witchcraft, limited inheritance and property rights, fewer opportunities for higher education, limited political participation, and limited participation in the labour force and low income are some of the factors that impede women's development in Nepal (Care, 2015; ADB, 1999; JICA, 2007; Bhattarai, 2017). Social norms that entrust women with reproductive responsibilities of the household, additionally burden them with care work like cooking, cleaning, and child rearing, which is unpaid for and leaves little or no time for their own personal development (Matinga, Gill, & Winther, 2019).

Against this background, this study attempts to understand how access to modern energy affects and influences different developmental aspects such as access to health and education facilities,

[5] Dowry is a practice of giving 'gifts' in the form of cash, household items, vehicles, property, etc. by the bride's family to the groom or his family/relatives at the time of the wedding.

opportunities for income generation, and women and men's role in general decision making within the household, and if these factors contribute directly or latently to women's empowerment.

2. Literature Review

2.1 Overall benefit of electricity on women

The benefits of electricity access on the lives of people are well documented in literature. As a crucial driver for growth, access to reliable and clean sources of electricity has been imperative in fostering indicators of human development (Gaye, 2007). Many studies have been conducted in this regard that provide enough empirical evidence to validate the positive impact of access to adequate and reliable modern energy including electricity, on people's lives, and especially on women (GSI, 2016; Winther T. , 2008; Practical Action, 2010). The beneficial impacts of energy access on women in terms of reduction in drudgery, enhanced convenience, opportunities for productive and economic activities and better conditions for children to study are established (Dinkelman, 2011; Grogan & Sadanand, 2013; Standal & Winther, 2016; Sovacool, et al., 2013; Matinga M. N., 2010). Few studies such as (Winther T. , 2008; IUCN, 2017; Brahmachari, 2018) examine the positive effects of electricity access on public services such as health, education, community centres, and ICT among others, highlighting the role played by energy access on different facets of human development. This is further substantiated by studies that suggest that access to electricity also enhances women's economic opportunities (UNDP/ESMAP, 2004; Sovacool, et al., 2013; Matinga M. N., 2010).

2.2 Lack of access of modern energy affects women disproportionately

As one delves deeper into literature, the lopsided or disproportionate effects of the lack of electricity or modern energy access on women, who are the primary caregivers of households, become evident. Literature also suggests that energy poverty often becomes the reason for the discontinuation of education for young girls, as like their mothers, they are also expected to stay back at home and help with house work which includes collection of fuel and water (McDade & Karlsson, 2000; Lambrou & Piana, 2006; Clancy, 2002). Though access to energy has the potential to reduce the burden created by energy poverty on women, it boils down to the decision making power held by women in the household. As men are the traditional decision-makers of the family,

the agency to acquire modern energy appliances to reduce women's workload then become a man's possession, in which case there would be uncertainty as to whether the energy related decision could benefit women (Rewald, R, 2017). Conversely, when women are not specifically targeted in supply chains, it is men who tend to be recruited (Winther T. , 2019)

2.3 Electricity scenario and women's energy access in Nepal

In Nepal, electrification has been tough owing to its difficult terrain. However, the government has made commendable efforts in increasing the level of access to households over the years, either by extending the conventional grid or through off-grid means using renewable energy, such as micro hydro and solar power (Mainali & Silveira, 2011). Studies suggests that women experience harsher repercussions of energy poverty than men, and that socio-economic and political conditions often restrict women's access to energy systems among other conditions of human development (Banerjee S.G., et al., 2011; AEPC, 2013; UNDP, 2010). The long-held perception of energy systems being a male domain is also restrictive to their efficient up take by women (Clancy, et al., 2011). The uptake of appliances in the household, that bring improvement to the lives of women in Nepal, has been found to have deep-rooted linkages with existing gender norms (Matinga, Gill, & Winther, 2019).

2.4 Gap in studies which look at linkages to gender relations

In Nepal socioeconomic, policy and legal structures often restrict women's ability to secure access to constituents of human development including energy services. For instance, socially constructed perceptions that consider modern energy as "male domain" limit the opportunities for women to take full advantage of new energy sources, particularly in entrepreneurship (J S Clancy et. al 2011). Further studies have revealed that existing income inequities also determine the ability to benefit from energy (AEPC 2014). However, not many have tried to look at effects of electricity on women's empowerment, where empowerment is defined through the lens of human development

The society in Nepal is also characterised by different forms of discrimination based on caste, class and ethnicity and gender is only a crosscutting factor. Gender norms have also resulted in women having lower opportunities for education; their literacy rate is 57.4% compared to men's 75.1%

(Govt. of Nepal, 2016). Though Nepal has constituted GESI (Gender Equality and Social Inclusion) to address the disparities between women and men and other social groups, on the ground there is a lack of participation by the disadvantaged at all levels of public life, including the energy sector (GESI).

2.5 Justification of the present study

The overview from the study of existing literature clearly indicates that there is a knowledge gap around gender, particularly in the realm of i) The nature of barriers and opportunities that women and disadvantaged groups experience while seeking benefits from component of human development such as access to energy services for attainments in health and education ii) the effect of energy services and technologies in addressing social inclusion, gender relations, agency and empowerment. All these necessitate carrying out a comprehensive gender equality and social inclusion analysis to recommend strategies for gender and social inclusion in electricity sector planning and implementation. We do so by using the following analytical framework and test it through primary surveys.

3. Framework

The basic foundation for the analysis is borrowed from Esther Duflo's ideas of how women empowerment has a bidirectional relationship with notions of *opportunity* and *capability* within the scope of human development theory and how empowerment may be defined as *improving the ability of women to access the constituents of development* (Duflo, 2012). Often unequal socio-economic circumstances provide women with unequal opportunities which result in unequal capabilities. Equal access to means of inclusive development like education, health and justice can provide women with opportunities which they can use to expand their capabilities in order to lead a life they choose to live. In that sense then, 'expansion of freedom' through enhanced capabilities is central to development, both as the primary end and as the principal means. (Sen, 1990; Nussbaum, 2000; Sen, 1999).

Table 1: Analytical Framework

Dimensions	Sub-dimensions	Indicators
Economic and Social Resources	Economic opportunities	Livelihood, land and home ownership
	Capabilities, Social Position	Heath and educational attainments, Access to Health and Education facilities, Social and electoral Participation
Agency	Influence over everyday and life decisions	Decision making related to Health, Education and Household spending

Source: Constructed by authors

The second component of the analytical framework looks at the relationship between electricity access, its gendered effects and its linkages to empowerment and is essentially borrowed from (Winther et al., 2017). Like for example, how income and asset ownership among men and women may vary within and between households with and without electricity access and can contribute to differing status of empowerment in these households. The framework also incorporates indicators to check human development dimensions such as attainments in health and education facilities, along with intra-household nuances and power relations influencing gendered aspects of decision making on issues related to personal health, education of children, and household expenditure among households with and without electricity access. Since the approach is empirical, due to the limited scope of data available, we restrict our analysis to these two dimensions of human development (see table 1). This analytical framework is tested using the methodology detailed in the next section.

4. Methodology

Mixed methods were adopted for the study, using both qualitative and quantitative techniques to assess the impact of various types of energy access on human development, gender relations and women's empowerment in the selected study site. A detailed qualitative and quantitative methodological framework of the study is provided in the next subsections.

4.1 Qualitative Design

Selection of Study Sites

The study area Mahadevsthan was chosen in the district of Dhading as it had large numbers of off-grid systems, as well as grid supply. The site had micro-hydro systems and solar PV home systems for off-grid electrification. The villages also had similar socio-economic characteristics and demography, which enabled us better comparison. The study adopted the following approaches to gather information-

Qualitative data collection techniques

Table 2: Qualitative data collection techniques

Qualitative Techniques	Male	Female	Total
Key Informant Interviews	21	32	53
Focus group discussions	4	4	8
Life stories	4	4	8
Total	29	40	69

Source: Qualitative interviews

- *Transect Walk*

In order to understand the socio-demographic distribution of each selected village, a transect walk was taken across the village and the features of the habitation were noted. The team also identified common places for the congregation of the gatekeepers or key people of the village.

- *Key Informant Interviews and Group Discussions*

The checklists were designed to bring out the nuances of the experiences and impacts of electricity access or the lack of it on the lives of women and men. The interviews were conducted with key women and men of the village, including women leaders, village heads, school staff, health centre staff/ health workers, enterprise owners. Focus Group Discussions (FGDs) were conducted with separate groups of male and female respondents in the villages. Suppliers of electricity, from both grid and off-grid, were also considered for interviews.

- *Life Stories*

In addition, these, life stories of men and women, who had been residing in the study site for a long period of time, were also recorded in order to understand the changes in people's lives before and after electrification.

4.2 Quantitative Design

The household survey was carried out only in Mahadevsthan VDC in Dhading district, which is a micro-hydro site. While the survey site was chosen purposively (based on the previously conducted qualitative study), the selection of sample households was carried out using a systematic sampling method with random starting points. The sub-samples comprise 'Grid', 'Micro hydro + SHS', and 'Some or No Access' households, with a high share of households falling in the SHS and micro hydro categories (Table 3). The rational for choosing Mahadevsthan as the selected location in Nepal was to survey households that were connected to grid, mini-grid supply and non-electrified households which were extremely remotely located and difficult to access. At the same time, it allowed us to enhance comparison between similar off-grid solutions: mini-grids and SHS.

Table 3: Sample Size Selection

Access Category	Total households by Access type*	Sample size#	Margin of Error#
Grid	85	81	2.38%
Micro hydro + SHS	800	109	8.73%
Some or No Access (Batteries, No Access)	35	30	6.86%
Mahadevsthan Total	920	220	5.77%
Share of women respondents in survey	73.18%		

Source: Qualitative Interviews and calculated by authors

Note: * Figures obtained from qualitative interviews local government officials

Calculated by authors

A sample size of 220 households was chosen in Mahadevsthan with 95% confidence interval accounted for 5.77% margin of error. Given that the study aimed at studying women's empowerment; it was decided to include more women (73%) than men (27%) in the survey sample.

5. Limitations of the Study

It is important to note that the results presented in this study are **specific to the study area and do not represent the situation of the entire province or country**. Further, since state level or country level estimates based on these results were not intended in this study, survey weights were not assigned to the results, thus making them relevant only to the local context.

6. Key Findings

The interviews and the survey brought out a diverse and gender disaggregated set of information from different stakeholders in the electricity access process which enriched the study and set the foundation for robust analysis for exploring the linkages between gender relations and human development goals like health and education based on the type of electricity access. Some major findings obtained from the study sites are discussed in the following sections.

5.1 Socio-cultural Background

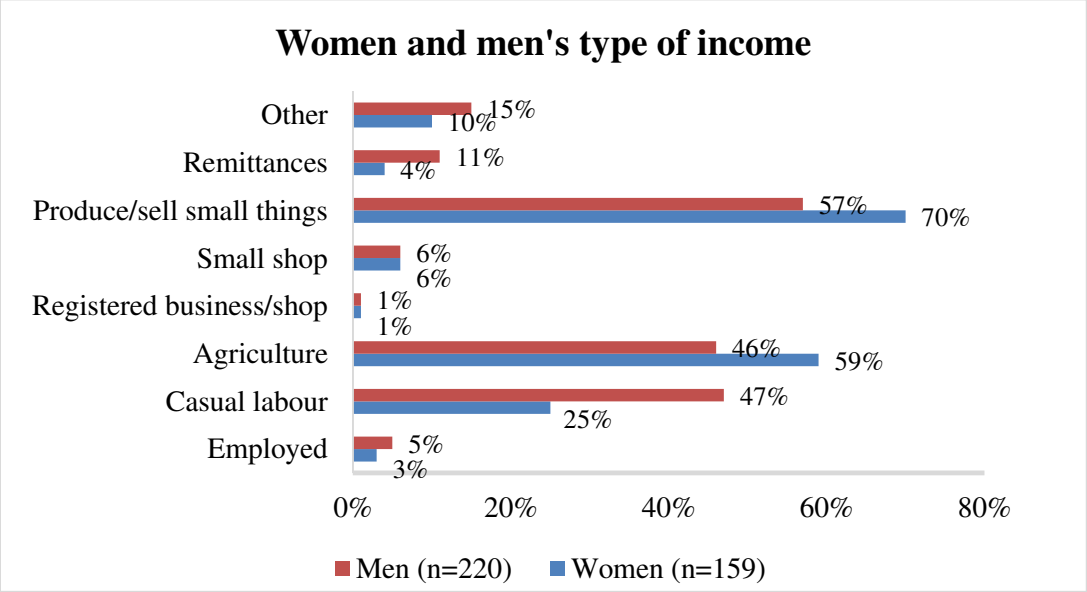
The socio-cultural background of the studied communities was diverse comprising different castes and tribes.

Marriages in the society were traditionally arranged by the family elders; however, the practice of girls and boys choosing their own partners was gaining prominence. Discussions with men and women's groups revealed that there have been cases of elopement by young people. Polygamy was also found to be perceived as a social evil even though it was prevalent, and was strongly opposed by the women. Dowry was often given at the time of marriage by the girl's parents depending on the financial condition of the households. Two forms of dowry existed in the community- *Daijo*, which was negotiated by both sides, and *Pewa*, which was given to the girl as per her parents' convenience. There have been very few cases of formal legal divorce in the villages, though separations were more common. In case the husband married a second time, he would generally move out of his matrimonial home. The related settlements of separation were usually mediated by community members. The Tamang community had their own ceremony for separation called *Sinko Pangra*, but women do not receive any share of the husband's property after their separation.

5.2 Livelihood and Income

Agriculture and allied activities was the mainstay in the study sites which provided food security and livelihood to the people. The large farmers had provisions for irrigation. The landless were engaged as casual labour on construction sites or as agricultural labour on others' lands. There were families where the men had migrated to other countries for employment, mostly to India and the Gulf countries. The remittances sent by these men to their families formed an important source of income for the households as well as the economy in general. Majority of the respondents (57% of men and 70% of women) were engaged in petty businesses such as producing and selling small things and groceries from shops (See Figure 1). A substantial percentage of our sample households were also engaged in agriculture or worked as casual labourers.

Figure 1 Women and men's sources of income



Source: Survey

It was seen that among women, almost 72% sometimes or regularly earned an income, while among men around 90% made an income.

5.3 House and Land Ownership

Interviews and interaction with key members of the community revealed that the society followed a traditional patriarchal structure, where women were not given equal ownership or inheritance rights over the family property. Men continued to be the legal owners of lands and houses. Women owners were mostly found among households where a male member was absent. This observation is corroborated by the sample survey which showed that commonly the house owner was either the man (55.7%) or the parents/in-laws (33%). Female ownership was as low as only 6.1% of the total sample. These observations resemble the findings of a recent study by the International Organization for Migration, which found that less than 50% of women in the studied areas had legal ownership of land, the reason for which was mostly attributed to patriarchal social set-up (IOM, 2016). Around 4.7% of respondents were found to be living in houses owned by their siblings or extended family, and a meagre 0.5% of houses were owned by both men and women jointly.

5.4 Education

i) Respondent's level of education

In the surveyed sample, almost three-fourths of the women respondents (74.5%) and more than half of the male respondents (52.5%) reported to not have received any formal education. The maximum number of 'educated respondents (both men and women) were the ones who had received primary education (39% men and 17.4% women). The respondents with secondary (5% women and 5.1% men) and higher educational qualifications (3.1% women and 3.4% men) formed only a small part of the sample. It is interesting to note that even though there is a huge gap in the share of women and men receiving primary education, there is not much difference in that share when it comes to secondary and higher education. This may imply that even though more boys were enrolled in schools as compared to girls, they may not continue with their education, and may pursue income generating activities after receiving a basic level of education.

ii) Children's education and homework hours

Interviews with key people in the villages revealed that education for girls and boys was given equal importance by the older generation, who themselves had limited access to education, and had faced discrimination in the form of preference given to male children's education. Though

basic education opportunities were given to both girls and boys equally, the society still viewed women as the main caregivers of the family, whereas men were expected to get higher education and obtain a decent employment to support the family.

In both study villages, children from all households were seen to be attending schools. The sample from Mahadevsthan shows 79.2 % of girls and 65.6% of boys in the age group of 13-17 years attended school. School education in both the sites was found to be up to School Leaving Certificate (SLC) or 12th grade. Parents, who could afford sent their children to boarding schools in nearby towns and cities, for better quality education. It was generally observed that parents preferred girls to stay home rather than move away for education, as they considered it unsafe. On the other hand, boys were not restricted by any such constraints and had a higher opportunity of pursuing tertiary or higher education if they wanted to. This shows that even though more number of girls received secondary education, parents' concern for girls' safety prevented them from sending their girls away from home for higher education.

After coming back home from school in the evening, girls and boys would spend, on average, around 1-2 hours doing homework or studying. According to teachers, those with access to some form of electricity or lighting at home were more regular in finishing homework assignments. Survey data shows (See Table 4 and 5) that amongst households with access, homework hours for both girls and boys with grid connections were significantly higher than that of other electricity sources. Of the girls who did homework in the sample, 42.6 % belonged to grid households, 36.2% were from micro hydro households, 12.8% in households with SHS only, 4.3% to households with both solar lanterns and batteries and 4.3% to households without access. Similarly, 35.1% of boys who did homework were from grid households, 48% were from micro hydro households, 8.1% each from households with SHS only and those with solar lanterns and batteries. Among girls and boys, survey data clearly shows that overall girls spent more hours on homework than boys. Teachers also attributed poor homework rates of children to their parents who would engage children-both boys and girls- more with household chores, which could potentially reduce by households gaining access to electricity and hence, access to convenience appliances.

Table 4 Percentage of GIRLS doing homework (hours/day) across access types

Percentage Girls (13-17) by Homework hours (per day)	
Access Category	**Total**
Grid	42.6%
Micro Hydro	36.2%
SHS only	12.8%
Batteries/ Solar Lanterns only	4.3%
No Access	4.3%
Total	100%
All Girls (13-17) (n)	47

Source: Survey

Table 5 Percentage of BOYS doing homework (hours/day) across access types

Percentage Boys (13-17) by Homework hours (per day)	
Access Category	**Total**
Grid	35.1%
Micro Hydro	48.6%
SHS only	8.1%
Batteries/ Solar Lanterns only	8.1%
No Access	0.0%
Total	100%
All Boys (13-17) (n)	37

Source: Survey

iii) Electricity access and enrolment in schools

In the study sites, both grid and off-grid sources provided electricity access to schools. The presence of any source of electricity in schools enhanced the overall quality of the classroom environment for students as well as teachers. Basic electrical appliances such as lights and fans bettered the comfort levels for students and enabled them to concentrate more on the subjects being taught. The visited school in Mahadevsthan had grid supply but its utility was limited to charging teachers' phones and lighting the head teacher's office. The supply was also used to run music systems and occasionally host visitors in the school. Since the classrooms had good ventilation and received ample daylight, lights and fans were not deemed necessary for the comfort of students. In the study area two schools- one grid connected and the other off-grid connected- were studied. The off-grid school made use of two solar PV systems for electricity. The larger-capacity system was used to power 16 computers while it was functional, but since it developed a fault, it had not been in use. Attempts by the school administration to contact the manufacturer for repair and maintenance of the system had also been fruitless. The smaller system was being used only to

charge teachers' mobile phones. Due to this lack of adequate power, academic activities like science practical and computer classes mentioned in the school curriculum were not being conducted. It also affected the water supply in the school as water lifting device could not be operated due to lack of adequate power. The grid-connected school in the second site received 24 hours of power supply, which was used to run fans and a computer. The school reportedly planned to add more fans and computers in the near future. However, the supply was marred by regular power cuts, which caused inconvenience.

Common to all study sites, teachers were of the opinion that the examination performance of students was not impacted greatly by the presence of electricity at home and school, even though their homework hours had increased. Teachers also did not observe an immediate impact on the enrolment rates due to electrification. However, analysis of the survey data finds a positive correlation between years since the surveyed household received access to electricity, and the number of girls and boys in these households who were enrolled in schools, as can be seen in Table 6. This implies that households that have had access to electricity for a longer period of time were more likely to send a higher number of their children to school as compared to those who got access to electricity later. This means there is a time lag between the time a household gets access to electricity and the time when improvement in socioeconomic and developmental attainments (like school enrolment) begin to show up.

Table 6: Correlations between log of enrolled children and log of years since access to electricity

Correlations	Log of Years since Access to Electricity*
Log Total Girls Enrolled	0.25
Log Total Boys Enrolled	0.11
Log Total Children Enrolled	0.12

*Significant at 5% level of significance

It was observed that 22.8 % of total households which had access to electricity since the last 1 to 10 years had at least 1 child enrolled in school, while 21.2 % of total households who had access to electricity in the same period had latest 2 children enrolled. This is indicative of the positive

impacts of the various electrification schemes rolled out by successive governments leading to better living conditions for all communities.

This clearly indicate that attempts have been in Nepal to promote Gender and Social Inclusion (GESI) sensitive programmes where traditionally disadvantaged groups like Janjati, Magar and Tamang have benefitted from electrification programs.

5.5 Health

In the rural areas of Nepal, health services are often provided through small health centres and networks of community health workers that are equipped to handle minor health issues and conduct basic medical procedures for women, men and children. A health post in Mahadevsthan was being managed by the stationed midwife, who was interviewed for the study. The centre was equipped to provide basic medical services, vaccination; and pre-natal, delivery and postnatal assistance to women. Electricity supply to the health post was through micro-hydro with solar PV as back-up. Light bulbs, refrigerator, autoclave machine and a heater were being run on micro-hydro, while emergency lighting was managed through the solar system. A private clinic was also found to be in operation making use of solar PV for lighting in the study site. The clinic offered basic services like first aid and birth control for women. For more serious cases, patients were referred to hospitals in the nearest town. A health post in one of the study villages received electricity for the first time in 2017, which was being used for lighting a birthing centre, and for running equipment such as an autoclave and a refrigerator for storing vaccines and medicines. Supply interruptions were experienced during thunderstorms if the transformer got damaged. The presence of health centres in the villages proved to be advantageous to the local community as they did not have to only rely on local quacks and could avail scientific remedies to their ailments.

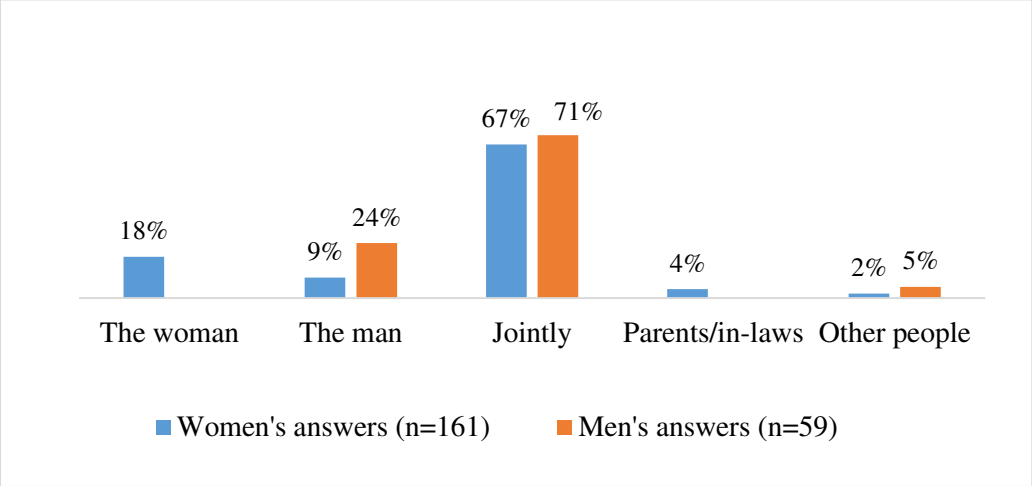
These health centres also conducted awareness programmes and provided information regarding family planning and birth control. Health workers were also present in the villages to provide assistance to patients, especially to women during delivery. The presence of electricity enabled these health workers to use mobile phones and stay in regular touch with patients and attend emergency calls. The presence of televisions in many homes also became a means of acquiring health-related information by the people.

5.6 Decision-making (Health, Education, Household Spending)

In the sample households, it was seen that all major decisions were in general taken jointly by the husband and wife. In terms of decisions regarding expenditure of household income, minor purchases for the household could be decided independently by women, but for all major investments, such as that of land or property, decisions were mostly taken jointly with the men, where the men had a greater say. In households where the husband had migrated outside for work, women were seen to be responsible for the day to day management of the household and would consult their husbands only for major decisions.

It was noted in the previous sections that a large percentage of women in the surveyed sample were engaged in income generation by producing or selling small things. However, decisions regarding how to spend the income were mostly taken jointly by the couple (See Figure 2).

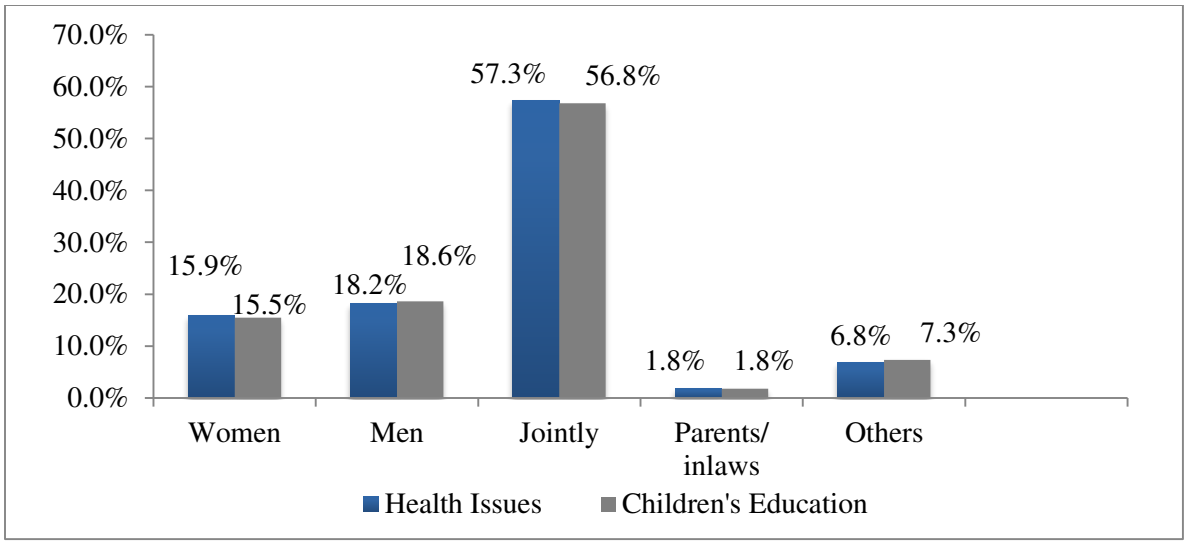
Figure 2 Decision on how to spend household income



Source: Survey

Decisions regarding children's education and health issues were also taken jointly by women and men (See Figure 3). The survey data shows that more than 56% of such decisions were taken jointly, while only 15.5% of women were found to be deciding on their children's education alone. Similarly for health issues in the family, decisions were taken mostly jointly (57.3%) by men and women.

Figure 3 Decisions on children's education and family health issues



Source: Survey

As for the decisions regarding issues related to women's health in these households, women were not found to be having a say in matters concerning their own health such as family planning and birth control, and often had to abide by the wishes of the husband. This had compelled many women to get contraceptive procedures done from health centres without telling their families, as per health workers.

5.7 Women's Social and electoral Participation by Caste/ Tribe/ Ethnicity

It was observed that in 82% of total households, women were members of various social groups. Further, in the study site, it was also found that people were largely aware of their electoral rights, as 81.02% of women and 82.04% of men reported to have voted during the last political elections.

7. Conclusion

The study finds that electricity access has undoubtedly brought about changes in the lives of the people in Nepal, especially women and children, in terms of better living conditions, and a nominal improvement in human development indicators like higher enrolment, higher average hours of study at home among children, access to and use of computers in schools, and access to better and

modern health facilities. However, there is more scope for the proper utilization of electricity to further improve the quality of public services like schools and health institutions. For instance, school authorities are in a position to better utilise electricity to run science practical laboratories, projectors for an enhanced and modern learning experience, computer classes, vocational courses, among others. Similarly, health centres and private clinics can diversify their usage of electricity to run more medical appliances crucial for life-saving procedures, and employ more staff to run round the clock emergency services.

However, access alone is not sufficient to significantly improve attainments in gendered and developmental outcomes or for that matter, supply-side requirements like the state of the infrastructure of public health and education services. The study also finds a positive correlation between years since the surveyed household received access to electricity, and the percentage of girls and boys in these households who were enrolled in schools, which implies households that have had access to electricity for a longer period of time were more likely to send a higher percentage of their children to school compared to those who got electricity connections only recently. This shows that there is a time lag between the point in time when a household gets access to electricity and the time when its improvement in socioeconomic and developmental attainments begin to show up. Numerous other factors also influence and impact attainments in these developmental goals more pronouncedly, which also need to be taken into account at both the policy framing and the implementation levels. For instance, the presence of light alone cannot guarantee students will do their homework or will continue their school education. Higher spending on education and health infrastructure and other social heads along with timely monitoring and interventions aimed at socio-cultural change remain crucial for attainments of improved human development and gender-related goals.

The analysis clearly shows that decision making in important matters such as health and education still remains a traditionally-rooted domain, where gender relations continue to be dictated by social norms established over generations and have hardly been influenced by electricity access. Income generation has been impacted by access to electricity to some level, but decisions regarding expenditure were mostly taken jointly or by men alone. However, women do have agency over making minor purchases or spending for their children. Therefore, it can be inferred that links between access and decision making are not direct or linear, and are influenced by a host of socio-

cultural factors such as limited decision making power for women within and outside the household, preference of marriage for girls over their higher education, limited rights to property and land for women compared to men, etc. Future studies in this domain could look at establishing clear linkages between electricity access and household decision making.

8. Policy Recommendations

Our study finds that having access to reliable and good quality electricity supply is crucial not only for households but also for public services like health centres and schools. In the study sites, though provisions were present for these services, the efficiency of service delivery was being hampered due to limited or lack of electricity access. This engenders a need for coordination and integration of the activities of relevant government departments like power, rural development, education, and health. The authors thus recommend the formulation of clear and concise executable strategies aimed at the holistic development of the village keeping power supply at its core and extending it to different dimensions of development.

The study finds that electricity access leads to higher school enrolment rates in students from household that have had access for a longer time. This is an important finding and incentive for policy makers and practitioners to continue with and focus on ensuring household electrification with a view to improve the level of education of school going children. However, this is not sufficient to ensure students, especially girls continue with higher education. This may require policies targeted towards incentivising higher education for girls and further employment assistance.

The government of Nepal has given special focus to health in its development agenda, and established an extensive network of primary health centres in villages across Nepal. One of the important findings from the sites was the presence of functional health centres that made use of electricity; which provided basic medical facilities, mostly catering to reproductive health of women. However, for other medical services and emergencies patients were referred to larger hospitals. Taking into account the difficult terrains and inconvenience caused to patients, government health agencies should make available critical lifesaving equipment and procedures in these health centres, and ensure zero fluctuations or power cuts in medical establishments.

The study comes to the conclusion that household gender dynamics are a product of years of social conditioning and could not be influenced solely by ensuring electricity access. Decisions were taken mostly by men, which were agreed to by women. This is also true for the income earned by women. Therefore, other developmental measures have to be taken to compliment the benefits from enhanced electricity access, and steps need to be taken to ensure that reliable and affordable electricity is provided to the households.

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10. Annex

A1.1 Electricity access and drudgery

Average Weekly Hours Spent Collecting Firewood	Mahadevasthan VDC, Nepal
Grid	3.72 n= 80
Mini/Micro Grid	4.89 n=94
SHS	6.67 n=13
Batteries/ Solar Lanterns	4.12 n= 24
No Access	8.08 n= 6
Total	4.57 n=217

A1.2 Electricity access and drudgery

Average Weekly Hours Spent Collecting Water	Mahadevasthan VDC, Nepal
Grid	4.95 n=81
Mini/Micro Grid	2.11 n=96
SHS	2.78 n=13
Batteries/ Solar Lanterns	7.24 n=24
No Access	9.72 n=6
Total	3.96 n=220

A1.3 Descriptive statistics of continuous variables

Variables	N (no of observations)	Mean	Std. Dev.	Min	Max
Continuous Variables					
Age	220	44.31	16.07	16	85
Total number of Girls	220	1.06	1.20	0	5
Total number of Boys	220	1.01	1.046	0	5
Total number of Children	220	2.08	1.71	0	7
Total number of Girls enrolled	220	0 .74	1.02	0	4
Total number of Boys enrolled	220	0.70	0.84	0	4
Total number of Children enrolled	220	1.45	1.42	0	5
Percentage Children enrolled	171	68.32	36.86	0	100

A1.4 Descriptive statistics of category variables

Categorical Variables				
Gender of the respondents	Female (73.18%; n=161)	Male (26.82%; n=59)		
Religion of the households	Buddhist (40.91%; n= 90)	Christian (1.82%; n=4)	Hindu (57.27; n=126)	
Education level of the respondents	No Education (68.64%; n=151)	Primary (23.18%; n=51)	Secondary (5%; n=11)	Higher (3.18%; n=7)

Source: Survey

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